Use these links to rapidly review the document
TABLE OF CONTENTS
TABLE OF CONTENTS 2

As filed with the Securities and Exchange Commission on June 14, 2013

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM S-1

REGISTRATION STATEMENT
UNDER THE SECURITIES ACT OF 1933

Onconova Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**2834**	**22-3627252**
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

375 Pheasant Run
Newtown, PA 18940
(267) 759-3680
(Address, including zip code and telephone number, including area code, of registrant's principal executive offices)

Ramesh Kumar, Ph.D.
President and Chief Executive Officer
Onconova Therapeutics, Inc.
375 Pheasant Run
Newtown, PA 18940
(267) 759-3680
(Name, address, including zip code and telephone number, including area code, of agent for service)

Copies to:

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Approximate date of commencement of proposed sale to the public:
As soon as practicable after the effective date of this registration statement.

If any of the securities being registered on this form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, as amended (the "Securities Act"), check the following box. o

If this form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer o	Accelerated filer o	Non-accelerated filer ☒ (Do not check if a smaller reporting company)	Smaller reporting company o

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CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered(1)	Proposed maximum aggregate offering price(2)	Amount of registration fee(3)
Common Stock, $0.01 par value per share	$75,000,000	$10,230

(1) Pursuant to Rule 416 under the Securities Act, this registration statement shall be deemed to cover the additional securities of the same class as the securities covered by this registration statement issued or issuable prior to completion of the distribution of the securities covered by this registration statement as a result of a split of, or a stock dividend on, the registered securities.

(2) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act and includes the offering price of shares that the underwriters have the option to purchase to cover over-allotments.

(3) Calculated pursuant to Rule 457(o) under the Securities Act based on an estimate of the proposed maximum aggregate offering price and includes the offering price of shares that the underwriters have the option to purchase to cover over-allotments.

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment that specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the registration statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

Table of Contents

SUBJECT TO COMPLETION, DATED JUNE 14, 2013

PRELIMINARY PROSPECTUS

Shares

Onconova Therapeutics, Inc.

Common Stock
$ per share

This is the initial public offering of our common stock. We are selling shares of common stock in this offering. We currently expect the initial public offering price to be between $ and $ per share of common stock.

We have granted the underwriters an option to purchase up to additional shares of common stock to cover over-allotments.

We have applied to list our common stock on the NASDAQ Global Market under the symbol "ONTX."

Investing in our common stock involves risks. See "Risk Factors" beginning on page 10.

We are an "emerging growth company" under applicable Securities and Exchange Commission rules and will be eligible for reduced public company reporting requirements. See "Summary—Implications of Being an Emerging Growth Company."

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

	Per Share	Total
Public Offering Price	$	$
Underwriting Discounts	$	$
Proceeds to Onconova Therapeutics, Inc. (before expenses)	$	$

The underwriters expect to deliver the shares to purchasers on or about , 2013 through the book-entry facilities of The Depository Trust Company.

Citigroup **Leerink Swann**

Piper Jaffray **Janney Montgomery Scott**

, 2013

We are responsible for the information contained in this prospectus. We have not authorized anyone to provide you with different information, and we take no responsibility for any other information others may give you. If anyone provides you with different or inconsistent information, you should not rely on it. We are not, and the underwriters are not, making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted. You should not assume that the information contained in this prospectus is accurate as of any date other than the date on the front of this prospectus.

TABLE OF CONTENTS

SUMMARY

This summary highlights certain information about us and this offering contained elsewhere in this prospectus. Because it is only a summary, it does not contain all the information that you should consider before investing in shares of our common stock and it is qualified in its entirety by, and should be read in conjunction with, the more detailed information appearing elsewhere in this prospectus. Before you decide to invest in our common stock, you should read the entire prospectus carefully, including "Risk Factors" beginning on page 10 and the consolidated financial statements and related notes included in this prospectus.

Unless the context indicates otherwise, as used in this prospectus, the terms "Onconova," "Onconova Therapeutics," "we," "us," "our," "our company" and "our business" refer to Onconova Therapeutics, Inc.

Overview

We are a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule drug candidates to treat cancer. Using our proprietary chemistry platform, we have created an extensive library of targeted anti-cancer agents designed to work against specific cellular pathways that promote cancer. We believe that the drug candidates in our pipeline have the potential to be efficacious in a wide variety of cancers without causing harm to normal cells. We have three clinical-stage product candidates and six preclinical programs.

Rigosertib, our most advanced product candidate, is being tested in a number of ongoing Phase 2 and Phase 3 clinical trials. We are conducting a pivotal Phase 3 tria of rigosertib under a Special Protocol Assessment, or SPA, from the U.S. Food and Drug Administration, or FDA, for higher risk myelodysplastic syndromes, or MDS. W expect to report top-line overall survival results from this trial in the fourth quarter of 2013 or the first quarter of 2014. We are also evaluating rigosertib in a Phase 3 trial for metastatic pancreatic cancer, in two Phase 2 trials for transfusion-dependent lower risk MDS, and in a Phase 2 trial for head and neck cancers. We have tested rigosertib in more than 850 patients with solid tumors and hematological diseases. Rigosertib has been granted orphan drug status for MDS in both the United States and Europe as well as orphan drug status for pancreatic cancer in the United States. Baxter Healthcare SA, or Baxter, a subsidiary of Baxter International Inc., has commercialization rights for rigosertib in Europe and SymBio Pharmaceuticals Limited, or SymBio, has commercialization rights in Japan and Korea. We have retained development and commercialization rights to rigosertib in the rest of the world, including in the United States.

Rigosertib is an inhibitor of two important cellular signaling pathways: phosphoinositide 3-kinase, or PI3K, and polo-like kinase, or PLK, both of which are frequently over-active in cancer cells. PI3K signaling promotes the growth and survival of cells under stressful conditions, such as under low oxygen levels that are often found in tumors. By inhibiting the PI3K pathway in cancer cells, rigosertib promotes tumor cell apoptosis, or programmed cell death.

The PLK pathway has a critical role in maintaining proper chromosome organization and sorting during cell division. By modulating the PLK pathway, rigosertib stops cancer cells at late stages of the cell division cycle, which leads to chromosome disorganization and death in these cells. In normal cells, rigosertib pauses progression of the cell cycle in the early stages, without causing harm or death to these cells.

Due to this dual effect of inhibiting both the PI3K and PLK pathways, and thereby effecting both tumor cell survival and division, we believe that rigosertib has potential to treat a variety of cancer types, including hematological diseases and solid tumors.

We are testing both intravenous and oral formulations of rigosertib, referred to as rigosertib IV and rigosertib Oral, in clinical trials.

- *Rigosertib IV in higher risk MDS:* We are evaluating rigosertib IV in a multi-center, pivotal Phase 3 trial under an SPA from the FDA in patients with higher risk MDS who failed hypomethylating agent therapy. MDS is a group of blood disorders that affect bone marrow function. We believe that there is significant medical need for new therapies to treat MDS patients who have failed or cannot tolerate treatment with the hypomethylating drugs azacitidine (Vidaza®) or decitabine (Dacogen®), which represent the current standard of care for higher risk MDS patients. We completed enrollment of 270 patients in this trial in May 2013 and expect to report top-line overall survival results in the fourth quarter of 2013 or the first quarter of 2014. Of the 30 evaluable MDS patients in four early-stage Phase 1/2 trials of rigosertib IV involving 39 refractory MDS patients, we observed objective responses in 12 patients, five of which were complete bone marrow responses. To our knowledge, there are no other current Phase 3 trials in this patient population. If we achieve positive results in this trial, we intend to submit a New Drug Application, or NDA, to the FDA in the second half of 2014, and a Marketing Authorization Application, or MAA, to the European Medicines Agency, or the EMA, by the fourth quarter of 2014 or the first quarter of 2015 for marketing approval o rigosertib IV.

  A provider of marketing analytics and data to the biopharmaceutical industry has estimated that, for 2011 in the United States, the diagnosed incidence of MDS was approximately 15,600 and the prevalence of MDS was approximately 52,000. According to the same marketing analytics firm, approximately 23% of MDS patients are estimated to fall into the categories of MDS characterized as higher risk.

- *Rigosertib IV in pancreatic cancer:* We are conducting a multi-center Phase 3 trial of rigosertib IV in combination with gemcitabine, a widely used chemotherapy drug, for the first-line treatment of metastatic pancreatic cancer patients. In March 2013, we completed enrollment of 150 patients in this trial and we expect results of the pre-planned interim analysis for overall survival in the fourth quarter of 2013 or the first quarter of 2014. The American Cancer Society estimates that 45,200 new cases of pancreatic cancer will be diagnosed in the United States in 2013.

- *Rigosertib Oral in lower risk MDS:* We are evaluating rigosertib Oral in two Phase 2 trials as a first-line treatment for transfusion-dependent, lower risk MDS patients. The quality of life of these patients could be significantly improved by lowering the number of required blood transfusions or eliminating the need for transfusions altogether. We reported initial response and safety data from the first Phase 2 trial in June 2013 and expect to complete enrollmer and present overall results from this trial in December 2013. Upon completion of the first Phase 2 trial, we will meet with the FDA to discuss an approval pathway for rigosertib Oral as a first-line treatment in lower risk MDS patients. We expect to complete enrollment in the second Phase 2 trial in lower risk transfusion-dependent MDS patients who have failed erythroid stimulating agents in the second half of 2014. Approximately 77% of MDS patients are estimated to fall into the categories of MDS characterized as lower risk.

- *Rigosertib Oral in head and neck cancers:* We are evaluating rigosertib Oral in a Phase 2 trial in patients with head and neck cancers. We expect to complete enrollment of 80 patients in this trial in the second half of 2014. The National Cancer Institute estimated that the 2012 incidence of head and nec cancers was more than 52,000 cases in the United States.

To accelerate and broaden the development of rigosertib, we entered into a development and licensing agreement with Baxter in 2012 to commercialize rigosertib in Europe. In 2011, we entered into a licensing agreement with SymBio to commercialize rigosertib in Japan and Korea. We have retained development and commercialization rights to rigosertib in the rest of the world, including the

United States. We will explore a variety of alternatives for the commercialization of rigosertib in territories we currently retain, including direct commercialization, co-promotion or selective out-licensing of rights to a third party.

Our second clinical-stage product candidate, *ON 013105,* is in a Phase 1 trial in patients with relapsed or refractory lymphoma, including an aggressive form of non-Hodgkin's lymphoma identified as mantle cell lymphoma, or MCL, and acute lymphoid leukemia, or ALL. A critical defect in many cancer cells is the uncontrolled expression of cyclin D1, a protein essential for normal cell division. Cyclin D1 is over-expressed in several hematological diseases, including B-cell lymphomas, such as MCL. ON 013105 suppresses the accumulation of cyclin D1 in cancer cells. In 2011, we suspended enrollment in this Phase 1 trial because enrollment of patients was occurring slowly, and as a result, our inventory of ON 013105 clinical trial materials expired. We plan to restart enrollment in this trial with newly manufactured clinical trial materials at a new clinical trial site in the fourth quarter of 2013.

Our third clinical-stage product candidate, *recilisib,* is being developed in collaboration with the U.S. Department of Defense, or DoD, for acute radiation syndromes or ARS. We have conducted animal studies and clinical trials of recilisib under the FDA's Animal Efficacy Rule, which permits marketing approval for new medical countermeasures for which human efficacy studies are not feasible or ethical, by relying on evidence from animal studies in appropriate animal models to support efficacy in humans. We have completed four Phase 1 trials to evaluate the safety and pharmacokinetics of recilisib in healthy human adult subjects using both subcutaneous and oral formulations. We have received orphan drug designation for recilisib for ARS in the United States.

The development status of our three clinical-stage product candidates is summarized below:

Clinical-Stage Product Candidates

In addition to our three clinical-stage product candidates, we are advancing six preclinical programs that target kinases, cellular metabolism or division.

We have broad-based capabilities that span drug discovery and clinical development, from medicinal chemistry and evaluation in biochemical, cell-based and anima models, through Phase 3 trials and regulatory filings in the United States, Europe and India. Our discovery program is based on a proprietary chemistry platform comprising more than 150 novel core chemical structures. Our

chemistry and screening approaches aim to discover new drug candidates that increase efficacy and help overcome resistance to therapy in cancer cells, while minimizing their toxicity to normal cells. Our intellectual property portfolio includes more than 100 issued patents and over 90 patent applications, either owned by us or licensed exclusively to us, including patents covering our most advanced product candidate, rigosertib. These patents and licenses cover composition-of-matter, process, formulations and method-of-treatment claims for our clinical-stage product portfolio.

Our Strategy

We are committed to delivering novel treatments to cancer patients. We are focused on discovering and developing targeted small molecule anti-cancer product candidates. The key components of our strategy are to:

- ***Seek Regulatory Approval of Rigosertib in Myelodysplastic Syndromes and Solid Tumors***

  - *For higher risk MDS patients who have failed azacitidine or decitabine therapy:* We completed enrollment of a 270-patient Phase 3 trial with rigosertib IV in higher risk MDS patients in May 2013 and expect to report top-line overall survival results from this trial in the fourth quarter of 2013 or the first quarter of 2014. If we achieve positive results in this trial, we intend to submit an NDA to the FDA in the second half of 2014, and an MAA to the EMA by the fourth quarter of 2014 or the first quarter of 2015 for marketing approval of rigosertib IV.

  - *For first-line treatment of transfusion-dependent, lower risk MDS patients:* We reported initial response and safety data from the first Phase 2 trial in June 2013 and expect to complete enrollment and present overall results from this trial in December 2013. Upon completion of the first Phase 2 trial, we will meet with the FDA to discuss an approval pathway for rigosertib Oral as a first-line treatment in lower risk MDS patients.

  - *For first-line treatment of patients with previously untreated metastatic pancreatic cancer:* We are conducting a randomized Phase 3 trial with rigosertib IV in combination with gemcitabine and expect the results of the pre-planned interim analysis for overall survival in the fourth quarter o 2013 or the first quarter of 2014. We will use these data to assess further development of rigosertib IV in this indication.

  - *For patients with head and neck cancers:* We are conducting a Phase 2 trial with rigosertib Oral in patients with head and neck cancers. We expect to complete enrollment of 80 patients in this Phase 2 trial in the second half of 2014.

- ***Continue Development of Our Pipeline***

  - *Advance clinical development of ON 013105 for the treatment of various lymphomas and leukemias:* We are conducting a Phase 1 clinical trial of ON 013105 for various lymphomas and leukemias, including MCL and ALL. We believe that this clinical study may provide proof-of-concept of the proposed mechanism of action of ON 013105. We have suspended enrollment in this Phase 1 trial; however, we plan to restart its enrollment in the fourth quarter of 2013.

  - *Advance recilisib for the treatment of acute radiation syndromes:* We are seeking collaborations, grants and government funding to conduct nonhuman primate studies to demonstrate recilisib's safety and efficacy, as well as to identify predictive biomarkers in animals and healthy human volunteers.

  - *Advance our preclinical programs via collaborations:* Building on the experience and knowledge we have gained from our clinical-stage product candidates, we have identified

several lead molecules in our preclinical pipeline. We intend to explore additional collaborations to further the development of these product candidates.

- ***Maintain Flexibility in Commercializing and Maximizing the Value of our Programs***

  - While retaining U.S. and other territorial rights, we have entered into collaborations with Baxter to commercialize rigosertib in Europe and with SymBio to commercialize rigosertib in Japan and Korea. We will explore a variety of alternatives for the commercialization of rigosertib in territories we currently retain, including direct commercialization, co-promotion or selective out-licensing of rights to a third party.

Risks Associated with Our Business

Our ability to implement our business strategy is subject to numerous risks and uncertainties. As a clinical-stage biopharmaceutical company, we face many risks inherent in our business and our industry generally. You should carefully consider all of the information set forth in this prospectus and, in particular, the information und the heading "Risk Factors," prior to making an investment in our common stock. These risks include, among others, the following:

- our success is primarily dependent on the regulatory approval and commercialization of rigosertib;
- we are subject to regulatory approval processes that are lengthy, time consuming and unpredictable. We may not obtain approval for any of our product candidates from the FDA or foreign regulatory authorities;
- we have no source of commercial revenue, may never become profitable and may incur substantial and increasing net losses for the foreseeable future as we continue development of, seek regulatory approvals for, and potentially begin to commercialize our product candidates;
- we may need to obtain additional funding to continue operations;
- it is difficult and costly to protect our intellectual property rights;
- we may be unable to recruit or retain key employees, including our senior management team;
- we depend on the performance of third parties, including contract research organizations and third-party manufacturers; and
- we will need to successfully remediate a material weakness in our internal control over financial reporting.

Our Corporate Information

We were formed as Onconova Therapeutics, Inc., a corporation under the laws of the State of Delaware, in December 1998 and commenced operations in January 1999. Our primary executive offices are located at 375 Pheasant Run, Newtown, PA 18940 and our telephone number is (267) 759-3680. Our website address is *http://www.onconova.com*. The information contained in, or that can be accessed through, our website is not part of this prospectus.

We have registered several U.S. trademarks, including Onconova Therapeutics, Inc. All other trademarks, trade names or service marks referred to in this prospectus are the property of their respective owners.

Implications of Being an Emerging Growth Company

We are an "emerging growth company," as defined in Section 2(a) of the Securities Act of 1933, as amended, or the Securities Act, as modified by the Jumpstart Our Business Act, or JOBS Act. As such,

we are eligible to take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not "emerging growth companies" including, but not limited to:

- not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, or the Sarbanes-Oxley Act;
- being permitted to present only two years of audited financial statements and only two years of related Management's Discussion and Analysis of Financia Condition and Results of Operations;
- reduced disclosure obligations regarding executive compensation;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We may choose to take advantage of some or all of the available exemptions. We have taken advantage of some of the reduced reporting burdens in this prospectus. Accordingly, the information contained herein may be different than the information you receive from other public companies in which you hold stock. We do not know i some investors will find our shares less attractive as a result of our utilization of these or other exemptions. The result may be a less active trading market for our shares and our share price may be more volatile.

In addition, Section 107 of the JOBS Act also provides that an "emerging growth company" can take advantage of the extended transition period provided in Section 7(a)(2)(B) of the Securities Act for complying with new or revised accounting standards. In other words, an "emerging growth company" can delay the adoption certain accounting standards until those standards would otherwise apply to private companies. We have irrevocably elected not to avail ourselves of this exemption from new or revised accounting standards and, therefore, we will be subject to the same new or revised accounting standards as other public companies that are not emerging growth companies.

We will remain an "emerging growth company" until the earliest of (a) the last day of the first fiscal year in which our annual gross revenues exceed $1.0 billion, (b) the date that we become a "large accelerated filer" as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, or the Exchange Act, which would occur if the market value of our shares that are held by non-affiliates exceeds $700 million as of the last business day of our most recently completed second fiscal quarter, (c) the date on which we have issued more than $1.0 billion in nonconvertible debt during the preceding three-year period or (d) the last day of our fiscal year containing the fifth anniversary of the date on which shares of our common stock become publicly traded in the United States.

THE OFFERING

Common stock offered by us	shares
Common stock to be outstanding after this offering	shares
Over-allotment option	shares
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $ million, or approximately $ million if the underwriters exercise their over-allotment option in full, assuming an initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. We expect to use the proceeds of this offering to fund the overall development of our product candidates, and for working capital and general corporate purposes. See "Use of Proceeds" for a more complete description of the intended use of proceeds from this offering.
Proposed NASDAQ Global Market symbol	ONTX
Risk factors	You should read the "Risk Factors" section of, and all of the other information set forth in, this prospectus for a discussion of factors to consider carefully before deciding to invest in shares of our common stock.

Unless otherwise noted, the information in this prospectus assumes:

- no exercise by the underwriters of their over-allotment option to purchase up to additional shares of common stock from us; and
- the conversion of all outstanding shares of our preferred stock into shares of our common stock, which will occur immediately prior to consummation of this offering.

The number of shares of common stock to be outstanding after this offering is based on 20,591,954 shares of common stock outstanding as of March 31, 2013, after giving effect to the conversion of our outstanding shares of preferred stock into 17,113,481 shares of common stock, and excludes as of that date:

- 6,128 shares of common stock issuable upon exercise of warrants, with an exercise price of $9.79 per share;
- 3,722,188 shares of common stock issuable upon exercise of options under our 2007 Equity Compensation Plan, with a weighted average exercise price of $6.41 per share; and
- 385,643 shares of common stock reserved for future issuances under our 2007 Equity Compensation Plan.

SUMMARY CONSOLIDATED FINANCIAL DATA

The following table summarizes our historical financial data as of the dates indicated and for the periods then ended. We have derived the following statement of operations data for the years ended December 31, 2011 and 2012 from our audited consolidated financial statements included elsewhere in this prospectus. We have derived the following statement of operations data for the three months ended March 31, 2012 and 2013 and balance sheet data as of March 31, 2013 from our unaudited condensed consolidated financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of the results that may be expected in the future, and our interim period results are not necessarily indicative of results to be expected for a full year or any other interim period. The summary of our consolidated financial data set forth below should be read together with our consolidated financial statements and the related notes to those statements, as well as "Management's Discussion and Analysis of Financial Condition and Results of Operations," appearing elsewhere in this prospectus.

	Year Ended December 31,		Three Months Ended March 31,	
	2011	2012	2012	2013
Consolidated Statement of Operations Data:				
Revenue	$ 1,487,000	$ 46,190,000	$ 198,000	$ 1,116,000
Operating expenses:				
General and administrative	6,436,000	15,707,000	2,460,000	3,346,000
Research and development	22,624,000	52,762,000	8,448,000	12,756,000
Total operating expenses	29,060,000	68,469,000	10,908,000	16,102,000
Loss from operations	(27,573,000)	(22,279,000)	(10,710,000)	(14,986,000)
Change in fair value of warrant liability	1,287,000	367,000	(609,000)	14,000
Interest expense	(19,000)	(8,608,000)	(21,000)	—
Other income, net	11,000	608,000	541,000	127,000
Net loss before income taxes expense	(26,294,000)	(29,912,000)	(10,799,000)	(14,845,000)
Income taxes	—	—	—	—
Net loss	(26,294,000)	(29,912,000)	(10,799,000)	(14,845,000)
Accretion of preferred stock	(4,020,000)	(3,953,000)	(1,231,000)	(1,019,000)
Net loss applicable to common stockholders	$ (30,314,000)	$ (33,865,000)	$ (12,030,000)	$ (15,864,000)
Per share information:				
Net loss per share of common stock, basic and diluted(1)	$ (10.64)	$ (11.51)	$ (4.15)	$ (4.56)
Basic and diluted weighted average shares outstanding(1)	2,849,159	2,941,782	2,897,347	3,475,673
Pro forma net loss per share of common stock, basic and diluted(1)		$ (2.01)		$ (0.77)
Basic and diluted pro forma weighted average shares outstanding(1)		16,887,329		20,589,154

	As of March 31, 2013		
	Actual	Pro Forma(2)	Pro Forma As Adjusted(3)(4)
Consolidated Balance Sheet Data:			
Cash and cash equivalents	$ 67,307,000	$ 67,307,000	
Total assets	70,759,000	70,759,000	
Total liabilities	42,544,000	42,544,000	
Accumulated deficit	(183,205,000)	(183,205,000)	
Total stockholders' (deficit) equity	(174,119,000)	28,215,000	

(1) See Note 2 to our audited consolidated financial statements for an explanation of the method used to calculate net loss per share of common stock basic and diluted, pro forma net loss per share of common stock, basic and diluted, and the basic and diluted pro forma weighted average shares outstanding used to calculate the pro forma per share amounts.

(2) Gives pro forma effect to the conversion of all outstanding shares of our preferred stock into 17,113,481 shares of our common stock, which will occur immediately prior to consummation of this offering.

(3) Gives further effect to the sale of shares of our common stock in this offering, assuming an initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, after deducting estimated underwritten discounts and commissions and estimated offering expenses payable by us.

(4) A $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, would increase or decrease the pro forma as adjusted amount of each of cash and cash equivalents, total assets and total stockholders' equity by $ million, assuming the number of shares of common stock offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each increase or decrease of 1.0 million shares in the number of shares of common stock offered by us at the assumed public offering price would increase or decrease the pro forma as adjusted amount of each of cash and cash equivalents, total assets and total stockholders' equity by $ million, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the risks described below, together with the other information contained in this prospectus, including our consolidated financial statements and the related notes appearing at the end of this prospectus, before making your decision to invest in shares of our common stock. We cannot assure you that any of the events discussed in the risk factors below will not occur. These risks could have a material and adverse impact on our business, results of operations, financial condition and cash flows and our future prospects would likely be materially and adversely affected. If that were to happen, the trading price of our common stock could decline, and you could lose all or part of your investment.

Risks Related to Our Financial Position and Capital Needs

We have incurred significant losses since our inception and anticipate that we will continue to incur losses in the future.

We are a clinical-stage biopharmaceutical company. Investment in biopharmaceutical product development is highly speculative because it entails substantial upfront capital expenditures and significant risk that a product candidate will fail to gain regulatory approval or become commercially viable. We do not have any products approved by regulatory authorities for marketing and have not generated any revenue from product sales to date, and we continue to incur significant research, development and other expenses related to our ongoing operations. As a result, we are not profitable and have incurred losses in every reporting period since our inception in 1998. For the year ended December 31, 2012 and the three months ended March 31, 2013, we reported a net loss of $29.9 million and $14.8 million, respectively, and we had an accumulated deficit of $183.2 million at March 31, 2013.

We expect to continue to incur significant expenses and operating losses for the foreseeable future. We anticipate these losses to increase as we continue the research and development of, and seek regulatory approvals for, our product candidates, and potentially begin to commercialize any products that may achieve regulatory approval. We may encounter unforeseen expenses, difficulties, complications, delays and other unknown factors that may adversely affect our business. The size of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenues. If any of our product candidates fail in clinical trials or do not gain regulatory approval, or if approved, fail to achieve market acceptance, we may never become profitable. Even if we achieve profitability in the future, we may not be able to sustain profitability in subsequent periods.

We have a limited operating history, which may make it difficult for you to evaluate the success of our business to date and to assess our future viability.

Our operations to date have been limited to organizing and staffing our company, acquiring product and technology rights, discovering novel molecules and conducting product development activities for our product candidates. We have not yet obtained regulatory approval for any of our product candidates. Consequently, any predictions about our future success, performance or viability may not be as accurate as they could be if we had a longer operating history or approved products on the market.

We currently have no source of product revenue and may never become profitable.

To date, we have not generated any revenues from commercial product sales. Our ability to generate revenue from product sales and achieve profitability will depend upon our ability to successfully commercialize products, including any of our current product candidates, or other product candidates that we may in-license or acquire in the future. Even if we are able to successfully achieve regulatory approval for these product candidates, we do not know when any of these products will

generate revenue from product sales for us, if at all. Our ability to generate revenue from product sales from our current or future product candidates also depends on a number of additional factors, including our ability to:

- successfully complete development activities, including the necessary clinical trials;
- complete and submit new drug applications, or NDAs, to the U.S. Food and Drug Administration, or FDA, and obtain regulatory approval for indications for which there is a commercial market;
- complete and submit applications to, and obtain regulatory approval from, foreign regulatory authorities;
- set a commercially viable price for our products;
- obtain commercial quantities of our products at acceptable cost levels;
- develop a commercial organization capable of sales, marketing and distribution for any products we intend to sell ourselves in the markets in which we choose to commercialize on our own;
- find suitable distribution partners to help us market, sell and distribute our approved products in other markets; and
- obtain coverage and adequate reimbursement from third parties, including government and private payors.

In addition, because of the numerous risks and uncertainties associated with product development, including that our product candidates may not advance through development or achieve the endpoints of applicable clinical trials, we are unable to predict the timing or amount of increased expenses, or when or if we will be able to achieve or maintain profitability. Even if we are able to complete the development and regulatory process for any product candidates, we anticipate incurring significant costs associated with commercializing these products.

Even if we are able to generate revenues from the sale of our products, we may not become profitable and may need to obtain additional funding to continue operations. If we fail to become profitable or are unable to sustain profitability on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce our operations.

We are likely to require additional capital to fund our operations and if we fail to obtain necessary financing, we may be unable to complete the development and potential commercialization of our product candidates.

Our operations have consumed substantial amounts of cash since inception. We expect to continue to spend substantial amounts to advance the clinical development of our product candidates and launch and commercialize any product candidates for which we receive regulatory approval, including potentially building our own commercial organization. We believe that the net proceeds from this offering, together with existing cash and cash equivalents and interest thereon, will be sufficient to fund our projected operating requirements for at least the next 12 months. However, we will likely require additional capital for the further development and potential commercialization of our product candidates and may also need to raise additional funds sooner to pursue a more accelerated development of our product candidates.

Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement and involves risks and uncertainties, and actual results could vary as a result of a number of factors, including the factors discussed elsewhere in this "Risk Factors" section. We have based this estimate on assumptions that may prove to be wrong, and

we could utilize our available capital resources sooner than we currently expect. Our future funding requirements, both near and long-term, will depend on many factors, including, but not limited to:

- the initiation, progress, timing, costs and results of clinical trials for our product candidates and future product candidates, including our Phase 2 and Phase 3 clinical trials for rigosertib, and our Phase 1 trials for ON 013105 and recilisib;
- the clinical development plans we establish for these and other product candidates;
- the achievement of milestones and our obligation to make royalty payments to Temple University, or Temple, and the Leukemia and Lymphoma Society, or LLS, or any other future product candidate licensor, if any, under our in-licensing agreements;
- the number and characteristics of product candidates that we discover or in-license and develop;
- the outcome, timing and cost of regulatory review by the FDA and comparable foreign regulatory authorities, including the potential for the FDA or comparable foreign regulatory authorities to require that we perform more studies than those that we currently expect;
- the costs of filing, prosecuting, defending and enforcing any patent claims and maintaining and enforcing other intellectual property rights;
- the effect of competing technological and market developments;
- the costs and timing of the implementation of commercial-scale outsourced manufacturing activities; and
- the costs and timing of establishing sales, marketing and distribution capabilities for any product candidates for which we may receive regulatory approval in territories where we choose to commercialize products on our own.

If we are unable to expand our operations or otherwise capitalize on our business opportunities due to a lack of capital, our ability to become profitable will be compromised.

Raising additional capital may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies or product candidates.

Until we can generate substantial revenue from product sales, if ever, we expect to seek additional capital through a combination of private and public equity offerings, debt financings, strategic collaborations and alliances and licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of existing stockholders will be diluted, and the terms may include liquidation or other preferences that adversely affect the rights of existing stockholders. Debt financing, if available, may involve agreements that include restrictive covenants limiting our ability to take important actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through strategic collaborations and alliances or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies or product candidates, or grant licenses on terms that are not favorable to us. If we are unable to raise additional funds through equity or debt financing when needed, we may be required to delay, limit, reduce or terminate our product development or commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and stock price.

As has been widely reported, global credit and financial markets have been experiencing extreme disruptions over the past several years, including severely diminished liquidity and credit availability,

declines in consumer confidence, declines in economic growth, increases in unemployment rates and uncertainty about economic stability. There can be no assurance that further deterioration in credit and financial markets and confidence in economic conditions will not occur. Our general business strategy may be compromised by economic downturns and volatile business environment and unpredictable and unstable market conditions. If the current equity and credit markets deteriorate, or do not improve, it may make any necessary debt or equity financing more difficult to secure, more costly, or more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could harm our growth strategy, financial performance and stock price and could require us to delay or abandon our business and clinical development plans. In addition, there is a risk that one or more of our current service providers, manufacturers and other partners may not survive these difficult economic times, which could directly affect our ability to attain our operating goals on schedule and on budget.

Risks Related to Our Business and Industry

Our future success is dependent primarily on the regulatory approval and commercialization of our product candidates, including rigosertib, which is currently undergoing Phase 3 clinical trials.

We do not have any products that have gained regulatory approval. Currently, our only clinical-stage product candidates are rigosertib, ON 013105 and recilisib, and rigosertib is our only late-stage product candidate.

As a result, our business is substantially dependent on our ability to obtain regulatory approval for, and, if approved, to successfully commercialize rigosertib and, to a lesser degree, ON 013105 and recilisib in a timely manner. We cannot commercialize product candidates in the United States without first obtaining regulatory approval for the product from the FDA; similarly, we cannot commercialize product candidates outside of the United States without obtaining regulatory approval from comparable foreign regulatory authorities. Before obtaining regulatory approvals for the commercial sale of any product candidate for a target indication, we must demonstrate with substantial evidence gathered in preclinical and well-controlled clinical studies, generally including two well-controlled Phase 3 trials, and, with respect to approval in the United States, to the satisfaction of the FDA, that the product candidate is safe and effective for use for that target indication and that the manufacturing facilities, processes and controls are adequate. Even if rigosertib or another product candidate were to successfully obtain approval from the FDA and comparable foreign regulatory authorities, any approval might contain significant limitations related to use restrictions for specified age groups, warnings, precautions or contraindications, or may be subject to burdensome post-approval study or risk management requirements. If we are unable to obtain regulatory approval for rigosertib in one or more jurisdictions, or any approval contains significant limitations, we may not be able to obtain sufficient funding or generate sufficient revenue to continue the development of ON 013105, recilisib, or any other product candidate that we may discover, in-license, develop or acquire in the future. Furthermore, even if we obtain regulatory approval for rigosertib, we will still need to develop a commercial organization, establish commercially viable pricing and obtain approval for adequate reimbursement from third-party and government payors. If we or our commercialization collaborators are unable to successfully commercialize rigosertib, we may not be able to earn sufficient revenues to continue our business.

Because the results of preclinical testing or earlier clinical studies are not necessarily predictive of future results, rigosertib, which is currently in Phase 3 clinical trials, or any other product candidate we advance into clinical trials may not have favorable results in later clinical trials or receive regulatory approval.

Success in preclinical testing and early clinical studies does not ensure that later clinical trials will generate adequate data to demonstrate the efficacy and safety of an investigational drug. A number of companies in the pharmaceutical and biotechnology industries, including those with greater resources and experience, have suffered significant setbacks in clinical trials, even after seeing promising results in

earlier clinical trials. Despite the results reported in earlier clinical trials for rigosertib and our other clinical-stage product candidates, we do not know whether the clinical trials we may conduct will demonstrate adequate efficacy and safety to result in regulatory approval to market any of our product candidates in any particular jurisdiction. If later-stage clinical trials do not produce favorable results, our ability to achieve regulatory approval for any of our product candidates may be adversely impacted.

Clinical drug development involves a lengthy and expensive process with an uncertain outcome.

Clinical testing is expensive, can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy traits despite having progressed through preclinical studies and early clinical trials.

We may experience delays in our ongoing or future clinical trials and we do not know whether planned clinical trials will begin or enroll subjects on time, need to be redesigned or be completed on schedule, if at all. For example, we experienced a clinical hold with our initial IND submission for recilisib based on the need to conduct additional toxicology studies and to revise quality requirements for manufacture of the drug product. While we do not anticipate any future such delays, there can be no assurance that the FDA will not put clinical trials of recilisib or any other of our product candidates on clinical hold in the future. Clinical trials may be delayed, suspended or prematurely terminated for a variety of reasons, such as:

- delay or failure in reaching agreement with the FDA or a comparable foreign regulatory authority on a trial design that we are able to execute;
- delay or failure in obtaining authorization to commence a trial or inability to comply with conditions imposed by a regulatory authority regarding the scope or design of a clinical study;
- delay or failure in reaching agreement on acceptable terms with prospective contract research organizations, or CROs, and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- delay or failure in obtaining institutional review board, or IRB, approval or the approval of other reviewing entities, including comparable foreign regulatory authorities, to conduct a clinical trial at each site;
- withdrawal of clinical trial sites from our clinical trials as a result of changing standards of care or the ineligibility of a site to participate in our clinical trials;
- delay or failure in recruiting and enrolling suitable subjects to participate in a trial;
- delay or failure in subjects completing a trial or returning for post-treatment follow-up;
- clinical sites and investigators deviating from trial protocol, failing to conduct the trial in accordance with regulatory requirements, or dropping out of a trial;
- inability to identify and maintain a sufficient number of trial sites, many of which may already be engaged in other clinical trial programs, including some that may be for the same indication;
- failure of our third-party clinical trial managers to satisfy their contractual duties or meet expected deadlines;
- delay or failure in adding new clinical trial sites;
- ambiguous or negative interim results or results that are inconsistent with earlier results;

- feedback from the FDA, the IRB, data safety monitoring boards, or a comparable foreign regulatory authority, or results from earlier stage or concurrent preclinical and clinical studies, that might require modification to the protocol for the trial;
- decision by the FDA, the IRB, a comparable foreign regulatory authority, or us, or recommendation by a data safety monitoring board or comparable foreign regulatory authority, to suspend or terminate clinical trials at any time for safety issues or for any other reason;
- unacceptable risk-benefit profile, unforeseen safety issues or adverse side effects;
- failure to demonstrate a benefit from using a drug;
- difficulties in manufacturing or obtaining from third parties sufficient quantities of a product candidate for use in clinical trials;
- lack of adequate funding to continue the clinical trial, including the incurrence of unforeseen costs due to enrollment delays, requirements to conduct additional clinical studies or increased expenses associated with the services of our CROs and other third parties; or
- changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial.

Patient enrollment, a significant factor in the timing of clinical trials, is affected by many factors including the size and nature of the patient population, the proximity of subjects to clinical sites, the eligibility criteria for the trial, the design of the clinical trial, ability to obtain and maintain patient consents, risk that enrolled subjects will drop out before completion, competing clinical trials and clinicians' and patients' perceptions as to the potential advantages of the drug being studied in relation to other available therapies, including any new drugs that may be approved for the indications we are investigating. In 2011, we suspended enrollment in our Phase 1 trial of ON 013105 because enrollment of patients was occurring so slowly that our inventory of ON 013105 clinical trial material expired. We intend to restart enrollment in this trial with newly manufactured clinical trial materials at a new clinical trial site in the fourth quarter of 2013. Furthermore, we rely on CROs and clinical trial sites to ensure the proper and timely conduct of our clinical trials, and while we have agreements governing their committed activities, we have limited influence over their actual performance.

If we experience delays in the completion or termination of, any clinical trial of our product candidates, the commercial prospects of our product candidates will be harmed, and our ability to generate product revenues from any of these product candidates will be delayed. In addition, any delays in completing our clinical trials will increase our costs, slow down our product candidate development and approval process and jeopardize our ability to commence product sales and generate revenues. In addition, many of the factors that could cause a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates.

The regulatory approval processes of the FDA and comparable foreign regulatory authorities are lengthy, time consuming and inherently unpredictable, and if we are ultimately unable to obtain regulatory approval for our product candidates, our business will be substantially harmed.

The time required to obtain approval by the FDA and comparable foreign regulatory authorities is unpredictable, but typically takes many years following the commencement of preclinical studies and clinical trials and depends upon numerous factors, including the substantial discretion of the regulatory authorities. In addition, approval policies, regulations, or the type and amount of clinical data necessary to gain approval may change during the course of a product candidate's clinical development and may vary among jurisdictions. We have not obtained regulatory approval for any product candidate, and it is possible that none of our existing product candidates or any product candidates we may discover, in-license or acquire and seek to develop in the future will ever obtain regulatory approval.

Our product candidates could fail to receive regulatory approval from the FDA or a comparable foreign regulatory authority for many reasons, including:

- disagreement over the design or implementation of our clinical trials;
- failure to demonstrate that a product candidate is safe and effective for its proposed indication;
- failure of clinical trials to meet the level of statistical significance required for approval;
- failure to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- disagreement over our interpretation of data from preclinical studies or clinical trials;
- disagreement over whether to accept efficacy results from clinical trial sites outside the United States where the standard of care is potentially different from that in the United States;
- the insufficiency of data collected from clinical trials of our product candidates to support the submission and filing of an NDA or other submission or to obtain regulatory approval;
- disapproval of the manufacturing processes or facilities of third-party manufacturers with whom we contract for clinical and commercial supplies; or
- changes in the approval policies or regulations that render our preclinical and clinical data insufficient for approval.

The FDA or a comparable foreign regulatory authority may require more information, including additional preclinical or clinical data to support approval, which may delay or prevent approval and our commercialization plans, or we may decide to abandon the development program altogether. Even if we do obtain regulatory approval, our product candidates may be approved for fewer or more limited indications than we request, approval contingent on the performance of costly post-marketing clinical trials, or approval with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that product candidate. In addition, if our product candidate produces undesirable side effects or safety issues, the FDA may require the establishment of Risk Evaluation Mitigation Strategies, or REMS, or a comparable foreign regulatory authority may require the establishment of a similar strategy, that may, restrict distribution of our products and impose burdensome implementation requirements on us. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates.

We have had limited interactions with foreign regulatory authorities. Approval by the FDA does not ensure approval by foreign regulatory authorities and approval by one or more foreign regulatory authorities does not ensure approval by regulatory authorities in other countries or by the FDA. However, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory process in others. We may not be able to file for regulatory approvals and even if we file we may not receive the necessary approvals to commercialize our products in any market.

Our product candidates may cause undesirable side effects or have other properties that could delay or prevent their regulatory approval, limit the commercial profile of an approved label, or result in significant negative consequences following any marketing approval.

Undesirable side effects caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other comparable foreign regulatory authority. For example, even though rigosertib IV and rigosertib Oral have generally been well tolerated by patients in our earlier-stage clinical trials, in some cases there were side effects, some of which were severe. The most common drug-related adverse side effects reported by at least 10% of the 79 patients enrolled in the four Phase 1 and 2 trials of rigosertib IV with MDS or acute myeloid leukemia, or AML, were

gastrointestinal, such as nausea and diarrhea, constitutional, such as fatigue, urinary, such as dysuria and hematuria, or the presence of red blood cells in the urine, or hematologic, such as anemia. These side effects were generally mild or moderate in severity. Drug-related side effects that were Grade 3 or Grade 4, meaning they were more than mild or moderate in severity, that were reported in two or more patients in the four studies were decreased red blood cells, decreased platelets, neutropenia, or decreased neutrophils, leukopenia, or decreased white blood cells, frequent urination, dysuria, low blood sodium, increased blood clotting time, fever, fatigue and diarrhea. In patients enrolled in our rigosertib Oral studies in MDS, the most common side effects were urinary disorders. In our rigosertib Oral Phase 1 MDS study, hematuria was the most frequent dose-limiting toxicity, although some patients did experience decreased appetite, diarrhea or nausea. The most severe side effects, seen in two patients, were neutropenia, which occurred at Grade 3 in one patient and Grade 4 in one other patient, as well as urinary tract infection, fainting and shortness of breath. None of these side effects required interruption of the trial.

As a result of these side effects or further safety or toxicity issues that we may experience in our clinical trials in the future, we may not receive approval to market any product candidates, which could prevent us from ever generating revenues or achieving profitability. Results of our trials could reveal an unacceptably high severity and prevalence of side effects. In such an event, our trials could be suspended or terminated and the FDA or comparable foreign regulatory authorities could order us to cease further development of or deny approval of our product candidates for any or all targeted indications. The drug-related side effects could affect patient recruitment or the ability of enrolled subjects to complete the trial or result in potential product liability claims.

Additionally, if any of our product candidates receives marketing approval, and we or others later identify undesirable side effects caused by such product, a number of potentially significant negative consequences could result, including:

- we may be forced to suspend marketing of such product;
- regulatory authorities may withdraw their approvals of such product;
- regulatory authorities may require additional warnings on the label that could diminish the usage or otherwise limit the commercial success of such products;
- we may be required to conduct post-market studies;
- we could be sued and held liable for harm caused to subjects or patients; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of the particular product candidate, if approved.

Even if our product candidates receive regulatory approval, they may still face future development and regulatory difficulties.

Even if we obtain regulatory approval for a product candidate, it would be subject to ongoing requirements by the FDA and comparable foreign regulatory authorities governing the manufacture, quality control, further development, labeling, packaging, storage, distribution, safety surveillance, import, export, advertising, promotion, recordkeeping and reporting of safety and other post-market information. The safety profile of any product will continue to be closely monitored by the FDA and comparable foreign regulatory authorities after approval. If the FDA or comparable foreign regulatory authorities become aware of new safety information after approval of any of our product candidates, they may require labeling changes or establishment of a REMS or similar strategy, impose significant restrictions on a product's indicated uses or marketing, or impose ongoing requirements for potentially

costly post-approval studies or post-market surveillance. For example, the label ultimately approved for rigosertib, if it achieves marketing approval, may include restrictions on use.

In addition, manufacturers of drug products and their facilities are subject to continual review and periodic inspections by the FDA and other regulatory authorities for compliance with current good manufacturing practices, or cGMP, and other regulations. If we or a regulatory agency discover previously unknown problems with a product, such as adverse events of unanticipated severity or frequency, or problems with the facility where the product is manufactured, a regulatory agency may impose restrictions on that product, the manufacturing facility or us, including requiring recall or withdrawal of the product from the market or suspension of manufacturing. If we, our product candidates or the manufacturing facilities for our product candidates fail to comply with applicable regulatory requirements, a regulatory agency may:

- issue warning letters or untitled letters;
- mandate modifications to promotional materials or require us to provide corrective information to healthcare practitioners;
- require us to enter into a consent decree, which can include imposition of various fines, reimbursements for inspection costs, required due dates for specific actions and penalties for noncompliance;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical studies;
- refuse to approve pending applications or supplements to applications filed by us;
- suspend or impose restrictions on operations, including costly new manufacturing requirements; or
- seize or detain products, refuse to permit the import or export of products, or require us to initiate a product recall.

The occurrence of any event or penalty described above may inhibit our ability to commercialize our products and generate revenue.

Advertising and promotion of any product candidate that obtains approval in the United States will be heavily scrutinized by the FDA, the Department of Justice, or the DOJ, the Office of Inspector General of the Department of Health and Human Services, or HHS, state attorneys general, members of Congress and the public. Violations, including promotion of our products for unapproved or off-label uses, are subject to enforcement letters, inquiries and investigations, and civil and criminal sanctions by the FDA. Additionally, advertising and promotion of any product candidate that obtains approval outside of the United States will be heavily scrutinized by comparable foreign regulatory authorities.

In the United States, engaging in impermissible promotion of our products for off-label uses can also subject us to false claims litigation under federal and state statutes, which can lead to civil and criminal penalties and fines and agreements that materially restrict the manner in which we promote or distribute our drug products. These false claims statutes include the federal False Claims Act, which allows any individual to bring a lawsuit against a pharmaceutical company on behalf of the federal government alleging submission of false or fraudulent claims, or causing to present such false or fraudulent claims, for payment by a federal program such as Medicare or Medicaid. If the government prevails in the lawsuit, the individual will share in any fines or settlement funds. Since 2004, these False Claims Act lawsuits against pharmaceutical companies have increased significantly in volume and breadth, leading to several substantial civil and criminal settlements based on certain sales practices

promoting off-label drug uses. This growth in litigation has increased the risk that a pharmaceutical company will have to defend a false claim action, pay settlement fines or restitution, agree to comply with burdensome reporting and compliance obligations, and be excluded from the Medicare, Medicaid and other federal and state healthcare programs. If we do not lawfully promote our approved products, we may become subject to such litigation and, if we are not successful in defending against such actions, those actions could compromise our ability to become profitable.

Failure to obtain regulatory approval in international jurisdictions would prevent our product candidates from being marketed abroad.

In order to market and sell our products in the European Union and many other jurisdictions, including Japan and Korea, we must obtain separate marketing approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and can involve additional testing. The time required to obtain approval may differ substantially from that required to obtain FDA approval. The regulatory approval process outside the United States generally includes all of the risks associated with obtaining FDA approval. In addition, in many countries outside the United States, it is required that the product be approved for reimbursement before the product can be approved for sale in that country. We may not obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by the FDA does not ensure approval by regulatory authorities in other countries or jurisdictions, and approval by one regulatory authority outside the United States does not ensure approval by regulatory authorities in other countries or jurisdictions or by the FDA. We may not be able to file for marketing approvals and may not receive necessary approvals to commercialize our products in any market. If we are unable to obtain approval of any of our product candidates by regulatory authorities in the European Union, Japan, Korea or another country, the commercial prospects of that product candidate may be significantly diminished and our business prospects could decline.

Recently enacted and future legislation, including potentially unfavorable pricing regulations or other healthcare reform initiatives, may increase the difficulty and cost for us to obtain marketing approval of and commercialize our product candidates and affect the prices we may obtain.

The regulations that govern, among other things, marketing approvals, coverage, pricing and reimbursement for new drug products vary widely from country to country. In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to successfully sell any product candidates for which we obtain marketing approval.

In the United States, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, or Medicare Modernization Act, changed the way Medicare covers and pays for pharmaceutical products. The legislation expanded Medicare coverage for drug purchases by the elderly and introduced a new reimbursement methodology based on average sales prices for physician administered drugs. In recent years, Congress has considered further reductions in Medicare reimbursement for drugs administered by physicians. The Centers for Medicare and Medicaid Services, the agency that runs the Medicare program, also has the authority to revise reimbursement rates and to implement coverage restrictions for some drugs. Cost reduction initiatives and changes in coverage implemented through legislation or regulation could decrease utilization of and reimbursement for any approved products, which in turn would affect the price we can receive for those products. While the Medicare Modernization Act and Medicare regulations apply only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates. Therefore, any reduction in reimbursement that results from federal legislation or regulation may result in a similar reduction in payments from private payors.

In March 2010, President Obama signed into law the Patient Protection and Affordable Care Act and the Health Care and Education Affordability Reconciliation Act of 2010, or the Affordable Care Act, a sweeping law intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for healthcare and health insurance industries, impose new taxes and fees on pharmaceutical and medical device manufacturers and impose additional health policy reforms. The Affordable Care Act expanded manufacturers' rebate liability to include covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations increased the minimum rebate due for innovator drugs from 15.1% of average manufacturer price, or AMP, to 23.1% of AMP and capped the total rebate amount for innovator drugs at 100% of AMP. The Affordable Care Act and subsequent legislation also changed the definition of AMP. Furthermore, the Affordable Care Act imposes a significant annual, nondeductible fee on companies that manufacture or import certain branded prescription drug products. Substantial new provisions affecting compliance have also been enacted, which may affect our business practices with healthcare practitioners, and a significant number of provisions are not yet, or have only recently become, effective. Although it is too early to determine the effect of the Affordable Care Act, it appears likely to continue the pressure on pharmaceutical pricing, especially under the Medicare program, and may also increase our regulatory burdens and operating costs.

In addition, other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. More recently, on August 2, 2011, the President signed into law the Budget Control Act of 2011, which, among other things, creates the Joint Select Committee on Deficit Reduction to recommend to Congress proposals in spending reductions. The Joint Select Committee did not achieve a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, starting in 2013. On January 2, 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, reduced Medicare payments to several providers and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws may result in additional reductions in Medicare and other healthcare funding, which could have a material adverse effect on our customers and accordingly, our financial operations. Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. We cannot be sure whether additional legislative changes will be enacted, or whether the FDA regulations, guidance or interpretations will be changed, or what the impact of such changes on the marketing approvals of our product candidates, if any, may be.

In the United States, the European Union and other potentially significant markets for our product candidates, government authorities and third-party payors are increasingly attempting to limit or regulate the price of medical products and services, particularly for new and innovative products and therapies, which has resulted in lower average selling prices. Furthermore, the increased emphasis on managed healthcare in the United States and on country and regional pricing and reimbursement controls in the European Union will put additional pressure on product pricing, reimbursement and usage, which may adversely affect our future product sales and results of operations. These pressures can arise from rules and practices of managed care groups, judicial decisions and governmental laws and regulations related to Medicare, Medicaid and healthcare reform, pharmaceutical reimbursement policies and pricing in general.

Some countries require approval of the sale price of a drug before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we might obtain marketing approval for a product candidate in a particular country, but then be subject to price regulations that delay our commercial launch of the product, possibly for lengthy time periods, which could negatively impact the

revenues we are able to generate from the sale of the product in that particular country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more product candidates even if our product candidates obtain marketing approval.

Laws and regulations governing international operations may preclude us from developing, manufacturing and selling certain product candidates outside of the United States and require us to develop and implement costly compliance programs.

As we expand our operations outside of the United States, we must comply with numerous laws and regulations in each jurisdiction in which we plan to operate. The creation and implementation of international business practices compliance programs is costly and such programs are difficult to enforce, particularly where reliance on third parties is required.

The Foreign Corrupt Practices Act, or FCPA, prohibits any U.S. individual or business from paying, offering, authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with certain accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations. The anti-bribery provisions of the FCPA are enforced primarily by the DOJ. The Securities and Exchange Commission, or the SEC, is involved with enforcement of the books and records provisions of the FCPA.

Compliance with the FCPA is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the FCPA presents particular challenges in the pharmaceutical industry, because, in many countries, hospitals are operated by the government, and doctors and other hospital employees are considered foreign officials. Certain payments to hospitals in connection with clinical studies and other work have been deemed to be improper payments to government officials and have led to FCPA enforcement actions.

Various laws, regulations and executive orders also restrict the use and dissemination outside of the United States, or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. Our expanding presence outside of the United States will require us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing, manufacturing, or selling certain products and product candidates outside of the United States, which could limit our growth potential and increase our development costs.

The failure to comply with laws governing international business practices may result in substantial penalties, including suspension or debarment from government contracting. Violation of the FCPA can result in significant civil and criminal penalties. Indictment alone under the FCPA can lead to suspension of the right to do business with the U.S. government until the pending claims are resolved. Conviction of a violation of the FCPA can result in long-term disqualification as a government contractor. The termination of a government contract or relationship as a result of our failure to satisfy any of our obligations under laws governing international business practices would have a negative impact on our operations and harm our reputation and ability to procure government contracts. The SEC also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions.

Even if we are able to commercialize our product candidates, the products may not receive coverage and adequate reimbursement from third-party payors, which could harm our business.

Our ability to commercialize any products successfully will depend, in part, on the extent to which coverage and adequate reimbursement for these products and related treatments will be available from government health administration authorities, private health insurers and other organizations. Government authorities and third-party payors, such as private health insurers and health maintenance organizations, determine which medications they will cover and establish reimbursement levels. A primary trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. Increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. Third-party payors may also seek additional clinical evidence, beyond the data required to obtain marketing approval, demonstrating clinical benefits and value in specific patient populations before covering our products for those patients. We cannot be sure that coverage and adequate reimbursement will be available for any product that we commercialize and, if reimbursement is available, what the level of reimbursement will be. Coverage and reimbursement may impact the demand for, or the price of, any product candidate for which we obtain marketing approval. If reimbursement is not available or is available only at limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval.

There may be significant delays in obtaining coverage and reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the drug is approved by the FDA or comparable foreign regulatory authorities. Moreover, eligibility for coverage and reimbursement does not imply that any drug will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale and distribution. Interim reimbursement levels for new drugs, if applicable, may also not be sufficient to cover our costs and may only be temporary. Reimbursement rates may vary according to the use of the drug and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost drugs and may be incorporated into existing payments for other services. Net prices for drugs may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their own reimbursement policies. Our inability to obtain coverage and profitable reimbursement rates from both government-funded and private payors for any approved products that we develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to market and sell our product candidates, we may be unable to generate any revenue.

We do not currently have an organization for the sale, marketing and distribution of pharmaceutical products and the cost of establishing and maintaining such an organization may exceed the cost-effectiveness of doing so. In order to market any products that may be approved by the FDA and comparable foreign regulatory authorities, we must build our sales, marketing, managerial and other non-technical capabilities or make arrangements with third parties to perform these services. If we are unable to establish adequate sales, marketing and distribution capabilities, whether independently or with third parties, we may not be able to generate product revenue and may not become profitable. We will be competing with many companies that currently have extensive and well-funded sales and marketing operations. Without an internal commercial organization or the support of a third party to perform sales and marketing functions, we may be unable to compete successfully against these more established companies.

Our commercial success depends upon attaining significant market acceptance of our product candidates, if approved, among physicians, patients, healthcare payors and the major operators of cancer clinics.

Even if we obtain regulatory approval for any of our product candidates that we may develop or acquire in the future, the product may not gain market acceptance among physicians, healthcare payors, patients or the medical community. Market acceptance of any of our product candidates for which we receive approval depends on a number of factors, including:

- the efficacy and safety of such product candidates as demonstrated in clinical trials;
- the clinical indications for which the product candidate is approved;
- acceptance by physicians, major operators of cancer clinics and patients of the drug as a safe and effective treatment;
- the potential and perceived advantages of product candidates over alternative treatments;
- the safety of product candidates seen in a broader patient group, including its use outside the approved indications;
- the prevalence and severity of any side effects;
- product labeling or product insert requirements of the FDA or other regulatory authorities;
- the timing of market introduction of our products as well as competitive products;
- the cost of treatment in relation to alternative treatments;
- the availability of coverage and adequate reimbursement and pricing by third-party payors and government authorities;
- relative convenience and ease of administration; and
- the effectiveness of our sales and marketing efforts and those of our collaborators.

If any of our product candidates are approved but fail to achieve market acceptance among physicians, patients, or healthcare payors, we will not be able to generate significant revenues, which would compromise our ability to become profitable.

Our relationships with customers and third-party payors will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers, physicians and third-party payors will play a primary role in the recommendation and prescription of any product candidates for which we obtain marketing approval. Our future arrangements with third-party payors and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we would market, sell and distribute our products. As a pharmaceutical company, even though we do not and will not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payors, federal and state healthcare laws and regulations pertaining to fraud and abuse and patients' rights are and will be applicable to our business. Restrictions under applicable federal and state healthcare laws and regulations that may affect our ability to operate include the following:

- the federal healthcare Anti-Kickback Statute will constrain our marketing practices, educational programs, pricing policies, and relationships with healthcare providers or other entities, by prohibiting, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order or

recommendation of, any good or service, for which payment may be made under a federal healthcare program such as Medicare and Medicaid;

- federal civil and criminal false claims laws and civil monetary penalty laws impose criminal and civil penalties, including through civil whistleblower or qui tam actions, against individuals or entities for knowingly presenting, or causing to be presented, to the federal government, including the Medicare and Medicaid programs, claims for payment that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government;

- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also created federal criminal laws that prohibit knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statements in connection with the delivery of or payment for healthcare benefits, items or services;

- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;

- the federal physician sunshine requirements under the Affordable Care Act requires manufacturers of drugs, devices, biologics and medical supplies to report annually to HHS information related to payments and other transfers of value to physicians, other healthcare providers, and teaching hospitals, and ownership and investment interests held by physicians and other healthcare providers and their immediate family members and applicable group purchasing organizations; and

- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers; some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government and may require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; and state and foreign laws govern the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, imprisonment, exclusion from government funded healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations. If any physicians or other healthcare providers or entities with whom we expect to do business are found to not be in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

Our employees may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements, which could cause significant liability for us and harm our reputation.

We are exposed to the risk of employee fraud or other misconduct, including intentional failures to comply with FDA regulations or similar regulations of comparable foreign regulatory authorities, provide accurate information to the FDA or comparable foreign regulatory authorities, comply with manufacturing standards we have established, comply with federal and state healthcare fraud and abuse laws and regulations and similar laws and regulations established and enforced by comparable foreign regulatory authorities, report financial information or data accurately or disclose unauthorized activities to us. Employee misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation. We will adopt a code of conduct for our directors, officers and employees, or the Code of Conduct, which will be effective as of consummation of this offering, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business and results of operations, including the imposition of significant fines or other sanctions.

We face substantial competition, which may result in others discovering, developing or commercializing products before or more successfully than we do.

The development and commercialization of new drug products is highly competitive. We face competition with respect to our current product candidates, rigosertib, ON 013105 and recilisib, and will face competition with respect to any product candidates that we may seek to develop or commercialize in the future, from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide. There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of the disease indications for which we are developing our product candidates. Some of these competitive products and therapies are based on scientific approaches that are the same as or similar to our approach, and others are based on entirely different approaches. Potential competitors also include academic institutions, government agencies and other public and private research organizations that conduct research, seek patent protection and establish collaborative arrangements for research, development, manufacturing and commercialization.

Our product candidates are being developed for cancer therapeutics and radiation protection. There are a variety of available therapies and supportive care products marketed for cancer patients. In many cases, these drugs are administered in combination to enhance efficacy or to reduce side effects. Some of these drugs are branded and subject to patent protection, and others are available on a generic basis. Many of these approved drugs are well established therapies or products and are widely accepted by physicians, patients and third-party payors. Insurers and other third-party payors may also encourage the use of generic products. This may make it difficult for us to achieve market acceptance at desired levels in a timely manner to ensure viability of our business.

More established companies may have a competitive advantage over us due to their greater size, cash flows and institutional experience. Compared to us, many of our competitors may have significantly greater financial, technical and human resources.

As a result of these factors, our competitors may obtain regulatory approval of their products before we are able to obtain patent protection or other intellectual property rights which will limit our ability to develop or commercialize our product candidates. Our competitors may also develop drugs that are safer, more effective, more widely used and cheaper than ours, and may also be more

successful than us in manufacturing and marketing their products. These appreciable advantages could render our product candidates obsolete or non-competitive before we can recover the expenses of development and commercialization.

Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller and other early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These third parties compete with us in recruiting and retaining qualified scientific, management and commercial personnel, establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

If we breach the license agreement with Temple University pertaining to our clinical-stage product candidates, we could lose the ability to continue the development and potential commercialization of these product candidates.

In January 1999, we entered into an agreement with Temple, as subsequently amended, to obtain an exclusive, world-wide license to make, have made, use, sell, offer for sale and import several classes of novel compounds, including all three of our clinical-stage product candidates. If we fail to meet our obligations under this license agreement, Temple has the right to terminate our exclusive license, and upon the effective date of such termination, our right to use the licensed technology would terminate. While we would expect to exercise all rights and remedies available to us, including attempting to cure any breach by us, and otherwise seek to preserve our rights under the patents and other technology licensed to us, we may not be able to do so in a timely manner, at an acceptable cost or at all. Any uncured, material breach under the license agreement could result in our loss of exclusive rights and may lead to a complete termination of our product development and any commercialization efforts for the applicable product candidates.

Product liability lawsuits against us could cause us to incur substantial liabilities and to limit commercialization of any products that we may develop.

We face an inherent risk of product liability exposure related to the testing of our product candidates in human clinical trials and will face an even greater risk if we commercially sell any products that we may develop. Product liability claims may be brought against us by subjects enrolled in our clinical trials, patients, healthcare providers or others using, administering or selling our products. If we cannot successfully defend ourselves against claims that our product candidates or products caused injuries, we could incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- decreased demand for any product candidates or products that we may develop;
- termination of clinical trial sites or entire trial programs;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants;
- significant costs to defend the related litigation;
- substantial monetary awards to trial subjects or patients;
- loss of revenue;
- diversion of management and scientific resources from our business operations; and
- the inability to commercialize any products that we may develop.

We currently hold $10.0 million in product liability insurance coverage in the aggregate, which may not be adequate to cover all liabilities that we may incur. Insurance coverage is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise. We intend to expand our insurance coverage for products to include the sale of commercial products if we obtain marketing approval for our product candidates in development, but we may be unable to obtain commercially reasonable product liability insurance for any products approved for marketing. Large judgments have been awarded in class action lawsuits based on drugs that had unanticipated side effects. A successful product liability claim or series of claims brought against us, particularly if judgments exceed our insurance coverage, could decrease our cash and adversely affect our business.

We will need to grow the size of our organization, and we may experience difficulties in managing this growth.

As of June 1, 2013, we had 56 employees. As our development and commercialization plans and strategies develop, or as a result of any future acquisitions, we will need additional managerial, operational, sales, marketing, financial and other resources. Our management, personnel and systems currently in place may not be adequate to support this future growth. Future growth would impose significant added responsibilities on members of management, including:

- managing our clinical trials effectively;
- identifying, recruiting, maintaining, motivating and integrating additional employees;
- managing our internal development efforts effectively while complying with our contractual obligations to licensors, licensees, contractors and other third parties;
- improving our managerial, development, operational and finance systems; and
- expanding our facilities.

As our operations expand, we will need to manage additional relationships with various strategic partners, suppliers and other third parties. Our future financial performance and our ability to commercialize our product candidates and to compete effectively will depend, in part, on our ability to manage any future growth effectively. To that end, we must be able to manage our development efforts and clinical trials effectively and hire, train and integrate additional management, administrative and sales and marketing personnel. Our failure to accomplish any of these tasks could prevent us from successfully growing our company.

Our future success depends on our ability to retain our executive officers and to attract, retain and motivate qualified personnel.

We are highly dependent upon Ramesh Kumar, Ph.D., President and Chief Executive Officer; Francois Wilhelm, M.D., Ph.D., Chief Medical Officer and Senior Vice President; Manoj Maniar, Ph.D., Senior Vice President, Product Development; Thomas McKearn, M.D., Ph.D., President, Research and Development; Ajay Bansal, Chief Financial Officer; Scott Megaffin, Senior Vice President, Commercial Development; David Stephon, Senior Vice President, Quality Management; and James Altland, Senior Vice President, Finance and Corporate Development. Although we have employment agreements with the persons named above, these agreements are at-will and do not prevent such persons from terminating their employment with us at any time. We do not maintain "key person" insurance for any of our executives or other employees, other than our President and Chief Executive Officer. The loss of the services of any of these persons could impede the achievement of our research, development and commercialization objectives.

If we are unable to attract and retain highly qualified employees, we may not be able to grow effectively.

Our future growth and success depend on our ability to recruit, retain, manage and motivate our employees. The loss of any member of our senior management team or the inability to hire or retain experienced management personnel could compromise our ability to execute our business plan and harm our operating results.

Because of the specialized scientific and managerial nature of our business, we rely heavily on our ability to attract and retain qualified scientific, technical and managerial personnel. The competition for qualified personnel in the pharmaceutical field is intense and as a result, we may be unable to continue to attract and retain qualified personnel necessary for the development of our business.

We may engage in future acquisitions that could disrupt our business, cause dilution to our stockholders and harm our financial condition and operating results.

While we currently have no specific plans to acquire any other businesses, we may, in the future, make acquisitions of, or investments in, companies that we believe have products or capabilities that are a strategic or commercial fit with our current product candidates and business or otherwise offer opportunities for our company. In connection with these acquisitions or investments, we may:

- issue stock that would dilute our existing stockholders' percentage of ownership;
- incur debt and assume liabilities; and
- incur amortization expenses related to intangible assets or incur large and immediate write-offs.

We may not be able to complete acquisitions on favorable terms, if at all. If we do complete an acquisition, we cannot assure you that it will ultimately strengthen our competitive position or that it will be viewed positively by customers, financial markets or investors. Furthermore, future acquisitions could pose numerous additional risks to our operations, including:

- problems integrating the purchased business, products or technologies;
- increases to our expenses;
- the failure to discover undisclosed liabilities of the acquired asset or company;
- diversion of management's attention from their day-to-day responsibilities;
- harm to our operating results or financial condition;
- entrance into markets in which we have limited or no prior experience; and
- potential loss of key employees, particularly those of the acquired entity.

We may not be able to complete any acquisitions or effectively integrate the operations, products or personnel gained through any such acquisition.

Our business and operations would suffer in the event of computer system failures.

Despite the implementation of security measures, our internal computer systems, and those of our CROs and other third parties on which we rely, are vulnerable to damage from computer viruses, unauthorized access, natural disasters, fire, terrorism, war and telecommunication and electrical failures. If such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our drug development programs. For example, the loss of clinical trial data from completed, ongoing or planned clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach results in a loss of or damage to our data or applications, or inappropriate disclosure

of confidential or proprietary information, we could incur liability and the further development of our product candidates could be delayed.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste products. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties.

Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials, this insurance may not provide adequate coverage against potential liabilities. We do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us in connection with our storage or disposal of biological or hazardous materials.

In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Business disruptions could seriously harm our future revenues and financial condition and increase our costs and expenses.

Our operations could be subject to earthquakes, power shortages, telecommunications failures, water shortages, floods, hurricanes, typhoons, fires, extreme weather conditions, medical epidemics and other natural or manmade disasters or business interruptions, for which we are predominantly self-insured. The occurrence of any of these business disruptions could seriously harm our operations and financial condition and increase our costs and expenses. We rely on third-party manufacturers to produce our product candidates. Our ability to obtain clinical supplies of product candidates could be disrupted, if the operations of these suppliers is affected by a man-made or natural disaster or other business interruption. The ultimate impact on us, our significant suppliers and our general infrastructure of being consolidated in certain geographical areas is unknown, but our operations and financial condition could suffer in the event of a major earthquake, fire or other natural disaster.

We are relying on the FDA's "Animal Efficacy Rule" to demonstrate efficacy of recilisib, which could result in delays or failure at any stage of recilisib's development process, increase our development costs and adversely affect the commercial prospects of recilisib.

Because humans are not normally exposed to radiation and it would be unethical to expose humans to such, effectiveness of recilisib cannot be demonstrated in humans, but instead, under the FDA's "Animal Efficacy Rule," can be demonstrated, in part, by utilizing animal models. This effect has to be demonstrated in more than one animal species expected to be predictive of a response in humans, but an effect in a single animal species may be acceptable if that animal model is sufficiently well-characterized for predicting a response in humans. The animal study endpoint must be clearly related to the desired benefit in humans and the information obtained from animal studies must allow selection of an effective dose in humans. Safety may be demonstrated in human studies.

We may not be able to sufficiently demonstrate the animal correlation to the satisfaction of the FDA, as these correlates are difficult to establish and are often unclear. The FDA may decide that our data are insufficient for approval and require additional preclinical, clinical or other studies, refuse to approve recilisib, or place restrictions on our ability to commercialize recilisib. Furthermore, other countries do not, at this time, have established criteria for review and approval of these types of products outside their normal review process. There is no "Animal Efficacy Rule" equivalent in countries other than the United States, and consequently there can be no assurance that we will be able to make a submission for marketing approval in foreign countries based on such animal data.

Risks Related to Our Dependence on Third Parties

We rely on third parties to conduct our preclinical and clinical trials. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, we may not be able to obtain regulatory approval for or commercialize our product candidates.

We have relied upon and plan to continue to rely upon third-party CROs to monitor and manage data for our ongoing preclinical and clinical programs. We rely on these parties for execution of our preclinical and clinical trials, and we control only some aspects of their activities. Nevertheless, we are responsible for ensuring that each of our studies is conducted in accordance with the applicable protocol and legal, regulatory and scientific standards, and our reliance on the CROs does not relieve us of our regulatory responsibilities. We also rely on third parties to assist in conducting our preclinical studies in accordance with Good Laboratory Practices, or GLP, and the Animal Welfare Act requirements. We and our CROs are required to comply with federal regulations and current Good Clinical Practices, or GCP, which are international standards meant to protect the rights and health of patients that are enforced by the FDA, the Competent Authorities of the Member States of the European Economic Area, or EEA, and comparable foreign regulatory authorities for all of our products in clinical development. Regulatory authorities enforce GCP through periodic inspections of trial sponsors, principal investigators and trial sites. If we or any of our CROs fail to comply with applicable GCP, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We cannot assure you that upon inspection by a given regulatory authority, such regulatory authority will determine that any of our clinical trials comply with GCP requirements. In addition, our clinical trials must be conducted with product produced under cGMP requirements. Failure to comply with these regulations may require us to repeat preclinical and clinical trials, which would delay the regulatory approval process.

Our CROs are not our employees, and except for remedies available to us under our agreements with such CROs, we cannot control whether or not they devote sufficient time and resources to our ongoing clinical, nonclinical and preclinical programs. If CROs do not successfully carry out their contractual duties or obligations or meet expected deadlines or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols, regulatory requirements or for other reasons, our clinical trials may be extended, delayed or terminated and we may not be able to obtain regulatory approval for or successfully commercialize our product candidates. As a result, our results of operations and the commercial prospects for our product candidates would be harmed, our costs could increase and our ability to generate revenues could be delayed.

Because we have relied on third parties, our internal capacity to perform these functions is limited. Outsourcing these functions involves risk that third parties may not perform to our standards, may not produce results in a timely manner or may fail to perform at all. In addition, the use of third-party service providers requires us to disclose our proprietary information to these parties, which could increase the risk that this information will be misappropriated. We currently have a small number of employees, which limits the internal resources we have available to identify and monitor our third-party providers. To the extent we are unable to identify and successfully manage the performance of

third-party service providers in the future, our business may be adversely affected. Though we carefully manage our relationships with our CROs, there can be no assurance that we will not encounter challenges or delays in the future or that these delays or challenges will not have a material adverse impact on our business, financial condition and prospects.

If we lose our relationships with CROs, our drug development efforts could be delayed.

We rely on third-party vendors and CROs for preclinical studies and clinical trials related to our drug development efforts. Switching or adding additional CROs would involve additional cost and requires management time and focus. Our CROs have the right to terminate their agreements with us in the event of an uncured material breach. In addition, some of our CROs have an ability to terminate their respective agreements with us if it can be reasonably demonstrated that the safety of the subjects participating in our clinical trials warrants such termination, if we make a general assignment for the benefit of our creditors or if we are liquidated. Identifying, qualifying and managing performance of third-party service providers can be difficult, time consuming and cause delays in our development programs. In addition, there is a natural transition period when a new CRO commences work and the new CRO may not provide the same type or level of services as the original provider. If any of our relationships with our third-party CROs terminate, we may not be able to enter into arrangements with alternative CROs or to do so on commercially reasonable terms.

We have limited experience manufacturing our product candidates on a large clinical or commercial scale and have no manufacturing facility. We are dependent on third-party manufacturers for the manufacture of our most advanced product candidate as well as on third parties for our supply chain, and if we experience problems with any third parties, the manufacturing of our product candidates or products could be delayed.

We do not own or operate facilities for the manufacture of our product candidates. We currently have no plans to build our own clinical or commercial scale manufacturing capabilities. We currently rely on a single source contract manufacturing organization, or CMO, for the chemical manufacture of active pharmaceutical ingredient for rigosertib, another CMO for the production of the rigosertib intravenous formulation, and a third CMO for the production of the rigosertib oral formulation for Phase 3 clinical trials. To meet our projected needs for clinical supplies to support our activities through regulatory approval and commercial manufacturing, the CMOs with whom we currently work will need to increase the scale of production. We may need to identify additional CMOs for continued production of supply for our product candidates. We have not yet identified alternate suppliers in the event the current CMOs we utilize are unable to scale production, or if we otherwise experience any problems with them. Although alternative third-party suppliers with the necessary manufacturing and regulatory expertise and facilities exist, it could be expensive and take a significant amount of time to arrange for alternative suppliers. If we are unable to arrange for alternative third-party manufacturing sources, or to do so on commercially reasonable terms or in a timely manner, we may not be able to complete development of our product candidates, or market or distribute them.

Reliance on third-party manufacturers entails risks to which we would not be subject if we manufactured product candidates or products ourselves, including reliance on the third party for regulatory compliance and quality assurance, the possibility of breach of the manufacturing agreement by the third party because of factors beyond our control, including a failure to synthesize and manufacture our product candidates or any products we may eventually commercialize in accordance with our specifications, and the possibility of termination or nonrenewal of the agreement by the third party, based on its own business priorities, at a time that is costly or damaging to us. In addition, the FDA and other regulatory authorities require that our product candidates and any products that we may eventually commercialize be manufactured according to cGMP and similar foreign standards. Any failure by our third-party manufacturers to comply with cGMP or failure to scale up manufacturing processes, including any failure to deliver sufficient quantities of product candidates in a timely manner,

could lead to a delay in, or failure to obtain, regulatory approval of any of our product candidates. In addition, such failure could be the basis for the FDA to issue a warning letter, withdraw approvals for product candidates previously granted to us, or take other regulatory or legal action, including recall or seizure of outside supplies of the product candidate, total or partial suspension of production, suspension of ongoing clinical trials, refusal to approve pending applications or supplemental applications, detention or product, refusal to permit the import or export of products, injunction, or imposing civil and criminal penalties.

Any significant disruption in our supplier relationships could harm our business. Any significant delay in the supply of a product candidate or its key materials for an ongoing clinical study could considerably delay completion of our clinical studies, product testing and potential regulatory approval of our product candidates. If our manufacturers or we are unable to purchase these key materials after regulatory approval has been obtained for our product candidates, the commercial launch of our product candidates would be delayed or there would be a shortage in supply, which would impair our ability to generate revenues from the sale of our product candidates.

We have entered into collaboration agreements with SymBio Pharmaceuticals Limited and Baxter Healthcare SA for rigosertib development and commercialization in certain territories and we may elect to enter into additional licensing or collaboration agreements to partner rigosertib in territories currently retained by us. Our dependence on such relationships may adversely affect our business.

Because we have limited resources, we seek to enter into, and in the past we have entered into, collaboration agreements with other pharmaceutical companies. In July 2011, we entered into a license agreement with SymBio Pharmaceuticals Limited, or SymBio, as subsequently amended, granting an exclusive, royalty-bearing license for the development and commercialization of rigosertib in Japan and Korea. In September 2012, we entered into a development and license agreement with Baxter Healthcare SA, or Baxter, a subsidiary of Baxter International Inc., granting an exclusive, royalty-bearing license for the development and commercialization of rigosertib in Europe. We have also entered into a collaboration agreement for the further development of two of our preclinical oncology programs. Any failure by our partners to perform their obligations or any decision by our partners to terminate these agreements could negatively impact our ability to successfully develop, obtain regulatory approvals for and commercialize the applicable product candidate. In addition, any termination of our collaboration agreements will terminate the funding we may receive under the relevant collaboration agreement and may impair our ability to fund further development efforts and our progress in our development programs.

Our commercialization strategy for rigosertib in territories currently retained by us may depend on our ability to enter into agreements with collaborators to obtain assistance and funding for the development and potential commercialization of rigosertib in those territories. Despite our efforts, we may be unable to secure additional collaborative licensing or other arrangements that are necessary for us to further develop and commercialize rigosertib. Supporting diligence activities conducted by potential collaborators and negotiating the financial and other terms of a collaboration agreement are long and complex processes with uncertain results. Even if we are successful in entering into one or more collaboration agreements, collaborations may involve greater uncertainty for us, as we have less control over certain aspects of our collaborative programs than we do over our proprietary development and commercialization programs. We may determine that continuing a collaboration under the terms provided is not in our best interest, and we may terminate the collaboration. Our collaborators could delay or terminate their agreements, and as a result rigosertib may never be successfully commercialized.

Further, our future collaborators may develop alternative products or pursue alternative technologies either on their own or in collaboration with others, including our competitors, and the priorities or focus of our collaborators may shift such that rigosertib receives less attention or resources

than we would like, or they may be terminated altogether. Any such actions by our collaborators may adversely affect our business prospects and ability to earn revenues. In addition, we could have disputes with our current or future collaborators, such as the interpretation of terms in our agreements. Any such disagreements could lead to delays in the development or commercialization of rigosertib or could result in time-consuming and expensive litigation or arbitration, which may not be resolved in our favor.

With respect to our programs that are currently not the subject of collaborations, we may enter into agreements with collaborators to share in the burden of conducting clinical trials, manufacturing and marketing these product candidates. In addition, our ability to apply our proprietary technologies to develop proprietary compounds will depend on our ability to establish and maintain licensing arrangements or other collaborative arrangements with the holders of proprietary rights to such compounds. We may not be able to establish such arrangements on favorable terms or at all, and our future collaborative arrangements may not be successful.

Risks Related to Our Intellectual Property

If we are unable to protect our intellectual property rights, our competitive position could be harmed.

We depend on our ability to protect our proprietary technology. We rely on trade secret, patent, copyright and trademark laws, and confidentiality, licensing and other agreements with employees and third parties, all of which offer only limited protection. Our commercial success will depend in large part on our ability to obtain and maintain patent protection in the United States and other countries with respect to our proprietary technology and products. Where we have the right to do so under our license agreements, we seek to protect our proprietary position by filing patent applications in the United States and abroad related to our novel technologies and products that are important to our business. The patent positions of biotechnology and pharmaceutical companies generally are highly uncertain, involve complex legal and factual questions and have in recent years been the subject of much litigation. As a result, the issuance, scope, validity, enforceability and commercial value of our patents, including those patent rights licensed to us by third parties, are highly uncertain.

The steps we have taken to protect our proprietary rights may not be adequate to preclude misappropriation of our proprietary information or infringement of our intellectual property rights, both inside and outside the United States. The rights already granted under any of our currently issued patents and those that may be granted under future issued patents may not provide us with the proprietary protection or competitive advantages we are seeking. If we are unable to obtain and maintain patent protection for our technology and products, or if the scope of the patent protection obtained is not sufficient, our competitors could develop and commercialize technology and products similar or superior to ours, and our ability to successfully commercialize our technology and products may be adversely affected.

With respect to patent rights, we do not know whether any of the pending patent applications for any of our licensed compounds will result in the issuance of patents that protect our technology or products, or if any of our issued patents will effectively prevent others from commercializing competitive technologies and products. Our pending applications cannot be enforced against third parties practicing the technology claimed in such applications unless and until a patent issues from such applications. Further, the examination process may require us or our licensor to narrow the claims for our pending patent applications, which may limit the scope of patent protection that may be obtained if these applications issue. Because the issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, issued patents that we own or have licensed from third parties may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in the loss of patent protection, the narrowing of claims in such patents or the invalidity or unenforceability of such patents, which could limit our ability to stop others from using or

commercializing similar or identical technology and products, or limit the duration of the patent protection for our technology and products. Protecting against the unauthorized use of our patented technology, trademarks and other intellectual property rights is expensive, difficult and may in some cases not be possible. In some cases, it may be difficult or impossible to detect third-party infringement or misappropriation of our intellectual property rights, even in relation to issued patent claims, and proving any such infringement may be even more difficult.

We could be required to incur significant expenses to perfect our intellectual property rights, and our intellectual property rights may be inadequate to protect our competitive position.

The patent prosecution process is expensive and time-consuming, and we or our licensors may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. It is also possible that we or our licensors will fail to identify patentable aspects of inventions made in the course of our development and commercialization activities before it is too late to obtain patent protection on them. Further, given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. We expect to seek extensions of patent terms in the United States and, if available, in other countries where we are prosecuting patents. In the United States, the Drug Price Competition and Patent Term Restoration Act of 1984 permits a patent term extension of up to five years beyond the expiration of the patent. However, the applicable authorities, including the FDA in the United States, and any equivalent regulatory authority in other countries, may not agree with our assessment of whether such extensions are available, and may refuse to grant extensions to our patents, or may grant more limited extensions than we request. If this occurs, our competitors may be able to take advantage of our investment in development and clinical trials by referencing our clinical and preclinical data and launch their product earlier than might otherwise be the case. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our patents or narrow the scope of our patent protection. The laws of foreign countries may not protect our rights to the same extent as the laws of the United States, and these foreign laws may also be subject to change. For example, methods of treatment and manufacturing processes may not be patentable in certain jurisdictions. Publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing or in some cases not at all. Therefore we cannot be certain that we or our licensors were the first to make the inventions claimed in our owned or licensed patents or pending patent applications, or that we or our licensors were the first to file for patent protection of such inventions.

Recent patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents.

On September 16, 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law. The Leahy-Smith Act includes a number of significant changes to U.S. patent law. These include provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. In particular, under the Leahy-Smith Act, the United States transitioned in March 2013 to a "first to file" system in which the first inventor to file a patent application will be entitled to the patent. Third parties are allowed to submit prior art before the issuance of a patent by the U.S. Patent and Trademark Office, or the USPTO, and may become involved in opposition, derivation, reexamination, inter-partes review or interference proceedings challenging our patent rights or the patent rights of others. An adverse determination in any such submission, proceeding or litigation could reduce the scope of, or invalidate, our patent rights, which could adversely affect our competitive position.

The USPTO is currently developing regulations and procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and in particular, the first to file provisions, did not become effective until March 16, 2013. Accordingly, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. However, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents.

Obtaining and maintaining our patent protection depends on compliance with various procedural, document submissions, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

Periodic maintenance fees on any issued patent are due to be paid to the USPTO and foreign patent agencies in several stages over the lifetime of the patent. The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance events that could result in abandonment or lapse of a patent or patent application include, but are not limited to, failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. If we or our licensors fail to maintain the patents and patent applications covering our product candidates, our competitive position would be adversely affected.

We may become involved in lawsuits to protect or enforce our intellectual property, which could be expensive, time consuming and unsuccessful.

Competitors may infringe our patents or misappropriate or otherwise violate our intellectual property rights. To counter infringement or unauthorized use, litigation may be necessary in the future to enforce or defend our intellectual property rights, to protect our trade secrets or to determine the validity and scope of our own intellectual property rights or the proprietary rights of others. This can be expensive and time consuming. Many of our current and potential competitors have the ability to dedicate substantially greater resources to defend their intellectual property rights than we can. Accordingly, despite our efforts, we may not be able to prevent third parties from infringing upon or misappropriating our intellectual property. Litigation could result in substantial costs and diversion of management resources. In addition, in an infringement proceeding, a court may decide that a patent owned by or licensed to us is invalid or unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation proceeding could put one or more of our patents at risk of being invalidated, held unenforceable or interpreted narrowly. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

Third parties may initiate legal proceedings alleging that we are infringing their intellectual property rights, the outcome of which would be uncertain and could harm our business.

Our commercial success depends upon our ability and the ability of our collaborators to develop, manufacture, market and sell our product candidates, and to use our proprietary technologies without infringing the proprietary rights of third parties. We may become party to, or threatened with, future adversarial proceedings or litigation regarding intellectual property rights with respect to our products and technology, including interference or derivation proceedings before the USPTO. Third parties may

assert infringement claims against us based on existing patents or patents that may be granted in the future. If we are found to infringe a third party's intellectual property rights, we could be required to obtain a license from such third party to continue developing and commercializing our products and technology. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. We could be forced, including by court order, to cease commercializing the infringing technology or product. In addition, in any such proceeding or litigation, we could be found liable for monetary damages. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business. Any claims by third parties that we have misappropriated their confidential information or trade secrets could have a similar negative impact on our business.

We may be subject to claims that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

Many of our employees, including our senior management, were previously employed at other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Some of these employees, including each member of our senior management, executed proprietary rights, non-disclosure and non-competition agreements in connection with such previous employment. Although we try to ensure that our employees do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or these employees have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such employee's former employer. We are not aware of any threatened or pending claims related to these matters or concerning the agreements with our senior management, but in the future litigation may be necessary to defend against such claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management.

Intellectual property disputes could cause us to spend substantial resources and distract our personnel from their normal responsibilities.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses, and could distract our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the market price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could compromise our ability to compete in the marketplace.

If we are unable to protect the confidentiality of our trade secrets, our business and competitive position would be harmed.

In addition to seeking patents for some of our technology and products, we also rely on trade secrets, including unpatented know-how, technology and other proprietary information, to maintain our competitive position. We seek to protect these trade secrets, in part, by entering into non-disclosure and confidentiality agreements with parties who have access to them, such as our employees, corporate collaborators, outside scientific collaborators, CMOs, consultants, advisors and other third parties. We also generally enter into confidentiality and invention or patent assignment agreements with our employees and consultants. Despite these efforts, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts both within and outside the United States may be less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position.

Although we expect all of our employees to assign their inventions to us, and all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information or technology to enter into confidentiality agreements, we cannot provide any assurances that all such agreements have been duly executed or that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating the trade secret, In addition, others may independently discover our trade secrets and proprietary information. For example, the FDA, as part of its Transparency Initiative, is currently considering whether to make additional information publicly available on a routine basis, including information that we may consider to be trade secrets or other proprietary information, and it is not clear at the present time how the FDA's disclosure policies may change in the future, if at all.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on all of our product candidates throughout the world would be prohibitively expensive. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products, and may export otherwise infringing products to territories where we have patent protection, but where enforcement is not as strong as that in the United States. These products may compete with our products in jurisdictions where we do not have any issued patents and our patent claims or other intellectual property rights may not be effective or sufficient to prevent them from so competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to biopharmaceuticals, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business.

Intellectual property rights do not necessarily address all potential threats to our competitive advantage.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and may not adequately protect our business, or permit us to maintain our competitive advantage. The following examples are illustrative:

- Others may be able to make compounds that are the same as or similar to our product candidates but that are not covered by the claims of the patents that we own or have exclusively licensed.
- We or our licensors or any strategic partners might not have been the first to make the inventions covered by the issued patent or pending patent application that we own or have exclusively licensed.
- We or our licensors or any strategic partners might not have been the first to file patent applications covering certain of our inventions.
- Others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our intellectual property rights.
- It is possible that our pending patent applications will not lead to issued patents.
- Issued patents that we own or have exclusively licensed may not provide us with any competitive advantages, or may be held invalid or unenforceable, as a result of legal challenges by our competitors.
- Our competitors might conduct research and development activities in the United States and other countries that provide a safe harbor from patent infringement claims for certain research and development activities, as well as in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets.
- We may not develop additional proprietary technologies that are patentable.
- The patents of others may have an adverse effect on our business.

Risks Related to This Offering and Ownership of Our Common Stock

We do not know whether an active, liquid and orderly trading market will develop for our common stock or what the market price of our common stock will be and as a result it may be difficult for you to sell your shares of our common stock.

Prior to this offering there has been no market for shares of our common stock. An active trading market for our shares may never develop or be sustained following this offering. The initial public offering price for our common stock will be determined through negotiations with the underwriters, and the negotiated price may not be indicative of the market price of our common stock after this offering. The market value of our common stock may decrease from the initial public offering price. As a result of these and other factors, you may be unable to resell your shares of our common stock at or above the initial public offering price. The lack of an active market may impair your ability to sell your shares at the time you wish to sell them or at a price that you consider reasonable. The lack of an active market may also reduce the fair market value of your shares. Further, an inactive market may also impair our ability to raise capital by selling shares of our common stock and may impair our ability to enter into collaborations or acquire companies or products by using our shares of common stock as consideration. The market price of our stock may be volatile, and you could lose all or part of your investment.

The trading price of our common stock following this offering is likely to be highly volatile and could be subject to wide fluctuations in response to various factors, some of which are beyond our control. In addition to the factors discussed in this "Risk Factors" section and elsewhere in this prospectus, these factors include:

- the success of competitive products or technologies;
- regulatory actions with respect to our products or our competitors' products;
- actual or anticipated changes in our growth rate relative to our competitors;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations or capital commitments;
- results of clinical trials of our product candidates or those of our competitors;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- the level of expenses related to any of our product candidates or clinical development programs;
- the results of our efforts to in-license or acquire additional product candidates or products;
- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or those of companies that are perceived to be similar to us;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us, our insiders or our other stockholders;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors; and
- general economic, industry and market conditions.

In addition, the stock market in general, and pharmaceutical and biotechnology companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance. The realization of any of these risks or any of a broad range of other risks, including those described in these "Risk Factors," could have a dramatic and material adverse impact on the market price of our common stock.

We may be subject to securities litigation, which is expensive and could divert management attention.

The market price of our common stock may be volatile, and in the past companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation. We may be the target of this type of litigation in the future. Securities litigation against us

could result in substantial costs and divert our management's attention from other business concerns, which could seriously harm our business.

Our principal stockholders and management own a significant percentage of our stock and will be able to exert significant control over matters subject to stockholder approval.

Prior to this offering, our executive officers, directors, holders of 5% or more of our capital stock together beneficially owned approximately 43.3% of our voting stock and, upon consummation of this offering, that same group will together hold approximately % of our outstanding voting stock, assuming no exercise of the underwriters' over-allotment option, no exercise of outstanding options and after giving effect to the issuance of shares in this offering. These stockholders may be able to determine the outcome of all matters requiring stockholder approval. For example, these stockholders may be able to control elections of directors, amendments of our organizational documents, or approval of any merger, sale of assets, or other major corporate transaction. This may prevent or discourage unsolicited acquisition proposals or offers for our common stock that you may feel are in your best interest as one of our stockholders. The interests of this group of stockholders may not always coincide with your interests or the interests of other stockholders and they may act in a manner that advances their best interests and not necessarily those of other stockholders, including seeking a premium value for their common stock, and might affect the prevailing market price for our common stock.

If you purchase our common stock in this offering, you will incur immediate and substantial dilution in the book value of your shares.

The initial public offering price is substantially higher than the net tangible book value per share of our common stock. Investors purchasing common stock in this offering will pay a price per share that substantially exceeds the book value of our tangible assets after subtracting our liabilities. As a result, investors purchasing common stock in this offering will incur immediate dilution of $ per share, based on an assumed initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover of this prospectus. Further, investors purchasing common stock in this offering will contribute approximately % of the total amount invested by stockholders since our inception, but will own, as a result of such investment, only approximately % of the shares of common stock outstanding immediately following this offering.

The exercise of any of our outstanding options would result in additional dilution. As a result of the dilution to investors purchasing shares in this offering, investors may receive significantly less than the purchase price paid in this offering, if anything, in the event of our liquidation. Further, because we may need to raise additional capital to fund our clinical development programs, we may in the future sell substantial amounts of common stock or securities convertible into or exchangeable for common stock. These future issuances of equity or equity-linked securities, together with the exercise of outstanding options and any additional shares issued in connection with acquisitions, if any, may result in further dilution to investors.

We are an "emerging growth company" and we intend to take advantage of reduced disclosure and governance requirements applicable to emerging growth companies, which could result in our common stock being less attractive to investors.

We are an "emerging growth company," as defined in the JOBS Act, and we intend to take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We

cannot predict if investors will find our common stock less attractive because we will rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile. We may take advantage of these reporting exemptions until we are no longer an emerging growth company, which in certain circumstances could be for up to five years. See "Summary—Implications of Being an Emerging Growth Company."

Our status as an "emerging growth company" under the JOBS Act may make it more difficult to raise capital as and when we need it.

Because of the exemptions from various reporting requirements provided to us as an "emerging growth company" we may be less attractive to investors and it may be difficult for us to raise additional capital as and when we need it. Investors may be unable to compare our business with other companies in our industry if they believe that our financial accounting is not as transparent as other companies in our industry. If we are unable to raise additional capital as and when we need it, our financial condition and results of operations may be materially and adversely affected.

If we fail to maintain an effective system of internal control over financial reporting in the future, we may not be able to accurately report our financial condition, results of operations or cash flows, which may adversely affect investor confidence in us and, as a result, the value of our common stock.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective internal controls for financial reporting and disclosure controls and procedures. Commencing with our annual report on Form 10-K for the year ending December 31, 2014, we will be required, under Section 404 of the Sarbanes-Oxley Act, to furnish a report by management on, among other things, the effectiveness of our internal control over financial reporting. This assessment will need to include disclosure of any material weaknesses identified by our management in our internal control over financial reporting. A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting that results in more than a reasonable possibility that a material misstatement of annual or interim financial statements will not be prevented or detected on a timely basis. Section 404 of the Sarbanes-Oxley Act also generally requires an attestation from our independent registered public accounting firm on the effectiveness of our internal control over financial reporting. However, for as long as we remain an emerging growth company as defined in the JOBS Act, we intend to take advantage of the exemption permitting us not to comply with the independent registered public accounting firm attestation requirement.

Our compliance with Section 404 will require that we incur substantial accounting expense and expend significant management efforts. We currently do not have an internal audit group, and we will need to hire additional accounting and financial staff with appropriate public company experience and technical accounting knowledge, and compile the system and process documentation necessary to perform the evaluation needed to comply with Section 404. We may not be able to complete our evaluation, testing and any required remediation in a timely fashion. During the evaluation and testing process, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. We cannot assure you that there will not be material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition, results of operations or cash flows. If we are unable to conclude that our internal control over financial reporting is effective, or if our independent registered public accounting firm determines we have a material weakness or significant deficiency in our internal control over financial reporting once that firm begin its Section 404 reviews, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of our common stock could decline, and we could be subject to

sanctions or investigations by the NASDAQ Stock Market, the SEC or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

If we are unable to successfully remediate the existing material weakness in our internal control over financial reporting, the accuracy and timing of our financial reporting may be adversely affected.

In connection with the audit of our consolidated financial statements for the year ended December 31, 2012, our management and independent registered public accounting firm identified control deficiencies in our internal control over financial reporting that together constitute a material weakness in our internal control over financial reporting. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our financial statements will not be prevented or detected on a timely basis. Our management and independent registered public accounting firm did not perform an evaluation of our internal control over financial reporting as of December 31, 2012 in accordance with the provisions of the Sarbanes-Oxley Act. Had we and our independent registered public accounting firm performed such an evaluation, additional control deficiencies may have been identified by management or our independent registered public accounting firm, and those control deficiencies could have also represented one or more material weaknesses.

Our management and independent registered public accounting firm identified a material weakness in our control over financial reporting attributable to the combination of our lack of sufficient financial reporting and accounting personnel with appropriate training in generally accepted accounting principles in the United States, or GAAP, and SEC rules and regulations with respect to financial reporting. As such, our controls over financial reporting were not designed or operating effectively, and as a result there were adjustments required in connection with closing our books and records and preparing our 2012 consolidated financial statements. The control deficiencies that we and our independent registered public accounting firm identified, and the adjustments recorded as a result, were as follows:

- We did not maintain effective controls over our accounting for our research and development expenses and as a result we recorded an adjustment to decrease accrued expenses by $810,000, decrease prepaid expenses by $212,000 and decrease research and development expenses by $598,000.

- We did not maintain effective controls over our accounting for our outstanding warrants to purchase shares of our preferred stock, including the accounting for warrant re-measurements and exercises, and as a result we recorded an adjustment to increase our warrant liability by $1.0 million, increase our preferred stock by $635,000 and increase the benefit from the change in the fair value of the warrant liability by $367,000.

- We did not maintain effective controls over our accounting for the beneficial conversion feature of our convertible promissory notes that were converted into Series I convertible preferred stock in 2012 and as a result we recorded an adjustment to increase interest expense by $8.2 million and increase additional paid-in capital by $8.2 million.

- We did not maintain effective controls over our accounting for our stock options pursuant to liability accounting and as a result we recorded an adjustment to increase stock option liabilities by $9.3 million, increase additional paid-in capital by $2.0 million, increase general and

administrative expenses by $5.8 million and increase research and development expenses by $5.5 million.

- We did not maintain effective controls over our accounting for the accretion of our preferred stock and as a result we recorded an adjustment to increase preferred stock by $204,000 and to decrease paid-in capital by $204,000.

These control deficiencies resulted in more than a remote likelihood that a material misstatement of our annual and interim financial statements would not be prevented or detected.

In an effort to remediate our material weakness, we have recently hired a Chief Financial Officer and a director of financial reporting. We intend to hire additional finance and accounting personnel with appropriate training, build our financial management and reporting infrastructure, and further develop and document our accounting policies and financial reporting procedures. There can be no assurance that we will be successful in pursuing these measures or that these measures will significantly improve or remediate the material weakness described above. There is also no assurance that we have identified all of our material weaknesses or that we will not in the future have additional material weaknesses. If we fail to remediate the material weakness or to meet the demands that will be placed upon us as a public company, including the requirements of the Sarbanes-Oxley Act, we may be unable to accurately report our financial results, or report them within the timeframes required by law or stock exchange regulations. Failure to comply with Section 404 of the Sarbanes-Oxley Act could also potentially subject us to sanctions or investigations by the SEC or other regulatory authorities. There is no assurance that we will be able to remediate the material weakness in a timely manner, or at all, or that in the future, additional material weaknesses will not exist or otherwise be discovered. If our efforts to remediate the material weakness identified are not successful, or if other material weaknesses or other deficiencies occur, our ability to accurately and timely report our financial position could be impaired, which could result in late filings of our annual and quarterly reports under the Exchange Act, restatements of our consolidated financial statements, a decline in our stock price, suspension or delisting of our common stock from the NASDAQ Global Market, and could adversely affect our reputation, results of operations and financial condition.

Our disclosure controls and procedures may not prevent or detect all errors or acts of fraud.

Upon consummation of this offering, we will become subject to the periodic reporting requirements of the Exchange Act. Our disclosure controls and procedures are designed to reasonably assure that information required to be disclosed by us in reports we file or submit under the Exchange Act is accumulated and communicated to management, recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures or internal controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met.

These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements or insufficient disclosures due to error or fraud may occur and not be detected.

We will incur increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives.

As a public company, we will incur significant legal, accounting and other expenses that we did not incur as a private company, and these expenses may increase even more after we are no longer an "emerging growth company." We will be subject to the reporting requirements of the Exchange Act,

the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Protection Act, as well as rules adopted, and to be adopted, by the SEC and NASDAQ Stock Market. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, we expect these rules and regulations to substantially increase our legal and financial compliance costs and to make some activities more time-consuming and costly. We estimate that we will incur approximately $2.0 to $3.0 million of incremental costs per year associated with being a publicly traded company, although it is possible that our actual incremental costs will be higher than we currently estimate. The increased costs will increase our consolidated net loss. For example, we expect these rules and regulations to make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to incur substantial costs to maintain the sufficient coverage. We cannot predict or estimate the amount or timing of additional costs we may incur to respond to these requirements. The impact of these requirements could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, our board committees or as executive officers.

Because we do not anticipate paying any cash dividends on our capital stock in the foreseeable future, capital appreciation, if any, will be your sole source of gain.

We have never declared or paid cash dividends on our capital stock. We currently intend to retain all of our future earnings, if any, to finance the growth and development of our business. In addition, the terms of any future debt agreements may preclude us from paying dividends. As a result, capital appreciation, if any, of our common stock will be your sole source of gain for the foreseeable future.

Sales of a substantial number of shares of our common stock in the public market could cause our stock price to fall.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. These sales, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock. After this offering, we will have outstanding shares of common stock based on the number of shares outstanding as of March 31, 2013. This includes the shares that we are selling in this offering, which may be resold in the public market immediately without restriction, unless purchased by our affiliates. Of the remaining shares, shares of our common stock, will be restricted as a result of securities laws or lock-up agreements but will be able to be sold after the offering as described in the "Shares Eligible for Future Sale" section of this prospectus. Moreover, after this offering, holders of an aggregate of shares of our common stock will have rights, subject to certain conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders. We also intend to register all shares of common stock that we may issue under our equity compensation plans. Once we register these shares, they can be freely sold in the public market upon issuance, subject to volume limitations applicable to affiliates and the lock-up agreements described in the "Underwriting" section of this prospectus.

Future sales and issuances of our common stock or rights to purchase common stock, including pursuant to our equity incentive plans, could result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to fall.

We expect that significant additional capital will be needed in the future to continue our planned operations. To raise capital, we may sell substantial amounts of common stock or securities convertible into or exchangeable for common stock. These future issuances of common stock or common stock-related securities, together with the exercise of outstanding options and any additional shares issued in connection with acquisitions, if any, may result in material dilution to our investors. Such sales may also result in material dilution to our existing stockholders, and new investors could gain rights, preferences

and privileges senior to those of holders of our common stock, including shares of common stock sold in this offering.

Pursuant to our equity incentive plans, our compensation committee is authorized to grant equity-based incentive awards to our directors, executive officers and other employees and service providers, including officers, employees and service providers of our subsidiaries and affiliates. The number of shares of our common stock available for future grant under our 2007 Equity Compensation Plan, which became effective on December 10, 2007, was 385,643 as of March 31, 2013. Future option grants and issuances of common stock under our 2007 Equity Compensation Plan may have an adverse effect on the market price of our common stock.

We have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Although we currently intend to use the net proceeds from this offering in the manner described in "Use of Proceeds" elsewhere in this prospectus, our management will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. The failure by our management to apply these funds effectively could result in financial losses that could have a material adverse effect on our business, cause the market price of our common stock to decline and delay the development of our product candidates. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value. If we do not invest the net proceeds from this offering in ways that enhance stockholder value, we may fail to achieve expected financial results, which could cause the price of our common stock to decline.

Some provisions of our charter documents and Delaware law may have anti-takeover effects that could discourage an acquisition of us by others, even if an acquisition would be beneficial to our stockholders and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our tenth amended and restated certificate of incorporation, or certificate of incorporation, and amended and restated bylaws, or bylaws, that will become effective in connection with consummation of this offering, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us or increase the cost of acquiring us, even if doing so would benefit our stockholders, or remove our current management. These include provisions that will:

- permit our board of directors to issue up to shares of preferred stock, with any rights, preferences and privileges as they may designate;
- provide that all vacancies on our board of directors, including as a result of newly created directorships, may, except as otherwise required by law, be filled by the affirmative vote of a majority of directors then in office, even if less than a quorum;
- require that any action to be taken by our stockholders must be effected at a duly called annual or special meeting of stockholders and not be taken by written consent;
- provide that stockholders seeking to present proposals before a meeting of stockholders or to nominate candidates for election as directors at a meeting of stockholders must provide advance notice in writing, and also specify requirements as to the form and content of a stockholder's notice;
- not provide for cumulative voting rights, thereby allowing the holders of a majority of the shares of common stock entitled to vote in any election of directors to elect all of the directors standing for election; and

- provide that special meetings of our stockholders may be called only by the board of directors or by such person or persons requested by a majority of the board of directors to call such meetings.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, who are responsible for appointing the members of our management. Because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which may discourage, delay or prevent someone from acquiring us or merging with us whether or not it is desired by or beneficial to our stockholders. Under Delaware law, a corporation may not, in general, engage in a business combination with any holder of 15% or more of its capital stock unless the holder has held the stock for three years or, among other things, the board of directors has approved the transaction. Any provision of our amended and restated certificate of incorporation or amended and restated bylaws or Delaware law that has the effect of delaying or deterring a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock, and could also affect the price that some investors are willing to pay for our common stock.

If securities or industry analysts do not publish research or publish inaccurate or unfavorable research about our business, our stock price and trading volume could decline.

The trading market for our common stock will depend in part on the research and reports that securities or industry analysts publish about us or our business. Securities and industry analysts do not currently, and may never, publish research on our company. If no securities or industry analysts commence coverage of our company, the trading price for our stock would likely be negatively impacted. In the event securities or industry analysts initiate coverage, if one or more of the analysts who cover us downgrade our stock or publish inaccurate or unfavorable research about our business, our stock price would likely decline. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, demand for our stock could decrease, which might cause our stock price and trading volume to decline.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS AND INDUSTRY DATA

This prospectus includes forward-looking statements. We may, in some cases, use terms such as "believes," "estimates," "anticipates," "expects," "plans," "intends," "may," "could," "might," "will," "should," "approximately" or other words that convey uncertainty of future events or outcomes to identify these forward-looking statements. Forward-looking statements appear in a number of places throughout this prospectus and include statements regarding our intentions, beliefs, projections, outlook, analyses or current expectations concerning, among other things, our ongoing and planned preclinical development and clinical trials, the timing of and our ability to make regulatory filings and obtain and maintain regulatory approvals for our product candidates, our intellectual property position, the degree of clinical utility of our products, particularly in specific patient populations, our ability to develop commercial functions, expectations regarding clinical trial data, our results of operations, cash needs, spending of the proceeds from this offering, financial condition, liquidity, prospects, growth and strategies, the industry in which we operate and the trends that may affect the industry or us.

By their nature, forward-looking statements involve risks and uncertainties because they relate to events, competitive dynamics and industry change, and depend on the economic circumstances that may or may not occur in the future or may occur on longer or shorter timelines than anticipated. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus, we caution you that forward-looking statements are not guarantees of future performance and that our actual results of operations, financial condition and liquidity, and the development of the industry in which we operate may differ materially from the forward-looking statements contained in this prospectus. In addition, even if our results of operations, financial condition and liquidity, and events in the industry in which we operate are consistent with the forward-looking statements contained in this prospectus, they may not be predictive of results or developments in future periods.

Actual results could differ materially from our forward-looking statements due to a number of factors, including risks related to:

- our estimates regarding expenses, future revenues, capital requirements and needs for additional financing;
- the success and timing of our preclinical studies and clinical trials;
- the difficulties in obtaining and maintaining regulatory approval of our product candidates, and the labeling under any approval we may obtain;
- our plans and ability to develop and commercialize our product candidates;
- our failure to recruit or retain key scientific or management personnel or to retain our executive officers;
- the size and growth of the potential markets for our product candidates and our ability to serve those markets;
- regulatory developments in the United States and foreign countries;
- the rate and degree of market acceptance of any of our product candidates;
- our use of the proceeds from this offering;
- obtaining and maintaining intellectual property protection for our product candidates and our proprietary technology;
- the successful development of our commercialization capabilities, including sales and marketing capabilities;
- recently enacted and future legislation regarding the healthcare system;

- the success of competing therapies and products that are or become available; and
- the performance of third parties, including CROs and third-party manufacturers.

Any forward-looking statements that we make in this prospectus speak only as of the date of such statement, and we undertake no obligation to update such statements to reflect events or circumstances after the date of this prospectus or to reflect the occurrence of unanticipated events. Comparisons of results for current and any prior periods are not intended to express any future trends or indications of future performance, unless expressed as such, and should only be viewed as historical data.

You should also read carefully the factors described in the "Risk Factors" section of this prospectus and elsewhere to better understand the risks and uncertainties inherent in our business and underlying any forward-looking statements. As a result of these factors, we cannot assure you that the forward-looking statements in this prospectus will prove to be accurate. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified timeframe, or at all. The Private Securities Litigation Reform Act of 1995 and Section 27A of the Securities Act do not protect any forward-looking statements that we make in connection with this offering.

We obtained the industry, market and competitive position data in this prospectus from our own internal estimates and research as well as from industry and general publications and research surveys and studies conducted by third parties. Industry publications and surveys generally state that the information contained therein has been obtained from sources believed to be reliable. We believe this data is accurate in all material respects as of the date of this prospectus.

USE OF PROCEEDS

We estimate that our net proceeds from the sale of the shares of common stock in this offering will be approximately $ million, assuming an initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering costs payable by us. If the underwriters exercise their over-allotment option in full, we estimate that our net proceeds from this offering will be approximately $ million.

We intend to use our net proceeds from this offering for the overall development of our product candidates. We currently estimate that we will use approximately $ million of the net proceeds from this offering to fund the clinical development of rigosertib and approximately $ to fund the development of our other clinical and preclinical programs. The balance will be used for working capital and general corporate purposes. Pending the application of the net proceeds as described above, we intend to invest the net proceeds of the offering in short-term, investment-grade, interest-bearing securities.

Our management will have broad discretion to allocate the net proceeds to us from this offering and investors will be relying on the judgment of our management regarding the application of the proceeds from this offering. We reserve the right to change the use of these proceeds as a result of certain contingencies such as competitive developments, the results of our commercialization efforts and investment opportunities and other factors.

A $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, would increase or decrease our net proceeds from this offering by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions. Each increase or decrease of 1.0 million shares in the number of shares offered by us at the assumed initial public offering price would increase or decrease the net proceeds to us in this offering by approximately $ million. We do not expect that a change in the offering price or the number of shares by these amounts would have a material effect on our uses of the proceeds from this offering, although it might affect the amount of time prior to which we will need to seek additional capital.

DIVIDEND POLICY

We have never declared or paid any cash dividends on our capital stock. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business. We do not intend to pay cash dividends on our common stock for the foreseeable future.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and capitalization as of March 31, 2013:

- on an actual basis;
- on a pro forma basis to give effect to the conversion of all outstanding shares of our preferred stock into 17,113,481 shares of our common stock, which will occur immediately prior to consummation of this offering; and
- on a pro forma as adjusted basis to additionally give effect to the sale of shares of our common stock in this offering, assuming an initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

You should read the information in this table together with our consolidated financial statements and accompanying notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations" appearing elsewhere in this prospectus.

	As of March 31, 2013		
	Actual	Pro Forma	Pro Forma As Adjusted
Cash and cash equivalents	$ 67,307,000	$ 67,307,000	$
Preferred stock, $0.01 par value per share:			
Series A convertible preferred stock: 400,000 shares authorized, 107,000 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	$ 535,000	$ —	$ —
Series B convertible preferred stock: 1,200,000 shares authorized, 1,107,189 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	12,733,000	—	—
Series C convertible preferred stock: 1,200,000 shares authorized, 1,069,946 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	7,618,000	—	—
Series D convertible preferred stock: 1,625,000 shares authorized, 1,583,568 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	18,211,000	—	—
Series E convertible preferred stock: 1,650,000 shares authorized, 1,633,082 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	18,780,000	—	—
Series F convertible preferred stock: 2,000,000 shares authorized, 2,000,000 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	23,000,000	—	—

	As of March 31, 2013		
	Actual	Pro Forma	Pro Forma As Adjusted
Series G convertible preferred stock: 2,700,000 shares authorized, 1,934,359 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	22,819,000	—	—
Series H convertible preferred stock: 2,042,950 shares authorized, 2,013,424 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	22,385,000	—	—
Series I convertible preferred stock: 2,700,000 shares authorized, 2,433,328 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	27,033,000	—	—
Series J convertible preferred stock: 3,030,303 shares authorized, 3,030,303 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	49,220,000	—	—
Total preferred stock	202,334,000	—	—
Stockholders' (deficit) equity:			
Common stock, $0.01 par value per share: 30,145,155 shares authorized, 3,478,473 shares issued and outstanding, actual; 30,145,155 shares authorized, 20,591,954 shares issued and outstanding, pro forma; and shares authorized, shares issued and outstanding, pro forma as adjusted	35,000	206,000	
Additional paid-in capital	9,044,000	211,207,000	
Accumulated other comprehensive income	7,000	7,000	7,000
Accumulated deficit	(183,205,000)	(183,205,000)	
Total stockholders' (deficit) equity	(174,119,000)	28,215,000	
Total capitalization	$ (174,119,000)	$ 28,215,000	$

The number of shares of common stock to be outstanding after this offering is based on 20,591,954 shares of common stock outstanding as of March 31, 2013, and excludes as of that date:

- 6,128 shares of common stock issuable upon exercise of warrants, with an exercise price of $9.79 per share;
- 3,722,188 shares of common stock issuable upon exercise of options under our 2007 Equity Compensation Plan, with a weighted average exercise price of $6.41 per share; and
- 385,643 shares of common stock reserved for future issuances under our 2007 Equity Compensation Plan.

DILUTION

If you invest in our common stock in this offering, your ownership interest will be diluted to the extent of the difference between the initial public offering price per share of our common stock and the pro forma as adjusted net tangible book value per share of our common stock upon consummation of this offering. The historical net tangible book value (deficit) of our common stock as of March 31, 2013 was $(174.1) million, or $(50.06) per share. Historical net tangible book value (deficit) per share is determined by dividing the number of our outstanding shares of common stock into our total tangible assets (total assets less intangible assets) less total liabilities.

On a pro forma basis, after giving effect to the conversion of all outstanding shares of our preferred stock into 17,113,481 shares of our common stock immediately prior to consummation of this offering, our net tangible book value at March 31, 2013 would have been $28.2 million, or $1.37 per share.

Investors purchasing in this offering will incur immediate and substantial dilution. After giving effect to the sale of common stock offered in this offering assuming an initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering costs payable by us, our pro forma as adjusted net tangible book value as of December 31, 2012 would have been $ million, or $ per share. This represents an immediate increase in pro forma net tangible book value of $ share to existing stockholders, and an immediate dilution in the pro forma net tangible book value of $ per share to investors purchasing in this offering. The following table illustrates this per share dilution:

Assumed initial public offering price per share		$
Historical net tangible book value (deficit) per share as of March 31, 2013	$ (50.06)	
Pro forma increase in net tangible book value per share attributable to the conversion of all outstanding shares of our preferred stock into 17,113,481 shares of our common stock immediately prior to consummation of this offering	51.43	
Pro forma net tangible book value per share March 31, 2013	1.37	
Increase in pro forma net tangible book value per share attributable to investors purchasing in this offering		
Pro forma as adjusted net tangible book value per share after this offering		
Dilution per share to investors purchasing in this offering		$

The following table summarizes, on the pro forma as adjusted basis described above as of March 31, 2013, the differences between the number of shares of common stock purchased from us, the total consideration paid and the average price per share paid by existing stockholders and by investors purchasing in this offering at an assumed initial public offering price of $ per share, before deducting estimated underwriting discounts and commissions and estimated offering costs payable by us.

	Shares Purchased		Total Consideration		Average Price Per Share
	Number	Percent	Amount	Percent	
Existing stockholders before this offering		%	$	%	$
Investors purchasing in this offering					
Total		100.0%	$	100.0%	

A $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, would increase or decrease the pro forma as adjusted net tangible book value per share by $, assuming the number of shares of common stock offered by us, as set forth on the cover page of this prospectus,

remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each increase or decrease of 1.0 million shares in the number of shares of common stock offered by us at the assumed public offering price would increase or decrease our pro forma as adjusted net tangible book value by $ million, our pro forma as adjusted net tangible book value per share after this offering by $ per share and the dilution per share to new investors in this offering by $.

Except as otherwise indicated, the discussion and tables above assume no exercise of the underwriters' over-allotment option and no exercise of any outstanding options or warrants. If the underwriters' over-allotment option is exercised in full, the number of shares of common stock held by existing stockholders will be reduced to % of the total number of shares of common stock to be outstanding upon consummation of this offering, and the number of shares of common stock held by investors purchasing in this offering will be increased to shares or % of the total number of shares of common stock to be outstanding upon consummation of this offering.

As of March 31, 2013, there were 3,722,188 shares of common stock issuable upon exercise of options under the 2007 Equity Compensation Plan, with a weighted average exercise price of $6.41 per share, and an aggregate of 385,643 shares of common stock were reserved for future issuance under our 2007 Equity Compensation Plan. As of March 31, 2013, there were 6,128 shares of common stock issuable upon exercise of warrants, with an exercise price of $9.79 per share. We may choose to raise additional capital through the sale of equity or convertible debt securities due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that any of these options or warrants are exercised, new options are issued under our 2007 Equity Compensation Plan or we issue additional shares of common stock or other equity securities in the future, there will be further dilution to investors purchasing in this offering.

SELECTED CONSOLIDATED FINANCIAL DATA

The following selected consolidated financial data should be read together with our consolidated financial statements and accompanying notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations" appearing elsewhere in this prospectus.

We have derived the following statement of operations data for the years ended December 31, 2011 and 2012 and balance sheet data as of December 31, 2012 from our audited consolidated financial statements included elsewhere in this prospectus. We have derived the following statement of operations data for the three months ended March 31, 2012 and 2013 and balance sheet data as of March 31, 2013 from our unaudited condensed consolidated financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of the results that may be expected in the future, and our interim period results are not necessarily indicative of results to be expected for a full year or any other interim period.

	Year Ended December 31,		Three Months Ended March 31,	
	2011	2012	2012	2013
Consolidated Statement of Operations Data:				
Revenue	$ 1,487,000	$ 46,190,000	$ 198,000	$ 1,116,000
Operating expenses:				
General and administrative	6,436,000	15,707,000	2,460,000	3,346,000
Research and development	22,624,000	52,762,000	8,448,000	12,756,000
Total operating expenses	29,060,000	68,469,000	10,908,000	16,102,000
Loss from operations	(27,573,000)	(22,279,000)	(10,710,000)	(14,986,000)
Change in fair value of warrant liability	1,287,000	367,000	(609,000)	14,000
Interest expense	(19,000)	(8,608,000)	(21,000)	—
Other income, net	11,000	608,000	541,000	127,000
Net loss before income taxes expense	(26,294,000)	(29,912,000)	(10,799,000)	(14,845,000)
Income taxes	—	—	—	—
Net loss	(26,294,000)	(29,912,000)	(10,799,000)	(14,845,000)
Accretion of preferred stock	(4,020,000)	(3,953,000)	(1,231,000)	(1,019,000)
Net loss applicable to common stockholders	$ (30,314,000)	$ (33,865,000)	$ (12,030,000)	$ (15,864,000)
Per share information:				
Net loss per share of common stock, basic and diluted(1)	$ (10.64)	$ (11.51)	$ (4.15)	$ (4.56)
Basic and diluted weighted average shares outstanding(1)	2,849,159	2,941,782	2,897,347	3,475,673
Pro forma net loss per share of common stock, basic and diluted(1)		$ (2.01)		$ (0.77)
Basic and diluted pro forma weighted average shares outstanding(1)		16,887,329		20,589,154

	As of December 31, 2012	As of March 31, 2013
Consolidated Balance Sheet Data:		
Cash and cash equivalents	$ 81,527,000	$ 67,307,000
Total assets	83,852,000	70,759,000
Total liabilities	40,843,000	42,544,000
Accumulated deficit	(168,360,000)	(183,205,000)
Total stockholders' deficit	(158,306,000)	(174,119,000)

(1) See Note 2 to our consolidated financial statements for an explanation of the method used to calculate net loss per share of common stock, basic and diluted, pro forma net loss per share of common stock, basic and diluted, and the basic and diluted pro forma weighted average shares outstanding used to calculate the pro forma per share amounts.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and related notes appearing in this prospectus. Some of the information contained in this discussion and analysis or set forth elsewhere in this prospectus, including information with respect to our plans and strategy for our business and related financing, includes forward looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the "Risk Factors" section of this prospectus, our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule drug candidates to treat cancer. Using our proprietary chemistry platform, we have created an extensive library of targeted anti-cancer agents designed to work against specific cellular pathways that promote cancer. We believe that the drug candidates in our pipeline have the potential to be efficacious in a wide variety of cancers without causing harm to normal cells. We have three clinical-stage product candidates and six preclinical programs.

Rigosertib, our most advanced product candidate, is being tested in a number of ongoing Phase 2 and Phase 3 clinical trials. We are conducting a pivotal Phase 3 trial of rigosertib under an SPA from the FDA for higher risk myelodysplastic syndromes, or MDS. We expect to report top-line overall survival results from this trial in the fourth quarter of 2013 or the first quarter of 2014. We are also evaluating rigosertib in a Phase 3 trial for metastatic pancreatic cancer, in two Phase 2 trials for transfusion-dependant lower risk MDS, and in a Phase 2 trial for head and neck cancers. Baxter has commercialization rights for rigosertib in Europe and SymBio has commercialization rights in Japan and Korea. We have retained development and commercialization rights to rigosertib in the rest of the world, including in the United States.

Our second clinical-stage product candidate, ON 013105, is in a Phase 1 trial in patients with relapsed or refractory lymphoma, including an aggressive form of non-Hodgkin's lymphoma known as mantle cell lymphoma, or MCL, and acute lymphoid leukemia, or ALL. We have suspended enrollment in this Phase 1 trial; however, we plan to restart its enrollment in the fourth quarter of 2013.

Our third clinical-stage product candidate, recilisib, is being developed in collaboration with the U.S. Department of Defense for acute radiation syndromes. We have conducted animal studies and clinical trials of recilisib under the FDA's Animal Efficacy Rule, which permits marketing approval for new medical countermeasures for which human efficacy studies are not feasible or ethical, by relying on evidence from animal studies in appropriate animal models to support efficacy in humans. We have completed four Phase 1 trials to evaluate the safety and pharmacokinetics of recilisib in healthy human adult subjects using both subcutaneous and oral formulations.

In addition to our three clinical-stage product candidates, we are advancing six preclinical programs that target kinases, cellular metabolism or division. We intend to explore additional collaborations to further the development of these product candidates as we focus internally on our more advanced programs.

We were incorporated in Delaware in December 1998 and commenced operations in January 1999. Our operations to date have included our organization and staffing, business planning, raising capital, in-licensing technology from research institutions, identifying potential product candidates, developing product candidates and building strategic alliances, as well as undertaking preclinical studies and clinical trials of our product candidates.

Since commencing operations we have dedicated a significant portion of our resources to our development efforts for our clinical-stage product candidates, particularly rigosertib. We incurred research and development expenses of $22.6 million and $52.8 million during the years ended December 31, 2011 and 2012, respectively, and $12.8 million during the three months ended March 31, 2013. We anticipate that a significant portion of our operating expenses will continue to be related to research and development as we continue to advance our preclinical programs and our clinical-stage product candidates. We have funded our operations primarily through the sale of preferred stock amounting to $144.7 million, including $50.0 million that Baxter invested in our preferred stock in 2012, as well as proceeds from the issuance of convertible debt and a stockholder loan amounting to $26.8 million in the aggregate, all of which was later converted into shares of our preferred stock, and upfront payments of $7.5 million from SymBio and $50.0 million from Baxter in connection with our collaboration agreements. We have also received an aggregate of $8.0 million from LLS under a funding agreement. Under our collaboration agreements with Baxter and SymBio, we are also eligible to receive an aggregate of up to $545.5 million upon the achievement of specified development and regulatory milestones and up to $280.0 million upon the achievement of specified commercialization milestones, as well as tiered royalties, at percentage rates ranging from the low-teens to low-twenties, on any future net sales of products resulting from these collaborations. As of December 31, 2012 and March 31, 2013, we had $81.5 million and $67.3 million in cash and cash equivalents, respectively.

Our net losses were $26.3 million and $29.9 million for the years ended December 31, 2011 and 2012, respectively, and $14.8 million for the three months ended March 31, 2013. We recognized revenues of $1.5 million and $46.2 million for the years ended December 31, 2011 and 2012, respectively, and $1.1 million for the three months ended March 31, 2013. As of March 31, 2013, we had an accumulated deficit of $183.2 million. We expect to incur significant expenses and operating losses for the foreseeable future as we continue the development and clinical trials of, and seek regulatory approval for, our product candidates, even as milestones under our license and collaboration agreements may be met. If we obtain regulatory approval for any of our product candidates, we expect to incur significant commercialization expenses. We do not currently have an organization for the sales, marketing and distribution of pharmaceutical products. We may rely on licensing and co-promotion agreements with strategic or collaborative partners for the commercialization of our products in the United States and other territories. If we choose to build a commercial infrastructure to support marketing in the United States for any of our product candidates that achieve regulatory approval, such commercial infrastructure could be expected to include a targeted, oncology sales force supported by sales management, internal sales support, an internal marketing group and distribution support. To develop the appropriate commercial infrastructure internally, we would have to invest financial and management resources, some of which would have to be deployed prior to having any certainty about marketing approval.

Furthermore, following consummation of this offering, we expect to incur additional costs associated with operating as a public company. Accordingly, we will seek to fund our operations primarily through public or private equity or debt financings or other sources. Other additional financing may not be available to us on acceptable terms, or at all. Our failure to raise capital as and when needed could have a material adverse effect on our financial condition and our ability to pursue our business strategy.

Collaboration Agreements

Baxter Healthcare SA

In September 2012, we entered into a development and license agreement with Baxter, granting Baxter an exclusive, royalty-bearing license for the research, development, commercialization and manufacture (in specified instances) of rigosertib in all therapeutic indications in Europe. Under the Baxter agreement, we are obligated to use commercially reasonable efforts to, in accordance with a development plan agreed upon by the parties, direct, coordinate and manage the development of

rigosertib for MDS and pancreatic cancer. Under the agreement, if after a specified development event we elect not to move forward with the development of rigosertib for pancreatic cancer, Baxter may, at its own expense, develop rigosertib for pancreatic cancer on its own for the purposes of obtaining marketing approval. In addition, there is a specified mechanism set forth in the agreement to expand the scope of the collaboration for additional indications. Our agreement with Baxter is guided by a joint steering committee. If the joint steering committee is not able to make a decision by consensus, then any dispute would be resolved by specified executive officers of both parties.

Under the terms of the agreement, Baxter made an upfront payment of $50.0 million. We are eligible to receive pre-commercial milestone payments of up to an aggregate of $512.5 million if specified development and regulatory milestones are achieved. The potential pre-commercial development milestone payments to us include the following:

- $50.0 million for successful completion of a Phase 3 clinical trial for rigosertib IV in higher risk MDS patients;
- $25.0 million for each of the two joint decisions to proceed with the development of rigosertib for certain indications specified in the arrangement with Baxter; and
- $25.0 million for each drug approval application filed for indications specified in the arrangement with Baxter.

We may also receive up to $337.5 million in milestone payments for regulatory approvals of the three rigosertib indications specified in the arrangement with Baxter, each of which may be up to and in excess of $100.0 million. We are also potentially eligible to receive an additional $20.0 million pre-commercial milestone payment related to the timing of regulatory approval of rigosertib IV in higher risk MDS patients in Europe. In addition to these pre-commercial milestones, we are eligible to receive up to an aggregate of $250.0 million in milestone payments based on Baxter's achievement of pre-specified threshold levels of annual net sales of rigosertib. We are also entitled to receive royalties at percentage rates ranging from the low-teens to the low-twenties on net sales of rigosertib by Baxter in the licensed territory. In July 2012, Baxter also purchased $50.0 million of our Series J convertible preferred stock.

SymBio Pharmaceuticals Limited

In July 2011, we entered into a license agreement with SymBio, as subsequently amended, granting SymBio an exclusive, royalty-bearing license for the development and commercialization of rigosertib in Japan and Korea. Under the SymBio license agreement, SymBio is obligated to use commercially reasonable efforts to develop and obtain market approval for rigosertib inside the licensed territory and we have similar obligations outside of the licensed territory. We have also entered into an agreement with SymBio providing for us to supply them with development-stage product. Under the SymBio license agreement, we also agreed to supply commercial product to SymBio under specified terms that will be included in a commercial supply agreement to be negotiated prior to first commercial sale of rigosertib. We have also granted SymBio a right of first negotiation to license or obtain the rights to develop and commercialize compounds having a chemical structure similar to rigosertib in the licensed territory.

Under the terms of the SymBio license agreement, we received an upfront payment of $7.5 million. We are eligible to receive milestone payments of up to an aggregate of $33.0 million from SymBio upon the achievement of specified development and regulatory milestones for specified indications. Of the development milestones, $3.0 million is due after enrollment of the first patient in the event a decision is made, after our interim analysis, to start a Phase 3 clinical trial of rigosertib IV in combination with gemcitabine for pancreatic cancer patients in the United States. Of the regulatory milestones, $5.0 million is due upon receipt of marketing approval in the United States for rigosertib IV in higher risk MDS patients, $3.0 million is due upon receipt of marketing approval in Japan for

rigosertib IV in higher risk MDS patients, $5.0 million is due upon receipt of marketing approval in the United States for rigosertib Oral in lower risk MDS patients, $5.0 million is due upon receipt of marketing approval in Japan for rigosertib Oral in lower risk MDS patients, $5.0 million is due upon receipt of marketing approval in the United States for rigosertib IV in combination with gemcitabine in pancreatic cancer patients, and $3.0 million is due upon receipt of marketing approval in Japan for rigosertib IV in combination with gemcitabine in pancreatic cancer patients. Furthermore, upon receipt of marketing approval in the United States and Japan for an additional specified indication of rigosertib, which we are currently not pursuing, an aggregate of $4.0 million would be due. In addition to these pre-commercial milestones, we are eligible to receive tiered milestone payments of up to an aggregate of $30.0 million based upon annual net sales of rigosertib by SymBio in the licensed territory. Further, under the terms of the SymBio license agreement, SymBio is obligated to make royalty payments to us at percentage rates ranging from the mid-teens to 20% based on net sales of rigosertib by SymBio in the licensed territory.

The Leukemia and Lymphoma Society

In May 2010, we entered into a funding agreement with LLS to fund the development of rigosertib. Under the LLS funding agreement, we are obligated to use the funding received exclusively for the payment or reimbursement of the costs and expenses for clinical development activities for rigosertib. Under this agreement, we retain ownership and control of all intellectual property pertaining to works of authorship, inventions, know-how, information, data and proprietary material.

Under the LLS funding agreement, as amended, we received funding of $8.0 million from LLS through 2012. We have not received any funding in 2013 and we terminated the funding agreement effective as of March 2013. We are required to make specified payments to LLS, including payments payable upon execution of the first out-license; first approval for marketing by a regulatory body; completion of the first commercial sale of rigosertib; and achieving specified annual net sales levels of rigosertib. The extent of these payments and our obligations will depend on whether we out-license rights to develop or commercialize rigosertib to a third party, we commercialize rigosertib on our own or we combine with or are sold to another company. In addition, we will pay to LLS a single-digit percentage royalty of our net sales of rigosertib, if any. The sum of our payments to LLS is capped at three times the total funding received from LLS, or $24.0 million.

Financial Overview

Revenue

To date, we have derived revenue principally from activities pursuant to our collaboration arrangements with Baxter and SymBio as well as from grants and research agreements. The following table sets forth a summary of revenue recognized from our collaboration agreements and research agreements for the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2012 and 2013:

	Year Ended December 31,	
	2011	2012
Baxter license and collaboration revenue	$ —	$ 45,490,000
SymBio license and collaboration revenue	227,000	503,000
Research funding	1,260,000	197,000
	$ 1,487,000	$ 46,190,000

	Three Months Ended March 31,	
	2012	2013
Baxter license and collaboration revenue	$ —	$ 978,000
SymBio license and collaboration revenue	113,000	138,000
Research funding	85,000	—
	$ 198,000	$ 1,116,000

We have not generated any revenue from commercial product sales. In the future, if any of our product candidates currently under development are approved for commercial sale in the United States and Canada, we may generate revenue from product sales, or alternatively, we may choose to select a collaborator to commercialize our product candidates in these markets.

The Baxter collaboration agreement is considered to be a multiple-element arrangement for accounting purposes. We determined that there are two deliverables under the Baxter agreement; specifically, the license to rigosertib for Europe and the related research and development services that we are obligated to provide. We concluded that $42.4 million of the fixed and determinable $50.0 million upfront payment was associated with the license and $7.6 million was associated with the research and development services. We recognized the entire $42.4 million associated with the upfront license as revenue during the third quarter of 2012 upon the execution of the Baxter agreement, and we are recognizing the research and development services revenue of $7.6 million on the proportional performance method over the period of commitment and development, which we estimate to be through March 31, 2014, the period of our non-contingent obligations to perform research and development services sufficient to advance rigosertib. For the year ended December 31, 2012 and for the three months ended March 31, 2013, we recognized $3.1 million and $1.0 million, respectively, of research and development services revenue under the Baxter agreement.

The SymBio collaboration agreement is also considered to be a multiple-element arrangement for accounting purposes. We determined that there were three deliverables under the SymBio collaboration agreement; specifically, the license to rigosertib for Japan and Korea, our obligation to perform research and development services necessary for SymBio to seek approval in its territory and our obligation to participate on a joint steering committee. We concluded that these deliverables should be accounted for as a single unit of accounting. We determined that the $7.5 million upfront payment received in 2011 should be deferred and recognized as revenue on a straight-line basis through December 2027, reflecting our estimate of when we will complete our obligations under the agreement. For the years ended December 31, 2011 and 2012, we recognized revenues of $227,000 and $455,000, respectively, under the SymBio collaboration agreement. In addition, we recognized revenues of $48,000 for the year ended December 31, 2012 related to the supply agreement with SymBio. For the three months ended March 31, 2013, we recognized revenues of $113,000 under the SymBio collaboration agreement. In addition, we recognized revenues of $25,000 for the three months ended March 31, 2013 related to the supply agreement with SymBio.

The remaining revenue recognized during the years ended December 31, 2011 and 2012 of $1,260,000 and $197,000, respectively, pertained to research and development services provided under research grants.

Pursuant to our funding agreement with LLS, during the year ended December 31, 2012, we paid $1.0 million to LLS, which we recorded as research and development expenses. This payment reduced the maximum milestone and royalty payment obligation under this agreement to $23.0 million at December 31, 2012.

In addition, some of our obligations under the LLS funding agreement will remain in effect until the completion of specified milestones and payments to LLS. Assuming the successful outcome of the development activities covered by the LLS funding agreement and our receipt of necessary regulatory

approvals, we will be required to take commercially reasonable steps through March 2018 to advance the development of rigosertib in clinical trials and to bring rigosertib to practical application for MDS in a major market country, provided that we believe the product is safe and effective. We believe that we can satisfy our obligation by out-licensing rigosertib to, or partnering rigosertib with, a third party. We are required to report to LLS on our efforts and results with respect to continuing development of rigosertib. Our failure to perform these diligence obligations, even if we successfully achieve the specified development milestones, would require us to pay back to LLS the total amount of the funding we received from them, unless an exception applies. If LLS were to claim that such failure occurred and we disagreed with such claim, the dispute would be settled through binding arbitration.

As a result of the potential obligation to pay back to LLS the total amount of funding received under this arrangement, the $8.0 million of milestone payments we received through March 31, 2013 has been recorded as deferred revenue.

Preclinical Collaboration

We recently entered into a joint venture with GVK Biosciences Private Limited, or GVK, a CRO based in India, to collaborate on the development of two of our preclinical programs. GVK will initially make a capital contribution of $500,000 in exchange for a 10% interest in the joint venture and we will contribute a sub-license to the intellectual property related to the two programs in exchange for a 90% interest. GVK will be required to make additional capital contributions over time, subject to specified conditions, and its interest in the joint venture will increase to as much as 50%. At specified times, we will be entitled to buy back from GVK the rights to either of these two programs.

We currently anticipate that the joint venture will be consolidated in our financial statements, which means that we will include its assets and liabilities in our balance sheets and its expenses in our statements of operations. We do not expect the consolidation of the joint venture will initially have a material affect on our consolidated financial position or results of operations.

Operating Expenses

The following table summarizes our operating expenses for the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2012 and 2013:

	Year Ended December 31,	
	2011	2012
General and administrative	$ 6,436,000	$ 15,707,000
Research and development	22,624,000	52,762,000
Total operating expenses	$ 29,060,000	$ 68,469,000

	Three Months Ended March 31,	
	2012	2013
General and administrative	$ 2,460,000	$ 3,346,000
Research and development	8,448,000	12,756,000
Total operating expenses	$ 10,908,000	$ 16,102,000

General and Administrative Expenses

General and administrative expenses consist principally of salaries and related costs for executive and other administrative personnel, including stock-based compensation and travel expenses. Other general and administrative expenses include facility-related costs, communication expenses and professional fees for legal, patent review, consulting and accounting services.

For the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2012 and 2013, our general and administrative expenses totaled approximately $6.4 million, $15.7 million, $2.5 million and $3.3 million, respectively. We anticipate that our general and administrative expenses will increase in the future with the continued research and development and potential commercialization of our product candidates and as we operate as a public company. These increases will likely include increased costs for insurance, costs related to the hiring of additional personnel and payments to outside consultants, investor relations, lawyers and accountants, among other expenses. Additionally, if and when we believe a regulatory approval of a product candidate appears likely, we anticipate an increase in payroll and expense as a result of our preparation for commercial operations, especially as it relates to the sales and marketing of our product candidates.

Research and Development Expenses

Our research and development expenses consist primarily of costs incurred for the development of our product candidates, which include:

- employee-related expenses, including salaries, benefits, travel and stock-based compensation expense;
- expenses incurred under agreements with CROs and investigative sites that conduct our clinical trials and preclinical studies;
- the cost of acquiring, developing and manufacturing clinical trial materials;
- facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities, insurance and other supplies; and
- costs associated with preclinical activities and regulatory operations.

Research and development costs are expensed as incurred. License fees and milestone payments we make related to in-licensed products and technology are expensed if it is determined that they have no alternative future use. We record costs for some development activities, such as clinical trials, based on an evaluation of the progress to completion of specific tasks using data such as patient enrollment, clinical site activations or information provided to us by our vendors.

Research and development activities are central to our business model. Product candidates in later stages of clinical development generally have higher development costs than those in earlier stages of clinical development, primarily due to the increased size and duration of later-stage clinical trials. We plan to increase our research and development expenses for the foreseeable future.

To date, our research and development expenses have related primarily to the development of rigosertib. In the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2012 and 2013, we recorded approximately $22.6 million, $52.8 million, $8.4 million and $12.8 million, respectively, of research and development expenses. We do not currently utilize a formal time allocation system to capture expenses on a project-by-project basis because we are organized and record expense by functional department and our employees may allocate time to more than one development project. Accordingly, we do not allocate expenses to individual projects or product candidates, although we do allocate some portion of our research and development expenses by functional area and by compound, as shown below.

The following table summarizes our research and development expenses by functional area for the years ended December 31, 2011 and 2012:

	Year Ended December 31,	
	2011	2012
Clinical development	$ 10,926,000	$ 19,285,000
Personnel related	4,020,000	4,876,000
Consulting fees	1,949,000	3,422,000
Milestone payments	1,875,000	13,500,000
Manufacturing and formulation	1,584,000	1,752,000
Institutional research	1,234,000	1,417,000
Pre-clinical research	667,000	1,672,000
Laboratory costs	366,000	193,000
Stock-based compensation	3,000	6,645,000
	$ 22,624,000	$ 52,762,000

The following table summarizes our research and development expenses by functional area for the three months ended March 31, 2012 and 2013:

	Three Months Ended March 31,	
	2012	2013
Clinical development	$ 4,194,000	$ 6,831,000
Personnel related	1,193,000	1,882,000
Consulting fees	809,000	1,496,000
Manufacturing and formulation	624,000	152,000
Institutional research	255,000	359,000
Pre-clinical research	145,000	835,000
Laboratory costs	58,000	43,000
Stock-based compensation	1,170,000	1,158,000
	$ 8,448,000	$ 12,756,000

The following table summarizes our research and development expenses by compound for the years ended December 31, 2011 and 2012:

	Year Ended December 31,	
	2011	2012
Rigosertib	$ 15,915,000	$ 38,683,000
Recilisib	876,000	286,000
ON 013105	202,000	274,000
Other research and development	1,608,000	1,998,000
Personnel related and stock-based compensation	4,023,000	11,521,000
	$ 22,624,000	$ 52,762,000

The following table summarizes our research and development expenses by compound for the three months ended March 31, 2012 and 2013:

	Three Months Ended March 31,	
	2012	2013
Rigosertib	$ 5,435,000	$ 9,183,000
Recilisib	221,000	20,000
ON 013105	68,000	58,000
Other research and development	361,000	455,000
Personnel related and stock-based compensation	2,363,000	3,040,000
	$ 8,448,000	$ 12,756,000

It is difficult to determine with certainty the duration and completion costs of our current or future preclinical programs and clinical trials of our product candidates, or if, when or to what extent we will generate revenues from the commercialization and sale of any of our product candidates that obtain regulatory approval. We may never succeed in achieving regulatory approval for any of our product candidates. The duration, costs and timing of clinical trials and development of our product candidates will depend on a variety of factors, including the uncertainties of future clinical and preclinical studies, uncertainties in clinical trial enrollment rate and significant and changing government regulation. In addition, the probability of success for each product candidate will depend on numerous factors, including competition, manufacturing capability and commercial viability. We will determine which programs to pursue and how much to fund each program in response to the scientific and clinical success of each product candidate, as well as an assessment of each product candidate's commercial potential.

Change in Fair Value of Warrant Liability

We have issued warrants for the purchase of our Series G convertible preferred stock that we believe are financial instruments that may require a transfer of assets because of the redemption features of the underlying preferred stock. Therefore, we have classified these warrants as liabilities that we re-measure to fair value at each balance sheet date and we record the changes in the fair value of the warrant liability as either income or expense. Upon consummation of this offering, the underlying preferred stock will be converted to common stock, and the fair value of the warrant liability at that time will be reclassified to additional paid-in capital.

Interest Expense and Other Income, Net

Other income, net consists principally of interest income earned on cash and cash equivalent balances and income earned on our sale of New Jersey state net operating losses in 2012.

Interest expense for the years ended December 31, 2011 and 2012 consisted of cash paid and non-cash interest expense related to our prior loan from a stockholder and convertible promissory notes payable, as well as a charge for the unamortized contingent beneficial conversion feature upon conversion of those promissory notes into shares of Series I convertible preferred stock.

Accretion of Preferred Stock

We account for the redemption of premium and issuance costs on our preferred stock using the interest method, accreting such amounts to preferred stock from the date of issuance to the earliest date of redemption.

Critical Accounting Policies and Significant Judgments and Estimates

This management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with GAAP. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and the disclosure of contingent assets and liabilities in our consolidated financial statements. On an ongoing basis, we evaluate our estimates and judgments, including those related to accrued expenses, revenue recognition, deferred revenue and stock-based compensation. We base our estimates on historical experience, known trends and events and various other factors that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in the notes to our consolidated financial statements appearing elsewhere in this prospectus, we believe the following accounting policies to be most critical to the judgments and estimates used in the preparation of our consolidated financial statements.

Revenue Recognition

We generate revenue primarily through collaborative research and license agreements. The terms of these agreements contain multiple deliverables, which may include licenses, research and development activities, participation in joint steering committees and product supply. The terms of these agreements may include nonrefundable upfront license fees, payments for research and development activities, payments based upon the achievement of specified milestones, royalty payments based on product sales derived from the collaboration, and payments for supplying product. In all instances, we recognize revenue only when the price is fixed or determinable, persuasive evidence of an arrangement exists, delivery has occurred or the services have been rendered, collectability of the resulting receivable is reasonably assured and we have fulfilled our performance obligations under the contract.

Effective January 1, 2011, we adopted the Financial Accounting Standards Board, or FASB, Accounting Standards Update, or ASU, No. 2009-13, *Multiple-Deliverable Revenue Arrangements*, or ASU 2009-13. This guidance, which applies to multiple-element arrangements entered into or materially modified on or after January 1, 2011, amends the criteria for separating and allocating consideration in a multiple-element arrangement by modifying the fair value requirements for revenue recognition and eliminating the use of the residual value method. The selling prices of deliverables under an arrangement may be derived using third-party evidence, or TPE, or a best estimate of selling price, or BESP, if vendor-specific objective evidence of fair value, or VSOE, is not available. The objective of BESP is to determine the price at which we would transact a sale if the element within the license agreement was sold on a standalone basis. Establishing BESP involves management's judgment and takes into account multiple factors, including market conditions and company-specific factors, such as those factors contemplated in negotiating the agreements as well as internally developed models that include assumptions related to market opportunity, discounted cash flows, estimated development costs, probability of success, and the time needed to commercialize a product candidate pursuant to the license. In validating the BESP, management considers whether changes in key assumptions used to determine the BESP will have a significant effect on the allocation of the arrangement consideration between the multiple deliverables. We may use third-party valuation specialists to assist us in determining BESP. Deliverables under the arrangement are separate units of accounting if (i) the delivered item has value to the customer on a standalone basis and (ii) if the arrangement includes a general right of return relative to the delivered item, delivery or performance of the undelivered item is considered probable and substantially within our control. The arrangement consideration that is fixed

or determinable at the inception of the arrangement is allocated to the separate units of accounting based on their relative selling prices. The appropriate revenue recognition model is applied to each element and revenue is accordingly recognized as each element is delivered. Management exercises significant judgment in determining whether a deliverable is a separate unit of accounting.

In determining the separate units of accounting, we evaluate whether the license has standalone value to the collaborator based on consideration of the relevant facts and circumstances for each arrangement. Factors considered in this determination include the research and development capabilities of the collaborator and the availability of relevant research expertise in the marketplace. In addition, we consider whether or not (i) the collaborator can use the license for its intended purpose without the receipt of the remaining deliverables, (ii) the value of the license is dependent on the undelivered items and (iii) the collaborator or other vendors can provide the undelivered items.

Under a collaborative research and license agreement, a steering committee is typically responsible for overseeing the general working relationships, determining the protocols to be followed in the research and development performed, and evaluating the results from the continued development of the product. We evaluate whether our participation in joint steering committees is a substantive obligation or whether the services are considered inconsequential or perfunctory. The factors we consider in determining if our participation in a joint steering committee is a substantive obligation include: (i) which party negotiated or requested the steering committee, (ii) how frequently the steering committee meets, (iii) whether or not there are any penalties or other recourse if we do not attend the steering committee meetings, (iv) which party has decision making authority on the steering committee and (v) whether or not the collaborator has the requisite experience and expertise associated with the research and development of the licensed intellectual property.

For all periods presented, whenever we determine that an element is delivered over a period of time, we recognize revenue using either a proportional performance model or a straight-line model over the period of performance, which is typically the research and development term. We typically use progress achieved under our various CRO contracts as the measure of performance. At each reporting period, we reassess our cumulative measure of performance and make appropriate adjustments, if necessary. We recognize revenue using the proportional performance model whenever we can make reasonably reliable estimates of the level of effort required to complete our performance obligations under an arrangement. We recognize revenue under the proportional performance model at each reporting period by multiplying the total expected payments under the contract, excluding royalties and payments contingent upon achievement of milestones, by the ratio of the level of effort incurred to date to the estimated total level of effort required to complete the performance obligations under the arrangement. Revenue is limited to the lesser of the cumulative amount of payments received or the cumulative amount of revenue earned, as determined using the proportional performance model as of each reporting period. Alternatively, if we cannot make reasonably reliable estimates of the level of effort required to complete our performance obligations under an arrangement, then we recognize revenue under the arrangement on a straight-line basis over the period expected to complete our performance obligations.

Incentive milestone payments may be triggered either by the results of our research efforts or by events external to us, such as regulatory approval to market a product. We recognize consideration that is contingent upon achievement of a milestone in its entirety as revenue in the period in which the milestone is achieved, but only if the consideration earned from the achievement of a milestone meets all the criteria for the milestone to be considered substantive at the inception of the arrangement. For a milestone to be considered substantive, the consideration earned by achieving the milestone must be commensurate with either our performance to achieve the milestone or the enhancement of the value of the item delivered as a result of a specific outcome resulting from our performance to achieve the milestone, relate solely to our past performance and be reasonable relative to all deliverables and payment terms in the collaboration agreement.

For events for which the occurrences are contingent solely upon the passage of time or are the result of performance by a third party, we will recognize the contingent payments as revenue when payments are earned, the amounts are fixed and determinable and collectability is reasonably assured.

We will recognize royalty revenue, if any, as earned in accordance with the contract terms when third-party sales can be reliably measured and collectability is reasonably assured.

We recognized revenue of $45.5 million and $1.0 million during the year ended December 31, 2012 and during the three months ended March 31, 2013, respectively, under our license and collaboration agreement with Baxter. We recognized revenue of $227,000, $503,000 and $138,000 during the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2013, respectively, under our license and collaboration agreement with SymBio. The remaining revenue recognized during the years ended December 31, 2011 and 2012 of $1,260,000 and $197,000, respectively, pertained to research and development services provided under research grants. The Baxter and SymBio agreements are the only agreements that are being accounted for under ASU 2009-13.

Research and Development Expenses

Research and development costs are charged to expense as incurred and include, but are not limited to, license fees related to the acquisition of in-licensed products, employee-related expenses, including salaries, benefits and travel, expenses incurred under agreements with CROs and investigative sites that conduct clinical trials and preclinical studies, the cost of acquiring, developing and manufacturing clinical trial materials, facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities, insurance and other supplies and costs associated with preclinical activities and regulatory operations.

We record costs for certain development activities, such as clinical trials, based on our evaluation of the progress to completion of specific tasks using data such as patient enrollment, clinical site activations, or information provided to us by our vendors on their actual costs incurred. Payments for these activities are based on the terms of the individual arrangements, which may differ from the pattern of costs incurred, and are reflected in the consolidated financial statements as prepaid or accrued research and development expense, as the case may be.

Income Taxes

We recorded deferred tax assets of $55.3 million as of December 31, 2012, which have been fully offset by a valuation allowance due to uncertainties surrounding our ability to realize these tax benefits. The deferred tax assets are primarily composed of federal and state tax net operating loss, or NOL, carry forwards and research and development tax credit carry forwards. As of December 31, 2012, we had federal NOL carry forwards of $91.3 million, state NOL carry forwards of $75.1 million and research and development tax credit carry forwards of $13.9 million available to reduce future taxable income, if any. These federal NOL carry forwards will begin to expire at various dates starting in 2019. The state NOL carry forwards will begin to expire at various dates starting in 2016. In general, if we experience a greater than 50 percentage point aggregate change in ownership of specified significant stockholders over a three-year period, utilization of our pre-change NOL carry forwards will be subject to an annual limitation under Section 382 of the U.S. Internal Revenue Code of 1986, as amended, or the Code, and similar state laws. Such limitations may result in expiration of a portion of the NOL carry forwards before utilization and may be substantial. We have determined that we have experienced ownership changes in the past and approximately $30.7 million of our NOL carry forwards are subject to an annual limitation under Section 382 of the Code. If we experience a Section 382 ownership change in connection with this offering or as a result of future changes in our stock ownership, some of which changes are outside our control, the tax benefits related to the NOL carry forwards may be further limited or lost.

Preferred Stock

We account for the redemption of premium and issuance costs on our preferred stock using the interest method, accreting such amounts to our preferred stock from the date of issuance to the earliest date of redemption.

Preferred Stock Warrants

Our outstanding warrants to purchase shares of preferred stock are classified as liabilities and recorded at fair value, regardless of the timing of the redemption feature or the redemption price or the likelihood of redemption of the underlying preferred stock. The warrants are subject to re-measurement at each balance sheet date and we recognize any change in fair value in our consolidated statements of operations as a change in fair value of warrant liability. Pursuant to the terms of these warrants, upon the conversion of the series of preferred stock underlying the warrants, the warrants automatically become exercisable for shares of common stock based upon the conversion ratio of the underlying series of preferred stock. The consummation of this offering will result in the conversion of all series of our preferred stock into common stock. Upon such conversion of the underlying series of preferred stock, the warrants will be classified as a component of equity and no longer be subject to re-measurement. We will continue to adjust the liability for changes in fair value until the earlier of the exercise or expiration of the warrants or the conversion of the underlying preferred stock. Our consolidated statements of operations for the period in which this offering occurs will be affected by any change in the fair value of the warrants from the end of the prior period through the time of conversion.

Stock-Based Compensation

Our stock option awards have been accounted for as liability awards as we, through our chairman of the board of directors, who is also a significant stockholder, have established a pattern of settling these awards for cash in the past. Accordingly, we have measured stock-based compensation expense at the end of each reporting period based on the intrinsic value of all outstanding vested stock options on each reporting date and recognize expense based on any increases in their intrinsic value since the last measurement date to the extent the stock options have vested. The intrinsic value represents the difference between the current fair value of our common stock and the contractual exercise prices of the awards.

Stock-based compensation expense totaled $6,000, $13.8 million and $2.5 million for the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2013, respectively. We record stock-based compensation expense as a component of research and development expenses or general and administrative expenses, depending on the function performed by the optionee. For the years ended December 31, 2011 and 2012 and the three months ended March 31, 2012 and 2013, we allocated stock-based compensation as follows:

	Year Ended December 31,	
	2011	2012
General and administrative	$ 3,000	$ 7,199,000
Research and development	3,000	6,645,000
Total	$ 6,000	$ 13,844,000

	Three Months Ended March 31,	
	2012	2013
General and administrative	$ 1,267,000	$ 1,306,000
Research and development	1,170,000	1,158,000
Total	$ 2,437,000	$ 2,464,000

On April 23, 2013, we distributed a notification letter to all holders of stock options under our 2007 Equity Compensation Plan advising them that cash settlement transactions will no longer occur, unless, at the time of a cash settlement transaction, the option holder has held the common stock issued upon exercise of options for a period of greater than six months prior to such cash settlement transaction and that any such settlement would be at the fair value of the common stock on the date of such sale. Following this notification, we reclassified options outstanding under our 2007 Equity Compensation Plan from liabilities to stockholders' deficit within our consolidated balance sheets.

Upon issuing the notification, a modification to the liability awards occurred and the awards will be accounted for as equity awards from the date of modification with compensation expensed fixed at fair value at the modification date. As a result, we classified the amount previously recorded as a stock-based compensation liability to additional paid-in capital. In addition, we will recognize the remaining modified date fair value over the remaining service period, generally the vesting period, which we will recognize on a straight-line basis. The fair value of the modified awards will be estimated using the Black-Scholes valuation model. Awards granted to non-employees will also be valued using the Black-Scholes valuation model and will be subject to periodic adjustment until the underlying equity instruments vest.

Fair Value Estimates

We are required to estimate the fair value of the common stock underlying our stock-based awards when performing the fair value calculations using the intrinsic value method at each reporting date. We engaged an independent third-party valuation firm to assist our board of directors in determining the fair value of the common stock underlying our stock-based awards. All options to purchase shares of our common stock have been granted with an exercise price per share no less than the fair value per share of our common stock underlying those options on the date of grant, based on the information known to us on the date of grant. Accordingly, under the liability method of accounting, we have not recorded any stock-based compensation expense on the grant dates of our options. However, under the liability method, the liability for all outstanding vested stock-based awards is adjusted through our statement of operations, based on the current estimated fair value of our common stock at each reporting date. As of March 31, 2013, the liability for all outstanding vested stock-based awards has been recorded based on the fair value of our common stock on March 31, 2013 as determined by our board of directors with the assistance of an independent third-party valuation.

In the absence of a public trading market for our common stock, on each grant date, we develop an estimate of the fair value of our common stock in order to determine an exercise price for the option grants based in part on input from the independent third-party valuation firm. We determined the fair value of our common stock using methodologies, approaches and assumptions consistent with the American Institute of Certified Public Accountants, or AICPA, Audit and Accounting Practice Aid Series: *Valuation of Privately Held Company Equity Securities Issued as Compensation,* or the AICPA Practice Guide. In addition, our board of directors considered various objective and subjective factors, along with input from management and the independent third-party valuation firm, to determine the fair value of our common stock, including external market conditions affecting the biotechnology industry, trends within the biotechnology industry, the prices at which we sold shares of our different series of preferred stock, the superior rights and preferences of each series of preferred stock relative

to our common stock at the time of each grant, our results of operations and financial position, the status of our research and development efforts, our stage of development and business strategy, the lack of an active public market for our common and our preferred stock, and the likelihood of achieving a liquidity event such as an initial public offering or sale of our company in light of prevailing market conditions.

The per share estimated fair value of common stock in the table below represents the determination by our board of directors of the fair value of our common stock as of the date of grant, taking into consideration the various objective and subjective factors described above, including the conclusions, if applicable, of contemporaneous valuations of our common stock as discussed below. The following table presents the grant dates and related exercise prices of stock options granted to employees and non-employees from January 1, 2011 through March 20, 2013:

Date of issuance	Number of shares underlying option grants	Exercise price per option	Per share estimated fair value of common stock	Per share grant date intrinsic value of options
January 1, 2011 to February 1, 2012	554,049	$ 4.60	$ 4.60	$ —
March 1, 2012 to July 11, 2012	49,270	5.65	5.65	—
August 31, 2012 to March 20, 2013	1,573,360	9.96	9.96	—

In determining the exercise prices of the options set forth in the table above granted from January 1, 2011 through March 20, 2013, our board of directors considered the most recent valuations of our common stock, which were prepared as of September 30, 2010, February 29, 2012, and July 31, 2012, and based its determination in part on the analyses summarized below. On May 16, 2013, an independent third-party valuation was prepared as of March 31, 2013 to assist our board of directors in determining the exercise price of options to be issued after that date and to calculate the liability for our outstanding vested stock awards as of March 31, 2013.

Stock option grants from January 1, 2011 to February 1, 2012

Our board of directors granted stock options from January 1, 2011 through February 1, 2012, with each having an exercise price of $4.60 per share. The exercise price per share was supported by an independent third-party valuation as of September 30, 2010 that was performed in connection with our Series H convertible preferred stock financing. In conducting this valuation, we estimated the value of our common stock using the income approach to estimate our equity value. The income approach involves applying an appropriate risk-adjusted discount rate to projected cash flows based on forecasted revenue and costs. For the September 30, 2010 valuation, we used a risk-adjusted discount rate of 17% to discount our projected cash flows to the valuation date. To corroborate our equity value calculated under the income approach, we used the option-pricing back solve method, or OPM-BS, to estimate the equity value that corresponded to the pricing and terms of the Series H convertible preferred stock financing. The lead investor in the financing was an unrelated investor, and the price for the Series H convertible preferred stock of $9.79 per share was determined through negotiations with the investors. We then allocated the equity value among our preferred stock and common stock using the OPM-BS. For our OPM-BS analysis, we estimated the time to liquidity as three years and assumed an annual volatility rate of 64.0%. Our estimate of volatility was based on historical share price trading data for a group of 13 companies we considered comparable to ours. We applied a discount for lack of marketability of 34.0% to our common stock. The income approach and OPM-BS methodologies resulted in a similar equity value. Based on these factors, we concluded that our common stock had a fair value of $4.60 per share as of September 30, 2010.

We concluded that the value of our company remained relatively unchanged from September 30, 2010 through February 1, 2012. This was primarily attributable to our continued efforts to obtain

financing to support our liquidity needs and funding of operating expenses. The specific facts and circumstances considered by our board of directors included the following:

- We had principally financed our operations through private placements of preferred stock and convertible debt. In 2010 and 2011, we successfully closed and received proceeds of $17.1 million and $10.0 million, respectively. The original issuance per share price of $9.79 for the preferred stock remained unchanged in 2010 and 2011.

- At December 31, 2010 and 2011, we had cash and cash equivalents of $7.3 million and $2.7 million, respectively. In May 2011, we received proceeds of $7.5 million in connection with our license and collaboration agreement with SymBio. Our ability to provide research and development services under the SymBio agreement was contingent upon our ability to obtain significant funding resources in excess of the initial payment from SymBio.

- In May 2010, we entered into the funding agreement with LLS to fund the development of rigosertib. Pursuant to the agreement, we received milestone payments of $1.9 million in 2011 to fund a portion of our research and development activities. If the research was successful, we were obligated to refund these amounts to LLS in the event we were to discontinue our efforts to commercialize the research. Future funding of our research and development efforts under the LLS funding agreement was substantially contingent throughout this period.

Stock option grants from March 1, 2012 to July 11, 2012

Our board of directors granted stock options from March 1, 2012 through July 11, 2012, with each having an exercise price of $5.65 per share. The exercise price per share was supported by an independent third-party valuation as of February 29, 2012. The specific facts and circumstances considered by our board of directors for the February 29, 2012 valuation included the following:

- From February 2012 through June 2012, we completed a financing with gross proceeds of $26.4 million through the issuance of our convertible promissory notes that included a right to convert outstanding principal and interest into a new series of preferred stock at a conversion price of $11.00 per share. With respect to the February 29, 2012 valuation, we used the income approach to estimate our equity value. The income approach involves applying an appropriate risk-adjusted discount rate to projected cash flows based on forecasted revenue and costs. For the February 29, 2012 valuation, we used a risk-adjusted discount rate of 16.0% to discount the projected cash flows to the valuation date within the income approach. This discount rate is based upon a market-derived weighted average cost of capital, which takes into account the required rate of return for debt and equity investors.

- We prepared financial forecasts used in the computation of the equity value for the income approach. The financial forecasts were based on assumed revenues and operating margin levels that took into account our future expectations. The risks associated with achieving these forecasts were assessed in selecting the appropriate cost of capital rates.

- The values derived from the income approach were then used to determine an initial estimated equity value. We then used an option pricing model to allocate the calculated equity value between the shares of preferred stock and common stock outstanding, including estimated liquidation payments to the preferred stockholders for all series of preferred stock. A discount was then applied to reach the final valuation of the common stock based on the fact that, inasmuch as we are a private company, there are impediments to liquidity, including lack of publicly available information and the lack of a trading market. The discount was determined after considering a number of empirical studies related to discounts for lack of marketability, and by using a protective put option model that considered such variables as an estimated time to liquidity of two years, estimated volatility of 62.1% and an expected dividend yield of 0% of

the underlying stock, as well as the risk-free rate of 0.4%. In addition, the current restrictions on the marketability of our common stock were considered. For the February 29, 2012 valuation, we estimated a 31.7% discount for the lack of marketability.

Stock option grants from August 31, 2012 to March 20, 2013

Our board of directors granted stock options from August 31, 2012 through March 20, 2013, with each having an exercise price of $9.96 per share. The exercise price per share was supported by an independent third-party valuation as of July 31, 2012. The specific facts and circumstances considered by our board of directors for the July 31, 2012 valuation included the following:

- We completed our $50.0 million equity financing with Baxter with the intent to enter into a development and license agreement with Baxter that was completed in September 2012.

- With respect to the July 31, 2012 valuation, we used the income approach to estimate our equity value. The income approach involves applying an appropriate risk-adjusted discount rate to projected cash flows based on forecasted revenue and costs. For the July 31, 2012 valuation, we used a risk-adjusted discount rate of 16.0% to discount the projected cash flows to the valuation date within the income approach. This discount rate is based upon a market-derived weighted average cost of capital, which takes into account the required rate of return for debt and equity investors.

- We prepared financial forecasts used in the computation of the equity value for the income approach. The financial forecasts were based on assumed revenues and operating margin levels that took into account future expectations. The risks associated with achieving these forecasts were assessed in selecting the appropriate cost of capital rates.

- The values derived from the income approach were then used to determine an initial estimated equity value. We then used an option pricing model to allocate the calculated equity value between the shares of preferred stock and common stock outstanding, including estimated liquidation payments to the preferred stockholders for all series of preferred stock. A discount was then applied to reach the final valuation of the common stock based on the fact that, inasmuch as we are a private company, there are impediments to liquidity, including lack of publicly available information and the lack of a trading market. The discount was determined after considering a number of empirical studies related to discounts for lack of marketability, and by using a protective put option model that considered such variables as an estimated time to liquidity of two years, estimated volatility of 64.3% and an expected dividend yield of 0% of the underlying stock, as well as the risk-free rate of 0.2%. In addition, the current restrictions on the marketability of our common stock were considered. For the July 31, 2012 valuation, we estimated a 23.8% discount for the lack of marketability.

Valuation as of March 31, 2013

We completed a valuation as of March 31, 2013 and determined the fair value of our common stock to be $11.06 per share. The specific facts and circumstances considered by our board of directors for this valuation included the following:

- With respect to the March 31, 2013 valuation, we used the probability-weighted average expected return method, or PWERM, as the methodology for determining our equity value. Under PWERM, the value of equity securities is estimated based upon an analysis of future values, assuming various outcomes. In this approach, the share value is based upon the probability-weighted present value of expected future investment returns, considering each of the possible future outcomes available to us as well as the rights of each share class. PWERM involves the

determination of equity value under various exit scenarios and an estimation of the return to common stock under each of them.

- We prepared financial forecasts to be used in the PWERM computation of the equity value. The financial forecasts were based on assumed revenues and operating margin levels that took into account future expectations. The risks associated with achieving these forecasts were assessed in selecting the appropriate cost of capital rates.

- Our application of PWERM can be broadly described in the following steps: (i) identify exit scenarios and related probabilities; (ii) determine the equity value under each scenario; and (iii) determine the return to common stock in each scenario. The three exit scenarios we identified were (1) complete an initial public offering, or IPO, (2) continue as a private company and (3) conduct a distress sale, while the related probabilities for each were estimated to be 75%, 20% and 5%, respectively. Under the IPO scenario, we estimated the equity value using the market approach. Since we do not expect to commercialize our product candidate prior to the completion of this offering, we calculated the ratios of enterprise value to invested capital for several biopharmaceutical companies that have completed IPOs in recent years. The multiples were then applied to our invested capital as of the valuation date to arrive at the equity value. Under the private company scenario, we assumed a prospective investor would evaluate an investment in us based on expected returns and associated risks of continued future operations. Accordingly, we used a discounted cash flow analysis under the income approach, with a discount rate of 16.25%, to determine equity value. Our determination of the discount rate was based on an analysis of market risks and the risks associated with our business to estimate an appropriate expected rate of return from an investment in our equity, including factors such as our proximity to an IPO, reduced funding risk and our progress made on the drug development front. Under the distress sale scenario, in the event that we are unable to commercialize our products and fail to raise additional funding to sustain operations, we may have to liquidate our assets to service our liabilities at an assumed value of invested capital. For each scenario identified, we determined the return on common stock and probability-weighted the present value returns to arrive at our equity value.

Determination of Estimated Offering Price

The midpoint of the price range for this offering as determined by us and the underwriters is $ per share. In comparison, our estimate of the fair value of our common stock was $11.06 per share as of the March 31, 2013 valuation, which was used for stock option grants subsequent to March 20, 2013. We note that, as is typical in initial public offerings, the price range was not derived using a formal determination of fair value, but was determined based upon discussions between us and the underwriters. Among the factors that were considered in setting this range were our prospects and the history of and prospects for our industry, the general condition of the securities markets and the recent market prices of, and the demand for, publicly traded common stock of generally comparable companies. We believe that the difference between the fair value of our common stock as of March 31, 2013 and the midpoint of the price range for this offering is the result of these factors as well as the fact that the estimated initial public offering price range necessarily assumes that the initial public offering has occurred, a public market for our common stock has been created and our preferred stock converted into common stock in connection with this offering, and therefore excludes any discount for lack of marketability of our common stock, which was factored into the March 31, 2013 valuation.

There is inherent uncertainty in our forecasts and projections and, if we had made different assumptions and estimates than those described previously, the amount of our stock-based compensation expense, net loss, and net loss per share amounts could have been materially different.

Clinical Trial Expense

As part of the process of preparing our consolidated financial statements, we are required to estimate our accrued expenses. Our clinical trial accrual process seeks to account for expenses resulting from our obligations under contracts with vendors, consultants and CROs and clinical site agreements in connection with conducting clinical trials. The financial terms of these contracts are subject to negotiations, which vary from contract to contract and may result in payment flows that do not match the periods over which materials or services are provided to us under such contracts. Our objective is to reflect the appropriate clinical trial expenses in our consolidated financial statements by matching the appropriate expenses with the period in which services and efforts are expended. We account for these expenses according to the progress of the trial as measured by patient progression and the timing of various aspects of the trial. We determine accrual estimates through financial models that take into account discussion with applicable personnel and outside service providers as to the progress or state of completion of trials, or the services completed. During the course of a clinical trial, we adjust our clinical expense recognition if actual results differ from our estimates. We make estimates of our accrued expenses as of each balance sheet date in our consolidated financial statements based on the facts and circumstances known to us at that time. Our clinical trial accrual and prepaid assets are dependent, in part, upon the receipt of timely and accurate reporting from CROs and other third-party vendors. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may result in us reporting amounts that are too high or too low for any particular period.

Basic and Diluted Net Loss Per Share of Common Stock

We compute basic net loss per share of common stock by dividing net loss applicable to common stockholders by the weighted-average number of shares of common stock outstanding during the period, excluding the dilutive effects of preferred stock, warrants to purchase preferred stock and stock options. We compute diluted net loss per share of common stock by dividing the net loss applicable to common stockholders by the sum of the weighted-average number of shares of common stock outstanding during the period plus the potential dilutive effects of preferred stock and warrants to purchase preferred stock, and stock options outstanding during the period calculated in accordance with the treasury stock method, but such items are excluded if their effect is anti-dilutive. Because the impact of these items is anti-dilutive during periods of net loss, there was no difference between our basic and diluted net loss per share of common stock for the years ended December 31, 2011 and 2012 and for the three months ended March 31, 2012 and 2013.

JOBS Act

In April 2012, the JOBS Act was enacted. Section 107 of the JOBS Act provides that an "emerging growth company" can take advantage of an extended transition period for complying with new or revised accounting standards. Thus, an "emerging growth company" can delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We have irrevocably elected not to avail ourselves of this extended transition period and, as a result, we will adopt new or revised accounting standards on the relevant dates on which adoption of such standards is required for other companies.

Internal Control Over Financial Reporting

In preparing our consolidated financial statements as of and for the year ended December 31, 2012, we and our independent registered public accounting firm identified control deficiencies in the design and operation of our internal control over financial reporting that together constituted a material weakness in our internal control over financial reporting. A material weakness is a deficiency,

or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our financial statements will not be prevented or detected on a timely basis. The material weakness identified was that we did not have sufficient financial reporting and accounting staff with appropriate training in GAAP and SEC rules and regulations with respect to financial reporting. As such, our controls over financial reporting were not designed or operating effectively, and as a result there were adjustments required in connection with closing our books and records and preparing our 2012 consolidated financial statements. The control deficiencies that we and our independent registered public accounting firm identified, and the adjustments recorded as a result, were as follows:

- We did not maintain effective controls over our accounting for our research and development expenses, and as a result we recorded an adjustment to decrease accrued expenses by $810,000, decrease prepaid expenses by $212,000 and decrease research and development expenses by $598,000.

- We did not maintain effective controls over our accounting for our outstanding warrants to purchase shares of our preferred stock, including the accounting for warrant re-measurements and exercises, and as a result we recorded an adjustment to increase our warrant liability by $1.0 million, increase our preferred stock by $635,000 and increase the benefit from the change in the fair value of the warrant liability by $367,000.

- We did not maintain effective controls over our accounting for the beneficial conversion feature of our convertible promissory notes that were converted into Series I convertible preferred stock in 2012 and as a result we recorded an adjustment to increase interest expense by $8.2 million and increase additional paid-in capital by $8.2 million.

- We did not maintain effective controls over our accounting for our stock options pursuant to liability accounting and as a result we recorded an adjustment to increase stock option liabilities by $9.3 million, increase additional paid-in capital by $2.0 million, increase general and administrative expenses by $5.8 million and increase research and development expenses by $5.5 million.

- We did not maintain effective controls over our accounting for the accretion of our preferred stock and as a result we recorded an adjustment to increase preferred stock by $204,000 and to decrease additional paid-in capital by $204,000.

The material weakness in our internal control over financial reporting was attributable to our lack of sufficient financial reporting and accounting personnel with appropriate training in GAAP and SEC rules and regulations. In response to this material weakness, we have recently hired a Chief Financial Officer and a director of financial reporting, each with public company financial reporting experience. We intend to hire additional finance and accounting personnel with appropriate training, build our financial management and reporting infrastructure, and further develop and document our accounting policies and financial reporting procedures. However, we cannot assure you that we will be successful in pursuing these measures or that these measures will significantly improve or remediate the material weakness described above. We also cannot assure you that we have identified all of our existing material weaknesses, or that we will not in the future have additional material weaknesses.

We have not yet remediated the material weakness described above, and the remediation measures that we have implemented and intend to implement may be insufficient to address our existing material weakness or to identify or prevent additional material weaknesses. See "Risk Factors—Risks Relating to this Offering and Ownership of Our Common Stock—If we are unable to successfully remediate the existing material weakness in our internal control over financial reporting, the accuracy and timing of our financial reporting may be adversely affected."

Neither we nor our independent registered public accounting firm has performed an evaluation of our internal control over financial reporting during any period in accordance with the provisions of the Sarbanes-Oxley Act. In light of the control deficiencies and the resulting material weakness that were identified as a result of the limited procedures performed, we believe that it is possible that, had we and our independent registered public accounting firm performed an evaluation of our internal control over financial reporting in accordance with the provisions of the Sarbanes-Oxley Act, additional material weaknesses and significant control deficiencies may have been identified. However, for as long as we remain an "emerging growth company" as defined in the JOBS Act, we intend to take advantage of the exemption permitting us not to comply with the requirement that our independent registered public accounting firm provide an attestation on the effectiveness of our internal control over financial reporting.

Results of Operations

Comparison of the Three Months Ended March 31, 2012 and 2013

	Three Months Ended March 31,		
	2012	2013	Change
Revenue	$ 198,000	$ 1,116,000	$ 918,000
Operating expenses:			
General and administrative	2,460,000	3,346,000	886,000
Research and development	8,448,000	12,756,000	4,308,000
Total operating expenses	10,908,000	16,102,000	5,194,000
Loss from operations	(10,710,000)	(14,986,000)	(4,276,000)
Change in fair value of warrant liability	(609,000)	14,000	623,000
Interest expense	(21,000)	—	21,000
Other income, net	541,000	127,000	(414,000)
Net loss before income taxes	(10,799,000)	(14,845,000)	(4,046,000)
Income taxes	—	—	—
Net loss	(10,799,000)	(14,845,000)	(4,046,000)
Accretion of preferred stock	(1,231,000)	(1,019,000)	212,000
Net loss applicable to common stockholders	$ (12,030,000)	$ (15,864,000)	$ (3,834,000)

Revenues

Revenues increased by $0.9 million for the first quarter of 2013 when compared to the same period in 2012 primarily as a result of entering into the Baxter agreement in the third quarter of 2012.

General and administrative expenses

General and administrative expenses increased by $0.9 million, or 36.0%, from $2.5 million for the three months ended March 31, 2012 to $3.3 million for the three months ended March 31, 2013. The increase was primarily attributable to an increase of $0.1 million related to stock-based compensation due to the increase in the fair value of our common stock, an increase of $0.5 million in professional fees, an increase of $0.1 million in travel expenses and an increase of $0.1 million as a result of the increase in general and administrative headcount from nine at the end of March 31, 2012 to 11 at March 31, 2013.

Research and development expenses

Research and development expenses increased by $4.3 million, or 51.0%, from $8.5 million for the three months ended March 31, 2012 to $12.8 million for the three months ended March 31, 2013. This

increase was driven by an increase in clinical trial expenses of $3.0 million for rigosertib, an increase of $0.7 million related to consulting services and an increase of $0.8 million related to an increase in research and development headcount from 25 at March 31, 2012 to 37 at March 31, 2013 as a result of our expanded research and development activities.

Change in fair value of warrant liability

The fair value of the warrant liability increased by $0.6 million during the three months ended March 31, 2012 compared to a decrease of $14,000 during the three months ended March 31, 2013, which resulted in a commensurate increase in other expense and other income, respectively. The decrease in the fair value of the warrant liability in 2013 was primarily due to a slight change in the value of the liability related to the revaluation of the warrants outstanding. The increase in the fair value of the warrant liability in 2012 was related to the revaluation of the outstanding warrants.

Interest expense

Interest expense decreased from $21,000 during the three months ended March 31, 2012 to zero for the three months ended March 31, 2013, as the promissory note outstanding in 2012 converted into shares of Series I convertible preferred stock in July 2012.

Other income, net

Other income, net, decreased by $0.4 million during the three months ended March 31, 2013 compared to the three months ended March 31, 2012. This decrease was largely the result of a $0.5 million gain recognized on our sale of New Jersey state NOL carry forwards in 2012.

Comparison of Years Ended December 31, 2011 and 2012

	Year Ended December 31,		
	2011	2012	Change
Revenue	$ 1,487,000	$ 46,190,000	$ 44,703,000
Operating expenses:			
General and administrative	6,436,000	15,707,000	9,271,000
Research and development	22,624,000	52,762,000	30,138,000
Total operating expenses	29,060,000	68,469,000	39,409,000
Loss from operations	(27,573,000)	(22,279,000)	5,294,000
Change in fair value of warrant liability	1,287,000	367,000	(920,000)
Interest expense	(19,000)	(8,608,000)	(8,589,000)
Other income, net	11,000	608,000	597,000
Net loss before income taxes	(26,294,000)	(29,912,000)	(3,618,000)
Income taxes	—	—	—
Net loss	(26,294,000)	(29,912,000)	(3,618,000)
Accretion of preferred stock	(4,020,000)	(3,953,000)	67,000
Net loss applicable to common stockholders	$ (30,314,000)	$ (33,865,000)	$ (3,551,000)

Revenues

Revenues increased by $44.7 million in 2012 when compared to 2011 primarily as a result of entering into the Baxter agreement in 2012. Of this increase, $42.4 million related to the value ascribed to the license, and was therefore recognized immediately upon signing of the agreement, and

$3.1 million related to the portion of development services revenue recognized in 2012 under the Baxter agreement. Those increases attributable to the Baxter agreement were partially offset by a $1.1 million reduction in research funding.

General and administrative expenses

General and administrative expenses increased by $9.3 million, or 144.0%, from $6.4 million for the year ended December 31, 2011 to $15.7 million for the year ended December 31, 2012. The increase was primarily attributable to an increase of $7.2 million related to stock-based compensation due to the increase in the fair value of our common stock during the year, an increase of $1.7 million in professional fees related to the negotiation of the Baxter agreement in 2012, and an increase of $0.4 million as a result of the increase in general and administrative headcount from six at the end of 2011 to nine at the end of 2012.

Research and development expenses

Research and development expenses increased by $30.1 million, or 133.0%, from $22.6 million for the year ended December 31, 2011 to $52.8 million for the year ended December 31, 2012. This increase was driven by a $12.5 million milestone due to Temple University, or Temple, in 2012 as a result of entering into the Baxter agreement in 2012 compared to a $1.9 million payment to Temple in 2011 as a result of entering into the SymBio agreement. The change was also due to an increase in clinical trial expenses of $8.4 million for rigosertib, $6.6 million in additional stock-based compensation due to the increase in the fair value of our common stock during the year, an increase of $1.4 million related to consulting services in connection with the rigosertib clinical trials, an increase of $1.5 million in nonclinical trial-related costs for rigosertib and an increase of $0.9 million related to a change in research and development headcount from 25 at the end of 2011 to 36 at the end of 2012 as a result of our expanded research and development activities.

Change in fair value of warrant liability

The fair value of the warrant liability decreased by $1.3 million during the year ended December 31, 2011 compared to a decrease of $0.4 million during the year ended December 31, 2012, which in both cases resulted in a commensurate increase in other income. The decrease in the fair value of the warrant liability in 2012 was primarily due to the expiration of Series G convertible preferred stock warrants in 2012, which accounted for a decrease of $1.0 million in the value of the liability, which was partially offset by an increase of $0.6 million in the value of the liability related to the revaluation of the warrants outstanding. The decrease in the fair value of the warrant liability in 2011 was primarily due to the revaluation of the warrants outstanding.

Interest expense

Interest expense increased by $8.6 million during the year ended December 31, 2012 compared to the year ended December 31, 2011. In July 2012, the holders of our convertible notes elected to convert their outstanding principal and accrued interest into shares of Series I convertible preferred stock. At the time of the conversion, there was $8.2 million in unamortized contingent beneficial conversion features that we immediately expensed.

Other income, net

Other income, net, increased by $0.6 million during the year ended December 31, 2012 compared to the year ended December 31, 2011. This increase was driven by a $0.5 million gain recognized on our sale of New Jersey state NOL carry forwards.

Liquidity and Capital Resources

Since our inception, we have incurred net losses and generally negative cash flows from our operations. We incurred net losses of $26.3 million and $29.9 million for the years ended December 31, 2011 and 2012, respectively, and $10.8 million and $14.8 million for the three months ended March 31, 2012 and 2013, respectively. Our operating activities used $6.1 million and $13.9 million of cash flows during the three months ended March 31, 2012 and 2013, respectively. At March 31, 2013, we had an accumulated deficit of $183.2 million, working capital of $41.7 million and cash and cash equivalents of $67.3 million. Historically, we have financed our operations principally through private placements of preferred stock and convertible debt. Through March 31, 2013, we have received gross proceeds of $171.5 million from the issuance of preferred stock and convertible debt. We have also financed our operations with the $57.5 million in upfront payments we received from SymBio and Baxter in 2011 and 2012.

Cash Flows

The following table summarizes our cash flows for the years ended December 31, 2011 and 2012 and the three months ended March 31, 2012 and 2013:

	Year Ended December 31,	
	2011	2012
Net cash (used in) provided by:		
Operating activities	$ (14,171,000)	$ 1,633,000
Investing activities	(241,000)	(279,000)
Financing activities	9,785,000	77,460,000
Net (decrease) increase in cash and cash equivalents	$ (4,627,000)	$ 78,814,000

	Three Months Ended March 31,	
	2012	2013
Net cash (used in) provided by:		
Operating activities	$ (6,088,000)	$ (13,949,000)
Investing activities	(4,000)	(284,000)
Financing activities	3,637,000	6,000
Effect of foreign currency translation on cash	—	7,000
Net decrease in cash and cash equivalents	$ (2,455,000)	$ (14,220,000)

Net cash (used in) provided by operating activities

Net cash used in operating activities was $14.2 million for the year ended December 31, 2011 and consisted primarily of a net loss of $26.3 million and $0.9 million of noncash decreases primarily related to the change in fair value of our warrant liabilities. The cash used in operating activities was offset by the $7.7 million increase in deferred revenues primarily related to receipt of the upfront payment from SymBio under the research and collaboration agreement and the $5.4 million increase related to the change in operating assets and liabilities. The significant items in the change in operating assets and liabilities included a decrease in grant receivable of $1.7 million, a $2.2 million increase in accounts payable, and a $1.1 million increase in accrued expenses. The decrease in grant receivable was attributable to our receipt in 2011 of the grant payment from LLS. The increase in accounts payable and accrued expenses was primarily due to the timing of our payment of clinical trial costs related to the ongoing trials and development of our product candidates.

Net cash provided by operating activities was $1.6 million for the year ended December 31, 2012 and consisted primarily of noncash increases of $22.0 million and a $9.6 million increase related to the change in operating assets and liabilities that were offset by a net loss of $29.9 million. The noncash increases were primarily attributable to increases in stock-based compensation and recognition of debt discounts and beneficial conversion features of $8.2 million upon conversion of our convertible promissory notes into preferred stock. The significant items in the change in operating assets and liabilities included an increase in prepaid expenses and other current assets of $1.1 million, offset by increases in accrued expenses of $2.6 million and an increase in deferred revenues of $8.2 million. The increase in prepaid expenses and other current assets was primarily due to the prepayment of upfront costs for our Phase 3 clinical trials and continued development activities. The increase in accrued expenses was primarily due to the costs for our Phase 3 clinical trial activities. The increase in deferred revenues was primarily due to the receipt of payments from Baxter and LLS of $6.9 million and $4.1 million, respectively, pursuant to the terms of our agreements with such parties. These increases were partially offset by the recognition of the unamortized portions of upfront payments under our collaboration agreements with Baxter and SymBio for $3.1 million and $0.5 million, respectively.

Net cash used in operating activities was $6.1 million for the three months ended March 31, 2012 and consisted primarily of a net loss of $10.8 million, offset by $3.1 million of noncash items primarily related to the change in fair value of our warrant liabilities and stock-based compensation. The cash used in operating activities was further offset by the $1.0 million increase in deferred revenue primarily related to receipt of an upfront payment from LLS under the research and collaboration agreement and the $0.6 million increase related to the change in operating assets and liabilities. The significant items in the change in operating assets and liabilities included a decrease in prepaid expenses of $0.2 million, a $0.2 million increase in accounts payable and a $0.2 million increase in accrued expenses.

Net cash used in operating activities was $14.0 million for the three months ended March 31, 2013 and consisted primarily of a net loss of $14.8 million, partially offset by $2.5 million of stock-based compensation expense. A $1.6 million decrease related to the change in operating assets and liabilities drove the balance of cash used in operations. The significant items in the change in operating assets and liabilities included an increase in prepaid expenses and other current assets of $0.9 million and a decrease in deferred revenue of $1.1 million, offset by a net increase in accounts payable and accrued expenses of $0.4 million. The increase in prepaid expenses and other current assets was primarily due to the prepayment of upfront manufacturing costs and filing fees. The decrease in deferred revenue was due to the recognition of the unamortized portions of upfront payments under our collaboration agreements with Baxter and SymBio in the amounts of $1.0 million and $0.1 million, respectively.

Net cash used in investing activities

Net cash used in investing activities for the years ended December 31, 2011 and 2012 was $0.2 million and $0.3 million, respectively. Cash used in investing activities primarily consisted of purchases of fixed assets.

Net cash used in investing activities for the three months ended March 31, 2012 and 2013 was $4,000 and $0.3 million, respectively. Cash used in investing activities consisted of purchases of fixed assets.

Net cash provided by financing activities

Net cash provided by financing activities was $9.8 million for the year ended December 31, 2011, which was primarily due to $7.2 million in proceeds from the issuance of Series H convertible preferred stock, $1.9 million in proceeds from the issuance of Series G convertible preferred stock, $0.8 million in proceeds from our loan and security agreement with a bank that were restricted and to be used for

future debt repayment, $0.6 million in proceeds from a loan from our chairman of the board of directors, who is also a significant stockholder, and $0.2 million in proceeds upon the exercise of stock options. These proceeds were partially offset by $0.9 million in principal payments made under our loan and security agreement with a bank.

Net cash provided by financing activities was $77.5 million for the year ended December 31, 2012, which was primarily due to $47.8 million in proceeds from the issuance of Series J convertible preferred stock in connection with the Baxter equity investment, $25.8 million in proceeds upon the issuance of convertible debt that was subsequently converted into shares of Series I convertible preferred stock, $2.2 million in proceeds upon the exercise of warrants in exchange for shares of Series G convertible preferred stock, $0.4 million in proceeds from collection of a subscription receivable for our issuance of Series H convertible preferred stock and $1.3 million in proceeds upon the exercise of stock options.

Net cash provided by financing activities was $3.6 million for the three months ended March 31, 2012, which was primarily due to $0.4 million in proceeds from the issuance of Series H convertible preferred stock, $0.4 million in proceeds upon the exercise of warrants in exchange for shares of Series G convertible preferred stock and $2.8 million in proceeds from a loan from our chairman of the board of directors, who is also a significant stockholder.

Net cash provided by financing activities was $6,000 for the three months ended March 31, 2013, resulting from the exercise of stock options.

Operating and Capital Expenditure Requirements

We have not achieved profitability since our inception and we expect to continue to incur net losses for the foreseeable future. We expect our cash expenditures to increase in the near term as we fund our Phase 2 and Phase 3 clinical trials of rigosertib, as well as our clinical trials of our other earlier-stage product candidates and continuing preclinical activities. Following this offering, we will be a publicly traded company and will incur significant legal, accounting and other expenses that we were not required to incur as a private company. In addition, the Sarbanes-Oxley Act, as well as rules adopted by the SEC and the NASDAQ Stock Market, require public companies to implement specified corporate governance practices that are currently inapplicable to us as a private company. We expect these rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. We estimate that we will incur approximately $2.0 to $3.0 million of incremental costs per year associated with being a publicly traded company, although it is possible that our actual incremental costs will be higher than we currently estimate.

We believe that our existing capital resources, together with the net proceeds from this offering, will be sufficient to fund our operations for at least the next 12 months. However, we anticipate that we will need to raise substantial additional financing in the future to fund our operations. In order to meet these additional cash requirements, we may seek to sell additional equity or convertible debt securities that may result in dilution to our stockholders. If we raise additional funds through the issuance of convertible debt securities, these securities could have rights senior to those of our common stock and could contain covenants that restrict our operations. There can be no assurance that we will be able to obtain additional equity or debt financing on terms acceptable to us, if at all. Further, the achievement of milestones and receipt from Baxter and SymBio of milestone payments and royalties, even if rigosertib is approved for commercial use in Baxter's and SymBio's licensed territories, are not assured. Our failure to obtain sufficient funds on acceptable terms when needed could have a negative impact on our business, results of operations, and financial condition. Our future capital requirements will depend on many factors, including:

- the results of our Phase 2 and Phase 3 clinical trials;

- whether Baxter and SymBio continue to pursue or terminate our collaboration arrangements for the development and commercialization of rigosertib in their licensed territories;
- the amount and timing of any milestone payments or royalties we may receive pursuant to our collaboration arrangements;
- the number and characteristics of any other product candidates we develop or may acquire;
- the scope, progress, results and costs of researching and developing our product candidates or any future product candidates, and conducting preclinical and clinical trials;
- the timing of, and the costs involved in, obtaining regulatory approvals for our product candidates or any future product candidates;
- the cost of commercialization activities if any future product candidates are approved for sale, including marketing, sales and distribution costs;
- the cost of manufacturing rigosertib and our other product candidates and any products that may achieve regulatory approval;
- our ability to establish and maintain strategic collaborations, licensing or other arrangements and the financial terms of such agreements;
- any product liability or other lawsuits related to our products;
- the expenses needed to attract and retain skilled personnel;
- the costs associated with being a public company;
- the costs involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent claims, including litigation costs and the outcome of such litigation; and
- the timing, receipt and amount of sales of, or royalties on, future approved products, if any.

Please see "Risk Factors" for additional risks associated with our substantial capital requirements.

Contractual Obligations and Commitments

The following is a summary of our long-term contractual cash obligations as of December 31, 2012:

	Total	Less than one year	1-3 Years	3-5 Years	More than 5 Years
Operating lease obligations	$ 365,000	$ 256,000	$ 109,000	$ —	$ —
Total contractual obligations	$ 365,000	$ 256,000	$ 109,000	$ —	$ —

Purchase Commitments

We have no material non-cancelable purchase commitments with contract manufacturers or service providers as we have generally contracted on a cancelable purchase order basis.

Milestone, Royalty-Based and Other Commitments

Under our license agreement with Temple to develop, manufacture, market and sell rigosertib related compounds and derivatives, we are obligated to pay annual license maintenance payments, as well as 25% of any sublicensing fees we receive. We are also required to pay a low-single digit percentage of our net sales of rigosertib as a royalty. During the year ended December 31, 2011, in connection with the execution of the SymBio agreement, we made a payment to Temple in the amount of $1.9 million. During the year ended December 31, 2012, in connection with the execution of the

Baxter agreement, we became obligated to make a payment to Temple in the amount of $12.5 million. Both of these payments were recorded as research and development expenses. There were no expenses related to this agreement during the three months ended March 31, 2013.

In May 2010, we entered into an agreement with LLS under which we were to conduct research in return for milestone payments, up to $10.0 million through 2013. This milestone payment amount was subsequently reduced to $8.0 million pursuant to an amendment signed in January 2013. In the event that the research is successful, we must proceed with commercialization of the product or repay the amount funded. In addition, we will owe to LLS regulatory and commercial milestone payments and royalties based on net sales of the product not to exceed three times the aggregate amount funded, or $24.0 million. During the year ended December 31, 2012, in connection with the execution of the Baxter agreement, we paid $1.0 million to LLS and we have recorded this amount in research and development expenses. This payment reduced the maximum contingent payment obligation under this agreement to $23.0 million at December 31, 2012, and there were no changes during the three months ended March 31, 2013.

Because the achievement and timing of these milestones and net sales is not fixed and determinable, our commitments under these agreements have not been included on our consolidated balance sheets or in the Contractual Obligations table above.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements, as defined by applicable SEC regulations.

Quantitative and Qualitative Disclosure About Market Risk

We are exposed to market risks in the ordinary course of our business. These market risks are principally limited to interest rate fluctuations.

We had cash and cash equivalents of $81.5 million and $67.3 million at December 31, 2012 and March 31, 2013, respectively, consisting primarily of funds in cash and money market accounts. The primary objective of our investment activities is to preserve principal and liquidity while maximizing income without significantly increasing risk. We do not enter into investments for trading or speculative purposes. Due to the short-term nature of our investment portfolio, we do not believe an immediate 10% increase in interest rates would have a material effect on the fair market value of our portfolio, and accordingly we do not expect our operating results or cash flows to be materially affected by a sudden change in market interest rates.

Segment Reporting

We view our operations and manage our business in one segment, which is the identification and development of oncology therapeutics.

Recent Accounting Pronouncements

Effective January 1, 2011, we prospectively adopted ASU 2009-13, which amended the guidance for revenue recognition related to multiple-deliverable revenue arrangements. The amendments in this guidance enabled vendors to account for products or services separately rather than as a combined unit upon meeting certain criteria and establish a hierarchy for determining the selling price of a deliverable. In addition, a vendor can determine a best estimate of selling price, in a manner that is consistent with that used to determine the price to sell the deliverable on a standalone basis, if a vendor does not have vendor-specific objective evidence or third party evidence of selling price. This guidance also eliminated the use of the residual method and requires a vendor to allocate revenue using the relative selling price method. The amendments were effective prospectively, with an option

for retrospective restatement of the financial statements, for revenue arrangements entered into or materially modified in fiscal years beginning on or after June 15, 2010 with early adoption permitted at the beginning of an entity's fiscal year. Our adoption of this new accounting standard did not have a significant impact on our consolidated financial position, results of operations or cash flows.

In June 2011, FASB issued ASU No. 2011-05, "Comprehensive Income (ASC Topic 220): Presentation of Comprehensive Income," or ASU 2011-05, which amended current comprehensive income guidance. This accounting update eliminated the option to present the components of other comprehensive income as part of the statement of stockholders' equity. Instead, comprehensive income must be presented in either a single continuous statement of comprehensive income, which contains two sections, net income and other comprehensive income, or in two separate but consecutive statements. ASU 2011-05 was effective for fiscal periods beginning after December 15, 2011 with early adoption permitted. Our retrospective adoption of ASU 2011-05 did not have a significant impact on our consolidated financial position, results of operations or cash flows.

In February 2013, FASB issued ASU No. 2013-02, "Comprehensive Income (Topic 220): Reporting of Amounts Reclassified Out of Accumulated Other Comprehensive Income," or ASU 2013-02. ASU 2013-02 requires companies to present either in a single note or parenthetically on the face of the financial statements, the effect of significant amounts reclassified from each component of accumulated other comprehensive income based on its source and the income statement line items affected by the reclassification. This guidance is effective for annual reporting periods beginning after December 15, 2012. We believe the adoption of this standard will not have a significant impact on our consolidated financial position, results of operations or cash flows.

Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

In connection with this offering, Ernst & Young LLP became our independent registered public accounting firm effective as of February 27, 2013, and EisnerAmper LLP was dismissed as our independent registered public accounting firm effective as of December 17, 2012. The decision to appoint Ernst & Young LLP and dismiss EisnerAmper LLP was recommended by our audit committee and subsequently approved by our board of directors.

The report of EisnerAmper LLP on our financial statements for the year ended December 31, 2011 did not contain an adverse opinion or a disclaimer of opinion and was not qualified or modified as to uncertainty, audit scope or accounting principles.

In connection with the audit of our financial statements for the year ended December 31, 2011 and through EisnerAmper LLP's dismissal, there were no disagreements with EisnerAmper LLP on any matters of accounting principles or practices, financial statement disclosures or auditing scope or procedures, which if not resolved to EisnerAmper LLP's satisfaction would have caused EisnerAmper LLP to make reference to the matter in their report.

In connection with our audited financial statements for the year ended December 31, 2011 through EisnerAmper LLP's dismissal, there have been no reportable events with us as set forth in Item 304(a)(1)(v) of Regulation S-K.

We requested that EisnerAmper LLP furnish us with a letter addressed to the SEC stating whether it agrees with the above statements. A copy of the letter, dated June 14, 2013, is filed as an exhibit to the registration statement of which this prospectus forms a part.

BUSINESS

Overview

We are a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule drug candidates to treat cancer. Using our proprietary chemistry platform, we have created an extensive library of targeted anti-cancer agents designed to work against specific cellular pathways that promote cancer. We believe that the drug candidates in our pipeline have the potential to be efficacious in a wide variety of cancers without causing harm to normal cells. We have three clinical-stage product candidates and six preclinical programs.

Rigosertib, our most advanced product candidate, is being tested in a number of ongoing Phase 2 and Phase 3 clinical trials. We are conducting a pivotal Phase 3 trial of rigosertib under a Special Protocol Assessment, or SPA, from the U.S. Food and Drug Administration, or FDA, for higher risk myelodysplastic syndromes, or MDS. We expect to report top-line overall survival results from this trial in the fourth quarter of 2013 or the first quarter of 2014. We are also evaluating rigosertib in a Phase 3 trial for metastatic pancreatic cancer, in two Phase 2 trials for transfusion-dependent lower risk MDS, and in a Phase 2 trial for head and neck cancers. We have tested rigosertib in more than 850 patients with solid tumors and hematological diseases. Rigosertib has been granted orphan drug status for MDS in both the United States and Europe as well as orphan drug status for pancreatic cancer in the United States. Baxter Healthcare SA, or Baxter, a subsidiary of Baxter International Inc., has commercialization rights for rigosertib in Europe and SymBio Pharmaceuticals Limited, or SymBio, has commercialization rights in Japan and Korea. We have retained development and commercialization rights to rigosertib in the rest of the world, including in the United States.

Rigosertib is an inhibitor of two important cellular signaling pathways: phosphoinositide 3-kinase, or PI3K, and polo-like kinase, or PLK, both of which are frequently over-active in cancer cells. PI3K signaling promotes the growth and survival of cells under stressful conditions, such as under low oxygen levels that are often found in tumors. By inhibiting the PI3K pathway in cancer cells, rigosertib promotes tumor cell apoptosis, or programmed cell death.

The PLK pathway has a critical role in maintaining proper chromosome organization and sorting during cell division. By modulating the PLK pathway, rigosertib stops cancer cells at late stages of the cell division cycle, which leads to chromosome disorganization and death in these cells. In normal cells, rigosertib pauses progression of the cell cycle in the early stages, without causing harm or death to these cells.

Due to this dual effect of inhibiting both the PI3K and PLK pathways, and thereby effecting both tumor cell survival and division, we believe that rigosertib has potential to treat a variety of cancer types, including hematological diseases and solid tumors.

We are testing both intravenous and oral formulations of rigosertib, referred to as rigosertib IV and rigosertib Oral, in clinical trials.

- *Rigosertib IV in higher risk MDS:* We are evaluating rigosertib IV in a multi-center, pivotal Phase 3 trial under an SPA with the FDA in patients with higher risk MDS who failed hypomethylating agent therapy. MDS is a group of blood disorders that affect bone marrow function. We believe that there is a significant medical need for new therapies to treat MDS patients who have failed or cannot tolerate treatment with the hypomethylating drugs azacitidine (Vidaza®) or decitabine (Dacogen®), which represent the current standard of care for higher risk MDS patients. We completed enrollment of 270 patients in this trial in May 2013 and expect to report top-line overall survival results in the fourth quarter of 2013 or the first quarter of 2014. Of the 30 evaluable MDS patients in four early-stage Phase 1/2 trials of rigosertib IV involving 39 refractory MDS patients, we observed objective responses in 12 patients, five of which were complete bone marrow responses. To our knowledge, there are no other current Phase 3 trials in this patient population. If we achieve positive results in this trial, we intend to submit a New

Drug Application, or NDA, to the FDA in the second half of 2014, and a Marketing Authorization Application, or MAA, to the European Medicines Agency, or the EMA, by the fourth quarter of 2014 or the first quarter of 2015, for marketing approval of rigosertib IV.

A provider of marketing analytics and data to the biopharmaceutical industry has estimated that, for 2011 in the United States, the diagnosed incidence of MDS was approximately 15,600 and the prevalence of MDS was approximately 52,000. According to the same marketing analytics firm, approximately 23% of MDS patients are estimated to fall into the categories of MDS characterized as higher risk.

- *Rigosertib IV in pancreatic cancer:* We are conducting a multi-center Phase 3 trial of rigosertib IV in combination with gemcitabine, a widely used chemotherapy drug, for the first-line treatment of metastatic pancreatic cancer patients. In March 2013, we completed enrollment of 150 patients in this trial and we expect results of the pre-planned interim analysis for overall survival in the fourth quarter of 2013 or the first quarter of 2014. The American Cancer Society estimates that 45,200 new cases of pancreatic cancer will be diagnosed in the United States in 2013.

- *Rigosertib Oral in lower risk MDS:* We are evaluating rigosertib Oral in two Phase 2 trials as a first-line treatment for transfusion-dependent, lower risk MDS patients. The quality of life of these patients could be significantly improved by lowering the number of required blood transfusions or eliminating the need for transfusions altogether. We reported initial response and safety data from the first Phase 2 trial in June 2013 and expect to complete enrollment and present overall results from this trial in December 2013. Upon completion of the first Phase 2 trial, we will meet with the FDA to discuss an approval pathway for rigosertib Oral as a first-line treatment in lower risk MDS patients. We expect to complete enrollment in the second Phase 2 trial in lower risk, transfusion-dependent MDS patients who have failed treatment with erythroid stimulating agents in the second half of 2014. Erythroid stimulating agents are therapeutic proteins that cause red blood cells to grow and mature, and are common treatments for lower risk MDS patients. Approximately 77% of MDS patients are estimated to fall into the categories of MDS characterized as lower risk.

- *Rigosertib Oral in head and neck cancers:* We are evaluating rigosertib Oral in a Phase 2 trial in patients with head and neck cancers. We expect to complete enrollment of 80 patients in this trial in the second half of 2014. The National Cancer Institute estimated that the 2012 incidence of head and neck cancers was more than 52,000 cases in the United States.

To accelerate and broaden the development of rigosertib, we entered into a development and licensing agreement with Baxter in 2012 to commercialize rigosertib in Europe. In 2011, we entered into a licensing agreement with SymBio to commercialize rigosertib in Japan and Korea. We have retained development and commercialization rights to rigosertib in the rest of the world, including the United States. We will explore a variety of alternatives for the commercialization of rigosertib in territories we currently retain, including direct commercialization, co-promotion or selective out-licensing of rights to a third party.

Our second clinical-stage product candidate, *ON 013105*, is in a Phase 1 trial in patients with relapsed or refractory lymphoma, including an aggressive form of non-Hodgkin's lymphoma identified as mantle cell lymphoma, or MCL, and acute lymphoid leukemia, or ALL. A critical defect in many cancer cells is the uncontrolled expression of cyclin D1, a protein essential for normal cell division. Cyclin D1 is over-expressed in several hematological diseases, including B-cell lymphomas, such as MCL. ON 013105 suppresses the accumulation of cyclin D1 in cancer cells. In 2011, we suspended enrollment in this Phase 1 trial because enrollment of patients was occurring slowly, and as a result, our inventory of ON 013105 clinical trial materials expired. We plan to restart enrollment in this trial with newly manufactured clinical trial materials at a new clinical trial site in the fourth quarter of 2013.

Our third clinical-stage product candidate, *recilisib*, is being developed in collaboration with the U.S. Department of Defense, or DoD, for acute radiation syndromes, or ARS. We have conducted animal studies and clinical trials of recilisib under the FDA's Animal Efficacy Rule, which permits marketing approval for new medical countermeasures for which human efficacy studies are not feasible or ethical, by relying on evidence from animal studies in appropriate animal models to support efficacy in humans. We have completed four Phase 1 trials to evaluate the safety and pharmacokinetics of recilisib in healthy human adult subjects using both subcutaneous and oral formulations, referred to as recilisib SC and recilisib Oral. We have received orphan drug designation for recilisib for ARS in the United States.

In addition to our three clinical-stage product candidates, we are advancing six preclinical programs that target kinases, cellular metabolism or division.

We have broad-based capabilities that span drug discovery and clinical development, from medicinal chemistry and evaluation in biochemical, cell-based and animal models, through Phase 3 trials and regulatory filings in the United States, Europe and India. Our discovery program is based on a proprietary chemistry platform comprising more than 150 novel core chemical structures. Our chemistry and screening approaches aim to discover new drug candidates that increase efficacy and help overcome resistance to therapy in cancer cells, while minimizing their toxicity to normal cells. Our intellectual property portfolio includes more than 100 issued patents and over 90 patent applications, either owned by us or licensed exclusively to us, including patents covering our most advanced product candidate, rigosertib. These patents and licenses cover composition-of-matter, process, formulations and method-of-treatment claims for our clinical-stage product portfolio.

Our Strategy

We are committed to delivering novel treatments to cancer patients. We are focused on discovering and developing targeted small molecule anti-cancer product candidates. The key components of our strategy are to:

- ***Seek Regulatory Approval of Rigosertib in Myelodysplastic Syndromes and Solid Tumors***

  - *For higher risk MDS patients who have failed azacitidine or decitabine therapy*: We completed enrollment of a 270-patient Phase 3 trial with rigosertib IV in higher risk MDS patients in May 2013 and expect to report top-line overall survival results from this trial in the fourth quarter of 2013 or the first quarter of 2014. If we achieve positive results in this trial, we intend to submit an NDA to the FDA in the second half of 2014, and an MAA to the EMA by the fourth quarter of 2014 or the first quarter of 2015 for marketing approval of rigosertib IV.

  - *For first-line treatment of transfusion-dependent, lower risk MDS patients*: We reported initial response and safety data from the first Phase 2 trial in June 2013 and expect to complete enrollment and present overall results from this trial in December 2013. Upon completion of the first Phase 2 trial, we will meet with the FDA to discuss an approval pathway for rigosertib Oral as a first-line treatment in lower risk MDS patients.

  - *For first-line treatment of patients with previously untreated metastatic pancreatic cancer*: We are conducting a randomized Phase 3 trial with rigosertib IV in combination with gemcitabine and expect the results of the pre-planned interim analysis for overall survival in the fourth quarter of 2013 or the first quarter of 2014. We will use these results to assess further development of rigosertib IV in this indication.

  - *For patients with head and neck cancers*: We are conducting a Phase 2 trial with rigosertib Oral in patients with head and neck cancers. We expect to complete enrollment of 80 patients in this Phase 2 trial in the second half of 2014.

- ***Continue Development of Our Pipeline***

  - *Advance clinical development of ON 013105 for the treatment of various lymphomas and leukemias*: We are conducting a Phase 1 clinical trial of ON 013105 for various lymphomas and leukemias, including MCL and ALL. We believe that this clinical study may provide proof-of-concept of the proposed mechanism of action of ON 013105. We have suspended enrollment in this Phase 1 trial; however, we plan to restart its enrollment in the fourth quarter of 2013.

  - *Advance recilisib for the treatment of acute radiation syndromes*: We are seeking collaborations, grants and government funding to conduct nonhuman primate studies to demonstrate recilisib's safety and efficacy, as well as to identify predictive biomarkers in animals and healthy human volunteers.

  - *Advance our preclinical programs via collaborations*: Building on the experience and knowledge we have gained from our clinical-stage product candidates, we have identified several lead molecules in our preclinical pipeline. We intend to explore additional collaborations to further the development of these product candidates.

- ***Maintain Flexibility in Commercializing and Maximizing the Value of our Programs***

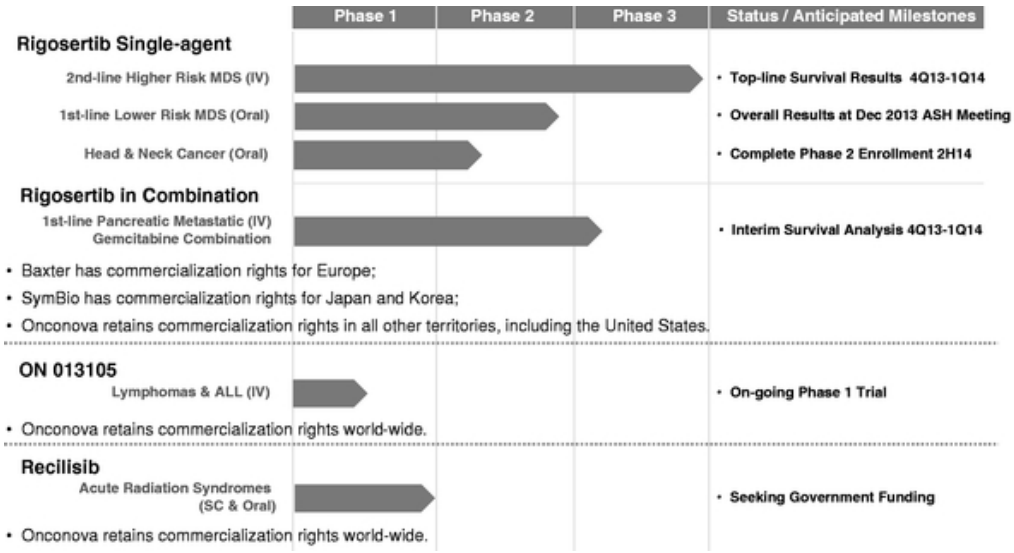
  - While retaining U.S. and other territorial rights, we have entered into collaborations with Baxter to commercialize rigosertib in Europe and with SymBio to commercialize rigosertib in Japan and Korea. We will explore a variety of alternatives for the commercialization of rigosertib in territories we currently retain, including direct commercialization, co-promotion or selective out-licensing of rights to a third party.

Our Product Candidates

Clinical Programs

The development status of our three clinical-stage product candidates is summarized below:

Clinical-Stage Product Candidates



Rigosertib—Inhibitor of Phosphoinositide 3-Kinase & Polo-Like Kinase Pathways

Overview

Rigosertib is our most advanced product candidate and has been extensively tested in clinical trials, which have collectively enrolled more than 850 patients. We believe that rigosertib has the potential to become the first approved second-line therapy for higher risk MDS patients. Also, we believe that rigosertib has the potential to be a first-line therapy for transfusion-dependent lower risk MDS patients and for metastatic pancreatic cancer patients.

Rigosertib IV is currently in several late-stage clinical trials, including a pivotal Phase 3 trial being conducted under an SPA from the FDA and Scientific Advice from the EMA for adult MDS patients whose disease has failed azacitidine or decitabine therapy. We completed enrollment in this trial in May 2013 and expect to report top-line overall survival results in the fourth quarter of 2013 or the first quarter of 2014.

Rigosertib IV is also being studied as a combination therapy with gemcitabine in a Phase 3 trial for treatment of patients with metastatic pancreatic cancer who have not previously received any chemotherapy. We have enrolled 150 patients in the first phase of this trial and expect results of the pre-planned interim analysis for overall survival in the fourth quarter of 2013 or the first quarter of 2014.

In addition, rigosertib Oral is being studied in Phase 2 trials in patients with transfusion-dependent lower risk MDS and in patients with head and neck cancers. We reported initial response and safety data from the first Phase 2 trial in lower risk MDS in June 2013 and expect to complete enrollment and present overall results from this trial in December 2013. We expect to complete enrollment for the head and neck cancers trial in the second half of 2014.

Rigosertib Inhibits Two Key Signaling Pathways Associated with Cancer Cell Growth and Survival

Rigosertib is an inhibitor of two important cellular signaling pathways, PI3K and PLK, both of which are frequently over-active in cancer cells. PI3K signaling promotes the growth and survival of cells under stressful conditions, such as under low oxygen levels that are often found in tumors. If the PI3K pathway is over-active, apoptosis of cancer cells is diminished, leading to excessive cellular growth. By inhibiting the PI3K pathway, rigosertib promotes tumor cell apoptosis. Rigosertib also influences signals along the PI3K pathway, such as those leading to the production of cyclin D1.

The PLK pathway plays a critical role in maintaining proper organization and sorting of chromosomes during cell division. Too much PLK activity in cancer cells results in uncontrolled proliferation. By modulating PLK pathway activity, rigosertib stops cancer cells at late stages of the cell division cycle, which leads to chromosome disorganization and death in these cells. In normal cells rigosertib pauses progression of the cell cycle in the early stages, without causing harm or death to these cells.

Due to this dual effect of inhibiting both the PI3K and PLK pathways, and thereby effecting both tumor cell survival and division, we believe that rigosertib has potential to treat a variety of cancer types, including hematological diseases and solid tumors.

Myelodysplastic Syndromes

MDS is a group of blood disorders that affect bone marrow function. MDS typically affects patients over the age of 65. In MDS, bone marrow becomes dysplastic, or defective. The blood cells produced do not develop normally, such that too few healthy blood cells are released into the blood stream, which leads to low blood cell counts, or cytopenias. Thus, many patients with MDS require frequent blood transfusions. In most cases, the disease worsens and the patient develops progressive bone marrow failure. In advanced stages of the disease, immature blood cells, or blasts, leave the bone

marrow and enter the blood stream, leading to acute myelogenous leukemia, or AML, which occurs in approximately one-third of patients with MDS.

Based on Surveillance Epidemiology and End Results (SEER) data from the National Cancer Institute, a marketing analytics firm has estimated the 2011 incidence of MDS at approximately 15,600 cases and the prevalence of MDS at approximately 52,000 cases in the United States. We believe that the actual incidence numbers may be higher, due to underdiagnosing and underreporting of new cases of MDS to centralized cancer registries, and that the incidence of MDS in the United States is likely to increase, due to an aging population, improved disease awareness and diagnostic precision, and an increase in the number of cases of secondary, often chemotherapy-induced, MDS.

MDS is typically diagnosed using routine blood tests or by observing symptoms, such as shortness of breath, weakness, easy bruising or bleeding, or fever with frequent infections. A diagnosis of MDS is confirmed by evaluating a bone marrow biopsy/aspirate showing dysplastic changes, and, in more advanced cases, the presence of excess blasts, meaning that blasts account for more than 5% of the total number of cells in the bone marrow. Because the bone marrow and blood cells in MDS patients can undergo different kinds of abnormal changes, several classification systems have been developed to gauge the severity of disease and help determine prognosis and treatment strategy. We use two standard classification systems, the French-American-British morphological classification system, or the FAB system, as modified by the World Health Organization, or WHO, and the International Prognostic Scoring System, or IPSS, to define patient inclusion criteria for our rigosertib trials in MDS:

- *FAB Classification/WHO Diagnostic Criteria.* In 1999, WHO modified the FAB system for MDS that had been based primarily on the percentage of blasts in the bone marrow and blood. Sub-categories under the WHO classification are: Refractory anemia, or RA (less than 5% blasts), RA with ringed sideroblasts, or RARS, refractory cytopenia with multilineage dysplasia, or RCMD, RA with excess blasts-1 (5-9% blasts), or RAEB-1, RAEB-2 (10-19% blasts), MDS with isolated deletion of the long arm of chromosome 5, or del(5q), and MDS unclassified, or MDS-U. Patients classified as RAEB in transformation (21-29% blasts), or RAEB-t, under the FAB system are reclassified in the WHO system as AML patients.

- *IPSS Diagnostic Criteria.* IPSS ranks the severity of chromosome abnormalities, number of cytopenias, and percentage of bone marrow blasts observed at diagnosis to calculate a four-level risk score: Low, Intermediate-1, Intermediate-2 and High. MDS patients are generally classified using IPSS in order to assess the risk of dying or having their disease progress to AML.

Patients with RAEB-1, RAEB-2 or RAEB-t under the FAB/WHO criteria or patients with IPSS risk scores of Intermediate-2 or High are generally considered to have higher risk MDS, with a median survival of less than two years. According to a marketing analytics firm, approximately 23% of MDS patients are classified in these higher risk categories.

Patients with IPSS scores of Low and Intermediate-1 are generally considered to have lower risk MDS, with an overall survival of approximately three to six years. Approximately 77% of MDS patients are classified in these lower risk categories.

Treating Myelodysplastic Syndromes

Stem cell or bone marrow transplantation is a potentially curative therapy for MDS. However, since most patients with MDS are elderly and therefore ineligible for transplantation, this option is generally considered only for the small proportion of younger MDS patients.

We believe that most higher risk and some lower risk MDS patients are treated with hypomethylating drugs, azacitidine and decitabine, the hypomethylating drugs approved in the United States for treatment of MDS. A provider of information, services and technology for the healthcare industry estimates that in the year ended June 2012, approximately 12,500 MDS patients received treatment with hypomethylating agents. For 2012, revenues of azacitidine have been reported to be

approximately $327 million in the United States and revenues for decitabine have been reported to be approximately $225 million in North America.

A significant number of higher risk MDS patients fail or cannot tolerate treatment with azacitidine or decitabine, which represent the current standard of care for higher risk MDS patients, and almost all patients who initially respond to therapy eventually relapse. Median survival time of MDS patients who have failed hypomethylating drugs is less than six months. Accordingly, we believe that a new therapy that would extend survival in these refractory patients would represent a major contribution in the treatment of MDS.

Hypomethylating drugs work by inhibiting the methylation of DNA. Methylation is a biochemical process involving the addition of a methyl group to DNA and plays an important role in gene expression during cell division and differentiation. By inhibiting methylation, hypomethylating drugs cause the death of rapidly dividing cells, including cancer cells that are no longer responsive to normal growth control mechanisms. Hypomethylation may also restore normal function to genes that are critical for differentiation and proliferation. The mechanisms underlying resistance to hypomethylating agents in patients is not well understood. Studies performed with decitabine in cultured cell lines revealed lowered expression of enzymes required for drug transport and activation.

By contrast, rigosertib works by inhibiting the PI3K pathway, a cellular signaling pathway that promotes the growth and survival of cells under stressful conditions, such as under low oxygen levels that are often found in tumors, and by modulating PLK pathway activity, which leads to chromosome disorganization and death in cancer cells. We believe that, because rigosertib has a mechanism of action that is different from hypomethylating agents, it may be effective in patients who have failed treatment with those drugs. We have observed that rigosertib treatment resulted in bone marrow responses in some patients whose bone marrow blast cell counts had increased during prior treatment with hypomethylating agents.

In the case of lower risk MDS patients, those categorized as Low or Intermediate-1 risk with transfusion-dependent anemia and del(5q) cytogenetic abnormality are generally treated with lenalidomide (Revlimid®). For all other lower risk MDS patients, supportive care employing blood products, such as red blood cell and platelet transfusions, and erythroid stimulating agents, is the mainstay of therapy. Frequent transfusions are subject to many risks, including iron overload, blood borne infections and immune-related reactions. We believe that a therapeutic agent that could lower or eliminate the need for transfusions over an extended period of time would fulfill a significant unmet medical need for this patient population.

Clinical Development of Rigosertib IV in Higher Risk Myelodysplastic Syndromes

We filed an investigational new drug application, or IND, amendment with the FDA for rigosertib in MDS in July 2008. We are conducting a multi-center, pivotal Phase 3 trial with rigosertib IV as a single agent in patients with MDS who have failed prior azacitidine or decitabine therapy, which we refer to as our "ONTIME" trial. The protocol for this trial was reviewed and agreed upon with the FDA under an SPA. The EMA has also provided Scientific Advice, indicating that the study design should be adequate to meet the scientific and regulatory requirements to support efficacy claims for a marketing application.

The ONTIME trial is a randomized, controlled study, where eligible patients must have failed azacitidine or decitabine treatment, have excess blasts (5-30% blasts) and have at least one cytopenia. There is currently no approved drug for this group of patients and the current standard treatment consists of best supportive care, which is treatment intended to manage disease-related symptoms. In the ONTIME trial, both groups of patients receive best supportive care, with the treatment group of patients also receiving rigosertib. The study employs a 2:1 randomization in which two-thirds of the patients receive rigosertib plus best supportive care, and one-third of patients receive only best supportive care. The key assumption used to calculate the required size of the ONTIME trial was

based on hypothesized median survival of 30 weeks in the rigosertib treatment group and 17 weeks in the best supportive care group. A total sample size of 270 patients, with 180 patients in the rigosertib group and 90 patients in the best supportive care group, and a total number of 223 deaths yields greater than 95% statistical power to detect a significant difference in overall survival between the two groups.

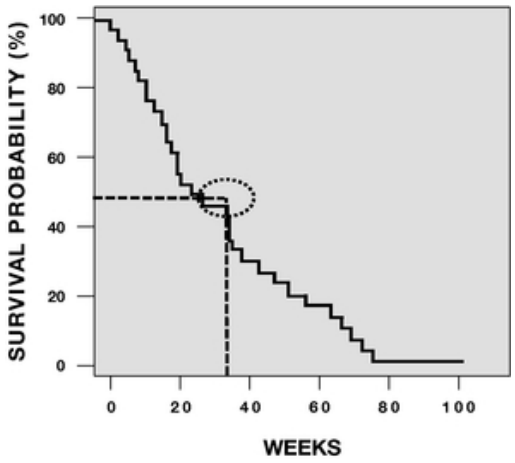
The primary objective of the ONTIME trial is to ascertain whether treatment with rigosertib leads to an overall survival benefit. Secondary objectives include evaluation of other responses, such as improvements in bone marrow and cytogenetic and blood profiles, according to standard response criteria for MDS defined by the 2006 WHO International Working Group, and to measure patients' quality of life scores and times to transition to AML. In this study, rigosertib is administered as a continuous intravenous infusion over a period of three days with a bag change every 24 hours. Patients use an ambulatory pump, avoiding the need for hospital stays. We completed enrollment of 270 patients in the ONTIME trial in May 2013.

The ONTIME trial is being conducted at 42 sites in the United States and at 47 sites in Belgium, France, Germany, Italy and Spain. Among the 270 patients enrolled as of May 2013, 179 are enrolled at U.S. sites. The safety and conduct of the trial is being reviewed by a data safety monitoring committee at fixed intervals. Three such reviews have been held to date, each with the recommendation to continue the trial without change to the study protocol. We expect to report top-line overall survival results from this trial in the fourth quarter of 2013 or the first quarter of 2014.

Phase 1/2 Trial Results of Rigosertib IV in Patients with Myelodysplastic Syndromes

We conducted two Phase 1 studies, one Phase 2 study and one Phase 1/2 study at four sites, where we enrolled 79 patients with MDS or AML. Of these 79 patients, 39 were RAEB-1, RAEB-2, or RAEB-t MDS patients and who had previously failed treatment with hypomethylating agents. There were encouraging signs of activity, as determined by survival and bone marrow analyses, in this group of patients. The following graph is a probability-of-survival curve, known as a Kaplan-Meier curve, showing the length of survival of these 39 patients after initiation of rigosertib IV treatment. In this intent-to-treat analysis, the median survival was 36 weeks. Twenty-three patients survived at least six months, eight patients lived more than one year, but less than two years, and three patients lived more than two years, including one alive at 142 weeks. According to several peer-reviewed published reports, median overall survival for MDS patients who have failed treatment with hypomethylating agents is less than six months.

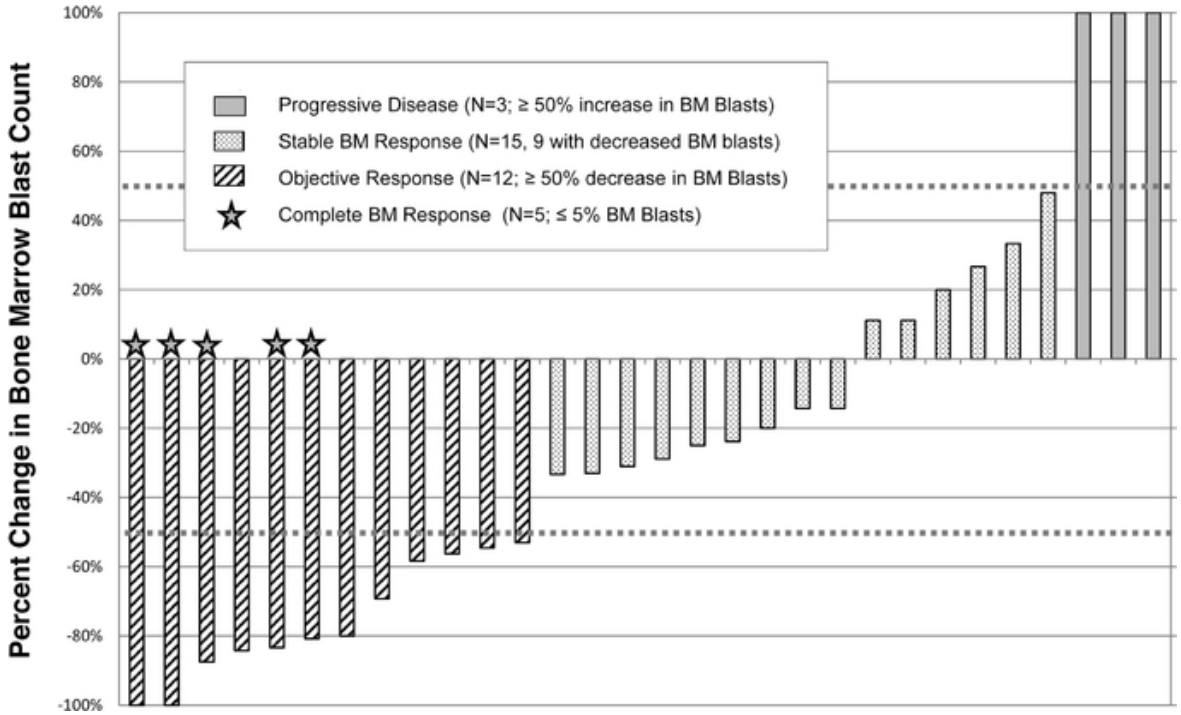
Survival Data for 39 Refractory MDS Patients Receiving Rigosertib IV:
Intent-to-Treat Analysis: Median Overall Survival = 36 Weeks



A follow-up bone marrow biopsy, to assess the effects of treatment on blast counts, was available for 30 of the 39 patients. The percentage change in bone marrow, or BM, blast count is shown in the graph below. Of the 30 evaluable patients, 21 had a reduction in BM blast count, and 12 patients in this subset demonstrated an objective response, meaning that they had a 50% or more reduction in BM blasts. Of the 12 patients with objective responses, five patients were determined to have a complete BM blast response, meaning that their blast count was reduced to 5% or less of BM cells present. Nine of the 30 evaluable patients had an increase in BM blast count, with three patients showing progression, meaning that they experienced an increase of 50% or more in BM blasts. During the period these patients received treatment, a subset of 37 patients had between one and four follow-up bone marrow biopsies. These biopsies showed that the cellularity, or distribution of normal cell types, was not decreased, suggesting that rigosertib was selectively reducing the BM blast counts in these patients, while being nontoxic to normal bone marrow cells.

Not all patients in a study may have follow-up bone marrow biopsies because these are invasive procedures and represent a risk of profuse bleeding, particularly in patients with severe thrombocytopenia, a condition in which the body does not produce enough platelets and a common occurrence in higher risk MDS patients. Such biopsies are also uncomfortable and sometimes painful procedures and patients may withhold consent for such procedures. Finally, early worsening of the overall clinical condition toward leukemia or death may cause follow-up bone marrow biopsies to be deferred. Since the primary endpoint of the ONTIME trial is overall survival, we anticipate that unavailable bone marrow biopsies would not have a material impact on the results of the trial.

Best Bone Marrow (BM) Responses After Rigosertib IV in 30 RAEB-1, -2, -t MDS Patients Previously Treated with Hypomethylating Agents



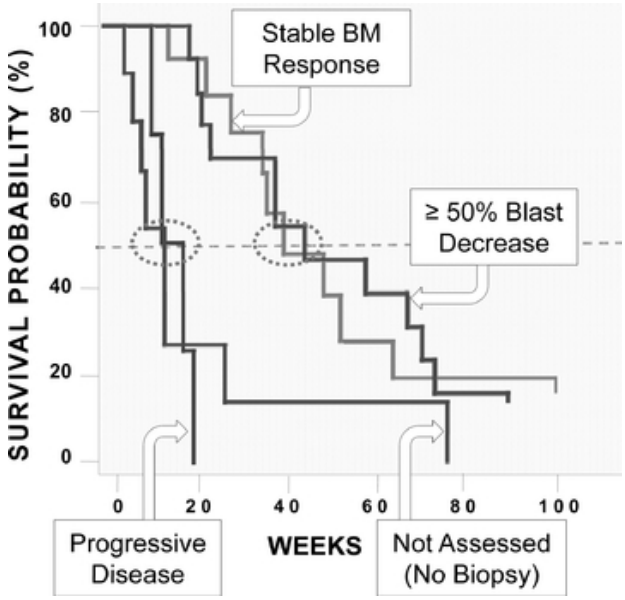
Further analysis, tabulated below, of BM results in comparison with the overall survival of these patients revealed a positive correlation between BM blast response and overall survival, with a statistically significant p-value of 0.003. The p-value is a widely used, conventional parameter for indicating statistical significance. A p-value of 0.05 or less represents statistical significance, meaning that there is a less than one-in-twenty likelihood that the observed results occurred by chance. Those patients with objective BM response and patients who had stable BM counts, meaning they had a less than 50% increase or decrease in BM blast count, exhibited a higher survival rate than patients who progressed during treatment or who were not evaluable for BM analysis. These initial results suggest that BM blast counts have predictive value for estimating overall survival in this group of patients.

Preliminary Analysis of BM Response and Overall Survival Data from 39 MDS Patients in Four Single-Arm Phase 1 and Phase 1/2 Trials of Rigosertib IV in Patients with MDS

	Objective BM Response (³ 50% blast decrease)	Stable BM Response (< 50% increase or decrease in blasts)	Progressive Disease (³ 50% blast increase)	Not Assessed (no biopsy)	P-value
Number of patients	**12**	**15**	**3**	**9**	**—**
Median overall survival (weeks)	**37**	**40**	**10**	**11**	**0.003**

This observation is further elaborated in the following Kaplan-Meier graph, in which survival curves for groups of patients are shown based on their BM response category. Treated patients with a stable BM response or an objective BM response survived significantly longer than those patients who experienced progression or who could not be evaluated for BM response.

**Overall Survival Data from 39 Refractory MDS Patients Receiving Rigosertib IV:
Grouped by Bone Marrow Responses**



In these exploratory trials, we also compared the relationship between duration of rigosertib exposure and BM response. Overall, more patients who received three-day infusions of rigosertib every two weeks achieved improved BM blast responses compared to patients who received two-day infusions every week for three weeks of a four week cycle. Extending infusion duration beyond three days did not result in further improvements of BM blast responses. As a result, we chose a three-day dosing regimen for the Phase 3 trial.

Safety data for the 79 patients with MDS or AML in four Phase 1 and 2 trials are available. Rigosertib IV was generally well tolerated in these trials. The most frequent drug-related adverse events, occurring in at least 10% of patients, were nausea, diarrhea, fatigue, anemia, dysuria and hematuria. Drug-related adverse events that were Grade 3 or Grade 4 in severity, meaning that they were more than mild or moderate in toxicity, observed in at least two patients included anemia, thrombocytopenia, neutropenia, decreased white blood cells, urinary frequency, dysuria, decreased blood sodium, increased clotting time, fatigue, fever and diarrhea.

Clinical Development of Rigosertib Oral in Lower Risk Myelodysplastic Syndromes

We filed an IND amendment with the FDA for rigosertib Oral in MDS in February 2009. Based on Phase 1 trial results with rigosertib Oral, we believe that rigosertib has the potential to significantly reduce the transfusion needs and improve the quality of life for patients with lower risk MDS. Although median survival for these transfusion-dependent patients is five or more years, frequent transfusions are subject to risks and limitations, including iron overload, blood borne infections and immune related reactions. We believe that an oral therapeutic agent that could lower or eliminate the need for transfusions over an extended period of time would fulfill a significant unmet medical need for this patient population.

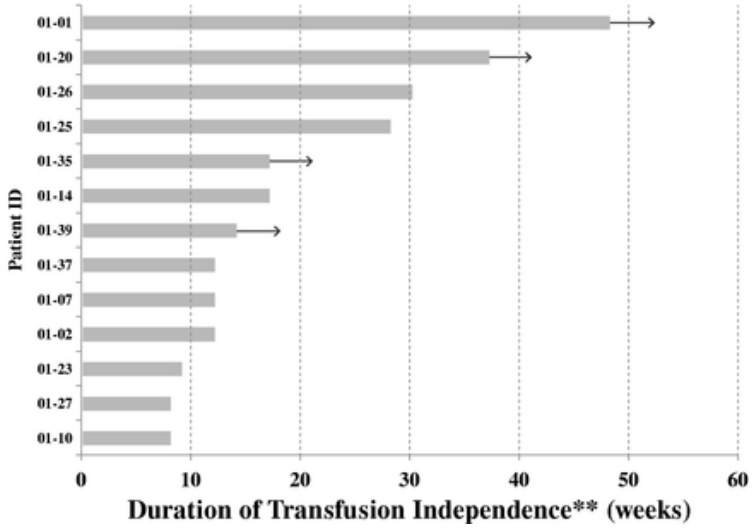
We are enrolling transfusion-dependent lower risk MDS patients in two Phase 2 trials. We reported an interim analysis of initial response and safety data from the first Phase 2 trial, which we refer to as our "ONTARGET" trial, at the June 2013 Annual Meeting of the American Society for Clinical Oncology, or ASCO. We expect to complete enrollment in this trial and to present overall results at the American Society of Hematology, or ASH, Annual Meeting in December 2013.

The ONTARGET trial is an open-label, multi-site trial testing the effect of rigosertib Oral on transfusion-dependent lower risk MDS patients. To be eligible for this study, patients must have received transfusions of at least four units of red blood cells during the eight weeks before randomization and patients can continue to receive transfusions and erythroid stimulating agents while in the trial. The primary objectives of this trial are to evaluate efficacy, as measured by transfusion independence, as well as safety. The study has a target enrollment of 60 patients, with enrollment open at four trial sites in the United States. Initially, patients were randomized 1:1 on an outpatient basis to one of two dosing regimens, receiving either 560 mg of rigosertib twice a day for 14 consecutive days of a 21-day cycle, which we refer to as the intermittent dosing arm, or 560 mg of rigosertib twice a day for 21 days of a 21-day circle, which we refer to as the continuous dosing arm. We were able to evaluate interim data from 26 evaluable patients in the intermittent dosing arm and eight evaluable patients in the continuous dosing arm.

Evaluation of the interim safety data indicated that rigosertib Oral was generally well tolerated, with the most frequently observed drug-related side effects being urologic in nature and believed to be related to the dosing regimen. In the continuous dosing arm of the study, five of the first nine patients experienced drug-related urinary side effects of Grade 2 or higher, meaning that they were more than mild in toxicity. Accordingly, the study protocol was amended to allow all patients to be treated with the intermittent dosing regimen. The most frequent urinary adverse events of Grade 2 or higher in the intermittent dosing arm were urinary urgency/frequency, which occurred in 38% of patients, dysuria, which occurred in 18%, and hematuria, or the presence of red blood cells in the urine, which occurred in 15%. Several of the patients who experienced dysuria reported improvements after they were administered oral hydration or sodium bicarbonate. Other adverse events of Grade 2 or higher included intermittent neutrophenia, or an abnormally low number of white blood cells that serve as the primary defense against infections, which occurred at Grade 3 in one patient and at Grade 4 in one other patient. Median onset of drug-related adverse events of Grade 2 or higher was 28 weeks in the intermittent dosing arm, compared with 12 weeks in the continuous dosing arm. Median duration of the treatment in the continuous dosing arm was 24 weeks. Because the trial is ongoing, median duration of the treatment in the intermittent dosing arm has not yet been determined. Renal function was unaffected and gastrointestinal adverse events and fatigue were infrequently observed. We are investigating ways to mitigate or eliminate urinary symptoms by employing oral hydration and sodium bicarbonate and adjusting the administered rigosertib dose and schedule, with the goal of reducing exposure of bladder mucosa to excreted rigosertib.

Initial response results showed that 13 of the 26 evaluable patients in the intermittent dosing arm and two of the eight evaluable patients in the continuous dosing arm achieved transfusion independence, defined as a period of at least eight consecutive weeks without any red blood cell transfusions. As shown in the graph below, in the 13 patients who achieved transfusion independence in the intermittent dosing arm, the duration of transfusion independence ranged from eight weeks to more than 48 weeks. Onset of independence ranged from one week to 24 weeks following the initiation of rigosertib dosing and two patients continued to benefit from therapy more than nine months after starting rigosertib.

Interim Analysis of Lower Risk Transfusion-Dependent MDS Patients Treated with Rigosertib Oral: Duration of Transfusion Independence Achieved in 13 of 26 Evaluable Patients in the Intermittent Dosing Arm*



* Horizontal arrows indicate patients who continued to meet the criteria for transfusion independence at the time this data analysis was conducted.

** Transfusion independence defined as a minimum of 8 consecutive weeks without any red blood cell transfusions.

One of the aims of our ongoing trials is to correlate patient characteristics with transfusion response, thus potentially allowing for the selection of appropriate patients for future trials with rigosertib. Eleven of the 13 transfusion-independent patients in the intermittent dosing arm received one or more injections of erythroid stimulating agents during the time of rigosertib Oral administration, and the patterns of hemoglobin responses observed in some patients suggest a possible synergy between rigosertib Oral and erythroid stimulating agents.

We initiated a second multi-center Phase 2 trial in May 2013 in lower risk, transfusion-dependent MDS patients who have failed treatment with erythroid stimulating agents, in which all patients will receive the intermittent dosing schedule. We expect to complete enrollment for this trial in the second half of 2014.

Previously, we conducted a Phase 1 trial of rigosertib Oral to determine drug safety and tolerability and to monitor plasma levels of rigosertib Oral in Low, Intermediate-1, Intermediate-2 and High Risk MDS patients who had failed prior azacitidine, decitabine or lenalidomide therapy or injection of an erythroid stimulating agent. Pharmacokinetic analysis showed that plasma levels of rigosertib could be achieved that were at or above levels predicted to be pharmacodynamically active. Encouraging preliminary signs of activity were observed. Safety data are available in 33 patients from this trial. The most frequent drug-related adverse events, occurring in at least 10% of patients, were decreased appetite, diarrhea, nausea and dysuria. Drug-related adverse events that were Grade 3 or greater in severity occurred in two patients and included urinary tract infection, syncope, or fainting, and dyspnea, or shortness of breath. Hematuria was identified as the most frequent dose-limiting toxicity, occurring in two patients.

Metastatic Pancreatic Cancer

The American Cancer Society estimates that 45,220 new cases of pancreatic cancer will be diagnosed in the United States in 2013, and that 38,460 people are expected to die in the United States from the disease in 2013. Deaths from pancreatic cancer ranked fourth among cancer-related deaths in the United States in 2012 according to the American Cancer Society. At diagnosis, 50% of pancreatic cancer patients already have metastasis to the liver or peritoneal surface in the abdomen. Since 1975, the five-year survival rate of pancreatic cancer patients has only marginally improved, from 2% to 6%. The median survival for locally advanced and for metastatic disease, which collectively represent over 80% of cases, is about ten months and six months, respectively.

Currently, the best therapeutic option for pancreatic cancer patients is surgical resection to remove tumor-laden tissue. However, only 15% of newly diagnosed patients are candidates for this treatment option, and of these patients only about 20% survive to five years. For the remaining 85% of pancreatic cancer patients, gemcitabine is one of two currently prescribed, FDA approved therapies, but it provides only a marginal survival benefit over best supportive care, from five and a half to six months. The epidermal growth factor receptor inhibitor erlotinib (Tarceva®) has also received approval in the United States and Europe for metastatic pancreatic cancer, and has shown a modest increase of median survival and a 6% increase in one-year survival rates. Fluorouracil and mitomycin-C, older cytotoxic drugs, are also approved for the treatment of pancreatic cancer. Unapproved combination therapies like FOLFIRINOX, a chemotherapy regimen, are becoming a part of standard care, especially in patients with good performance status who can tolerate the toxic side effects associated with this regimen. We believe that metastatic pancreatic cancer remains an area of significant unmet medical need and presents a large market opportunity for the development of additional targeted therapies.

Clinical Development Rigosertib IV in Metastatic Pancreatic Cancer

We filed an original IND with the FDA for rigosertib in pancreatic cancer in December 2011. We are studying rigosertib as first-line therapy in a Phase 3 trial in advanced pancreatic cancer. In this trial, we are comparing a treatment combination of rigosertib IV and gemcitabine to a treatment with gemcitabine alone. After reviewing our Phase 1 results in 24 advanced pancreatic cancer patients and proposing a clinical plan to the FDA, the FDA authorized us to move directly from the Phase 1 trial to a two-stage Phase 3 trial, which we refer to as our "ONTRAC" trial.

ONTRAC is a multi-center, open-label, randomized controlled clinical trial in patients with histologically confirmed metastatic pancreatic cancer who received no prior chemotherapy, with overall survival as the primary endpoint. In March 2013, we completed enrollment of 150 patients in the first portion of this trial. Once 100 deaths have been reported in this patient population, a data safety monitoring committee will compare overall survival between the two arms of the trial and will also review the adequacy of the proposed sample size. This committee may recommend adjusting the target enrollment for the second portion of the study, beyond the initially planned 364 patients, or it may recommend early termination of the study. We believe that this study, if successful, could support an NDA submission for this indication. We expect results of the pre-planned interim analysis for overall survival of the 150 patients enrolled in the first portion of this trial in the fourth quarter of 2013 or the first quarter of 2014.

Rigosertib has been evaluated in combination with gemcitabine in 40 patients in a two-site Phase 1 trial. Of the patients we studied, 25 had advanced pancreatic cancer and 15 had other tumors. Efficacy was assessed according to a set of published international rules that define when cancer patients improve, or respond, stay the same, or stabilize, or worsen, or progress, during treatments, called Response Evaluation Criteria in Solid Tumors. Of the 37 patients with measurable disease, three achieved partial response, including one with metastatic pancreatic cancer previously treated with gemcitabine, and a fourth patient with gemcitabine-naive pancreatic cancer had an unconfirmed partial

response. Sixteen patients, including nine patients with metastatic pancreatic cancer, had an overall response of stable disease.

All 40 patients were evaluable for safety. A total of 37 patients in this study had drug-related adverse events. The most frequent drug-related adverse events, occurring in at least 10% of patients, were nausea, thrombocytopenia, fatigue, neutropenia, diarrhea, vomiting, anemia, leukopenia, pyrexia, constipation, abdominal pain, lymphopenia, aspartate transaminase increase and decreased appetite. Twenty-two patients had drug-related adverse events of Grade 3 or greater in severity, the most common of which were the hematological adverse events of neutropenia, thrombocytopenia, and lymphopenia. Hematological adverse events following administration of gemcitabine are well documented, including anemia, neutropenia, leukopenia and thrombocytopenia.

Clinical Development of Rigosertib Oral in Head and Neck Cancers

According to the National Cancer Institute, head and neck cancers accounts for approximately 3% of all new cancer cases in the United States, with approximately 52,000 cases diagnosed in 2012. Single-modality treatment with surgery or radiation is generally recommended for the 30% to 40% of patients with early-stage disease. Combined modality therapy with surgery, radiation or concurrent chemotherapy and radiation is utilized for patients with locally or regionally advanced disease. Patients with very advanced or recurrent disease are treated with platinum-based chemotherapy, cetuximab (Erbitux®) or both in combination. Expected overall survival in patients with head and neck cancers who have failed platinum-based therapy is about six months.

We filed an IND amendment with the FDA for rigosertib in head and neck cancer in November 2012. We conducted a Phase 1 trial with rigosertib Oral in 48 patients with various advanced solid tumors refractory to standard therapy, including six patients with head and neck cancers who had previously failed on platinum-based therapy. Two of these six head and neck cancers patients achieved durable responses to rigosertib therapy. One patient had a confirmed complete response, defined as the disappearance of chest and lung disease, and the other patient had a partial response, with a 53% decrease of liver metastasis. Both patients remained on therapy for an extended period of time, over 98 weeks for one and over 48 weeks for the other. We believe that these observations are encouraging for this patient population.

Rigosertib Oral is currently in a Phase 2 trial in relapsed or metastatic squamous cell carcinoma, with a focus on enrolling patients with head and neck cancers. The study will evaluate both human papilloma virus, or HPV, positive and HPV negative groups of patients. HPV infection presents a significant new therapeutic challenge in head and neck cancer patients. We expect to complete enrollment of 80 patients in this trial in the second half of 2014.

ON 013105—Targeted Anti-cancer Agent Modulating Cyclin D1

Overview

ON 013105 suppresses cyclin D1 accumulation in cancer cells. Cyclin D1 is a protein required for normal progression through the cell reproduction cycle, and it is over-expressed in several hematological diseases, including B-cell lymphomas, such as MCL. Based on the activity of ON 013105 in preclinical in vitro and in vivo models of MCL, we are currently evaluating ON 013105 in a Phase 1 trial in patients with relapsed or refractory lymphomas and ALL.

Cyclin D1 in Lymphoma

Lymphomas are a collection of blood cancers that develop in the lymphatic system, including the B and T lymphocytes. Lymphoma is the most common form of hematological disease in the developed world. Approximately 75,000 people in the United States were diagnosed with lymphoma in 2011. MCL is an aggressive subset of non-Hodgkin's lymphoma with a poor prognosis and high frequency of cyclin

D1 overexpression. Studies conducted in patients with MCL have shown that levels of cyclin D1 correlate with the proliferative rate of the malignant cells as well as decrease in overall survival.

Clinical Development in Lymphoma and Acute Lymphoid Leukemia

We filed an original IND with the FDA for ON 013105 in November 2008. We are conducting a Phase 1 dose-escalation study of ON 013105 in patients with relapsed or refractory lymphomas and ALL, in which we are evaluating the safety, pharmacokinetics and activity of a once-weekly intravenous infusion regimen. In the first two complete dose cohorts, ON 013105 was readily detectible in plasma and had a half-life of less than one hour. In 2011, we suspended enrollment in our Phase 1 trial of ON 013105 because enrollment of patients was occurring slowly and, as a result, our inventory of ON 013105 clinical trial materials expired. We plan to restart enrollment in this trial with newly manufactured clinical trial materials at a new clinical trial site in the fourth quarter of 2013.

Recilisib—Acute Radiation Syndromes Treatment

Overview

Recilisib is a small molecule with radiation protection properties. We are developing recilisib SC and recilisib Oral to address a need for medical countermeasures to treat the effects of ARS, specifically radiation-induced cytopenia. The DoD provided $10.2 million in government funding to us pursuant to a number of programs through 2011. Our strategy is to continue to seek support from government agencies and to develop recilisib under the FDA Animal Efficacy Rule.

Novel Mechanism of Action

Recilisib employs a novel mechanism of action that involves intracellular signaling and DNA damage repair pathways. In preclinical studies, cells treated with recilisib sustained less DNA damage upon exposure to ionizing radiation in comparison to untreated cells.

Clinical Development for Acute Radiation Syndromes

We filed original INDs with the FDA for recilisib SC and for recilisib Oral in April 2008 and May 2011, respectively. We have completed four Phase 1 trials with recilisib, three trials with recilisib SC in more than 50 healthy adults and one trial with recilisib Oral in nine healthy adults.

- In these Phase 1 trials, recilisib SC was generally well tolerated without significant drug-related systemic toxicity. Main adverse events were mild, self-limited injection site reactions, generally subsiding in a few hours. No clinically significant trends were noted in plasma cytokines between recilisib and placebo-treated groups. In one study, subjects successfully self-administered recilisib using an auto-injector system.

- Recilisib Oral displayed good bioavailability and was well tolerated. No drug-related systemic side-effects were observed. Drug concentration and overall exposure increased more than dose-proportionately, with corresponding decreases in the rate of clearance of recilisib.

Preclinical Development for Acute Radiation Syndromes

We have conducted preclinical studies to evaluate the radioprotective effects of recilisib SC and recilisib Oral in collaboration with the Armed Forces Radiobiology Research Institute and Georgetown University. In these studies, protection from radiation injury by recilisib was observed when administered prophylactically prior to ionizing radiation exposure in cellular and animal models. In irradiated mice, the protective benefits included increased overall survival and an enhanced rate of recovery of the hematopoietic system and crypt cells lining the gut. We are also working with the Biomedical Advanced Research and Development Authority on this program.

Preclinical Programs

In addition to our three clinical-stage programs, we have developed a pipeline of preclinical programs. Our preclinical pipeline includes six programs that target kinases, cellular metabolism or division. We intend to explore additional collaborations to further the development of these product candidates as we focus internally on our more advanced programs.

ON 1231320—Inhibitor of Polo-like Kinase 2, or PLK2: PLK2 is critical for centriole duplication during cell division, or mitosis. ON 1231320 is a specific inhibitor of PLK2, and in preclinical studies, it induced mitotic arrest and reduced tumor burden in mice injected subcutaneously with colon tumor and triple-negative breast cancer cells.

ON 123300—Inhibitor of the Cell Cycle and Cancer Cell Metabolism: ON 123300 inhibits the activity of two kinases, cyclin-dependent kinase 4, or CDK4, and AMP-activated protein kinase 5, or ARK5. CDK4 is an essential component of the cell division machinery and is a well-established target for therapeutic development. ARK5 is believed to be involved in the regulation of cancer cell metabolic activity. We believe that ON 123300 may have promise as a brain tumor therapy. We observed that ON 123300 can kill glioblastoma tumor cells in vitro and we also observed that, in mouse brain tumor models, ON 0123300 can cross the blood-brain barrier.

ON 108600—Inhibitor of Cyclin-dependent Kinase 9 and Casein Kinase 2: ON 108600 is a dual inhibitor of two growth-regulatory kinases. Cyclin-dependent kinase 9 is over expressed in several cancers, including leukemias and lymphomas. Casein kinase 2 is overexpressed in a variety of tumor types and plays a role in oncogenic processes including DNA damage and repair. We believe that ON 108600 may invoke a novel mechanism of cancer cell lethality by inhibiting these two targets.

ON 044580—Non-ATP Dual Inhibitor of Janus Kinase 2, or JAK-2, and Bcr-Abl Kinase: ON 044580 inhibits mutant forms of the two target kinases, including $JAK2^{V617F}$ and imatinib-resistant $Bcr\text{-}Abl^{T315I}$. Three major myeloproliferative disorders, a group of diseases of the bone marrow in which excess cells are produced, are polythycemia vera, essential thrombocythemia and myeloid metaplasia with myelofibrosis. These disorders harbor mutations in JAK2, making this enzyme a potentially attractive therapeutic target for treating these disorders. Philadelphia chromosome-positive chronic myeloid leukemia cells make an abnormal protein called Bcr-Abl kinase, which is the clinical target of the approved inhibitor, imatinib (Gleevec®).

ON 24 Series of Compounds—Oral Anti-Tubulin Agents: Microtubules are organelles composed of a protein known as tubulin that help maintain cell shape, assist in cell movement and guide cell division. Interference with microtubule formation is an established anti-cancer strategy. ON 24 compounds cause tubulin to depolymerize, inducing mitotic arrest in cultured tumor cell lines.

ON 146 Series—Selective Inhibitors of PI3K alpha/delta Isoforms: Gain-of-function mutations in alpha and delta isoforms of PI3K are critical drivers of growth in several cancers. ON 146040 inhibits the growth of a variety of blood cancer cell lines, including Burkitt's lymphoma, MCL, multiple myeloma and chronic myeloid leukemia.

Our Proprietary Drug Discovery Platform

Our product candidates, designed for targeting cancer while protecting healthy cells, are derived from a novel chemistry platform and cell-based differential screening, which together define our discovery approach. Our chemical library contains more than 150 novel core chemical structures and thousands of unique compounds. Most are simple two-ring or three-ring structures that are built around a common core or signature element. Most kinase enzymes require the binding of adenosine triphosphate, or ATP, to function. Unlike most kinase inhibitors, our proprietary library includes many molecules that do not compete with the ATP binding site of kinases, which we believe may provide a more selective way to inhibit these enzymes.

Research and Development

Since commencing operations, we have dedicated a significant portion of our resources to the development of our clinical-stage product candidates, particularly rigosertib. We incurred research and development expenses of $22.6 million, $52.8 million and $12.8 million during the years ended December 31, 2011 and 2012 and the three months ended March 31, 2013, respectively. We anticipate that a significant portion of our operating expenses will continue to be related to research and development as we continue to advance our clinical-stage product candidates.

Collaborations

Baxter Healthcare SA

In September 2012, we entered into a development and license agreement with a subsidiary of Baxter International Inc., Baxter Healthcare SA, or Baxter, granting Baxter an exclusive, royalty-bearing license for the research, development, commercialization and manufacture (in specified instances) of rigosertib in all therapeutic indications in Europe. Under the Baxter agreement, we are obligated to use commercially reasonable efforts to, in accordance with a development plan agreed upon by the parties, direct, coordinate and manage the development of rigosertib for MDS and pancreatic cancer. Under the agreement, if after a specified development event we elect not to move forward with the development of rigosertib for pancreatic cancer, Baxter may, at its own expense, develop rigosertib for pancreatic cancer on its own for the purposes of obtaining marketing approval. In addition, there is a specified mechanism set forth in the agreement to expand the scope of the collaboration for additional indications. Our agreement with Baxter is guided by a joint steering committee. If the joint steering committee is not able to make a decision by consensus, then any dispute would be resolved by specified executive officers of both parties.

Under the terms of the agreement, Baxter made an upfront payment of $50.0 million. We are eligible to receive pre-commercial milestone payments of up to an aggregate of $512.5 million if specified development and regulatory milestones are achieved. The potential pre-commercial development milestone payments to us include the following:

- $50.0 million for successful completion of a Phase 3 clinical trial for rigosertib IV in higher risk MDS patients;
- $25.0 million for each of the two joint decisions to proceed with the development of rigosertib for certain indications specified in the arrangement with Baxter; and
- $25.0 million for each drug approval application filed for indications specified in the arrangement with Baxter.

We may also receive up to $337.5 million in milestone payments for regulatory approvals of the three rigosertib indications specified in the arrangement with Baxter, each of which may be up to and in excess of $100.0 million. We are also potentially eligible to receive an additional $20.0 million pre-commercial milestone payment related to the timing of regulatory approval of rigosertib IV in higher risk MDS patients in Europe. In addition to these pre-commercial milestones, we are eligible to receive up to an aggregate of $250.0 million in milestone payments based on Baxter's achievement of pre-specified threshold levels of annual net sales of rigosertib. We are also entitled to receive royalties at percentage rates ranging from the low-teens to the low-twenties on net sales of rigosertib by Baxter in the licensed territory.

Under the agreement, Baxter is obligated to pay us royalties, on a country-by-country basis in the licensed territory, until the later of the expiration of all valid claims of the patent rights licensed to Baxter that cover the manufacture, use, sale or importation of rigosertib in such country, and the expiration of regulatory-based exclusivity for rigosertib in such country. If the patent rights and

regulatory-based exclusivity expire in a particular country before a specified period of time after first commercial sale of rigosertib in that country, Baxter will pay us royalties at a reduced rate until the end of the specified period. In addition, unless we receive marketing approval for the use of rigosertib IV for MDS from the EMA or specified European Union countries without undertaking additional specified clinical-trials, the royalty rates may be reduced depending on when we receive marketing approval for the use of rigosertib IV for MDS from the EMA or specified European Union countries, and whether or not a competing product for refractory MDS has been approved within a specified period after our receipt of approval for rigosertib IV for MDS.

The agreement with Baxter will remain in effect until the expiration of all applicable royalty terms and satisfaction of all payment obligations in each licensed country, unless terminated earlier due to the uncured material breach or bankruptcy of a party, force majeure, or in the event of a specified commercial failure. We may terminate the agreement in the event that Baxter brings a challenge against us in relation to the licensed patents. Baxter may terminate the agreement without cause commencing after a specified period of time from the execution of the agreement.

In July 2012, Baxter also purchased $50.0 million of our Series J convertible preferred stock.

SymBio Pharmaceuticals Limited

In July 2011, we entered into a license agreement with SymBio Pharmaceuticals Limited, or SymBio, as subsequently amended, granting SymBio an exclusive, royalty-bearing license for the development and commercialization of rigosertib in Japan and Korea. Under the SymBio license agreement, SymBio is obligated to use commercially reasonable efforts to develop and obtain market approval for rigosertib inside the licensed territory and we have similar obligations outside of the licensed territory. We have also entered into an agreement with SymBio to supply them with development-stage product. Under the SymBio license agreement we also agreed to supply commercial product to SymBio under specified terms that will be included in a commercial supply agreement to be negotiated prior to the first commercial sale of rigosertib. We have also granted SymBio a right of first negotiation to license or obtain the rights to develop and commercialize compounds having a chemical structure similar to rigosertib in the licensed territory.

Under the terms of the SymBio license agreement, we received an upfront payment of $7.5 million. We are eligible to receive milestone payments of up to an aggregate of $33.0 million from SymBio upon the achievement of specified development and regulatory milestones for specified indications. Of the development milestones, $3.0 million is due after enrollment of the first patient in the event a decision is made, after our interim analysis, to start a Phase 3 clinical trial of rigosertib IV in combination with gemcitabine for pancreatic cancer patients in the United States. Of the regulatory milestones, $5.0 million is due upon receipt of marketing approval in the United States of rigosertib IV in higher risk MDS patients, $3.0 million is due upon receipt of marketing approval in Japan for rigosertib IV in higher risk MDS patients, $5.0 million is due upon receipt of marketing approval in the United States for rigosertib Oral in lower risk MDS patients, $5.0 million is due upon receipt of marketing approval in Japan for rigosertib Oral in lower risk MDS patients, $5.0 million is due upon receipt of marketing approval in the United States for rigosertib IV in combination with gemcitabine in pancreatic cancer patients, and $3.0 million is due upon receipt of marketing approval in Japan for rigosertib IV in combination with gemcitabine in pancreatic cancer patients. Furthermore, upon receipt of marketing approval in the United States and Japan for an additional specified indication of rigosertib, which we are currently not pursuing, an aggregate of $4.0 million would be due. In addition to these pre-commercial milestones, we are eligible to receive tiered milestone payments of up to an aggregate of $30.0 million based upon annual net sales of rigosertib by SymBio in the licensed territory. Further, under the terms of the SymBio license agreement, SymBio is obligated to make royalty payments to us at percentage rates ranging from the mid-teens to 20% based on net sales of rigosertib by SymBio in the licensed territory.

Royalties will be payable under the SymBio agreement on a country-by-country basis in the licensed territory, until the later of the expiration of marketing exclusivity in those countries, a specified period of time after first commercial sale of rigosertib in such country, or the expiration of all valid claims of the licensed patents covering rigosertib or the manufacture or use of rigosertib in such country. If no valid claim exists covering the composition of matter of rigosertib or the use of or treatment with rigosertib in a particular country before the expiration of the royalty term, and specified competing products achieve a specified market share percentage in such country, SymBio's obligation to pay us royalties will continue at a reduced royalty rate until the end of the royalty term. In addition, the applicable royalties payable to us may be reduced if SymBio is required to pay royalties to third parties for licenses to intellectual property rights necessary to develop, use, manufacture or commercialize rigosertib in the licensed territory.

The license agreement with SymBio will remain in effect until the expiration of the royalty term. However, the SymBio license agreement may be terminated earlier due to the uncured material breach or bankruptcy of a party, or force majeure. If SymBio terminates the license agreement in these circumstances, its licenses to rigosertib will survive, subject to SymBio's milestone and royalty obligations, which SymBio may elect to defer and offset against any damages that may be determined to be due from us. In addition, we may terminate the license agreement in the event that SymBio brings a challenge against us in relation to the licensed patents, and SymBio may terminate the license agreement without cause by providing us with written notice a specified period of time in advance of termination.

The Leukemia and Lymphoma Society

In May 2010, we entered into a funding agreement with The Leukemia and Lymphoma Society, or LLS, to fund the development of rigosertib. Under the LLS funding agreement, we are obligated to use the funding received exclusively for the payment or reimbursement of the costs and expenses for clinical development activities for rigosertib. Under this agreement, we retain ownership and control of all intellectual property pertaining to works of authorship, inventions, know-how, information, data and proprietary material.

Under the LLS funding agreement, as amended, we received funding of $8.0 million from LLS through 2012. We have not received any funding from LLS in 2013 and we terminated the funding agreement effective as of March 2013. We are required to make specified payments to LLS, including payments payable upon execution of the first out-license; first approval for marketing by a regulatory body; completion of the first commercial sale of rigosertib; and achieving specified annual net sales levels of rigosertib. The extent of these payments and our obligations will depend on whether we out-license rights to develop or commercialize rigosertib to a third party, we commercialize rigosertib on our own or we combine with or are sold to another company. In addition, we will pay to LLS a single-digit percentage royalty of our net sales of rigosertib, if any. The sum of our payments to LLS is capped at three times the total funding received from LLS, or $24.0 million.

In addition, some of our obligations under the funding agreement will remain in effect until the completion of specified milestones and payments to LLS. Assuming the successful outcome of the development activities covered by the LLS funding agreement and our receipt of necessary regulatory approvals, we will be required to take commercially reasonable steps through March 2018 to advance the development of rigosertib in clinical trials and to bring rigosertib to practical application for MDS in a major market country, provided that we reasonably believe the product is safe and effective. We believe that we can satisfy our obligation by out-licensing rigosertib to, or partnering rigosertib with, a third party. We are required to report to LLS on our efforts and results with respect to continuing development of rigosertib. Our failure to perform these diligence obligations, even if we successfully achieve the specified development milestones, would require us to pay back to LLS the total amount of

the funding we received from them, unless an exception applies. If LLS were to claim that such failure occurred and we disagreed with such claim, the dispute would be settled through binding arbitration.

Preclinical Collaboration

We recently formed a joint venture with GVK Biosciences Private Limited, or GVK, a contract research organization based in India, to collaborate on the development of our ON 1231320 and ON 108600 preclinical programs through the submission of an IND with the FDA or conducting proof of concept studies. GVK will initially make a monetary capital contribution in exchange for a 10% interest in the joint venture and we will contribute a sub-license to the intellectual property related to the two programs in exchange for a 90% interest. GVK will be required to make additional capital contributions over time, subject to specified conditions, and its interest in the joint venture will increase to as much as 50%. At specified times, we will be entitled to buy back from GVK the rights to either of these two programs.

Intellectual Property

Patents and Proprietary Rights

We have access to intellectual property through our internal research, a licensing agreement with Temple University, or Temple, and a research agreement with the Mount Sinai School of Medicine, or Mount Sinai.

License Agreement with Temple University

In January 1999, we entered into a license agreement with Temple as subsequently amended, to obtain an exclusive, world-wide license to certain Temple patents and technical information to make, have made, use, sell, offer for sale and import several classes of novel compounds, including our three clinical-stage product candidates, rigosertib, ON 013105 and recilisib.

Under the terms of the license agreement, we paid Temple a non-refundable up-front payment, and are required to pay annual license maintenance fees, as well as a low single-digit percentage of net sales as a royalty. In addition, we agreed to pay Temple 25% of any consideration received from any sublicensee of the licensed Temple patents and technical information, which does not include any royalties on sales, funds received for research and development or proceeds from any equity or debt investment.

The license agreement with Temple can be terminated by mutual agreement or due to the material breach or bankruptcy of either party. We may terminate the license agreement for any reason by giving Temple prior written notice.

Research Agreement with Mount Sinai School of Medicine

In May 2010, we entered into a research agreement with Mount Sinai. This agreement is described in more detail under the caption "Certain Relationships and Related Party Transactions—Research Agreement."

Rigosertib Patents

We own or exclusively license 64 issued patents and 18 pending patent applications covering composition-of-matter, process, formulation and various indications for method-of-use for rigosertib filed worldwide, including five patents and three patent applications in the United States. The U.S. composition-of-matter patent for rigosertib, which we in-license pursuant to the license agreement with Temple, expires in 2026. The U.S. method of treatment patent for rigosertib, which we also in-license from Temple, expires in 2025.

ON 013105 Patents

We own or exclusively license eight issued patents and five pending patent applications covering composition-of-matter, process, formulation and various indications for method-of-use for ON 013105 filed worldwide, including one patent in the United States. The U.S. composition-of-matter patent for ON 013105 expires in 2025.

Recilisib Patents

We own or exclusively license 43 issued patents and 38 pending patent applications covering composition of matter, formulation and various indications for method-of-use for recilisib filed worldwide, including four patents and five patent applications in the United States. The U.S. composition-of-matter patent for recilisib expires in 2020.

General Considerations

As with other biotechnology and pharmaceutical companies, our ability to maintain and solidify a proprietary position for our product candidates will depend upon our success in obtaining effective patent claims and enforcing those claims once granted.

Our commercial success will depend in part upon not infringing upon the proprietary rights of third parties. It is uncertain whether the issuance of any third-party patent would require us to alter our development or commercial strategies, or our product candidates or processes, obtain licenses or cease certain activities. The biotechnology and pharmaceutical industries are characterized by extensive litigation regarding patents and other intellectual property rights. If a third party commences a patent infringement action against us, or our collaborators, it could consume significant financial and management resources, regardless of the merit of the claims or the outcome of the litigation.

The term of a patent that covers an FDA-approved drug may be eligible for patent term extension, which provides patent term restoration as compensation for the patent term lost during the FDA regulatory review process. The Drug Price Competition and Patent Term Restoration Act of 1984, or the Hatch-Waxman Act, permits a patent term extension of up to five years beyond the expiration of the patent. The length of the patent term extension is related to the length of time the drug is under regulatory review. Patent extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval and only one patent applicable to an approved drug may be extended. Similar provisions are available in Europe and other foreign jurisdictions to extend the term of a patent that covers an approved drug. In the future, if and when our pharmaceutical products receive FDA approval, we expect to apply for patent term extensions on patents covering those products.

Furthermore, we may be able to obtain extension of patent term by adjustment of the said term under the provisions of 35 U.S.C. §154 if the issue of an original patent is delayed due to the failure of the U.S. Patent and Trademark Office. For example, we have received adjustments of 1,139 days extension to the patent term for the rigosertib composition of matter patent (US 7,598,232), 1,155 days extension for the patent covering the process for making rigosertib (US 8,143,453) and 751 days extension for rigosertib formulation patent (US 8,063,109) under the provisions of 35 U.S.C. §154.

Many pharmaceutical companies, biotechnology companies and academic institutions are competing with us in the field of oncology and filing patent applications potentially relevant to our business. Even when a third party patent is identified, we may conclude upon a thorough analysis, that we do not infringe upon the patent or that the patent is invalid. If the third-party patent owner disagrees with our conclusion and we continue with the business activity in question, we may be subject to patent litigation. Alternatively, we might decide to initiate litigation in an attempt to have a court

declare the third-party patent invalid or non-infringed by our activity. In either scenario, patent litigation typically is costly and time-consuming, and the outcome can be favorable or unfavorable.

In addition to patents, we rely upon unpatented trade secrets, know-how and continuing technological innovation to develop and maintain a competitive position. We seek to protect our proprietary information, in part, through confidentiality agreements with our employees, collaborators, contractors and consultants, and invention assignment agreements with our employees. We also have agreements requiring assignment of inventions with selected consultants and collaborators. The confidentiality agreements are designed to protect our proprietary information and, in the case of agreements or clauses requiring invention assignment, to grant us ownership of technologies that are developed through a relationship with a third party.

Competition

The pharmaceutical industry is highly competitive and subject to rapid and significant technological change. While we believe that our development experience and scientific knowledge provide us with competitive advantages, we face competition from both large and small pharmaceutical and biotechnology companies. There are a number of pharmaceutical companies, biotechnology companies, public and private universities and research organizations actively engaged in the research and development of products that may compete with our products. Many of these companies are multinational pharmaceutical or biotechnology organizations, which are pursuing the development of, or are currently marketing, pharmaceuticals that target the key oncology indications or cellular pathways on which we are focused.

It is probable that the increasing incidence and prevalence of cancer will lead to many more companies seeking to develop products and therapies for the treatment of unmet needs in oncology. Many of our competitors have significantly greater financial, technical and human resources than we have. Many of our competitors also have a significant advantage with respect to experience in the discovery and development of product candidates, as well as obtaining FDA and other regulatory approvals of products and the commercialization of those products. We anticipate intense and increasing competition as new drugs enter the market and as more advanced technologies become available. Our success will be based in part on our ability to identify, develop and manage a portfolio of drugs that are safer and more effective than competing products in the treatment of cancer patients.

Myelodysplastic Syndromes

There are several ongoing clinical trials aimed at expanding the use of approved chemotherapeutic and immunomodulatory agents in higher risk MDS. Companies competing in this space include Eisai Inc. (decitabine alone and in combination with clofarabine), Celgene Corporation (azacitidine in combination with lenalidomide or vorinostat (Zolinza®)), Genentech, Inc. (erlotinib), Cell Therapeutics, Inc. (tosedostat in combination with decitabine or cytarabine) and Cyclacel Pharmaceuticals, Inc. (sapacitabine). To our knowledge, there are no Phase 3 trials other than our trial for rigosertib being conducted for higher risk MDS patients who have failed treatment with hypomethylating agents. In the lower risk MDS market, we face competition from a number of companies in early-stage clinical trials, such as Celgene Corporation (lenalidomide), Telik, Inc. (ezatiostat (Telintra®)), Spectrum Pharmaceuticals, Inc. (belinostat as monotherapy and in combination with bortezomib (Velcade®)), Astex (SG-110) and Array BioPharma Inc (ARRY-614).

Pancreatic Cancer

There are a number of ongoing clinical programs for the treatment of pancreatic cancer. Companies competing in this space include Celgene Corporation, Astellas Pharma, Inc. and Threshold Pharmaceuticals, Inc. Recently, the FOLFIRINOX chemotherapy regimen, combining fluorouracil,

leucovorin, irinotecan and oxaliplatin, showed survival improvement over gemcitabine alone in metastatic pancreatic cancer. However, patients receiving FOLFIRINOX reported higher frequency of toxicities including febrile neutropenia that render its use restricted to selected patients with good performance status. In addition, recent studies have shown that albumin-bound paclitaxel (Abraxane®) in combination with gemcitabine helped patients with advanced pancreatic cancer live a median of 1.8 months longer than those given chemotherapy alone. Gemcitabine and erlotinib are two FDA-approved therapies for this disease. Fluorouracil and mitomycin-C are also approved for the treatment of pancreatic cancer, but these drugs are rarely used as single agents.

Refractory Lymphomas

Chemotherapy and radiation therapy are the two principal forms of treatment for non-Hodgkin's lymphoma. Stem cell transplantation is also used to treat some subtypes of non-Hodgkin's lymphoma. Other forms of treatment are emerging, and some are already approved for specific forms of non-Hodgkin's lymphoma. Most patients with refractory or relapsed disease receive second-line therapy, in some cases followed by stem cell transplantation. A number of targeted therapies have been approved for MCL, including bortezomib as a second-line treatment and lenalidomide for patients whose disease relapsed or progressed after two prior therapies, one of which included bortezomib. In addition, there are multiple programs currently in late-stage clinical development for this disease. Ibrutinib, which is a Bruton's tyrosine kinase inhibitor being developed by Pharmacyclics Inc., is being tested in Phase 2 and 3 trials for MCL.

Acute Radiation Syndromes

Competitors developing products to address ARS include Soligenix, Inc., Cellerant Therapeutics, Inc., and Cleveland BioLabs, Inc. Each of these companies is working with the U.S. government to develop its products through federal contracts and grants.

Manufacturing

Our product candidates are synthetic small molecules. Manufacturing activities must comply with FDA current good manufacturing practices, or cGMP, regulations. We conduct our manufacturing activities under individual purchase orders with third-party contract manufacturers, or CMOs. We have in place quality agreements with our key CMOs and are negotiating supply agreements with them. We have also established an internal quality management organization, which audits and qualifies CMOs in the United States and abroad.

One of our CMOs is currently validating its manufacturing process to synthesize the rigosertib active pharmaceutical ingredient, which we believe will enable us to launch and commercialize rigosertib IV if and when marketing approval is obtained. Another CMO produces rigosertib IV for use in our ongoing clinical trials. A third CMO produces rigosertib Oral for use in our ongoing clinical trials. We believe that the manufacturing processes for the active pharmaceutical ingredient and finished drug products for rigosertib have been developed to adequately support future development and commercial demands. We believe that our existing suppliers of the rigosertib active pharmaceutical ingredient and drug products would be capable of providing sufficient quantities of the rigosertib active pharmaceutical ingredient and drug products to meet anticipated full-scale commercial demands.

The FDA regulates and inspects equipment, facilities and processes used in manufacturing pharmaceutical products prior to approval. If we fail to comply with applicable cGMP requirements and conditions of product approval, the FDA may seek sanctions, including fines, civil penalties, injunctions, suspension of manufacturing operations, operating restrictions, withdrawal of FDA approval, seizure or recall of products and criminal prosecution. Although we periodically monitor the

FDA compliance of our third-party CMOs, we cannot be certain that our present or future third-party CMOs will consistently comply with cGMP and other applicable FDA regulatory requirements.

Commercial Operations

We do not currently have an organization for the sales, marketing and distribution of pharmaceutical products. We may rely on licensing and co-promotion agreements with strategic partners for the commercialization of our products in the United States and other territories. If we choose to build a commercial infrastructure to support marketing in the United States, such commercial infrastructure could be expected to include a targeted, oncology sales force supported by sales management, internal sales support, an internal marketing group and distribution support. To develop the appropriate commercial infrastructure internally, we would have to invest financial and management resources, some of which would have to be deployed prior to any confirmation that rigosertib will be approved.

Government Regulation

As a pharmaceutical company that operates in the United States, we are subject to extensive regulation by the FDA, and other federal, state, and local regulatory agencies. The Federal Food, Drug, and Cosmetic Act, or the FDC Act, and its implementing regulations set forth, among other things, requirements for the research, testing, development, manufacture, quality control, safety, effectiveness, approval, labeling, storage, record keeping, reporting, distribution, import, export, advertising and promotion of our products. Although the discussion below focuses on regulation in the United States, we anticipate seeking approval for, and marketing of, our products in other countries. Generally, our activities in other countries will be subject to regulation that is similar in nature and scope as that imposed in the United States, although there can be important differences. Additionally, some significant aspects of regulation in Europe are addressed in a centralized way through the EMA, but country-specific regulation remains essential in many respects. The process of obtaining regulatory marketing approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

United States Government Regulation

The FDA is the main regulatory body that controls pharmaceuticals in the United States, and its regulatory authority is based in the FDC Act. Pharmaceutical products are also subject to other federal, state and local statutes. A failure to comply explicitly with any requirements during the product development, approval, or post-approval periods, may lead to administrative or judicial sanctions. These sanctions could include the imposition by the FDA or an institutional review board, or IRB, of a hold on clinical trials, refusal to approve pending marketing applications or supplements, withdrawal of approval, warning letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, civil penalties or criminal prosecution.

The steps required before a new drug may be marketed in the United States generally include:

- Completion of preclinical laboratory tests, animal studies and formulation studies in compliance with the FDA's GLP regulations;
- Submission to the FDA of an IND to support human clinical testing;
- Approval by an IRB at each clinical site before each trial may be initiated;
- Performance of adequate and well-controlled clinical trials in accordance with federal regulations and with current good clinical practices, or GCPs, to establish the safety and efficacy of the investigational drug product for each targeted indication;

- Submission of an NDA to the FDA;
- Satisfactory completion of an FDA Advisory Committee review, if applicable;
- Satisfactory completion of an FDA inspection of the manufacturing facilities at which the investigational product is produced to assess compliance with cGMP, and to assure that the facilities, methods and controls are adequate; and
- FDA review and approval of the NDA.

Clinical Trials

An IND is a request for authorization from the FDA to administer an investigational drug product to humans. This authorization is required before interstate shipping and administration of any new drug product to humans that is not the subject of an approved NDA. A 30-day waiting period after the submission of each IND is required prior to the commencement of clinical testing in humans. If the FDA has neither commented on nor questioned the IND within this 30-day period, the clinical trial proposed in the IND may begin. Clinical trials involve the administration of the investigational drug to patients under the supervision of qualified investigators following GCPs, an international standard meant to protect the rights and health of patients and to define the roles of clinical trial sponsors, administrators and monitors. Clinical trials are conducted under protocols that detail the parameters to be used in monitoring safety, and the efficacy criteria to be evaluated. Each protocol involving testing on U.S. patients and subsequent protocol amendments must be submitted to the FDA as part of the IND. The informed written consent of each participating subject is required. The clinical investigation of an investigational drug is generally divided into three phases. Although the phases are usually conducted sequentially, they may overlap or be combined. The three phases of an investigation are as follows:

- Phase 1. Phase 1 includes the initial introduction of an investigation drug into humans. Phase 1 clinical trials may be conducted in patients with the target disease or condition or healthy volunteers. These studies are designed to evaluate the safety, metabolism, pharmacokinetics and pharmacologic actions of the investigational drug in humans, the side effects associated with increasing doses, and if possible, to gain early evidence on effectiveness. During Phase 1 clinical trials, sufficient information about the investigational product's pharmacokinetics and pharmacological effects may be obtained to permit the design of Phase 2 clinical trials. The total number of participants included in Phase 1 clinical trials varies, but is generally in the range of 20 to 80.
- Phase 2. Phase 2 includes the controlled clinical trials conducted to evaluate the effectiveness of the investigational product for a particular indication(s) in patients with the disease or condition under study, to determine dosage tolerance and optimal dosage, and to identify possible adverse side effects and safety risks associated with the drug. Phase 2 clinical trials are typically well-controlled, closely monitored, and conducted in a limited patient population, usually involving no more than several hundred participants.
- Phase 3. Phase 3 clinical trials are controlled clinical trials conducted in an expanded patient population at geographically dispersed clinical trial sites. They are performed after preliminary evidence suggesting effectiveness of the investigational product has been obtained, and are intended to further evaluate dosage, clinical effectiveness and safety, to establish the overall benefit-risk relationship of the product, and to provide an adequate basis for product approval. Phase 3 clinical trials usually involve several hundred to several thousand participants. In most cases, the FDA requires two adequate and well controlled Phase 3 clinical trials to demonstrate the efficacy of the drug. A single Phase 3 trial with other confirmatory evidence may be sufficient in rare instances where the study is a large multicenter trial demonstrating internal

consistency and a statistically very persuasive finding of a clinically meaningful effect on mortality, irreversible morbidity or prevention of a disease with a potentially serious outcome and confirmation of the result in a second trial would be practically or ethically impossible.

The decision to terminate development of an investigational drug product may be made by either a health authority body, such as the FDA or IRB/ethics committees, or by a company for various reasons. The FDA may order the temporary, or permanent, discontinuation of a clinical trial at any time, or impose other sanctions, if it believes that the clinical trial either is not being conducted in accordance with FDA requirements or presents an unacceptable risk to the clinical trial patients. In some cases, clinical trials are overseen by an independent group of qualified experts organized by the trial sponsor, or the clinical monitoring board. This group provides authorization for whether or not a trial may move forward at designated check points. These decisions are based on the limited access to data from the ongoing trial. The suspension or termination of development can occur during any phase of clinical trials if it is determined that the participants or patients are being exposed to an unacceptable health risk. In addition, there are requirements for the registration of ongoing clinical trials of drugs on public registries and the disclosure of certain information pertaining to the trials as well as clinical trial results after completion.

A sponsor may be able to request an SPA, the purpose of which is to reach agreement with the FDA on the Phase 3 clinical trial protocol design and analysis that will form the primary basis of an efficacy claim. A sponsor meeting the regulatory criteria may make a specific request for an SPA and provide information regarding the design and size of the proposed clinical trial. An SPA request must be made before the proposed trial begins, and all open issues must be resolved before the trial begins. If a written agreement is reached, it will be documented and made part of the record. The agreement will be binding on the FDA and may not be changed by the sponsor or the FDA after the trial begins except with the written agreement of the sponsor and the FDA or if the FDA determines that a substantial scientific issue essential to determining the safety or efficacy of the product candidate was identified after the testing began. An SPA is not binding if new circumstances arise, and there is no guarantee that a study will ultimately be adequate to support an approval even if the study is subject to an SPA. Rigosertib is being tested in several advanced stage clinical trials, including a pivotal Phase 3 trial under an SPA. Having an SPA agreement does not guarantee that a product will receive FDA approval.

Assuming successful completion of all required testing in accordance with all applicable regulatory requirements, detailed investigational drug product information is submitted to the FDA in the form of a NDA to request market approval for the product in specified indications.

New Drug Applications

In order to obtain approval to market a drug in the United States, a marketing application must be submitted to the FDA that provides data establishing the safety and effectiveness of the drug product for the proposed indication. The application includes all relevant data available from pertinent preclinical and clinical trials, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls and proposed labeling, among other things. Data can come from company-sponsored clinical trials intended to test the safety and effectiveness of a product, or from a number of alternative sources, including studies initiated by investigators. To support marketing approval, the data submitted must be sufficient in quality and quantity to establish the safety and effectiveness of the investigational drug product to the satisfaction of the FDA.

In most cases, the NDA must be accompanied by a substantial user fee (currently exceeding $1,958,000); there may be some instances in which the user fee is waived. The FDA will initially review the NDA for completeness before it accepts the NDA for filing. The FDA has 60 days from its receipt

of an NDA to determine whether the application will be accepted for filing based on the agency's threshold determination that it is sufficiently complete to permit substantive review. After the NDA submission is accepted for filing, the FDA begins an in-depth review. The FDA has agreed to certain performance goals in the review of NDAs. Most such applications for standard review drug products are reviewed within ten to twelve months. The FDA can extend this review by three months to consider certain late-submitted information or information intended to clarify information already provided in the submission. The FDA reviews the NDA to determine, among other things, whether the proposed product is safe and effective for its intended use, and whether the product is being manufactured in accordance with cGMP. The FDA may refer applications for novel drug products which present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions.

Before approving an NDA, the FDA will inspect the facilities at which the product is manufactured. The FDA will not approve the product unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving an NDA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP. After the FDA evaluates the NDA and the manufacturing facilities, it issues either an approval letter or a complete response letter. A complete response letter generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If, or when, those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the NDA, the FDA will issue an approval letter. The FDA has committed to reviewing such resubmissions in two or six months depending on the type of information included. Notwithstanding the submission of any requested additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

An approval letter authorizes commercial marketing of the drug with specific prescribing information for specific indications. As a condition of NDA approval, the FDA may require a risk evaluation and mitigation strategy, or REMS, to help ensure that the benefits of the drug outweigh the potential risks. REMS can include medication guides, communication plans for healthcare professionals, and elements to assure safe use, or ETASU. ETASU can include, but are not limited to, special training or certification for prescribing or dispensing, dispensing only under certain circumstances, special monitoring, and the use of patient registries. The requirement for a REMS can materially affect the potential market and profitability of the drug. Moreover, product approval may require substantial post-approval testing and surveillance to monitor the drug's safety or efficacy. Once granted, product approvals may be withdrawn if compliance with regulatory standards is not maintained or problems are identified following initial marketing.

Changes to some of the conditions established in an approved application, including changes in indications, labeling, or manufacturing processes or facilities, require submission and FDA approval of a new NDA or NDA supplement before the change can be implemented. An NDA supplement for a new indication typically requires clinical data similar to that in the original application, and the FDA uses the same procedures and actions in reviewing NDA supplements as it does in reviewing NDAs.

Advertising and Promotion

The FDA and other federal regulatory agencies closely regulate the marketing and promotion of drugs through, among other things, standards and regulations for direct-to-consumer advertising, communications regarding unapproved uses, industry-sponsored scientific and educational activities, and promotional activities involving the Internet. A product cannot be commercially promoted before it is approved. After approval, product promotion can include only those claims relating to safety and effectiveness that are consistent with the labeling approved by the FDA. Healthcare providers are permitted to prescribe drugs for "off-label" uses—that is, uses not approved by the FDA and therefore not described in the drug's labeling—because the FDA does not regulate the practice of medicine. However, FDA regulations impose stringent restrictions on manufacturers' communications regarding off-label uses. Broadly speaking, a manufacturer may not promote a drug for off-label use, but may engage in non-promotional, balanced communication regarding off-label use under specified conditions. Failure to comply with applicable FDA requirements and restrictions in this area may subject a company to adverse publicity and enforcement action by the FDA, the DOJ, or the Office of the Inspector General of HHS, as well as state authorities. This could subject a company to a range of penalties that could have a significant commercial impact, including civil and criminal fines and agreements that materially restrict the manner in which a company promotes or distributes drug products.

Post-Approval Regulations

After regulatory approval of a drug is obtained, a company is required to comply with a number of post-approval requirements. For example, as a condition of approval of an NDA, the FDA may require post-marketing testing, including Phase 4 clinical trials, and surveillance to further assess and monitor the product's safety and effectiveness after commercialization. Regulatory approval of oncology products often requires that patients in clinical trials be followed for long periods to determine the overall survival benefit of the drug. In addition, as a holder of an approved NDA, a company would be required to report adverse reactions and production problems to the FDA, to provide updated safety and efficacy information, and to comply with requirements concerning advertising and promotional labeling for any of its products. Also, quality control and manufacturing procedures must continue to conform to cGMP after approval to assure and preserve the long term stability of the drug or biological product. The FDA periodically inspects manufacturing facilities to assess compliance with cGMP, which imposes extensive procedural and substantive record keeping requirements. In addition, changes to the manufacturing process are strictly regulated, and, depending on the significance of the change, may require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting and documentation requirements upon a company and any third-party manufacturers that a company may decide to use. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain compliance with cGMP and other aspects of regulatory compliance.

We rely, and expect to continue to rely, on third parties for the production of clinical and commercial quantities of our product candidates. Future FDA and state inspections may identify compliance issues at our facilities or at the facilities of our contract manufacturers that may disrupt production or distribution, or require substantial resources to correct. In addition, discovery of previously unknown problems with a product or the failure to comply with applicable requirements may result in restrictions on a product, manufacturer or holder of an approved NDA, including withdrawal or recall of the product from the market or other voluntary, FDA-initiated or judicial action that could delay or prohibit further marketing.

Newly discovered or developed safety or effectiveness data may require changes to a product's approved labeling, including the addition of new warnings and contraindications, and also may require the implementation of other risk management measures. Also, new government requirements, including

those resulting from new legislation, may be established, or the FDA's policies may change, which could delay or prevent regulatory approval of our products under development.

FDA Animal Efficacy Rule for Approval of Medical Countermeasures

Marketing approval by the FDA for new medical countermeasures in situations for which human efficacy testing is not feasible or ethical, such as for ARS, is based on the so-called "Animal Efficacy Rule." Under this rule, FDA can rely on the evidence from animal studies to provide substantial prediction of effectiveness of an agent in humans, when coupled with:

- a reasonably well understood pathophysiological mechanism for the toxicity of the radiological or nuclear substance and its amelioration or prevention by the agent;
- protective effect is demonstrated in generally more than one animal species expected to react with a response predictive for humans, and hence be a reliable indicator of its effectiveness in humans;
- animal study endpoint is clearly related to the desired benefit in humans; and
- data or information on the pharmacokinetics and pharmacodynamics of the product in animals and humans is sufficiently well understood to allow selection of a dose predicted to be effective in humans.

The Hatch-Waxman Amendments to the FDC Act

Orange Book Listing

In seeking approval for a drug through an NDA, applicants are required to list with the FDA each patent whose claims cover the applicant's product. Upon approval of a drug, each of the patents listed in the application for the drug is then published in the FDA's Approved Drug Products with Therapeutic Equivalence Evaluations, commonly known as the Orange Book. Drugs listed in the Orange Book can, in turn, be cited by potential generic competitors in support of approval of an abbreviated new drug application, or ANDA. An ANDA provides for marketing of a drug product that has the same active ingredients in the same strengths and dosage form as the listed drug and has been shown through bioequivalence testing to be therapeutically equivalent to the listed drug. Other than the requirement for bioequivalence testing, ANDA applicants are not required to conduct, or submit results of, pre-clinical or clinical tests to prove the safety or effectiveness of their drug product. Drugs approved in this way are commonly referred to as "generic equivalents" to the listed drug, and can often be substituted by pharmacists under prescriptions written for the original listed drug.

The ANDA applicant is required to certify to the FDA concerning any patents listed for the approved product in the FDA's Orange Book. Specifically, the applicant must certify that: (i) the required patent information has not been filed; (ii) the listed patent has expired; (iii) the listed patent has not expired, but will expire on a particular date and approval is sought after patent expiration; or (iv) the listed patent is invalid or will not be infringed by the new product. The ANDA applicant may also elect to submit a statement certifying that its proposed ANDA label does not contain (or carves out) any language regarding the patented method-of-use rather than certify to a listed method-of-use patent. If the applicant does not challenge the listed patents, the ANDA application will not be approved until all the listed patents claiming the referenced product have expired.

A certification that the new product will not infringe the already approved product's listed patents, or that such patents are invalid, is called a Paragraph IV certification. If the ANDA applicant has provided a Paragraph IV certification to the FDA, the applicant must also send notice of the Paragraph IV certification to the NDA and patent holders once the ANDA has been accepted for filing by the FDA. The NDA and patent holders may then initiate a patent infringement lawsuit in response

to the notice of the Paragraph IV certification. The filing of a patent infringement lawsuit within 45 days of the receipt of a Paragraph IV certification automatically prevents the FDA from approving the ANDA until the earlier of 30 months, expiration of the patent, settlement of the lawsuit, or a decision in the infringement case that is favorable to the ANDA applicant.

The ANDA application also will not be approved until any applicable non-patent exclusivity listed in the Orange Book for the referenced product has expired.

Exclusivity

Upon NDA approval of a new chemical entity, or NCE, which is a drug that contains no active moiety that has been approved by the FDA in any other NDA, that drug receives five years of marketing exclusivity during which the FDA cannot receive any ANDA seeking approval of a generic version of that drug. Certain changes to a drug, such as the addition of a new indication to the package insert, are associated with a three-year period of exclusivity during which the FDA cannot approve an ANDA for a generic drug that includes the change.

An ANDA may be submitted one year before NCE exclusivity expires if a Paragraph IV certification is filed. If there is no listed patent in the Orange Book, there may not be a Paragraph IV certification, and, thus, no ANDA may be filed before the expiration of the exclusivity period.

Patent Term Extension

After NDA approval, owners of relevant drug patents may apply for up to a five year patent extension. The allowable patent term extension is calculated as half of the drug's testing phase—the time between IND application and NDA submission—and all of the review phase—the time between NDA submission and approval up to a maximum of five years. The time can be shortened if the FDA determines that the applicant did not pursue approval with due diligence. The total patent term after the extension may not exceed 14 years.

The Foreign Corrupt Practices Act

The Foreign Corrupt Practices Act, or FCPA, prohibits any U.S. individual or business from paying, offering, or authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations.

Europe and Other International Government Regulation

In addition to regulations in the United States, we will be subject to a variety of regulations in other jurisdictions governing, among other things, clinical trials and any commercial sales and distribution of our products. Whether or not we obtain FDA approval for a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical trials or marketing of the product in those countries. Some countries outside of the United States have a similar process that requires the submission of a clinical trial application, or CTA, much like the IND prior to the commencement of human clinical trials. In Europe, for example, a CTA must be submitted to each country's national health authority and an independent ethics committee, much like the FDA and IRB, respectively. Once the CTA is approved in accordance with a country's requirements, clinical trial development may proceed.

To obtain regulatory approval to commercialize a new drug under European Union regulatory systems, we must submit a marketing authorization application, or MAA. The MAA is similar to the NDA, with the exception of, among other things, country-specific document requirements.

For other countries outside of the European Union, such as countries in Eastern Europe, Latin America or Asia, the requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, again, the clinical trials are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

Compliance

During all phases of development (pre- and post-marketing), failure to comply with applicable regulatory requirements may result in administrative or judicial sanctions. These sanctions could include the FDA's imposition of a clinical hold on trials, refusal to approve pending applications, withdrawal of an approval, warning letters, product recalls, product seizures, total or partial suspension of production or distribution, product detention or refusal to permit the import or export of products, injunctions, fines, civil penalties or criminal prosecution. Any agency or judicial enforcement action could have a material adverse effect on us.

Other Special Regulatory Procedures

Orphan Drug Designation

The FDA may grant Orphan Drug Designation to drugs intended to treat a rare disease or condition that affects fewer than 200,000 individuals in the United States, or, if the disease or condition affects more than 200,000 individuals in the United States, there is no reasonable expectation that the cost of developing and making the drug would be recovered from sales in the United States. In the European Union, the EMA's Committee for Orphan Medicinal Products, or COMP, grants Orphan Drug Designation to promote the development of products that are intended for the diagnosis, prevention or treatment of life-threatening or chronically debilitating conditions affecting not more than five in 10,000 persons in the European Union community. Additionally, designation is granted for products intended for the diagnosis, prevention or treatment of a life- threatening, seriously debilitating or serious and chronic condition and when, without incentives, it is unlikely that sales of the drug in the European Union would be sufficient to justify the necessary investment in developing the drug.

In the United States, Orphan Drug Designation entitles a party to financial incentives, such as opportunities for grant funding towards clinical trial costs, tax credits for certain research and user fee waivers under certain circumstances. In addition, if a product receives the first FDA approval for the indication for which it has orphan designation, the product is entitled to seven years of market exclusivity, which means the FDA may not approve any other application for the same drug for the same indication for a period of seven years, except in limited circumstances, such as a showing of clinical superiority over the product with orphan exclusivity. Orphan drug exclusivity does not prevent the FDA from approving a different drug for the same disease or condition, or the same drug for a different disease or condition.

In the European Union, Orphan Drug Designation also entitles a party to financial incentives such as reduction of fees or fee waivers and ten years of market exclusivity is granted following drug approval. This period may be reduced to six years if the Orphan Drug Designation criteria are no longer met, including where it is shown that the product is sufficiently profitable not to justify maintenance of market exclusivity.

Orphan drug designation must be requested before submission of an application for marketing approval. Orphan drug designation does not convey any advantage in, or shorten the duration of the regulatory review and approval process.

Priority Review (United States) and Accelerated Review (European Union)

Based on results of the Phase 3 clinical trial(s) submitted in an NDA, upon the request of an applicant, a priority review designation may be granted to a product by the FDA, which sets the target date for FDA action on the application at six months from FDA filing, or eight months from the sponsor's submission. Priority review is given where preliminary estimates indicate that a product, if approved, has the potential to provide a safe and effective therapy where no satisfactory alternative therapy exists, or a significant improvement compared to marketed products is possible. If criteria are not met for priority review, the standard FDA review period is ten months from FDA filing, or 12 months from sponsor submission. Priority review designation does not change the scientific/medical standard for approval or the quality of evidence necessary to support approval.

Under the Centralized Procedure in the European Union, the maximum timeframe for the evaluation of a marketing authorization application is 210 days (excluding clock stops, when additional written or oral information is to be provided by the applicant in response to questions asked by the CHMP). Accelerated evaluation might be granted by the CHMP in exceptional cases, when a medicinal product is expected to be of a major public health interest, defined by three cumulative criteria: the seriousness of the disease (e.g., heavy disabling or life-threatening diseases) to be treated; the absence or insufficiency of an appropriate alternative therapeutic approach; and anticipation of high therapeutic benefit. In this circumstance, EMA ensures that the opinion of the CHMP is given within 150 days.

Pediatric Information

Under the Pediatric Research Equity Act, or PREA, NDAs or supplements to NDAs must contain data to assess the safety and effectiveness of the drug for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the drug is safe and effective. The FDA may grant full or partial waivers, or deferrals, for submission of data. Unless otherwise required by regulation, PREA does not apply to any drug for an indication for which orphan designation has been granted.

The Best Pharmaceuticals for Children Act, or BPCA, provides NDA holders a six-month extension of any exclusivity—patent or non-patent—for a drug if certain conditions are met. Conditions for exclusivity include the FDA's determination that information relating to the use of a new drug in the pediatric population may produce health benefits in that population, the FDA making a written request for pediatric studies, and the applicant agreeing to perform, and reporting on, the requested studies within the statutory timeframe. Applications under the BPCA are treated as priority applications, with all of the benefits that designation confers.

Healthcare Reform

In March 2010, the President of the United States signed one of the most significant healthcare reform measures in decades. The Affordable Care Act, substantially changes the way healthcare will be financed by both governmental and private insurers, and significantly impacts the pharmaceutical industry. The Affordable Care Act will impact existing government healthcare programs and will result in the development of new programs. For example, the Affordable Care Act provides for Medicare payment for performance initiatives and improvements to the physician quality reporting system and feedback program.

Among the Affordable Care Act's provisions of importance to the pharmaceutical industry are the following:

- an annual, nondeductible fee on any entity that manufactures or imports specified branded prescription drugs and biologic agents apportioned among these entities according to their market share in some government healthcare programs, beginning in 2011;
- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program, retroactive to January 1, 2010, to 23% and 13% of the average manufacturer price for most branded and generic drugs, respectively;
- expansion of healthcare fraud and abuse laws, including the False Claims Act and the Anti-Kickback Statute, new government investigative powers, and enhanced penalties for noncompliance;
- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturers' outpatient drugs to be covered under Medicare Part D;
- extension of manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;
- expansion of eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals beginning in 2014 and by adding new mandatory eligibility categories for individuals with income at or below 133% of the Federal Poverty Level, thereby potentially increasing manufacturers' Medicaid rebate liability;
- expansion of the entities eligible for discounts under the Public Health Service pharmaceutical pricing program;
- new requirements to report annually specified financial arrangements with physicians and teaching hospitals, as defined in the Affordable Care Act and its implementing regulations, including reporting any "payments or transfers of value" made or distributed to prescribers, teaching hospitals, and other healthcare providers and reporting any ownership and investment interests held by physicians and other healthcare providers and their immediate family members and applicable group purchasing organizations during the preceding calendar year, with data collection to be required beginning August 1, 2013 and reporting to the Centers for Medicare and Medicaid Services to be required by March 31, 2014 and by the 90th day of each subsequent calendar year;
- a new requirement to annually report drug samples that manufacturers and distributors provide to physicians; and
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research.

The Affordable Care Act also establishes an Independent Payment Advisory Board, or IPAB, to reduce the per capita rate of growth in Medicare spending. Beginning in 2014, IPAB is mandated to propose changes in Medicare payments if it determines that the rate of growth of Medicare expenditures exceeds target growth rates. The IPAB has broad discretion to propose policies to reduce expenditures, which may have a negative impact on payment rates for pharmaceutical products. A proposal made by the IPAB is required to be implemented by the U.S. government's Centers for Medicare & Medicaid Services unless Congress adopts a proposal with savings greater than those proposed by the IPAB. IPAB proposals may impact payments for physician and free-standing services beginning in 2015 and for hospital services beginning in 2020.

In addition, other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. On August 2, 2011, the President signed into law the Budget Control Act of 2011, which, among other things, created the Joint Select Committee on Deficit Reduction to recommend proposals in spending reductions to Congress. The Joint Select Committee did not achieve its targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, triggering the legislation's automatic reductions to several government programs. These reductions include aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, starting in 2013. On January 2, 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, reduced Medicare payments to several providers and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws may result in additional reductions in Medicare and other healthcare funding, which could have a material adverse effect on our customers and accordingly, our financial operations.

We anticipate that the Affordable Care Act will result in additional downward pressure on coverage and the price that we receive for any approved product, and could seriously harm our business. Any reduction in reimbursement from Medicare and other government programs may result in a similar reduction in payments from private payors. The implementation of cost containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain profitability, or commercialize our products. In addition, it is possible that there will be further legislation or regulation that could harm our business, financial condition, and results of operations.

Coverage and Reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any drug products for which we obtain regulatory approval. In the United States and markets in other countries, sales of any products for which we receive regulatory approval for commercial sale will depend in part on the availability of reimbursement from third-party payors. Third-party payors include government health administrative authorities, managed care providers, private health insurers and other organizations. The process for determining whether a payor will provide coverage for a drug product may be separate from the process for setting the price or reimbursement rate that the payor will pay for the drug product. Third-party payors may limit coverage to specific drug products on an approved list, or formulary, which might not include all of the FDA-approved drugs for a particular indication. Third-party payors are increasingly challenging the price and examining the medical necessity and cost-effectiveness of medical products and services, in addition to their safety and efficacy. We may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of our products, in addition to the costs required to obtain FDA approvals. Our product candidates may not be considered medically necessary or cost-effective. A payor's decision to provide coverage for a drug product does not imply that an adequate reimbursement rate will be approved. Adequate third party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development.

In 2003, the U.S. government enacted legislation providing a partial prescription drug benefit for Medicare recipients, which became effective at the beginning of 2006. Government payment for some of the costs of prescription drugs may increase demand for any products for which we receive marketing approval. However, to obtain payments under this program, we would be required to sell products to Medicare recipients through prescription drug plans operating pursuant to this legislation. These plans will likely negotiate discounted prices for our products. Federal, state and local governments in the U.S. continue to consider legislation to limit the growth of healthcare costs, including the cost of prescription drugs. Future legislation could limit payments for pharmaceuticals such as the drug candidates that we are developing.

Different pricing and reimbursement schemes exist in other countries. In the European Union, governments influence the price of pharmaceutical products through their pricing and reimbursement

rules and control of national healthcare systems that fund a large part of the cost of those products to consumers. Some jurisdictions operate positive and negative list systems under which products may only be marketed once a reimbursement price has been agreed upon. To obtain reimbursement or pricing approval, some of these countries may require the completion of clinical trials that compare the cost-effectiveness of a particular product candidate to currently available therapies. Other member states allow companies to fix their own prices for medicines, but monitor and control company profits. The downward pressure on healthcare costs in general, particularly prescription drugs, has become more intense. As a result, increasingly high barriers are being erected to the entry of new products. The European Union provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. We may face competition for our product candidates from lower-priced products in foreign countries that have placed price controls on pharmaceutical products. In addition, in some countries, cross-border imports from low-priced markets exert a commercial pressure on pricing within a country.

The marketability of any products for which we receive regulatory approval for commercial sale may suffer if the government and third-party payors fail to provide adequate coverage and reimbursement. In addition, an increasing emphasis on managed care in the United States has increased and will continue to increase the pressure on pharmaceutical pricing. Coverage policies and third party reimbursement rates may change at any time.

Even if favorable coverage and reimbursement status is attained for one or more products for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Other Healthcare Laws and Compliance Requirements

The federal Anti-Kickback Statute prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce or in return for purchasing, leasing, ordering or arranging for the purchase, lease or order of any healthcare item or service reimbursable under Medicare, Medicaid or other federally financed healthcare programs. This statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on one hand and prescribers, purchasers, and formulary managers on the other. Although there are a number of statutory exemptions and regulatory safe harbors protecting some business arrangements from prosecution, the exemptions and safe harbors are drawn narrowly and practices that involve remuneration intended to induce prescribing, purchasing or recommending may be subject to scrutiny if they do not qualify for an exemption or safe harbor. Our practices may not in all cases meet all of the criteria for safe harbor protection from federal Anti-Kickback Statute liability. The reach of the Anti-Kickback Statute was broadened by the Affordable Care Act, which, among other things, amends the intent requirement of the federal Anti-Kickback Statute. Pursuant to the statutory amendment, a person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it in order to have committed a violation. In addition, the Affordable Care Act provides that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act (discussed below) or the civil monetary penalties statute, which imposes penalties against any person who is determined to have presented or caused to be presented a claim to a federal health program that the person knows or should know is for an item or service that was not provided as claimed or is false or fraudulent.

The federal False Claims Act prohibits any person from knowingly presenting, or causing to be presented, a false claim for payment to the federal government or knowingly making, using, or causing to be made or used a false record or statement material to a false or fraudulent claim to the federal

government. As a result of a modification made by the Fraud Enforcement and Recovery Act of 2009, a claim includes "any request or demand" for money or property presented to the U.S. government. Recently, several pharmaceutical and other healthcare companies have been prosecuted under these laws for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. Other companies have been prosecuted for causing false claims to be submitted because of the companies' marketing of the product for unapproved, and thus non-reimbursable, uses. HIPAA created new federal criminal statutes that prohibit knowingly and willfully executing a scheme to defraud any healthcare benefit program, including private third-party payors and knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services. Also, many states have similar fraud and abuse statutes or regulations that apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor.

In addition, we may be subject to data privacy and security regulation by both the federal government and the states in which we conduct our business. HIPAA, as amended by HITECH, and its implementing regulations, imposes requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to "business associates"—independent contractors or agents of covered entities that receive or obtain protected health information in connection with providing a service on behalf of a covered entity. HITECH also increased the civil and criminal penalties that may be imposed against covered entities, business associates and possibly other persons, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorney's fees and costs associated with pursuing federal civil actions. In addition, state laws govern the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

In the United States, our activities are potentially subject to additional regulation by various federal, state and local authorities in addition to the FDA, including the Centers for Medicare and Medicaid Services, other divisions of HHS (e.g., the Office of Inspector General), the DOJ and individual U.S. Attorney offices within the DOJ, and state and local governments. If a drug product is reimbursed by Medicare or Medicaid, pricing and rebate programs must comply with, as applicable, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 as well as the Medicaid rebate requirements of the Omnibus Budget Reconciliation Act of 1990, or the OBRA, and the Veterans Health Care Act of 1992, each as amended. Among other things, the OBRA requires drug manufacturers to pay rebates on prescription drugs to state Medicaid programs and empowers states to negotiate rebates on pharmaceutical prices, which may result in prices for our future products that will likely be lower than the prices we might otherwise obtain. If products are made available to authorized users of the Federal Supply Schedule of the General Services Administration, additional laws and requirements apply. Under the Veterans Health Care Act, or VHCA, drug companies are required to offer some drugs at a reduced price to a number of federal agencies including the U.S. Department of Veterans Affairs and DoD, the Public Health Service and some private Public Health Service designated entities in order to participate in other federal funding programs including Medicaid. Recent legislative changes require that discounted prices be offered for specified DoD purchases for its TRICARE program via a rebate system. Participation under the VHCA requires submission of pricing data and calculation of discounts and rebates pursuant to complex statutory formulas, as well as the entry into government procurement contracts governed by the Federal Acquisition Regulation.

Because of the breadth of these laws and the narrowness of available statutory and regulatory exemptions, it is possible that some of our business activities could be subject to challenge under one or more of such laws. If our operations are found to be in violation of any of the federal and state laws described above or any other governmental regulations that apply to us, we may be subject to penalties,

including criminal and significant civil monetary penalties, damages, fines, imprisonment, exclusion from participation in government programs, injunctions, recall or seizure of products, total or partial suspension of production, denial or withdrawal of pre-marketing product approvals, private "qui tam" actions brought by individual whistleblowers in the name of the government or refusal to allow us to enter into supply contracts, including government contracts, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations. To the extent that any of our products are sold in a foreign country, we may be subject to similar foreign laws and regulations, which may include, for instance, applicable post-marketing requirements, including safety surveillance, anti-fraud and abuse laws, and implementation of corporate compliance programs and reporting of payments or transfers of value to healthcare professionals.

In order to distribute products commercially, we must comply with state laws that require the registration of manufacturers and wholesale distributors of pharmaceutical products in a state, including, in some states, manufacturers and distributors who ship products into the state even if such manufacturers or distributors have no place of business within the state. Some states also impose requirements on manufacturers and distributors to establish the pedigree of product in the chain of distribution, including some states that require manufacturers and others to adopt new technology capable of tracking and tracing product as it moves through the distribution chain. Several states have enacted legislation requiring pharmaceutical companies to, among other things, establish marketing compliance programs, file periodic reports with the state, make periodic public disclosures on sales, marketing, pricing, clinical trials and other activities, and/ or register their sales representatives, as well as to prohibit pharmacies and other healthcare entities from providing specified physician prescribing data to pharmaceutical companies for use in sales and marketing, and to prohibit other specified sales and marketing practices. All of our activities are potentially subject to federal and state consumer protection and unfair competition laws.

Employees

As of June 1, 2013, we had 56 employees, of whom 17 hold Ph.D. degrees and five hold M.D. degrees. We have no collective bargaining agreements with our employees and have not experienced any work stoppages. We believe that relations with our employees are good.

Facilities

Our corporate headquarters and research facilities are located in Newtown, Pennsylvania, where we lease an aggregate of approximately 9,500 square feet of office and laboratory space, pursuant to lease agreements, the terms of which expire in March 2014 and September 2013, respectively. We have a second office located in Pennington, New Jersey, where we lease an aggregate of approximately 5,200 square feet of office space pursuant to lease agreements, the terms of which expire in February 2015 and October 2014, respectively. This facility houses our clinical development, clinical operations, regulatory and commercial personnel.

We believe that our existing facilities are adequate for our near-term needs. When our leases expire, we may exercise renewal options or look for additional or alternate space for our operations. We believe that suitable additional or alternative space would be available if required in the future on commercially reasonable terms.

Legal Proceedings

We are not a party to any legal proceedings.

MANAGEMENT

Executive Officers, Directors and Other Significant Employees

The following table sets forth information regarding our executive officers, the directors to be serving following the listing of our common stock on the NASDAQ Global Market and other significant employees, including their respective ages as of June 1, 2013:

Name	Age	Position(s)
Executive Officers and Directors		
Ramesh Kumar, Ph.D.	57	Director, President and Chief Executive Officer
Michael B. Hoffman	62	Chairman of the Board of Directors
Thomas McKearn, M.D., Ph.D.	64	President, Research and Development
François E. Wilhelm, M.D., Ph.D.	58	Chief Medical Officer and Senior Vice President
Manoj Maniar, Ph.D.	50	Senior Vice President, Product Development
Ajay Bansal	51	Chief Financial Officer
Henry S. Bienen, Ph.D.	74	Director
Viren Mehta	63	Director
E. Premkumar Reddy, Ph.D.	69	Director
		Director Nominee
		Director Nominee
Other Significant Employees		
James Altland	64	Senior Vice President, Finance & Corporate Development
Scott Megaffin	50	Senior Vice President, Commercial Development
David Stephon	52	Senior Vice President, Quality Management

Ramesh Kumar, Ph.D. Dr. Kumar is one of our co-founders, and is currently our President and Chief Executive Officer, a position he has held since 1998, as well as a member of our board of directors. Prior to founding our company, Dr. Kumar held positions in research and development or management at Princeton University, Bristol-Myers Squibb Company, or Bristol-Myers Squibb, DNX Corp. (later Nextran Corp., a subsidiary of Baxter International Inc.) and Kimeragen, Inc. (later ValiGen Inc.), a genomics company, where he was President of the Genomics and Transgenics Division. Dr. Kumar received his Ph.D. in Molecular Biology from the University of Illinois, Chicago, and trained at the National Cancer Institute. Additionally, Dr. Kumar received his B.Sc. and M.Sc., both with honors, in Microbiology from Panjab University.

Our board of directors believes Dr. Kumar's perspective and experience as our co-founder, President and Chief Executive Officer, as well as his depth of operating and senior management experience in our industry, provide him with the qualifications and skills to serve as a director.

Michael B. Hoffman. Mr. Hoffman has served as Chairman of our board of directors since 2006 and as a member of our board of directors since December 2002. Since 2003, Mr. Hoffman has been a managing director of Riverstone Holdings LLC, or Riverstone, where he is principally responsible for investments in power and renewable energy. Before joining Riverstone, Mr. Hoffman was senior managing director and head of the mergers and acquisitions advisory business of The Blackstone Group L.P., or Blackstone, where he also served on the firm's principal group investment committee as well as its executive committee. Prior to joining Blackstone, Mr. Hoffman was managing director and

co-head of the mergers and acquisitions department at Smith Barney, Harris Upham & Co. Mr. Hoffman received his Bachelor's and Master's Degrees from Northwestern University and his M.B.A. from the Harvard Business School.

Our board of directors believes Mr. Hoffman's perspective and experience as an investor, as well as his educational background, provide him with the qualifications and skills to serve as a director.

Thomas McKearn, M.D., Ph.D. Dr. McKearn has served as our President, Research & Development since September 2012. Prior to joining us, Dr. McKearn served as Vice President, Medical Affairs and then as Vice President, Strategic Clinical Affairs at Agennix AG (formerly GPC Biotech GP), a biopharmaceutical company, from April 2002 to August 2012. Prior to joining Agennix AG, Dr. McKearn held several executive positions both in biotech and pharmaceutical organizations, including Executive Director of Strategic Science & Medicine at Bristol-Myers Squibb. Dr. McKearn was a founder of Cytogen Corporation in 1981 and later served as its Chief Executive Officer. He has served as a director of Advaxis, Inc., a publicly held biotechnology company focused on oncology, since 2004. Dr. McKearn has served on the faculty of the Medical School at the University of Pennsylvania. Dr. McKearn received his medical, graduate, and post-graduate training at the University of Chicago.

François E. Wilhelm, M.D., Ph.D. Dr. Wilhelm has served as our Chief Medical Officer and Senior Vice President since May 2008. Before joining us, Dr. Wilhelm held a variety of clinical development positions with several pharmaceutical and biotechnology companies, including Hoffmann-La Roche Ltd., Fujisawa Healthcare Inc., Pfizer Inc., The Procter & Gamble Company, Akros Pharma Inc. and Johnson and Johnson. Dr. Wilhelm is Board Certified in Rheumatology, receiving his medical degree from Paris University Medical School, his Ph.D. in Endocrinology and a Master's degree in Biostatistics, both from the Paris Sciences University.

Ajay Bansal. Mr. Bansal has served as our Chief Financial Officer and as a member of our board of directors since March 2013. He intends to resign from our board of directors prior to consummation of this offering. From May 2010 to March 2013, Mr. Bansal served as Chief Financial Officer of Complete Genomics Incorporated, a life sciences company. From June 2009 to January 2010, Mr. Bansal served as Chief Financial Officer of Lexicon Pharmaceuticals, Inc., a biopharmaceutical company. From October 2008 to June 2009 and from February 2010 to April 2010, Mr. Bansal was a consultant. From March 2006 to October 2008, Mr. Bansal served as Chief Financial Officer of Tercica, Inc., a biopharmaceutical company. From February 2003 to January 2006, Mr. Bansal served as Chief Financial Officer of Nektar Therapeutics, a biopharmaceutical company. Prior to joining Nektar Therapeutics, Mr. Bansal spent more than 15 years as a management consultant at Arthur D. Little, Inc., McKinsey & Company, Inc. and ZS Associates, Inc., in management roles at Novartis Corporation, a pharmaceuticals company, at Mehta Partners, a financial advisory firm, and at Capital One, a bank holding company. Mr. Bansal received a B.S. in Mechanical Engineering from the Indian Institute of Technology (Delhi) and an M.S. in Operations Research and an M.B.A. from Northwestern University.

Manoj Maniar, Ph.D. Dr. Maniar has served as our Senior Vice President, Product Development since August 2005. Prior to joining us, Dr. Maniar was with SRI International, Inc., a nonprofit research institute, where he served as Senior Director, Formulations and Drug Delivery. Dr. Maniar received his B.S. in Pharmacy from Bombay College of Pharmacy and his Ph.D. in Pharmaceutics from the University of Connecticut.

Henry S. Bienen, Ph.D. Dr. Bienen has served as a member of our board of directors since May 2009. He currently serves as the chairman of Rasmussen College, has served as the president emeritus of Northwestern University since 2009 and served as the president of Northwestern University from 1995 to 2009. Dr. Bienen was the James S. McDonnell Distinguished University Professor and Dean of the Woodrow Wilson School of Public and International Affairs at Princeton University prior to his

appointment at Northwestern. Dr. Bienen began his association with Princeton University in 1966, advancing from assistant professor to professor of politics and international affairs, and was then appointed the William Stewart Tod Professor of Politics and International Affairs in 1981 and the James S. McDonnell Distinguished University Professor in 1985. Dr. Bienen has served as a director of Gleacher & Company, a publicly held investment banking firm, since May 2010, and the Grosvenor Registered Multi Strategy Fund (TI 1), LLC, the Grosvenor Registered Multi Strategy Fund (TI 2), LLC, the Grosvenor Registered Multi Strategy Fund (TE), LLC and the Grosvenor Registered Multi Strategy Master Fund, LLC since April 2011. Dr. Bienen previously served on the boards of directors of The Bear Stearns Companies Inc. until its purchase by JP Morgan Chase & Co. in 2008, and SPSS Inc. from 2007 until 2009, when the company was sold to IBM Corporation. Dr. Bienen received his Bachelor's Degree with honors from Cornell University and both his Master's Degree and Ph.D., from the University of Chicago.

Our board of directors believes Dr. Bienen's perspective and experience as a director of a public company, as well as his educational background, provide him with the qualifications and skills to serve as a director.

Viren Mehta. Dr. Mehta has served as a member of our board of directors since February 2004. Dr. Mehta has been a managing member of Mehta Partners since 1997. Mehta Partners provides strategic advisory services to the biotechnology and pharmaceutical companies worldwide. Prior to founding Mehta Partners, Dr. Mehta co-founded Mehta and Isaly in 1989, and prior to that was a part of the strategic planning team of the International Division at Merck & Co., or Merck. Dr. Mehta earned a Doctor of Pharmacy at the University of Southern California, and an M.B.A. from the Anderson School of Business at the University of California, Los Angeles.

Our board of directors believes Dr. Mehta's perspective and experience in the life sciences industry as a biopharma fund manager, fund consultant and a strategic advisor to senior managers in the biopharma industry, as well as his educational background, provide him with the qualifications and skills to serve as a director.

E. Premkumar Reddy, Ph.D. Dr. Reddy is one of our scientific founders and has served as a member of our board of directors since February 1999. Since March 2010, Dr. Reddy has served as a Professor and Director of the Experimental Cancer Therapeutics Program at Mount Sinai School of Medicine, or Mount Sinai. From 1992 to February 2010, Dr. Reddy served as a Professor and Director of the Fels Institute for Cancer Research of Temple University. He was the founder and co-editor of the international journal of cancer research, Oncogene, published by Nature Publishing Group. Dr. Reddy received his B.Sc., M.Sc. and Ph.D. from Osmania University.

Our board of directors believes Dr. Reddy's perspective and experience as our co-founder, his educational background, as well as his experience in research and product development, provide him with the qualifications and skills to serve as a director.

James Altland. Mr. Altland has served as our Senior Vice President, Finance and Corporate Development since August 2007. Prior to joining us, Mr. Altland was a Partner of the Philadelphia office of Tatum LLC, a professional services firm, where he was Practice Leader for the life science segment. Mr. Altland received a B.S. in Accounting from the University of Akron and is a retired Certified Public Accountant.

Scott T. Megaffin. Mr. Megaffin has served as our Senior Vice President, Commercial Development since August 2010. Prior to that, he served as a commercial consultant for us from December 2009 to August 2010. From September 2009 to December 2009, Mr. Megaffin was a consultant. From July 2008 to September 2009, Mr. Megaffin was Vice President, Pain Marketing of Cephalon, Inc. From June 2006 to July 2008, Mr. Megaffin was the Vice President of Marketing of Adolor Corporation. Mr. Megaffin received his B.S. in Biology from Pittsburg State University.

David Stephon. Mr. Stephon has served as our Senior Vice President, Quality Management since February 2011. Prior to joining us, Mr. Stephon was the head of a pharmaceutical quality consulting business, David M. Stephon Consulting, LLC, from July 2010 to February 2011. Previously, Mr. Stephon was Vice President, Quality Management at Adolor Corporation from October 2002 to July 2010. Mr. Stephon received a M.S. in Chemistry from Lehigh University, and a B.S. in Chemistry from Muhlenberg College.

Clinical Advisory Board Members

We have established a clinical advisory board and we regularly seek advice and input from these experienced clinical leaders on matters related to our research and development programs. The members of our clinical advisory board consist of experts across a range of key disciplines relevant to our programs. We intend to continue to leverage the broad expertise of our advisors by seeking their counsel on important topics relating to our drug discovery and development programs. Some members of our clinical advisory board have entered into consulting agreements with us covering their respective confidentiality, non-disclosure and proprietary rights matters and own or have owned shares of our common stock or options to purchase shares of our common stock.

All of the clinical advisors are employed by or have consulting arrangements with other entities and devote only a small portion of their time to us. Our current advisors are:

Name	Title
Jerome E. Groopman, M.D.	Dina and Raphael Recanati Professor of Medicine, Harvard Medical School Chief, Division of Experimental Medicine, Beth Israel Deaconess Medical Center Boston, MA
Ross Donehower, M.D.	Professor of Oncology, Professor of Medicine Director, Medical Oncology/Hematology Fellowship Training Program Director, Division of Medical Oncology Johns Hopkins Sidney Kimmel Comprehensive Cancer Center Baltimore, MD
S. Gail Eckhardt, M.D.	Professor and Co-Division Head, Medical Oncology Stapp/Harlow Endowed Chair in Cancer Research University of Colorado School of Medicine Senior Associate Director of Translational and Collaborative Research University of Colorado Comprehensive Cancer Center The Anschutz Medical Campus Aurora, CO
James Holland, M.D.	Distinguished Professor of Neoplastic Diseases, Mount Sinai School of Medicine, Department of Medicine—Oncology New York, NY
Stephen D. Nimer, M.D.	Director, Sylvester Comprehensive Cancer Center Professor of Medicine, Biochemistry & Molecular Biology University of Miami Hospitals and Clinics Miami, FL
David Parkinson, M.D.	Venture Partner, New Enterprise Associates Menlo Park, CA
Mark J. Ratain, M.D.	Leon O. Jacobson Professor of Medicine Director, Center for Personalized Therapeutics Associate Director for Clinical Sciences, Comprehensive Cancer Center The University of Chicago Chicago, IL

Scientific Advisory Board

We have also established a scientific advisory board. We regularly seek advice and input from these experienced scientific leaders on matters related to our research and development programs. The members of our scientific advisory board consist of experts across a range of key disciplines relevant to our programs and science. We intend to continue to leverage the broad expertise of our advisors by seeking their counsel on important topics relating to our drug discovery and development programs. Some members of our scientific advisory board have entered into consulting agreements with us covering their respective confidentiality, non-disclosure and proprietary rights matters and own or have owned shares of our common stock or options to purchase shares of our common stock.

All of the scientific advisors are employed by or have consulting arrangements with other entities and devote only a small portion of their time to us. Our current advisors are:

Name	Title
Anna Marie Skalka, M.D., Ph.D.	Professor, W.W. Smith Chair in Cancer Research, Senior Advisor to the President Fox Chase Cancer Center Philadelphia, PA
Peter Vogt, Ph.D.	Professor, Department of Molecular and Experimental Medicine Executive Vice President for Scientific Affairs The Scripps Research Institute La Jolla, CA
George Vande Woude, Ph.D.	Founding Director, Distinguished Scientific Fellow, and Professor Van Andel Research Institute Grand Rapids, MI

Board Composition

Our board of directors currently consists of ten members, five of whom intend to resign prior to consummation of this offering. We expect that upon the listing of our common stock on the NASDAQ Global Market, our board of directors will consist of members. Prior to the listing of our common stock on the NASDAQ Global Market, we intend to appoint and to our board of directors and they have consented to so serve. Our ninth amended and restated certificate of incorporation currently in effect provides that our board of directors shall consist of ten directors. Our tenth amended and restated certificate of incorporation will provide that our board of directors will consist of not less than three nor more than 11 directors, as such number of directors may from time to time be fixed by our board of directors. Each director shall be elected to the board for a one-year term, to serve until the election and qualification of successor directors at the annual meeting of stockholders, or until the director's earlier removal, resignation or death.

Board Committees

Upon the listing of our common stock on the NASDAQ Global Market, our board of directors will have a standing audit committee, compensation committee and nominating and corporate governance committee. The members of our audit committee will consist of , and , with serving as chairman. The members of our compensation committee will consist of , and , with serving as chairman. The members of our nominating and corporate governance committee will consist of , and , with serving as chairman.

Our board of directors has undertaken a review of the independence of our directors and has determined that all directors except are independent within the meaning of Section 5605(a)(2) of the NASDAQ Stock Market listing rules and Rule 10A-3 under the Securities Act and that and meet the additional test for independence for audit committee members imposed by SEC regulations and Section 5605(c)(2)(A) of the NASDAQ Stock Market listing rules. The NASDAQ Stock Market listing rules require that each committee of our board of directors has at least one independent director on the listing date of our common stock, has a majority of independent directors no later than 90 days after such date and be fully independent within one year after that date. The composition of our audit, compensation and nominating and corporate governance committees will satisfy these independence requirements in accordance with the phase-in schedule allowed by the NASDAQ Global Market.

Audit Committee

The primary purpose of our audit committee will be to assist the board of directors in the oversight of the integrity of our accounting and financial reporting process, the audits of our consolidated financial statements, and our compliance with legal and regulatory requirements. The functions of our audit committee will include, among other things:

- hiring the independent registered public accounting firm to conduct the annual audit of our consolidated financial statements and monitoring its independence and performance;
- reviewing and approving the planned scope of the annual audit and the results of the annual audit;
- pre-approving all audit services and permissible non-audit services provided by our independent registered public accounting firm;
- reviewing the significant accounting and reporting principles to understand their impact on our consolidated financial statements;
- reviewing our internal financial, operating and accounting controls with management, our independent registered public accounting firm and our internal audit provider;
- reviewing with management and our independent registered public accounting firm, as appropriate, our financial reports, earnings announcements and our compliance with legal and regulatory requirements;
- reviewing potential conflicts of interest under and violations of our Code of Conduct;
- establishing procedures for the treatment of complaints received by us regarding accounting, internal accounting controls or auditing matters and confidential submissions by our employees of concerns regarding questionable accounting or auditing matters;
- reviewing and approving related-party transactions; and
- reviewing and evaluating, at least annually, our audit committee's charter.

With respect to reviewing and approving related-party transactions, our audit committee will review related-party transactions for potential conflicts of interests or other improprieties. Under SEC rules, related-party transactions are those transactions to which we are or may be a party in which the amount involved exceeds $120,000, and in which any of our directors or executive officers or any other related person had or will have a direct or indirect material interest, excluding, among other things, compensation arrangements with respect to employment and board membership. Our audit committee could approve a related-party transaction if it determines that the transaction is in our best interests. Our directors will be required to disclose to this committee or the full board of directors any potential conflict of interest, or personal interest in a transaction that our board is considering. Our executive

officers will be required to disclose any related-party transaction to the audit committee. We also plan to poll our directors on an annual basis with respect to related-party transactions and their service as an officer or director of other entities. Any director involved in a related-party transaction that is being reviewed or approved must recuse himself or herself from participation in any related deliberation or decision. Whenever possible, the transaction should be approved in advance and if not approved in advance, must be submitted for ratification as promptly as practical.

The financial literacy requirements of the SEC require that each member of our audit committee be able to read and understand fundamental financial statements. In addition, at least one member of our audit committee must qualify as an audit committee financial expert, as defined in Item 407(d)(5) of Regulation S-K promulgated under the Securities Act, and have financial sophistication in accordance with the NASDAQ Stock Market listing rules. Our board of directors has determined that qualifies as an audit committee financial expert.

Both our independent registered public accounting firm and management periodically will meet privately with our audit committee.

In connection with this offering, our board of directors intends to adopt a charter for the audit committee that complies with current federal and NASDAQ Stock Market rules relating to corporate governance. The charter will be available on our website at *http://www.onconova.com*.

Compensation Committee

The primary purpose of our compensation committee will be to assist our board of directors in exercising its responsibilities relating to compensation of our executive officers and employees and to administer our equity compensation and other benefit plans. In carrying out these responsibilities, this committee will review all components of executive officer and employee compensation for consistency with its compensation philosophy, as in effect from time to time. The functions of our compensation committee will include, among other things:

- designing and implementing competitive compensation policies to attract and retain key personnel;
- reviewing and formulating policy and determining the compensation of our executive officers and employees;
- reviewing and recommending to our board of directors the compensation of our directors;
- administering our equity incentive plans and granting equity awards to our employees and directors under these plans;
- if required from time to time, reviewing with management our disclosures under the caption "Compensation Discussion and Analysis" and recommending to the full board its inclusion in our periodic reports to be filed with the SEC;
- if required from time to time, preparing the report of the compensation committee to be included in our annual proxy statement;
- engaging compensation consultants or other advisors it deems appropriate to assist with its duties; and
- reviewing and evaluating, at least annually, our compensation committee's charter.

In connection with this offering, our board of directors intends to adopt a charter for the compensation committee that complies with current federal and NASDAQ Stock Market rules relating to corporate governance. The charter will be available on our website at *http://www.onconova.com*.

Nominating and Corporate Governance Committee

The primary purpose of our nominating and corporate governance committee will be to assist our board of directors in promoting the best interest of our company and our stockholders through the implementation of sound corporate governance principles and practices. The functions of our nominating and corporate governance committee will include, among other things:

- identifying, reviewing and evaluating candidates to serve on our board;
- determining the minimum qualifications for service on our board;
- developing and recommending to our board an annual self-evaluation process for our board and overseeing the annual self-evaluation process;
- developing, as appropriate, a set of corporate governance principles, and reviewing and recommending to our board any changes to such principles; and
- periodically reviewing and evaluating our nominating and corporate governance committee's charter.

In connection with this offering, our board of directors intends to adopt a charter for the nominating and corporate governance committee that complies with current federal and NASDAQ Stock Market rules relating to corporate governance. The charter will be available on our website at *http://www.onconova.com*.

Code of Conduct for Employees, Executive Officers and Directors

In connection with the consummation of this offering, we plan to adopt a Code of Conduct applicable to all of our employees, executive officers and directors. Following the consummation of this offering, the Code of Conduct will be available on our website at *http://www.onconova.com*. The audit committee of our board of directors will be responsible for overseeing the Code of Conduct and must approve any waivers of the Code of Conduct for employees, executive officers or directors. We expect that any amendments to the Code of Conduct, or any waivers of its requirements, will be disclosed on our website.

Compensation Committee Interlocks and Insider Participation

No member of our compensation committee has ever been an executive officer or employee of ours. None of our officers currently serves, or has served during the last completed year, on the board of directors, compensation committee or other committee serving an equivalent function, of any other entity that has one or more officers serving as a member of our board of directors or compensation committee.

EXECUTIVE AND DIRECTOR COMPENSATION

Summary Compensation Table

The following table sets forth information for the fiscal year ended December 31, 2012 concerning compensation of our principal executive officer and our three other executive officers who were serving as executive officers as of December 31, 2012. We refer to these four executives as our named executive officers.

Name and Principal Position	Year	Salary ($)	Bonus ($)(1)	Option Awards ($)(2)	All Other Compensation(3) ($)	Total ($)
Ramesh Kumar, Ph.D. President and Chief Executive Officer	2012	408,595	163,438	—	9,407	581,440
Francois Wilhelm, M.D., Ph.D. Chief Medical Officer and Senior Vice President	2012	374,587	112,376	—	10,167	497,130
Manoj Maniar, Ph.D. Senior Vice President of Development	2012	326,795	98,039	—	9,422	434,256
Thomas McKearn, M.D., Ph.D. President of Research and Development(5)	2012	68,265	23,917	—	539	92,721

(1) Represents discretionary annual bonus amounts paid pursuant to the named executive officers' employment agreements.

(2) We recognize compensation expense in our consolidated financial statements for stock options based on their intrinsic value at each balance sheet date, not the grant date, because the awards are classified as liability awards, primarily due to their cash settlement features. The amounts below show the intrinsic value of all outstanding stock options held by the named executive officers as of December 31, 2012. These amounts correspond to the liability recorded on our consolidated balance sheet as of December 31, 2012.

December 31, 2012 Fair Value	
Ramesh Kumar, Ph.D.	$ 1,832,568
Francois Wilhelm, M.D., Ph.D.	1,103,460
Manoj Maniar, Ph.D.	634,528
Thomas McKearn, M.D., Ph.D.	5,133

(3) Includes amounts paid for insurance premiums on behalf of the named executive officer and the matching funds paid pursuant to our 401(k) Plan.

(4) Dr. McKearn was hired as our President, Research and Development, on September 1, 2012. The amounts disclosed in the table above do not include $20,000 of compensation paid to Chartres Group, LLC, as a consultant to us. Dr. McKearn is a principal of Chartres Group, LLC.

Employment Agreements

We have entered into employment agreements with our all of our named executive officers. The following is a summary of the material terms of each employment agreement. For complete terms, please see the respective employment agreements attached as exhibits to the registration statement of which this prospectus forms a part.

Ramesh Kumar, Ph.D.

We entered into an employment agreement with Dr. Kumar on April 1, 2007. The employment agreement provided for an initial term of four years, unless extended by mutual agreement of the parties. We and Dr. Kumar have mutually agreed to extend the term until March 31, 2015, unless sooner terminated in accordance with the terms of the agreement.

The employment agreement provided for an initial base salary of $299,076 and an annual bonus of up to 35% of such base salary, payable upon our achievement of revenue or profit objectives, specific business plan goals or other performance milestones mutually agreed to by Dr. Kumar and our board of directors, provided that Dr. Kumar remain employed by us throughout the performance year. The bonus may be paid in the form of cash, stock options, shares of our common stock, or a combination thereof, at our compensation committee's discretion. Dr. Kumar may also be entitled to additional compensation in recognition of extraordinary contributions, at the sole discretion of our compensation committee.

Dr. Kumar is entitled to participate in all of our employee benefit plans and programs that are made generally available from time to time to our executive officers and is entitled to vacation benefits. Pursuant to his employment agreement, Dr. Kumar is entitled to term life insurance coverage in a face amount of $300,000, a reasonable transportation allowance if we relocate our research facility more than 40 miles from its present location, and up to $10,000 annually for educational programs related to the performance of his duties. If Dr. Kumar dies during his employment, we will be entitled to a $1 million death benefit under a "key man" life insurance policy. Dr. Kumar's employment agreement contains non-solicitation, non-competition, confidentiality and inventions assignment provisions that, among other things, prevent him from competing with us during the term of his employment and for a specified time thereafter.

If Dr. Kumar's employment is terminated due to his death, disability, by us for "cause" or by Dr. Kumar without "good reason" during the term of his employment agreement, we will pay to Dr. Kumar or his spouse or estate the balance of his accrued and unpaid salary, unreimbursed expenses, and unused accrued vacation time through the termination date.

If Dr. Kumar's employment is terminated by us without "cause" or by Dr. Kumar for "good reason," Dr. Kumar will be entitled to receive bi-weekly payments equal to his then-current bi-weekly base salary commencing on the date written notice of a termination without "cause" is delivered to Dr. Kumar or the date of termination for "good reason" and ending on the earlier of the date on which the term of the employment agreement would otherwise expire or the date Dr. Kumar accepts comparable employment, provided that if Dr. Kumar accepts such comparable employment within one year of the commencement of such payments, he shall continue to receive such payments until the earlier of the date on which the term of the employment agreement would otherwise expire or one year from such commencement. All incentive stock options that are unvested as of the date of such termination would fully vest as of the date of termination and would remain exercisable for three months from the date of termination.

Francois Wilhelm, M.D., Ph.D., Manoj Maniar, Ph.D. and Thomas McKearn, M.D., Ph.D.

We entered into an employment agreement with Dr. Wilhelm on April 17, 2008. The original employment agreement provided for a term of two years, unless extended by mutual agreement of the parties, with an automatic renewal for successive one-year periods unless written notification is provided by either party to the other at least ten business days prior to the expiration of the term. The current term has been extended through May 5, 2014, unless sooner terminated in accordance with the terms of the agreement.

We entered into an employment agreement with Dr. Maniar on January 1, 2007. The original employment agreement provided for a term of two years, unless extended by mutual agreement of the parties. The current term has been extended through May 31, 2014, unless sooner terminated in accordance with the terms of the agreement.

We entered into an employment agreement with Dr. McKearn on September 1, 2012. The employment agreement provides for a term of two years, unless extended by mutual agreement of the parties, with an automatic renewal for successive one-year periods unless written notification is

provided by either party to the other at least ten business days prior to the expiration of the term, unless sooner terminated in accordance with the terms of the agreement.

Dr. Wilhelm's employment agreement provided for an initial base salary of $290,000 and an annual bonus of up to 30% of such base salary, based on our performance and the performance of Dr. Wilhelm. Dr. Maniar's employment agreement provided for an initial base salary of $236,500 and an annual bonus of up to 30% of such base salary, based on our performance and the performance of Dr. Maniar. Dr. McKearn's employment agreement provides for an initial base salary of $205,000 and an annual bonus of up to 35% of such base salary, based on our performance and the performance of Dr. McKearn. In each case, the bonus may be paid in the form of cash, stock options, shares of our common stock, or a combination thereof, at our compensation committee's discretion.

Drs. Wilhelm, Maniar and McKearn are entitled to participate in all of our employee benefit plans and programs that are made generally available from time to time to our executive officers and are entitled to vacation benefits and reimbursement of reasonable business expenses in conformance with our policies. Drs. Wilhelm, Maniar and McKearn's employment agreements contain non-solicitation, non-competition, confidentiality and inventions assignment provisions that, among other things, prevent the executive from competing with us during the term of his employment and for a specified time thereafter.

If Dr. Wilhelm, Dr. Maniar or Dr. McKearn's employment is terminated due to death, disability, by us for "cause," or by the executive without "good reason" (with 30 days' notice to us) during the term of his employment agreement, the agreement shall terminate and we shall pay to the executive or his spouse or estate the balance of his accrued and unpaid salary, unreimbursed expenses, and unused accrued vacation time through the termination date.

If Dr. Wilhelm's or Dr. McKearn's employment is terminated by us without "cause" or by the executive with "good reason" during the term of the employment agreement, the executive will continue to receive salary during a three-month period from the date of notice but shall not be required to perform his duties during such period. All stock options that are unvested as of the date of such termination shall fully vest and shall remain exercisable for three months from the date of termination.

We may terminate Dr. Maniar's employment during the term of the employment agreement without "cause" at any time upon the lesser of six months' or the remainder of the term of the employment agreement's written notice to Dr. Maniar. During the notice period, Dr. Maniar will continue to receive salary but shall not be required to perform his duties, provided that if Dr. Maniar accepts comparable employment during the notice period, all compensation and benefits shall cease as of the date of such acceptance. All stock options that are unvested as of the date of such termination shall fully vest upon written notice of such termination. If Dr. Maniar terminates his employment agreement with "good reason," we will pay him in accordance with the above terms and conditions as well.

If we, Dr. Wilhelm or Dr. McKearn provides written notice of intent to terminate their applicable employment agreements at the expiration of the term, the executive shall receive a lump sum payment equal to three months of his then-current base salary, subject to his execution of a general release of claims against us.

If any of the payments or benefits received by Drs. Kumar, Wilhelm, Maniar or McKearn shall be nondeductible to us by reason of Section 280G of the Code, such payments shall be reduced to the maximum amount which can be deducted by us, provided that we shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including seeking stockholder approval if our board of directors determines that such seeking of approval shall have no adverse effect on us.

For purposes of the employment agreements, "cause" generally means (i) any gross failure of the executive (other than by reason of disability) to faithfully and professionally carry out his duties or to comply with any other material provision of his employment agreement, which continues after our written notice thereof or is not susceptible to remedy or relates to the same types of acts or omissions for which notice has previously been given, (ii) the executive's dishonesty or other willful misconduct, (iii) the executive's conviction for any felony or any other crime involving moral turpitude, whether or not relating to his employment, (iv) in accordance with applicable law, the executive's insobriety or use of illegal drugs either in the course of performing his duties or otherwise affecting his ability to perform such duties, (v) the executive's failure to comply with a lawful written direction of us or (vi) any wanton or willful dereliction of duties by the executive.

For purposes of the employment agreements, "good reason" generally means (i) a reduction in base salary by more than 20% in and for any twelve-month period, (ii) breach by us of any material provision of the employment agreement that continues without steps being taken to cure such breach for ten days after written notice thereof by the executive to us, or (iii) during the term of the employment agreement, the occurrence of (1) the sale or transfer of substantially all of our assets or (2) our merger or consolidation under circumstances where we are not the surviving entity or where persons having control of us immediately prior thereto are not in control of us immediately after.

Potential Payments Upon a Termination or Change in Control

As discussed under the caption "—Employment Agreements" above, we have agreements with our named executive officers pursuant to which they will receive severance payments upon certain termination events. The information below describes and quantifies certain compensation that would be available under our existing plans and arrangements if (i) the named executive officer was terminated as of December 31, 2012 or (ii) if a Change in Control, as defined herein, occurred on December 31, 2012 and the named executive officer had been subsequently terminated on the same date.

Acceleration of Equity Awards

Pursuant to the terms of each named executive officer's option agreements, in the event of a "Change in Control" that occurs during any time prior to such named executive officer's Termination of Service (as such terms are defined in our 2007 Equity Compensation Plan) with us, all stock options granted pursuant to such option agreement shall fully vest. See "—Equity Benefit Plans—2007 Equity Compensation Plan—Change in Control" for a summary of the definition of a Change in Control under the 2007 Equity Compensation Plan.

Termination Other than for Cause, Death or Disability; Resignation for Good Reason

Assuming a December 31, 2012 termination event, the aggregate value of the payment and benefits to which each named executive officer would be entitled in the event the named executive officer's employment is terminated for any reason other than for cause, death, or disability, or if the named

executive officer resigns for good reason, whether or not following a "change in control" as described above, would be as follows:

Name	Cash Severance ($)(1)	Benefits and Health Programs ($)(2)	Value of Accelerated Equity Awards ($)(3)	Total ($)
Ramesh Kumar, Ph.D.	939,769	—	1,974,220	2,913,989
Francois Wilhelm, M.D., Ph.D.	93,647	5,115	1,254,565	1,353,327
Manoj Maniar, Ph.D.	163,398	7,644	719,514	890,556
Thomas McKearn, M.D., Ph.D.	51,250	2,977	5,133	59,360

(1) This amount represents, in the case of Dr. Kumar, 28 months' base salary, assuming that he would not accept comparable employment during the remaining term of his employment agreement, in the case of Dr. Wilhelm and Dr. McKearn, three months of the executive's base salary, and, in the case of Dr. Maniar, six months of the executive's base salary, each at the rate in effect immediately prior to the executive's termination of employment.

(2) This amount represents, in the case of Dr. Wilhelm and Dr. McKearn, three months of continuation of the executive's benefits, and, in the case of Dr. Maniar, six months of continuation of the executive's benefits.

(3) Amounts included in the table for stock option acceleration are calculated as the difference between an assumed fair value of $9.96 per share of our common stock on December 31, 2012 and the exercise price of the option, multiplied by the number of accelerated shares. If calculated based on an assumed fair value of $ per share, which is the mid-point of the price range set forth on the cover page of this prospectus, the value of the equity acceleration would have been as follows: (i) Dr. Kumar— ; (ii) Dr, Wilhelm— ; (iii) Dr. Maniar— ; and (iv) Dr. McKearn— .

Risk Considerations in Our Compensation Program

Our board of directors is evaluating the philosophy and standards on which our compensation plans will be implemented. It is our belief that our compensation programs do not, and in the future will not, encourage inappropriate actions or risk taking by our executive officers. We do not believe that any risks arising from our employee compensation policies and practices are reasonably likely to have a material adverse effect on us. In addition, we do not believe that the mix and design of the components of our executive compensation program will encourage management to assume excessive risks. We believe that our current business process and planning cycle fosters the behaviors and controls that would mitigate the potential for adverse risk caused by the action of our executives.

Outstanding Equity Awards at Fiscal Year-End

The following table provides information regarding equity awards held by each of our named executive officers that were outstanding as of December 31, 2012.

Name	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date
Ramesh Kumar	7,007		2.00	1/1/2016
	140,000		4.50	4/1/2017
	25,000		4.32	3/17/2020
	69,863(1)	30,137	4.32	3/17/2020
	70,000		4.60	12/10/2020
	13,777		4.60	12/5/2021
	125,000		9.96	12/19/2022
	—(2)	125,000	9.96	12/19/2022
Francois E. Wilhelm	100,000		4.50	5/6/2018
	25,000		4.32	3/17/2020
	34,932(1)	15,068	4.32	3/17/2020
	25,000		4.60	12/10/2020
	9,493(3)	10,507	4.60	2/7/2021
	671(4)	1,829	4.60	12/5/2021
	5,777		4.60	12/5/2021
	—(2)	40,000	9.96	12/19/2022
	—(2)	20,000	9.96	12/19/2022
Manoj Maniar	15,000		4.50	8/1/2017
	25,000		4.32	3/17/2020
	34,932(1)	15,068	4.32	3/17/2020
	10,000		4.60	12/10/2020
	25,000		4.60	12/10/2020
	5,040		4.60	12/5/2021
	—(2)	40,000	9.96	12/19/2022
Thomas McKearn	1,191		5.65	3/10/2022
	550		9.96	8/31/2022
	—(2)	100,000	9.96	12/19/2022

(1) 25% of the total shares underlying this option vested on March 17, 2011. The remaining shares vest 1/36th monthly over 36 months thereafter, subject to continued service to us through each vesting date.

(2) 25% of the total shares underlying this option will vest on December 18, 2013. The remaining shares vest 1/36th monthly over 36 months thereafter, subject to continued service to us through each vesting date.

(3) 25% of the total shares underlying this option vested on February 7, 2012. The remaining shares vest 1/36th monthly over 36 months thereafter, subject to continued service to us through each vesting date.

(4) 25% of the total shares underlying this option vested on December 5, 2012. The remaining shares vest 1/36th monthly over 36 months thereafter, subject to continued service to us through each vesting date.

Equity Benefit Plans

2007 Equity Compensation Plan

Our board of directors adopted our 2007 Equity Compensation Plan in December 2007 for the purpose of attracting key employees, directors and consultants, inducing them to remain with us and encouraging them to increase their efforts to make our business more successful. Our stockholders approved the 2007 Equity Compensation Plan in January 2008. Our 2007 Equity Compensation Plan provides for the grant of stock options, stock appreciation rights, restricted stock, or other equity-based awards to our employees, directors and consultants. We have reserved 4,107,831 shares of common stock for issuance pursuant to our 2007 Equity Compensation Plan, subject to adjustment as set forth in the plan, of which 385,643 shares were available for future grant as of March 31, 2013. This summary is qualified in its entirety by the detailed provisions of our 2007 Equity Compensation Plan, which is filed as an exhibit to the registration statement of which this prospectus is a part.

Section 162(m) of the Code limits publicly held companies to an annual deduction for U.S. federal income tax purposes of $1,000,000 for compensation paid to each of their chief executive officer and their three highest compensated executive officers, other than the chief executive officer or the chief financial officer, determined at the end of each year, referred to as covered employees. However, performance-based compensation is excluded from this limitation. Our 2007 Equity Compensation Plan is designed to permit the compensation committee to grant awards that qualify as performance-based for purposes of satisfying the conditions of Section 162(m), but it is not required under our 2007 Equity Compensation Plan that awards qualify for this exception. To qualify as performance-based (i) the compensation must be paid solely on account of attainment of one or more pre-established objective performance goals; (ii) the performance goal under which compensation is paid must be established by a compensation committee comprised solely of two or more directors who qualify as outside directors; (iii) the material terms under which the compensation is to be paid must be disclosed to, and subsequently approved by, stockholders before payment is made; and (iv) the compensation committee must certify in writing before payment of the compensation that the performance goals and any other material terms were in fact satisfied.

Administration of our 2007 Equity Compensation Plan

Our 2007 Equity Compensation Plan will be administered by our compensation committee, as appointed by our board of directors, and such committee will determine all terms of awards under the plan. Each member of the compensation committee that administers the plan will be a "non-employee director" within the meaning of Rule 16b-3 of the Exchange Act and, at such times as we are subject to Section 162(m) of the Code, an "outside director" within the meaning of Section 162(m) of the Code. If no compensation committee is designated by our board of directors to act for these purposes, our board of directors will have the rights and responsibilities of our compensation committee under our 2007 Equity Compensation Plan. References below to the compensation committee include a reference to our board of directors or another committee appointed by our board of directors for those periods in which our board of directors or such other committee appointed by our board of directors is acting. Our compensation committee will, in its discretion, (i) authorize the granting of awards to key employees, directors and consultants, (ii) determine the eligibility of an employee, director or consultant to receive an award, (iii) determine the number of shares to be covered under any award agreement, (iv) make rules and regulations and establish procedures for the administration of the plan as it deems appropriate, (v) determine the extent, if any, to which awards shall be forfeited, (vi) interpret the plan and award agreements and (vii) take any other actions or make any other determinations or decisions that it deems necessary or appropriate in connection with the plan or the administration and interpretation thereof.

Eligibility

All of our key employees, directors and consultants and those of our related corporations designated by our compensation committee as eligible to participate in our 2007 Equity Compensation Plan are eligible to receive awards under the 2007 Equity Compensation Plan, provided that non-employee directors and consultants may not receive incentive stock options.

Share Authorization

We have reserved 4,107,831 shares of common stock for issuance under our 2007 Equity Compensation Plan. In connection with stock dividends, recapitalizations, forward or reverse stock splits, reorganizations, mergers, consolidations, spin-offs, combinations, repurchases or share exchanges, extraordinary or unusual cash distributions and other similar corporate transactions or events, our compensation committee will make appropriate adjustments that it deems equitable in the number and kind of shares subject to the plan and any outstanding awards, individual participant limits, incentive stock option limits, performance goals and the exercise or purchase price per share under any outstanding awards, as well as take any other such action as our compensation committee shall deemed necessary in its judgment to preserve the participants' rights in their respective awards substantially proportionate to the rights existing in such awards prior to such event. In addition, the number of shares available for issuance under our 2007 Equity Compensation Plan will be increased automatically on each anniversary of the effective date of the plan by (a) a number of shares that when added to the number of shares subject to outstanding awards not otherwise considered to be issued and outstanding shares plus the number of shares remaining available for future awards under our 2007 Equity Compensation Plan such new reserve equals 17% of our issued and outstanding shares on a fully diluted and converted basis or (b) such lesser number as may be determined by our board of directors, provided that in no case shall such increase result in the total number of shares available under our 2007 Equity Compensation Plan exceeding the number of our authorized shares minus the sum of (x) the number of our issued and outstanding shares, (y) the number of shares reserved by us for issuance upon exercise or conversion of other securities exercisable for or convertible into shares and (z) the number of shares subject to outstanding awards under our 2007 Equity Compensation Plan.

If any awards are forfeited or for any other reason are not payable under the plan, the shares of common stock subject to such awards will again be available for purposes of our 2007 Equity Compensation Plan.

The maximum aggregate number of shares that may be issued under our 2007 Equity Compensation Plan pursuant to incentive stock options was initially 2,069,292 shares, subject to annual increase by the lesser of the annual increase amount described above or 1,000,000 shares. No participant in our 2007 Equity Compensation Plan may receive awards for more than 300,000 shares in any calendar year.

Options

Our 2007 Equity Compensation Plan authorizes the compensation committee to grant incentive stock options (under Section 421 of the Code) and options that do not qualify as incentive stock options, or nonstatutory stock options. The exercise price of each option is determined by the compensation committee, provided that the price is equal to at least 100% of the fair market value of the shares of common stock on the date on which the option is granted. If we were to grant incentive stock options to any 10% stockholder, the exercise price may not be less than 110% of the fair market value of our shares of common stock on the date of grant.

The term of an option cannot exceed ten years from the date of grant. If we were to grant incentive stock options to any 10% stockholder, the term cannot exceed five years from the date of grant. Our compensation committee determines at what time or times each option may be exercised

and the period of time, if any, after termination of service during which options may be exercised, provided that no incentive stock option may be exercised later than three months following a termination of service other than as a result of death or disability or one year following death or disability. Options may be made exercisable in installments. The exercisability of options may be accelerated by our compensation committee.

The aggregate fair market value, determined at the time of grant, of our common stock with respect to incentive stock options that are exercisable for the first time by an optionee during any calendar year under all of our stock plans may not exceed $100,000. Options or portions thereof that exceed such limit will generally be treated as nonstatutory stock options.

The exercise price for any option is generally payable (1) in cash or a certified or banker's check, (2) if permitted by our compensation committee in its discretion, with the proceeds of a loan program by us or third-party sale program or a note acceptable to our compensation committee given as consideration under such a program, (3) if approved by our compensation committee in its discretion, by the surrender of shares of common stock with an aggregate fair market value on the date on which the option is exercised of the exercise price, (4) if approved by our compensation committee in its discretion, through the written election of the optionee to have shares withheld by us from the shares otherwise to be received, with such withheld shares having an aggregate fair market value on the date on which the option is exercised equal to the exercise price or (5) by any combination of such methods of payment or any other methods of payments acceptable to our compensation committee in its discretion.

Stock Appreciation Rights

Our 2007 Equity Compensation Plan authorizes our compensation committee to grant stock appreciation rights that provide the recipient with the right to receive, upon exercise of the stock appreciation right, cash, shares of common stock or a combination of the two. The amount that the recipient will receive upon exercise of the stock appreciation right will equal the excess of the fair market value of our common stock on the date of exercise over the base price of the stock appreciation right as determined by our compensation committee, which shall not be less than the shares' fair market value on the date of grant. Stock appreciation rights will become exercisable in accordance with terms determined by our compensation committee. Stock appreciation rights may be granted in tandem with an option grant or independently from an option grant. The term of a stock appreciation right cannot exceed ten years from the date of grant.

Restricted Stock

Our 2007 Equity Compensation Plan also provides for the grant of restricted stock. A restricted stock award is an award of shares of common stock that may be subject to restrictions on transferability and other restrictions as our compensation committee determines in its sole discretion on the date of grant. The restrictions, if any, may lapse over a specified period of time or through the satisfaction of conditions, in installments or otherwise, as our compensation committee may determine. A participant who receives restricted stock will have all of the rights of a stockholder as to those shares, including, without limitation, the right to vote and the right to receive dividends or distributions on the shares. During the period, if any, when restricted stock is non-transferable or forfeitable, a participant is prohibited from selling, transferring, pledging, anticipating, alienating, encumbering or assigning his or her restricted stock.

Performance Awards

Our 2007 Equity Compensation Plan permits the grant of performance-based stock awards that may qualify as performance-based compensation not subject to the $1,000,000 limitation on the income

tax deductibility of compensation paid to a covered executive officer imposed by Section 162(m) of the Code. Our compensation committee will determine the applicable performance period, the performance goals and such other conditions that apply to the performance-based award.

The performance goals that may be selected may be based upon: (i) the price of our common stock, (ii) our market share, (iii) our sales, (iv) earnings per share of our common stock, (v) return on our stockholder equity, (vi) our costs, (vii) our cash flow, (viii) return on our total assets, (ix) return on our invested capital, (x) return on our net assets, (xi) our operating income, (xii) our net income or (xiii) any other criteria specified by our compensation committee.

Other Equity-Based Awards

Our compensation committee may grant other types of equity-based awards under our 2007 Equity Compensation Plan. Other equity-based awards are payable in cash, shares of common stock or other equity, or a combination thereof, and may be restricted or unrestricted, as determined by our compensation committee. The terms and conditions that apply to other equity-based awards are determined by our compensation committee.

Change in Control

Upon a change in control, unless otherwise provided in the participant's award agreement, our compensation committee, in its discretion, may (i) accelerate the vesting and exercisability of all options and stock appreciation rights, (ii) cancel outstanding awards in exchange for a cash payment in an amount equal to the fair market value of restricted stock with respect to which the restricted period has expired or will expire in connection with such change in control or the excess, if any, of the fair market value of the common stock underlying the portion the option or stock appreciation right that is exercisability or become exercisable as of the date of such change in control over the exercise price or base price (or, if such exercise price or base price exceeds the fair market value, cancel such award without further obligation), (iii) terminate all such options and stock appreciation rights immediately prior to the change in control, provided that we provide participants an opportunity to exercise the options and stock appreciation rights within a specified period following the participants' receipt of written notice of such change in control or (iv) require the successor corporation to assume or substitute all outstanding awards on terms and conditions necessary to preserve the rights of participants with respect to such awards.

For purposes of this section only, a "change in control" shall mean (i) the acquisition in one or more transactions by any person other than us, its related corporations and its employee benefit plans, of beneficial ownership of 50% or more of the combined voting power of our then-outstanding voting securities, (ii) the individuals comprising our board of directors at the effective date of our 2007 Equity Compensation Plan ceasing to constitute a majority of our board of directors, provided that new members approved by a majority of the incumbent board shall be considered members of the incumbent board and reductions in size of the board shall not be considered to be a Change in Control, (iii) a merger or consolidation involving us if our stockholders immediately prior to the transaction do not own more than 65% of the voting power of our outstanding voting securities immediately following the transaction, as well as our complete liquidation or dissolution or a sale or disposition of all or substantially all of our assets, (iv) acceptance by our stockholders of shares in a share exchange if our stockholders immediately prior to the exchange do not own more than 65% of the voting power of our outstanding voting securities immediately following the exchange, or (v) in our compensation committee's discretion, a "change in control" as defined in any employment, consulting or similar agreement between us and a participant.

Amendment; Termination

Our board of directors may amend our 2007 Equity Compensation Plan or any outstanding awards at any time; provided that our board of directors may not make any amendment to our 2007 Equity Compensation Plan that would, if such amendment were not approved by the holders of a requisite percentage of our issued and outstanding voting capital stock, cause our 2007 Equity Compensation Plan to fail to comply with our stockholders agreement or any requirement of applicable law or regulation, without such approval. In addition, no amendment may, without the participant's consent, adversely affect the rights of such participation with respect to a previously granted award, except that such participant shall be deemed to consent if (i) there is an amendment to our stockholders agreement that affects our 2007 Equity Compensation Plan or the award agreement, (ii) the amendment is required to comply with applicable law or (iii) such amendment is necessary or desirable, in our compensation committee's discretion, in order to obtain desired tax or accounting treatment. Unless terminated sooner by our board of directors, our 2007 Equity Compensation Plan will terminate on December 10, 2017.

Retirement Benefits

In October 2007, we established a 401(k) Retirement Savings Plan. Employees are eligible to participate in the plan as soon as they join us if they are at least 21 years of age and work a minimum of 1,000 hours per year. We match $0.50 for every dollar of the first 6% of payroll that employees invest, up to the legal limit. Our contributions vest over four years at the rate of 25% per year. For the year ended December 31, 2012, we made approximately $159,000 in matching contributions.

Compensation of Directors

During 2012, we did not pay any cash compensation to our directors. Our board of directors has not adopted a formal non-employee director compensation policy. All of our directors are eligible to receive awards under the 2007 Equity Compensation Plan, provided that non-employee directors may not receive incentive stock options. The following table sets forth information concerning the compensation of our directors who were not also executive officers for the fiscal year ended December 31, 2012:

Name (1)(2)	Option Awards ($)	Total ($)
Michael B. Hoffman*	—(3)	—
Henry S. Bienen, Ph.D.*	—(3)	—
Chandra Shekhar Reddy Kundar(4)	—	—
Viren Mehta*	—	—
Pankaj R. Patel	—	—
K. Ravindra(5)	—	—
E. Premkumar Reddy, Ph.D.*	—(3)	—
Alan R. Williamson, Ph.D.	—(3)	—

* Denotes that director will be a member of our board of directors upon the listing of our common stock on the NASDAQ Global Market.

(1) Ajay Bansal became a member of our board of directors in March 2013. Mr. Bansal will not be a member of our board of directors upon the listing of our common stock on the NASDAQ Global Market.

(2) As of December 31, 2012, Mr. Hoffman, Dr. Bienen, Dr. Reddy and Alan Williamson, a current director who intends to resign prior to the completion of this offering, held options to purchase

220,000 shares, 28,900 shares, 103,809 shares and 73,825 shares, respectively. None of our other directors who served during 2012 hold any options to purchase our common stock.

(3) During the fiscal year ended December 31, 2012, Mr. Bienen and Dr. Williamson were granted 9,600 and 11,250 options, respectively, to purchase shares of our common stock. We recognize compensation expense in our financial statements for stock options based on their intrinsic value at each balance sheet date, not the grant date, because the awards are classified as liability awards, primarily due to their cash settlement features. The amounts below show the intrinsic value of all outstanding stock options as of December 31, 2012 held by the directors named below. These amounts correspond to the liability recorded on our consolidated balance sheet as of December 31, 2012.

	December 31, 2012 Fair Value
Michael B. Hoffman	$ 1,271,300
Henry S. Bienen	152,286
Alan R. Williamson, Ph.D.	515,760
E. Premkumar Reddy, Ph.D.	847,129

(4) Sarath Naru replaced Mr. Kundar as a member of our board of directors in April 2013. Mr. Naru will not be a member of our board of directors upon the listing of our common stock on the NASDAQ Global Market.

(5) K. Ravindra resigned as a member of our board of directors in April 2013.

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

The following is a description of transactions since January 1, 2010, to which we have been a party, in which the amount involved in the transaction exceeds $120,000, and in which any of our directors, executive officers or to our knowledge, beneficial owners of more than 5% of our capital stock or an affiliate or immediate family member thereof, had or will have a direct or indirect material interest, other than employment, compensation, termination and change in control arrangements with our named executive officers, which are described under "Executive and Director Compensation." We believe the terms obtained or consideration that we paid or received, as applicable, in connection with the transactions described below were comparable to terms available or the amounts that would be paid or received, as applicable, in arm's-length transactions with unrelated third parties.

After consummation of this offering, our audit committee will be responsible for the review, approval and ratification of related person transactions. The audit committee will review these transactions under our Code of Conduct, which will govern conflicts of interests, among other matters, and will be applicable to our employees, officers and directors.

Preferred Stock and Convertible Promissory Note Issuances

Issuance of Series H convertible preferred stock

In September 2010, November 2010, December 2010, February 2011, June 2011 and September 2011, we issued and sold an aggregate of 2,013,424 shares of our Series H convertible preferred stock at a price per share of $9.79, for aggregate consideration of approximately $19.7 million. In September 2010 and June 2011, we issued and sold an aggregate of 199,144 and 102,146 shares of our Series H convertible preferred stock, respectively, to an affiliate of Michael B. Hoffman, the Chairman of our board of directors and the beneficial owner of more than 5% of our capital stock, at a price per share of $9.79, for aggregate consideration of approximately $2.9 million. In September 2011, we issued and sold an aggregate of 510,725 shares of our Series H convertible preferred stock to an affiliate of Sarath Naru, a member of our current board of directors, at a price per share of $9.79, for aggregate consideration of approximately $5.0 million. For every share of Series H convertible preferred stock, the affiliates of Mr. Hoffman and Mr. Naru, respectively, will receive, upon conversion, one share of our common stock immediately prior to consummation of this offering.

Promissory Notes and Issuance of Series I convertible preferred stock

In April, 2012, June 2012, and July 2012, we issued and sold $26.4 million aggregate principal amount of our convertible promissory notes for an aggregate purchase price of $26.4 million. On July 25, 2012, $26.4 million aggregate principal amount of and $0.3 million of accrued interest on our convertible promissory notes were converted into 2,433,328 shares of our Series I convertible preferred stock at a price per share of $11.00.

The table below sets forth the aggregate principal amount of convertible promissory notes purchased by, and the number of shares of Series I convertible preferred stock subsequently issued to, our executive officers, directors and stockholders who held more than 5% of any class of our voting securities and their affiliates. For every share of Series I convertible preferred stock set forth in the

table below, the holder will receive, upon conversion, one share of our common stock immediately prior to consumption of this offering.

	Aggregate Purchase Price of April 2012 Convertible Promissory Notes	Aggregate Purchase Price of June 2012 Convertible Promissory Notes	Aggregate Purchase Price of July 2012 Convertible Promissory Notes	Series I Convertible Preferred Stock Issued Upon Conversion of the Promissory Notes	Shares of Common Stock Issuable Upon Conversion of Series I Convertible Preferred Stock
Directors and their affiliates					
Affiliates of Michael B. Hoffman(1)	$ 6,420,000	$ 1,297,000	$ 10,000,000	1,635,514	1,635,514
Viren Mehta(2)	—	—	250,000	22,771	22,771

(1) Mr. Hoffman is the Chairman of our board of directors and the beneficial owner of more than 5% of our capital stock.

(2) Dr. Mehta is a member of our board of directors.

Issuance of Series J convertible preferred stock

On July 27, 2012, we issued and sold an aggregate of 3,030,303 shares of our Series J convertible preferred stock to Baxter, the beneficial owner of more than 5% of our capital stock, at a price per share of $16.50, for aggregate consideration of $50.0 million. For every share of Series J convertible preferred stock, Baxter will receive, upon conversion, one share of our common stock immediately prior to consumption of this offering.

Indemnification Agreements

We intend to enter into indemnification agreements with our directors and executive officers. Under these agreements, we will agree to indemnify these persons against any and all expenses incurred by them resulting from their status as one of our directors or executive officers to the fullest extent permitted by Delaware law, our certificate of incorporation and our bylaws to be in effect upon the consummation of this offering, except in limited circumstances. In addition, these indemnification agreements will provide that, to the fullest extent permitted by Delaware law, we will pay for all expenses incurred by such persons in connection with a legal proceeding arising out of their service to us.

Agreements with Our Stockholders

We have entered into the eighth amended and restated stockholders' agreement, dated July 27, 2012, or the stockholders' agreement, with substantially all holders of our common and preferred stock that contains agreements with respect to the election of our board of directors, restrictions on transfer of shares, right of first offer, right of first refusal and co-sale and registration rights. For a description of the registration rights, see "Description of Capital Stock—Registration Rights." Certain of our current directors were elected pursuant to the terms of the stockholders' agreement or an antecedent version thereof. The provisions of the stockholders' agreement relating to the rights of first offer, rights of first refusal and co-sale rights shall terminate upon consummation of this offering.

Development and License Agreement

In September 2012, we entered into a development and license agreement with Baxter, the beneficial owner of more than 5% of our capital stock. For a description of the Baxter development and license agreement, see "Business—Collaborations—Baxter Healthcare SA."

Research Agreement

On May 3, 2010, as subsequently amended, we entered into a research agreement with Mount Sinai, with which E. Premkumar Reddy, Ph.D., a member of our board of directors and the beneficial owner of more than 5% of our capital stock, is affiliated. The research is undertaken by Mount Sinai on our behalf. Mount Sinai, in connection with us, will prepare applications for patents generated from the research. Results from all projects will belong exclusively to Mount Sinai, but we will have an exclusive option to license any inventions. The initial term of the research agreement was one year with options to extend by mutual agreement. The term of the agreement has been extended through July 2013. In 2010, 2011 and 2012 and for the three months ended March 31, 2013, we paid Mount Sinai an aggregate of $369,000, $554,000, $1.2 million and $56,000, respectively. As of March 31, 2013, $190,000 was due to Mount Sinai under the research agreement.

Loans

In December 2011, Michael B. Hoffman, the Chairman of our board of directors and the beneficial owner of more than 5% of our capital stock, advanced $620,000 to us to fund operations. Interest accrued at 10% per annum. In April 2012, we and Mr. Hoffman cancelled the loan in exchange for approximately $620,000 aggregate principal amount of our convertible promissory notes at the closing of our convertible promissory note offering described above.

Vendor Agreements

We outsource the synthesis of some of our chemical compounds to vendors in the United States and abroad. EPR Pharmaceuticals Pvt Ltd., an entity affiliated with E. Premkumar Reddy, Ph.D., a member of our board of directors and the beneficial owner of more than 5% of our capital stock, produced one of these compounds for us under purchase orders. The payments for these services for the years ended December 31, 2010, 2011 and 2012 and for the three months ended March 31, 2013 were approximately $230,000, $6,000, $157,000 and $28,000, respectively. There were no amounts due under purchase orders with EPR Pharmaceuticals Pvt Ltd. as of March 31, 2013.

We purchase chemical compounds from Zydus BSV Pharma Pvt. Limited, an entity affiliated with Pankaj R. Patel, a member of our current board of directors Mr. Patel will not continue as a director after this offering. We made purchases from Zydus during the years ended December 31, 2010, 2011 and 2012 and the three months ended March 31, 2013 in the amounts of $0, $451,000, $400,000 and $28,000, respectively. There were no amounts due under purchase orders with Zydus BSV Pharma Pvt. Limited as of March 31, 2013.

We purchase chemical compounds from Zyfine (A Division of Cadila Healthcare Limited), an entity affiliated with Pankaj R. Patel, a member of our current board of directors. Mr. Patel will not continue as a director after this offering. We made purchases from Zyfine during the years ended December 31, 2010, 2011 and 2012 and the three months ended March 31, 2013 in the amounts of $186,000, $519,000, $10,000 and $35,000, respectively. There were no amount due under purchase orders with Zyfine as of March 31, 2013.

Lease

We rent office space in Pennington, New Jersey from Zydus Healthcare, LLC, an entity affiliated with Pankaj R. Patel, a member of our current board of directors. Mr. Patel will not continue as a director after this offering. We made aggregate rent payments under the leases for the years ended December 31, 2010, 2011 and 2012 and for the three months ended March 31, 2013 of $0, $49,000, $55,000 and $33,000, respectively.

Consulting Agreements

We entered into a consulting agreement with E. Premkumar Reddy, Ph.D., a member of our board of directors and the beneficial owner of more than 5% of our capital stock, effective as of January 1, 2012 for consulting services rendered in addition to his membership on our board of directors. The consulting agreement provided for a term of one year, unless renewed by mutual agreement of the parties. The current term has been extended through December 31, 2013, unless sooner terminated in accordance with the terms of the agreement. We had previously entered in a consulting agreement with Dr. Reddy, effective as of March 1, 2010, which terminated effective as of December 31, 2011. The services provided by Dr. Reddy include guidance and opinions on Temple's intellectual property that has been licensed for commercialization through us, with certain restrictions relating to Dr. Reddy's other employment. Dr. Reddy is subject to certain confidentiality and use and intellectual property restrictions. The payments for these services for the years ended December 31, 2010, 2011 and 2012 and the three months ended March 31, 2013 were approximately $146,000, $158,000, $165,000 and $45,000, respectively. No amounts were due under the consulting agreement as of March 31, 2013.

Employment Agreement

We entered into an employment agreement with Ajay Bansal, our Chief Financial Officer as well as a member of our current board of directors, on March 20, 2013. The employment agreement provides for a term of employment of two years, with automatic renewals for one-year terms unless earlier terminated in accordance with its terms or on ten business days' written notice by either party.

The employment agreement provides for an initial base salary of $310,000 and an annual bonus of up to 30% of such base salary, based on our and Mr. Bansal's performance. The bonus may be paid in the form of cash, stock options, shares of our common stock, or a combination thereof, at our compensation committee's discretion.

Mr. Bansal is entitled to either participate in all of our employee benefit plans and programs that are made generally available from time to time to our executive officers or to receive $10,000 annually in lieu of health coverage under our medical plans, and is entitled to vacation benefits. Pursuant to his employment agreement, Mr. Bansal is eligible to be granted incentive stock options, with a vesting period of four years, in amount to be determined by our compensation committee. Mr. Bansal's employment agreement contains non-solicitation, non-competition, confidentiality and inventions assignment provisions that, among other things, prevent the executive from competing with us during the term of his employment and for a specified time thereafter.

If Mr. Bansal's employment is terminated due to his death, disability, by us for "cause" or by Mr. Bansal without "good reason" during the term provided under the employment agreement, we shall pay to Mr. Bansal or his spouse or estate the balance of his accrued and unpaid salary, unreimbursed expenses, and unused accrued vacation time through the termination date.

If Mr. Bansal's employment is terminated by us without "cause" or by Mr. Bansal with "good reason" during the term provided under the employment agreement, he will continue to receive salary during a three-month period from the date of notice but shall not be required to perform his duties

during such period. All stock options that are unvested as of the date of such termination shall fully vest and shall remain exercisable for three months from the date of termination.

If we or Mr. Bansal provides written notice of intent to terminate Mr. Bansal's employment agreements at the expiration of the term of his employment pursuant to the employment agreement, Mr. Bansal shall receive a lump sum payment equal to three months of his then-current base salary, subject to his execution of a general release of claims against us.

If any of the payments or benefits received by Mr. Bansal shall be nondeductible to us by reason of Section 280G of the Code such payments shall be reduced to the maximum amount which can be deducted by us, provided that we shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including seeking stockholder approval if our board of directors determines that such seeking of approval shall have no adverse effect on us.

For purposes of Mr. Bansal's employment agreement, "cause" means (i) any gross failure of the executive (other than by reason of disability) to faithfully and professionally carry out his duties or to comply with any other material provision of his employment agreement, which continues after our written notice thereof or is not susceptible to remedy or relates to the same types of acts or omissions for which notice has previously been given, (ii) the executive's dishonesty or other willful misconduct, (iii) the executive's conviction for any felony or any other crime involving moral turpitude, whether or not relating to his employment, (iv) in accordance with applicable law, the executive's insobriety or use of illegal drugs either in the course of performing his duties or otherwise affecting his ability to perform such duties, (v) the executive's failure to comply with a lawful written direction of us or (vi) any wanton or willful dereliction of duties by the executive.

For purposes of Mr. Bansal's employment agreement, "good reason" means (i) a reduction in base salary by more than 20% in and for any twelve-month period, (ii) breach by us of any material provision of the employment agreement that continues without steps being taken to cure such breach for ten days after written notice thereof by the executive to us, or (iii) during the term of his employment pursuant to the employment agreement, the occurrence of (1) the sale or transfer of substantially all of our assets or (2) our merger or consolidation under circumstances where we are not the surviving entity or where persons having control of us immediately prior thereto are not in control of us immediately after.

PRINCIPAL STOCKHOLDERS

The following table sets forth certain information regarding the beneficial ownership of our capital stock outstanding as of June 1, 2013 by:

- each person, or group of affiliated persons, known by us to beneficially own more than 5% of our common stock;
- each of the members of our board of directors;
- each of our named executive officers; and
- all of the members of our board of directors and executive officers as a group.

The percentage ownership information shown in the table is based upon 20,591,954 shares of common stock outstanding as of June 1, 2013 after giving effect to the conversion of all outstanding shares of preferred stock into an aggregate of 17,113,481 shares of common stock immediately prior to consummation of this offering. The number of shares and percentage of shares beneficially owned after the offering gives effect to the issuance by us of shares of common stock in this offering. The percentage ownership information after this offering assumes no exercise of the underwriters' over-allotment option.

Each individual or entity shown in the table has furnished us with information with respect to beneficial ownership. We have determined beneficial ownership in accordance with the SEC's rules. These rules generally attribute beneficial ownership of securities to persons who possess sole or shared voting power or investment power with respect to those securities. In addition, the rules include shares of common stock issuable pursuant to the exercise of stock options, warrants or other rights that are either immediately exercisable or exercisable on or before July 31, 2013, which is 60 days after June 1, 2013. These shares are deemed to be outstanding and beneficially owned by the person holding those rights for the purpose of computing the percentage ownership of that person, but they are not treated as outstanding for the purpose of computing the percentage ownership of any other person. Unless otherwise indicated, the persons or entities identified in this table have sole voting and investment power with respect to all shares shown as beneficially owned by them, subject to applicable community property laws.

Except as otherwise noted below, the address for each person or entity listed in the table is c/o Onconova Therapeutics, Inc., 375 Pheasant Run, Newtown, PA 18940.

Name and Address of Beneficial Owner	Number of shares beneficially owned	Percentage of shares beneficially owned	
		Before offering	After offering
5% or greater stockholders:			
The Jane & Michael B. Hoffman 2013 Descendants Trust 712 Fifth Avenue, 51st Fl. New York, NY 10019	4,495,321	21.8%	%
Michael B. Hoffman(1) 712 Fifth Avenue, 51st Fl. New York, NY 10019	4,765,321	22.8	
Baxter Healthcare SA c/o Baxter Healthcare Corporation One Baxter Parkway, DF2-1W Deerfield, IL 60015	3,030,303	14.7	
E. Premkumar Reddy(2)	1,773,697	8.6	
Other Directors and Named Executive Officers:			
Ramesh Kumar, Ph.D.(3)	823,400	3.9	
Thomas McKearn, M.D., Ph.D.(4)	1,741	*	
François E. Wilhelm, M.D., Ph.D.(5)	211,400	1.0	
Manoj Maniar, Ph.D.(6)	122,232	*	
Ajay Bansal(7)	58,451	*	
Henry S. Bienen, Ph.D.(8)	54,329	*	
Viren Mehta(9)	171,074	*	
Sarath Naru(10)	510,725	2.5	
Pankaj R. Patel(11)	867,925	4.2	
Alan R. Williamson, Ph.D.(12)	116,316	*	
All current executive officers and directors as a group (12 persons)(13)	9,476,611	43.3	

* Represents beneficial ownership of less than 1%.

(1) Includes (i) 4,495,321 shares of common stock held by the Michael and Jane Hoffman 2013 Descendants Trust of which Mr. Hoffman is donor and (ii) 270,000 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013. Mr. Hoffman has no voting or dispositive power with regard to any of the shares held by the Michael and Jane Hoffman 2013 Descendants Trust. A.J. Agarwal and Jane Hoffman, Mr. Hoffman's spouse, as trustees, have voting and dispositive power with regard to the shares held by the Michael and Jane Hoffman 2013 Descendants Trust.

(2) Includes 103,809 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013.

(3) Includes (i) 200,000 shares of common stock held by the Ramesh Kumar 2012 Trust and (ii) 465,168 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013. Dr. Kumar has voting and dispositive power with regard to the shares held by the Ramesh Kumar 2012 Trust.

(4) Includes 1,741 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013.

(5) Includes (i) 197,969 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013 and (ii) 13,432 shares of common stock subject to outstanding options held by Dr. Wilhelm's spouse that are exercisable within 60 days of June 1, 2013.

(6) Includes 122,232 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013.

(7) Includes 906 shares of common stock held jointly with Mr. Bansal's spouse.

(8) Includes 45,173 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013.

(9) (i) Includes 37,908 shares of common stock held jointly with Dr. Mehta's spouse, (ii) 10,741 shares of common stock held by Mehta Partners, LLC, (iii) 2,312 shares of common stock held by Mehta Partners, LLC FBO Jean Marie Kiss IRA, and (iv) 11,060 shares of common stock held by Viram Foundation. Dr. Mehta, as managing member, has voting and dispositive power with regard to the shares held by Mehta Partners, LLC. Dr. Mehta, as trustee, has voting and dispositive power with regard to the shares held by Mehta Partners, LLC FBO Jean Marie Kiss IRA. Dr. Mehta, as trustee has voting and dispositive power with regard to the shares held by Viram Foundation.

(10) Includes 510,725 shares of common stock held by Ventureast Life III LLC. Mr. Naru is the Managing Director of Ventureast Life III LLC. Mr. Naru has voting and dispositive power with regard to the shares held by Ventureast Life III LLC.

(11) Includes 867,925 shares of common stock held by Cadila Healthcare Ltd. Mr. Patel is the Managing Director of Cadila Healthcare Ltd. Mr. Patel has voting and dispositive power with regard to the shares held by Cadila Healthcare Ltd.

(12) Includes 79,498 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013.

(13) Includes 1,299,022 shares of common stock subject to outstanding options that are exercisable within 60 days of June 1, 2013. The table does not include information regarding the beneficial ownership of our capital stock by K. Ravindra, who resigned from our board of directors in April 2013.

DESCRIPTION OF CAPITAL STOCK

Upon consummation of this offering, our authorized capital stock will consist of shares, of which will be designated as common stock with a par value of $0.01 per share and of which will be designated as preferred stock with a par value of $0.01 per share. As of March 31, 2013, there would have been 20,591,954 shares of common stock outstanding, held by 250 stockholders of record, and no shares of preferred stock outstanding, in each case after giving effect to the conversion of all outstanding preferred stock immediately prior to consummation of this offering.

The following is a summary of our capital stock upon consummation of this offering. This summary does not purport to be complete and is qualified in its entirety by the provisions of our certificate of incorporation and bylaws to be in effect upon consummation of this offering, copies of which have been filed as exhibits to the registration statement of which this prospectus is a part.

Common Stock

Voting Rights

Each holder of common stock shall be entitled to one vote for each share on all matters submitted to a vote of the stockholders.

Dividends

Subject to the preferences that may be applicable to any outstanding preferred stock, holders of our common stock shall be entitled to receive ratably any dividends that may be declared by the board of directors out of funds legally available for that purpose.

Liquidation

In the event of our liquidation, dissolution or winding up, holders of our common stock shall be entitled to share ratably in all assets remaining after payment of liabilities and the liquidation preference of any outstanding preferred stock.

No Preemptive or Similar Rights

Our common stock shall not be entitled to preemptive rights and is not subject to conversion, redemption or sinking fund provisions.

Preferred Stock

Immediately prior to consummation of this offering, all outstanding shares of our preferred stock will be converted into an aggregate of 17,113,481 shares of common stock. Under our certificate of incorporation that will be in effect following consummation of this offering, our board of directors has the authority, subject to limitations prescribed by Delaware law, to issue preferred stock in one or more series, to establish from time to time the number of shares to be included in each series and to fix the designation, powers, preferences and rights of the shares of each series and any of its qualifications, limitations and restrictions. Our board of directors also can increase or decrease the number of shares of any series, but not below the number of shares of that series then outstanding.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in control of our company and may adversely affect the market price of our

common stock and the voting and other rights of the holders of common stock. We have no current plan to issue any shares of preferred stock.

Warrants

In connection with a credit facility obtained in 2007, we issued a warrant to purchase 6,128 shares of Series G convertible preferred stock in June 2009. The warrant was immediately exercisable upon issuance. The warrant expires on May 12, 2015. Upon consummation of this offering, the expiration date of the warrant will be extended to the third anniversary of the consummation of this offering. Furthermore, upon the consummation of this offering and the conversion of the Series G convertible preferred stock into shares of common stock, the warrant shall become exercisable for 6,128 shares of common stock. The exercise price per share is $9.79.

Registration Rights

We entered into the stockholders' agreement with substantially all holders of our common and preferred stock. Under the stockholders' agreement, holders of shares of our preferred stock have been granted registration rights with respect to the shares of common stock issuable upon conversion as further described below.

Demand Registration Rights

At any time after six months following consummation of this offering, the holders of 25% or more of the shares having demand registration rights may request that we register all or a portion of their shares of common stock. We will effect the registration as requested, unless, in the good faith judgment of our board of directors, such registration would be materially detrimental to us and our stockholders and should be delayed. We have the right to defer the filing of such registration statement once for up to 120 days during any 12-month period. We are not obligated to file a registration statement pursuant to this provision on more than two occasions. In addition, when we are eligible for the use of Form S-3, or any successor form, holders of a majority of the shares having demand registration rights may make unlimited requests that we register all or a portion of their common stock for sale under the Securities Act on Form S-3, or any successor form, so long as the aggregate price to the public in connection with any such offering is at least $500,000. However, we are not obligated to file a Form S-3 pursuant to this provision on more than two occasions in any 12-month period.

Piggyback/Incidental Registration Rights

In addition, if at any time we register any shares of our stock, the holders of all shares having registration rights are entitled to notice of the filing of the applicable registration statement and to include all or a portion of their common stock in the registration. Certain holders of these registration rights have waived this right to the extent it relates to this offering and we are seeking waivers from the remaining holders.

Other Provisions

In the event that any registration in which the holders of registrable shares participate pursuant to the stockholders' agreement is an underwritten public offering, the number of registrable shares to be included may, in specified circumstances, be limited due to market conditions. With the exception of this offering, from which all registrable shares may be excluded, the number of registrable shares to be excluded from registration pursuant to the above shall not be reduced below 20% of the shares to be offered.

We will pay all registration expenses, other than underwriting discounts and selling commissions, and the reasonable fees and expenses, other than underwriting discounts and selling commissions, and

the reasonable fees and expenses of a single special counsel for the selling stockholders, related to any demand or piggyback registration. The stockholders' agreement contains customary cross-indemnification provisions, pursuant to which we are obligated to indemnify the selling stockholders in the event of material misstatements or omissions in the registration statement attributable to us, and they are obligated to indemnify us for material misstatements or omissions in the registration statement attributable to them.

Delaware Anti-Takeover Law and Provisions of Our Certificate of Incorporation and Bylaws

Delaware Anti-Takeover Law

We are subject to Section 203 of the Delaware General Corporation Law. Section 203 generally prohibits a public Delaware corporation from engaging in a "business combination" with an "interested stockholder" for a period of three years after the date of the transaction in which the person became an interested stockholder, unless:

- prior to the date of the transaction, the board of directors of the corporation approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;
- upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding specified shares; or
- at or subsequent to the date of the transaction, the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least $66^{2}/_{3}\%$ of the outstanding voting stock which is not owned by the interested stockholder.

Section 203 defines a "business combination" to include:

- any merger or consolidation involving the corporation and the interested stockholder;
- any sale, lease, exchange, mortgage, pledge, transfer or other disposition of 10% or more of the assets of the corporation to or with the interested stockholder;
- subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;
- subject to exceptions, any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

In general, Section 203 defines an "interested stockholder" as any person that is:

- the owner of 15% or more of the outstanding voting stock of the corporation;
- an affiliate or associate of the corporation who was the owner of 15% or more of the outstanding voting stock of the corporation at any time within three years immediately prior to the relevant date; or
- the affiliates and associates of the above.

Under specific circumstances, Section 203 makes it more difficult for an "interested stockholder" to effect various business combinations with a corporation for a three-year period, although the

stockholders may, by adopting an amendment to the corporation's certificate of incorporation or bylaws, elect not to be governed by this section, effective 12 months after adoption.

Our certificate of incorporation and bylaws do not exclude us from the restrictions of Section 203. We anticipate that the provisions of Section 203 might encourage companies interested in acquiring us to negotiate in advance with our board of directors since the stockholder approval requirement would be avoided if a majority of the directors then in office approve either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder.

Certificate of Incorporation and Bylaws

Provisions of our certificate of incorporation and bylaws to be in effect upon the consummation of this offering may delay or discourage transactions involving an actual or potential change of control or change in our management, including transactions in which stockholders might otherwise receive a premium for their shares, or transactions that our stockholders might otherwise deem to be in their best interests. Therefore, these provisions could adversely affect the price of our common stock. Among other things, our certificate of incorporation and bylaws will:

- permit our board of directors to issue up to shares of preferred stock, with any rights, preferences and privileges as they may designate;
- provide that all vacancies on our board of directors, including as a result of newly created directorships, may, except as otherwise required by law, be filled by the affirmative vote of a majority of directors then in office, even if less than a quorum;
- require that any action to be taken by our stockholders must be effected at a duly called annual or special meeting of stockholders and not be taken by written consent;
- provide that stockholders seeking to present proposals before a meeting of stockholders or to nominate candidates for election as directors at a meeting of stockholders must provide advance notice in writing, and also specify requirements as to the form and content of a stockholder's notice;
- not provide for cumulative voting rights, thereby allowing the holders of a majority of the shares of common stock entitled to vote in any election of directors to elect all of the directors standing for election; and
- provide that special meetings of our stockholders may be called only by the board of directors or by such person or persons requested by a majority of the board of directors to call such meetings.

Listing on the NASDAQ Global Market

We have applied to list our common stock on the NASDAQ Global Market under the symbol "ONTX."

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is . The transfer agent and registrar's address is .

SHARES ELIGIBLE FOR FUTURE SALE

Immediately prior to this offering, there was no public market for our common stock. Future sales of substantial amounts of our common stock in the public market could adversely affect prevailing market prices. Furthermore, since only a limited number of shares will be available for sale shortly after this offering because of contractual and legal restrictions on resale described below, sales of substantial amounts of common stock in the public market after the restrictions lapse could adversely affect the prevailing market price for our common stock as well as our ability to raise equity capital in the future.

After consummation of this offering, shares of common stock will be outstanding, assuming no exercise of the underwriters' over-allotment option. All of the shares sold in this offering will be freely tradable unless held by an affiliate of ours. Except as set forth below, the remaining shares of common stock outstanding after this offering will be restricted as a result of securities laws or lock-up agreements. These remaining shares will generally become available for sale in the public market as follows:

- restricted shares will be eligible for immediate sale upon consummation of this offering;
- restricted shares will be eligible for sale under Rule 144 or Rule 701 upon expiration of lock-up agreements 180 days after the date of this offering; and
- additional shares will become eligible for sale at various times thereafter.

Rule 144

In general, under Rule 144 under the Securities Act as in effect on the date of this prospectus, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is not an affiliate of ours at any time during the three months preceding a sale, and who has held their shares for at least six months, as measured by SEC rule, including the holding period of any prior owner other than one of our affiliates, may sell shares without restriction, provided current public information about us is available. In addition, under Rule 144, any person who is not an affiliate of ours at any time during the three months preceding a sale, and who has held their shares for at least one year, as measured by SEC rule, including the holding period of any prior owner other than one of our affiliates, would be entitled to sell an unlimited number of shares immediately upon consummation of this offering without regard to whether current public information about us is available.

Beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is an affiliate of ours and who has beneficially owned restricted securities for at least six months, as measured by SEC rule, including the holding period of any prior owner other than one of our affiliates, is entitled to sell a number of restricted shares within any three-month period that does not exceed the greater of:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately shares immediately after this offering; and
- the average weekly trading volume of our common stock on the NASDAQ Global Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to the sale.

Sales of restricted shares under Rule 144 held by our affiliates are also subject to requirements regarding the manner of sale, notice and the availability of current public information about us. Rule 144 also requires that affiliates relying on Rule 144 to sell shares of our common stock that are not restricted shares must nonetheless comply with the same restrictions applicable to restricted shares, other than the holding period requirement.

Notwithstanding the availability of Rule 144, certain holders of our restricted shares have entered into lock-up agreements as described below and their restricted shares will become eligible for sale at the expiration of the restrictions set forth in those agreements.

Rule 701

Under Rule 701 under the Securities Act, shares of our common stock acquired upon the exercise of currently outstanding options or pursuant to other rights granted under a written compensatory stock or option plan or other written agreement in compliance with Rule 701 may be resold, by:

- persons other than affiliates, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, subject only to the manner-of-sale provisions of Rule 144; and

- our affiliates, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, subject to the manner-of-sale and volume limitations, current public information and filing requirements of Rule 144, in each case, without compliance with the six-month holding period requirement of Rule 144.

As of March 31, 2013, options to purchase a total of 3,722,188 shares of common stock were outstanding, of which 2,334,784 were vested. Of the total number of shares of our common stock issuable under these options, are subject to contractual lock-up agreements with the underwriters described below under "Underwriting" and will become eligible for sale at the expiration of those agreements.

Lock-up Agreements

In connection with this offering, we, our officers and directors and certain of our stockholders have agreed with the underwriters, subject to certain exceptions, not to dispose of or hedge any shares of our common stock or securities convertible into or exchangeable for shares of common stock during the period from the date of the lock-up agreement continuing through the date 180 days after the date of this prospectus, except with the prior written consent of Citigroup Global Markets Inc. Citigroup Global Markets Inc. has advised us that they have no current intent or arrangement to release any of the shares subject to the lock-up agreements prior to the expiration of the lock-up period. The lock-up agreements permit stockholders to transfer common stock and other securities subject to the lock-up agreements in certain circumstances.

Following the lock-up periods set forth in the agreements described above, and assuming that the representatives of the underwriters do not release any parties from these agreements and that there is no extension of the lock-up period, all of the shares of our common stock that are restricted securities or are held by our affiliates as of the date of this prospectus will be eligible for sale in the public market in compliance with Rule 144 under the Securities Act.

Registration Rights

Upon consummation of this offering, the holders of shares of our common stock will be entitled to rights with respect to the registration of their shares under the Securities Act, subject to the lock-up arrangement described above. Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act, except for shares purchased by affiliates, immediately upon the effectiveness of the registration statement of which this prospectus is a part. Any sales of securities by these stockholders could have a material adverse effect on the trading price of our common stock. See "Description of Capital Stock—Registration Rights."

Equity Incentive Plans

We intend to file one or more registration statements on Form S-8 under the Securities Act after consummation of this offering to register the shares of our common stock that are issuable pursuant to our 2007 Equity Compensation Plan. The registration statements are expected to be filed and become effective as soon as practicable after the consummation of this offering. Accordingly, shares registered under the registration statements will be available for sale in the open market following their effective dates, subject to Rule 144 volume limitations and the lock-up arrangement described above, if applicable.

MATERIAL U.S. FEDERAL INCOME TAX CONSIDERATIONS FOR NON-U.S. HOLDERS OF OUR COMMON STOCK

The following discussion is a general summary of the material U.S. federal income tax consequences applicable to Non-U.S. Holders of acquiring, owning and disposing of our common stock as of the date hereof.

For the purposes of this discussion, a "Non-U.S. Holder" of our common stock means a holder that, for U.S. federal income tax purposes, is not a U.S. Holder. A "U.S. Holder" means a holder of our common stock that is for U.S. federal income tax purposes:

- an individual who is a citizen or resident of the United States;
- a corporation (or other entity taxable as a corporation) created or organized in or under the laws of the U.S., any state thereof or the District of Columbia;
- an estate the income of which is subject to U.S. federal income taxation regardless of its source; or
- a trust, if it (1) is subject to the primary supervision of a court within the U.S. and one or more U.S. persons have the authority to control all substantial decisions of the trust or (2) has a valid election in effect under applicable U.S. Treasury regulations to be treated as a U.S. person.

This summary does not consider specific facts and circumstances that may be relevant to a particular Non-U.S. Holder's tax particular circumstances and does not consider the state, local or non-U.S. tax consequences of an investment in our common stock. It also does not consider Non-U.S. Holders subject to special tax treatment under U.S. federal income tax laws (including partnerships or other pass-through entities, banks and insurance companies, regulated investment companies, real estate investment trusts, dealers in securities, holders of our common stock held as part of a "straddle," hedge," conversion transaction" or other risk-reduction transaction, controlled foreign corporations, passive foreign investment companies, companies that accumulate earnings to avoid U.S. federal income tax, foreign tax-exempt organizations, "expatriated entities," companies subject to the "stapled stock" rules, former U.S. citizens or residents and persons who hold or receive the shares of common stock as compensation). This summary is based on provisions of the Code, applicable Treasury regulations, administrative pronouncements of the U.S. Internal Revenue Service, or IRS, and judicial decisions, all as in effect on the date hereof, and all of which are subject to change, possibly on a retroactive basis, and different interpretations.

This summary is general information only. It is not tax advice. We urge each prospective Non-U.S. Holder to consult their own tax advisor concerning the particular U.S. federal, state, local and non-U.S. income, estate and other tax consequences of the purchase, ownership and disposition of our common stock.

U.S. Trade or Business Income

For purposes of this discussion, dividend income and gain on the sale or other taxable disposition of shares of our common stock will be considered to be "U.S. trade or business income" if such dividend income or gain is (1) effectively connected with the conduct by a Non-U.S. Holder of a trade or business within the United States; and (2) in the case of a Non-U.S. Holder that is eligible for the benefits of an income tax treaty with the United States, attributable to a "permanent establishment" or "fixed base" maintained by the Non-U.S. Holder in the United States. Generally, U.S. trade or business income is not subject to U.S. federal withholding tax (provided the Non-U.S. Holder complies with applicable certification and disclosure requirements); instead, U.S. trade or business income is subject to U.S. federal income tax on a net income basis at regular U.S. federal income tax rates in the same manner as if the recipient were a U.S. person. Any U.S. trade or business income received by a

Non-U.S. Holder that is treated as a corporation also may be subject to a "branch profits tax" at a 30% rate, or such lower rate as provided under an applicable income tax treaty.

Distributions

Distributions of cash or property (other than certain stock distributions) that we pay with respect to our common stock (or certain redemptions that are treated as distributions with respect to our shares of common stock) will be taxable as dividends for U.S. federal income tax purposes to the extent paid out of our current or accumulated earnings and profits as determined for U.S. federal income tax purposes. Subject to the discussion in "—Recently-Enacted Federal Tax Legislation" below, a Non-U.S. Holder generally will be subject to withholding of U.S. federal income tax at a rate of 30% of the gross amount of our distributions or such lower rate as may be specified by an applicable income tax treaty. In order to obtain a reduced rate of U.S. federal withholding tax under an applicable income tax treaty, a Non-U.S. Holder will be required to provide a properly executed IRS Form W-8BEN (or appropriate substitute or successor form) certifying its entitlement to benefits under the treaty. A Non-U.S. Holder of our common stock that is eligible for a reduced rate of U.S. federal withholding tax under an income tax treaty may obtain a refund or credit of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. A Non-U.S. Holder is encouraged to consult its own tax advisor regarding its possible entitlement to benefits under an income tax treaty. If the amount of a distribution exceeds our current and accumulated earnings and profits, such excess first will be treated as a tax-free return of capital to the extent of the Non-U.S. Holder's adjusted tax basis in our shares, and thereafter will be treated as capital gain. To the extent a distribution exceeds our current or accumulated earnings and profits, a Non-U.S. Holder of our common stock may obtain a refund or credit of any excess amounts withheld by timely filing an appropriate from for refund with the IRS. A Non-U.S. Holder's adjusted tax basis in our shares will generally be equal to the amount the Non-U.S. Holder paid for its shares, reduced by the amount of any distributions treated as a return of capital. See, "—Sale, Exchange or Other Disposition of Common Stock" below.

The U.S. federal withholding tax does not apply to dividends that are U.S. trade or business income, as described above, of a Non-U.S. Holder who provides a properly executed IRS Form W-8ECI (or appropriate substitute or successor form), certifying that the dividends are subject to tax as income effectively connected with the Non-U.S. Holder's conduct of a trade or business within the U.S.

Sale, Exchange or Other Disposition of Our Common Stock

Subject to the discussion in "—Recently-Enacted Federal Tax Legislation" below, a Non-U.S. Holder generally will not be subject to U.S. federal income tax or withholding tax in respect of any gain recognized on a sale, exchange or other disposition of shares of our common stock unless:

- the gain is U.S. trade or business income, as described above;
- if a Non-U.S. Holder is an individual and holds shares of our common stock as a capital asset, the Non-U.S. Holder is present in the United States for 183 or more days in the taxable year of the sale or other disposition but is not treated as a resident of the United States for that year, and certain other conditions are met; or
- we are or have been during a specified testing period a "United States real property holding corporation" for U.S. federal income tax purposes.

Gain described in the first bullet above will be subject to U.S. federal income tax in the manner described under "—U.S. Trade or Business Income." Gain described in the second bullet above will be subject to a flat 30% tax (or such lower rate specified by an applicable income tax treaty), but may be offset by certain U.S. source capital losses (even though the Non-U.S. Holder is not considered a

resident of the United States), provided that the Non-U.S. Holder has timely filed U.S. federal income tax returns with respect to such losses.

In general, a corporation is a "United States real property holding corporation" if the fair market value of its "U.S. real property interests" equals or exceeds 50% of the sum of the fair market value of its worldwide (domestic and foreign) real property interests and its other assets used or held for use in a trade or business. For this purpose, real property interests generally include land, improvements and associated personal property. We believe that we have not been, and we are not and do not anticipate becoming, a "United States real property holding corporation" for U.S. federal income tax purposes. If we are or become a "United States real property holding corporation," a Non-U.S. Holder, nevertheless, will not be subject to U.S. federal income or withholding tax in respect of any gain on a sale or other disposition of our common stock so long as shares of our common stock are "regularly traded on an established securities market" as defined under applicable Treasury regulations and a Non-U.S. Holder owns, actually and constructively, 5% or less of our shares at all times during the shorter of the five-year period ending on the date of disposition and such Non-U.S. Holder's holding period for our shares. Prospective investors should be aware that no assurance can be given that our shares will be so regularly traded when a Non-U.S. Holder sells its shares of our common stock.

U.S. Federal Estate Tax

Individual Non-U.S. Holders and entities, the property of which is potentially includible in an individual's gross estate for U.S. federal income tax purposes (for example, a trust funded by an individual and with respect to which the individual has retained certain interests or powers), should note that, unless an applicable tax treaty provides otherwise, shares of our common stock will be treated as U.S. situs property subject to U.S. federal estate tax.

Information Reporting Requirements and Backup Withholding

We must annually report to the IRS and to each Non-U.S. Holder any dividend income that is subject to U.S. federal withholding tax, or that is exempt from such withholding tax pursuant to an income tax treaty with the United States. Copies of these information returns also may be made available under the provisions of a specific treaty or agreement to the tax authorities of the country in which the Non-U.S. Holder resides. Under certain circumstances, the Code imposes a backup withholding obligation on certain reportable payments. Dividends paid to a Non-U.S. Holder of our common stock generally will be exempt from backup withholding if the Non-U.S. Holder provides a properly executed IRS Form W-8BEN (or appropriate substitute or successor form) or otherwise establishes an exemption.

The payment of the proceeds from the disposition of our common stock to or though the U.S. office of any broker, U.S. or foreign, will be subject to information reporting and possible backup withholding unless the owner certifies (usually on IRS Form W-8BEN) as to its non-U.S. status under penalties of perjury or otherwise establishes an exemption, provided that the broker does not have actual knowledge or reason to know that the holder is a U.S. person or that the conditions of any other exemption are not, in fact, satisfied. The payment of the proceeds from the disposition of our common stock to or through a non-U.S. office of a non-U.S. broker will not be subject to information reporting or backup withholding unless the non-U.S. broker has certain types of relationships with the United States (which we refer to as a United States related person). In the case of the payment of the proceeds from the disposition of our common stock to or through a non-U.S. office of a broker that is either a U.S. person or a United States related person, the Treasury Regulations require information reporting (but not the backup withholding) on the payment unless the broker has documentary evidence in its files that the owner is a non-U.S. holder and the broker has no knowledge to the contrary. Non-U.S. Holders should consult their own tax advisors on the application of information

reporting and backup withholding to them in their particular circumstances (including upon their disposition of our common stock).

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules from a payment to a Non-U.S. Holder will be credited against the Non-U.S. Holder's U.S. federal income tax liability, if any, with any excess withholding refunded to the Non-US. Holder, provided that the required information is furnished on a timely basis to the IRS.

Recently Enacted Legislation Affecting Taxation of Our Common Stock Held by or Through Non-U.S. Entities

Withholding taxes may apply to certain types of payments made to "foreign financial institutions" (as specifically defined in the Code) and certain other non-United States entities. Specifically, a 30% withholding tax may be imposed on distributions and gross proceeds from the sale, exchange or other disposition of our common stock paid to a foreign financial institution or to a non-financial foreign entity unless (1) the foreign financial institution undertakes certain diligence and reporting, (2) the non-financial foreign entity either certifies it does not have any substantial United States owners or furnishes identifying information regarding each substantial United States owner, or (3) the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from these rules. If the payee is a foreign financial institution and is subject to the diligence and reporting requirements in clause (1) above, it must enter into an agreement with the IRS requiring, among other things, that it undertake to identify accounts held by certain United States persons or United States-owned foreign entities, annually report certain information about such accounts, and withhold 30% on payments to non-compliant foreign financial institutions and certain other account holders.

The withholding provisions above will generally apply to payments of dividends made on or after January 1, 2014 and to payments of gross proceeds from the sale or disposition of stock on or after January 1, 2017. Non-U.S. Holders are urged to consult their own tax advisors regarding the possible implications of this legislation on their investment in our common stock.

UNDERWRITING

Citigroup Global Markets Inc. and Leerink Swann LLC are acting as joint book-running managers of the offering and as representatives of the underwriters named below. Subject to the terms and conditions stated in the underwriting agreement dated the date of this prospectus, each underwriter named below has severally agreed to purchase, and we have agreed to sell to that underwriter, the number of shares of common stock set forth opposite the underwriter's name.

Underwriter	Number of Shares of Common Stock
Citigroup Global Markets Inc.	
Leerink Swann LLC	
Piper Jaffray & Co.	
Janney Montgomery Scott LLC	
Total	

The underwriting agreement provides that the obligations of the underwriters to purchase the shares of common stock included in this offering are subject to approval of legal matters by counsel and to other conditions. The underwriters are obligated to purchase all the shares of common stock (other than those covered by the over-allotment option described below) if they purchase any of the shares of common stock.

Shares of common stock sold by the underwriters to the public will initially be offered at the initial public offering price set forth on the cover of this prospectus. Any shares of common stock sold by the underwriters to securities dealers may be sold at a discount from the initial public offering price not to exceed $ per share. If all the shares of common stock are not sold at the initial offering price, the underwriters may change the offering price and the other selling terms. The representatives have advised us that the underwriters do not intend to make sales to discretionary accounts.

If the underwriters sell more shares of common stock than the total number set forth in the table above, we have granted to the underwriters an option, exercisable for 30 days from the date of this prospectus, to purchase up to additional shares of common stock at the public offering price less the underwriting discount. The underwriters may exercise the option solely for the purpose of covering over-allotments, if any, in connection with this offering. To the extent the option is exercised, each underwriter must purchase a number of additional shares of common stock approximately proportionate to that underwriter's initial purchase commitment. Any shares of common stock issued or sold under the option will be issued and sold on the same terms and conditions as the other shares of common stock that are the subject of this offering.

We, our officers and directors and certain of our stockholders have agreed that, subject to specified limited exceptions, for a period of 180 days from the date of this prospectus, we and they will not, without the prior written consent of Citigroup Global Markets Inc., dispose of or hedge any shares or any securities convertible into or exchangeable for our common stock. Citigroup Global Markets Inc. in its sole discretion may release any of the securities subject to these lock-up agreements at any time, which, in the case of officers and directors, shall be with notice.

Prior to this offering, there has been no public market for our common stock. Consequently, the initial public offering price for the shares of our common stock will be determined by negotiations between us and the representatives. Among the factors considered in determining the initial public offering price will be our results of operations, our current financial condition, our future prospects, our markets, the economic conditions in and future prospects for the industry in which we compete, our management, and currently prevailing general conditions in the equity securities markets, including current market valuations of publicly traded companies considered comparable to our company. We

cannot assure you, however, that the price at which the shares of our common stock will sell in the public market after this offering will not be lower than the initial public offering price or that an active trading market in our common stock will develop and continue after this offering.

We have applied to list our common stock on the NASDAQ Global Market under the symbol "ONTX."

The following table shows the underwriting discounts and commissions that we are to pay to the underwriters in connection with this offering. These amounts are shown assuming both no exercise and full exercise of the underwriters' over-allotment option.

	Paid by Onconova Therapeutics, Inc.	
	No Exercise	Full Exercise
Per share	$	$
Total	$	$

We estimate that the total expenses of this offering payable by us will be $.

In connection with this offering, the underwriters may purchase and sell shares of common stock in the open market. Purchases and sales in the open market may include short sales, purchases to cover short positions, which may include purchases pursuant to the over-allotment option, and stabilizing purchases.

- Short sales involve secondary market sales by the underwriters of a greater number of shares of common stock than they are required to purchase in this offering.
    - "Covered" short sales are sales of shares of common stock in an amount up to the number of shares represented by the underwriters' over-allotment option.
    - "Naked" short sales are sales of shares of common stock in an amount in excess of the number of shares represented by the underwriters' over-allotment option.
- Covering transactions involve purchases of shares of common stock either pursuant to the underwriters' over-allotment option or in the open market in order to cover short positions.
    - To close a naked short position, the underwriters must purchase shares of common stock in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the shares of common stock in the open market after pricing that could adversely affect investors who purchase in this offering.
    - To close a covered short position, the underwriters must purchase shares of common stock in the open market or must exercise the over-allotment option. In determining the source of shares of common stock to close the covered short position, the underwriters will consider, among other things, the price of shares of common stock available for purchase in the open market as compared to the price at which they may purchase shares of common stock through the over-allotment option.
- Stabilizing transactions involve bids to purchase shares of common stock so long as the stabilizing bids do not exceed a specified maximum.

Purchases to cover short positions and stabilizing purchases, as well as other purchases by the underwriters for their own accounts, may have the effect of preventing or retarding a decline in the market price of the shares of common stock. They may also cause the price of the shares of common stock to be higher than the price that would otherwise exist in the open market in the absence of these transactions. The underwriters may conduct these transactions on the NASDAQ Global Market, in the

over-the-counter market or otherwise. If the underwriters commence any of these transactions, they may discontinue them at any time.

Conflicts of Interest

The underwriters are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage activities. The underwriters and their respective affiliates may, from time to time, engage in transactions with and perform services for us in the ordinary course of their business for which they may receive customary fees and reimbursement of expenses. In the ordinary course of their various business activities, the underwriters and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (which may include bank loans and/or credit default swaps) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. The underwriters and their affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or financial instruments and may hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments the underwriters may be required to make because of any of those liabilities.

Notice to Prospective Investors in the European Economic Area

In relation to each member state of the European Economic Area that has implemented the Prospectus Directive (each, a relevant member state), with effect from and including the date on which the Prospectus Directive is implemented in that relevant member state (the relevant implementation date), an offer of shares described in this prospectus may not be made to the public in that relevant member state other than:

- to any legal entity which is a qualified investor as defined in the Prospectus Directive;
- to fewer than 100 or, if the relevant member state has implemented the relevant provision of the 2010 PD Amending Directive, 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), as permitted under the Prospectus Directive, subject to obtaining the prior consent of the relevant Dealer or Dealers nominated by us for any such offer; or
- in any other circumstances falling within Article 3(2) of the Prospectus Directive,

provided that no such offer of shares shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive.

For purposes of this provision, the expression an "offer of securities to the public" in any relevant member state means the communication in any form and by any means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase or subscribe for the shares, as the expression may be varied in that member state by any measure implementing the Prospectus Directive in that member state, and the expression "Prospectus Directive" means Directive 2003/71/EC (and amendments thereto, including the 2010 PD Amending Directive, to the extent implemented in the relevant member state) and includes any relevant implementing measure in the relevant member state. The expression 2010 PD Amending Directive means Directive 2010/73/EU.

We have not authorized and do not authorize the making of any offer of shares through any financial intermediary on our behalf, other than offers made by the underwriters with a view to the final placement of the shares as contemplated in this prospectus. Accordingly, no purchaser of the shares, other than the underwriters, is authorized to make any further offer of the shares on behalf of us or the underwriters.

Notice to Prospective Investors in the United Kingdom

This prospectus is only being distributed to, and is only directed at, persons in the United Kingdom that are qualified investors within the meaning of Article 2(1)(e) of the Prospectus Directive that are also (i) investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order") or (ii) high net worth entities, and other persons to whom it may lawfully be communicated, falling within Article 49(2)(a) to (d) of the Order (each such person being referred to as a "relevant person"). This prospectus and its contents are confidential and should not be distributed, published or reproduced (in whole or in part) or disclosed by recipients to any other persons in the United Kingdom. Any person in the United Kingdom that is not a relevant person should not act or rely on this document or any of its contents.

Notice to Prospective Investors in Australia

No prospectus or other disclosure document (as defined in the Corporations Act 2001 (Cth) of Australia, or Corporations Act) in relation to the common stock has been or will be lodged with the Australian Securities & Investments Commission, or ASIC. This document has not been lodged with ASIC and is only directed to certain categories of exempt persons. Accordingly, if you receive this document in Australia:

- you confirm and warrant that you are either:
  - a "sophisticated investor" under section 708(8)(a) or (b) of the Corporations Act;
  - a "sophisticated investor" under section 708(8)(c) or (d) of the Corporations Act and that you have provided an accountant's certificate to us which complies with the requirements of section 708(8)(c)(i) or (ii) of the Corporations Act and related regulations before the offer has been made;
  - a person associated with the company under section 708(12) of the Corporations Act; or
  - a "professional investor" within the meaning of section 708(11)(a) or (b) of the Corporations Act, and to the extent that you are unable to confirm or warrant that you are an exempt sophisticated investor, associated person or professional investor under the Corporations Act, any offer made to you under this document is void and incapable of acceptance; and
- you warrant and agree that you will not offer any of the common stock for resale in Australia within 12 months of that common stock being issued unless any such resale offer is exempt from the requirement to issue a disclosure document under section 708 of the Corporations Act.

Notice to Prospective Investors in France

Neither this prospectus nor any other offering material relating to the shares described in this prospectus has been submitted to the clearance procedures of the *Autorité des Marchés Financiers* or of the competent authority of another member state of the European Economic Area and notified to the *Autorité des Marchés Financiers.* The shares have not been offered or sold and will not be offered or

sold, directly or indirectly, to the public in France. Neither this prospectus nor any other offering material relating to the shares has been or will be:

- released, issued, distributed or caused to be released, issued or distributed to the public in France; or
- used in connection with any offer for subscription or sale of the shares to the public in France.

Such offers, sales and distributions will be made in France only:

- to qualified investors (*investisseurs qualifiés*) and/or to a restricted circle of investors (*cercle restreint d'investisseurs*), in each case investing for their own account, all as defined in, and in accordance with articles L.411-2, D.411-1, D.411-2, D.734-1, D.744-1, D.754-1 and D.764-1 of the French *Code monétaire et financier*;
- to investment services providers authorized to engage in portfolio management on behalf of third parties; or
- in a transaction that, in accordance with article L.411-2-II-1°-or-2°-or 3° of the French *Code monétaire et financier* and article 211-2 of the General Regulations (*Règlement Général*) of the *Autorité des Marchés Financiers*, does not constitute a public offer (*appel public à l'épargne*).

The shares may be resold directly or indirectly, only in compliance with articles L.411-1, L.411-2, L.412-1 and L.621-8 through L.621-8-3 of the French *Code monétaire et financier*.

Notice to Prospective Investors in Hong Kong

The shares may not be offered or sold in Hong Kong by means of any document other than (i) in circumstances which do not constitute an offer to the public within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong), or (ii) to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder, or (iii) in other circumstances which do not result in the document being a "prospectus" within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong) and no advertisement, invitation or document relating to the shares may be issued or may be in the possession of any person for the purpose of issue (in each case whether in Hong Kong or elsewhere), which is directed at, or the contents of which are likely to be accessed or read by, the public in Hong Kong (except if permitted to do so under the laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder.

Notice to Prospective Investors in Japan

The shares offered in this prospectus have not been and will not be registered under the Financial Instruments and Exchange Law of Japan. The shares have not been offered or sold and will not be offered or sold, directly or indirectly, in Japan or to or for the account of any resident of Japan (including any corporation or other entity organized under the laws of Japan), except (i) pursuant to an exemption from the registration requirements of the Financial Instruments and Exchange Law and (ii) in compliance with any other applicable requirements of Japanese law.

Notice to Prospective Investors in Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore, or the SFA, (ii) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275 of the SFA or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA, in each case subject to compliance with the conditions set forth in the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

- a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

- a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor,

shares, debentures and units of shares and debentures of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

- to an institutional investor (for corporations, under Section 274 of the SFA) or to a relevant person defined in Section 275(2) of the SFA, or to any person pursuant to an offer that is made on terms that such shares, debentures and units of shares and debentures of that corporation or such rights and interest in that trust are acquired at a consideration of not less than S$200,000 (or its equivalent in a foreign currency) for each transaction, whether such amount is to be paid for in cash or by exchange of securities or other assets, and further for corporations, in accordance with the conditions specified in Section 275 of the SFA;

- where no consideration is or will be given for the transfer; or

- where the transfer is by operation of law.

LEGAL MATTERS

The validity of the shares of common stock being offered by this prospectus will be passed upon for us by Dechert LLP, New York, New York. Cooley LLP, Reston, Virginia, is acting as counsel for the underwriters in connection with this offering.

EXPERTS

Our consolidated financial statements at December 31, 2012, and for the year then ended, appearing in this prospectus and registration statement have been audited by Ernst & Young LLP, independent registered public accounting firm, and at December 31, 2011, and for the year then ended, by EisnerAmper LLP, independent registered public accounting firm, as set forth in their respective reports thereon appearing elsewhere herein, and are included in reliance upon such reports given on the authority of such firms as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act of 1933, as amended, with respect to the shares of common stock being offered by this prospectus. This prospectus, which constitutes a part of the registration statement, does not contain all of the information in the registration statement and its exhibits. For further information with respect to us and the common stock offered by this prospectus, you should refer to the registration statement and the exhibits filed as part of that document. Statements contained in this prospectus as to the contents of any contract or any other document referred to are not necessarily complete, and in each instance, we refer you to the copy of the contract or other document filed as an exhibit to the registration statement. Each of these statements is qualified in all respects by this reference.

You can read our SEC filings, including the registration statement, over the Internet at the SEC's website at *http://www.sec.gov*. You may also read and copy any document we file with the SEC at its public reference facilities at 100 F Street, N.E., Room 1580 Washington, D.C. 20549. You may also obtain copies of these documents at prescribed rates by writing to the Public Reference Section of the SEC at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the public reference facilities. You may also request a copy of these filings, at no cost, by writing or telephoning us at: Onconova Therapeutics, Inc., 375 Pheasant Run, Newtown, PA 18940, (267) 759-3680.

Upon consummation of this offering, we will be subject to the information and periodic reporting requirements of the Exchange Act, and we will file periodic reports, proxy statements and other information with the SEC. These reports, proxy statements and other information will be available for inspection and copying at the public reference room and website of the SEC referred to above. We also maintain a website at *http://www.onconova.com*, at which you may access these materials free of charge as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. The information contained in, or that can be accessed through, our website is not part of this prospectus.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Audited consolidated financial statements for the years ended December 31, 2011 and 2012:

Unaudited condensed consolidated financial statements for the three months ended March 31, 2012 and 2013:

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders of Onconova Therapeutics, Inc.

We have audited the accompanying consolidated balance sheet of Onconova Therapeutics, Inc. (the Company) as of December 31, 2012, and the related consolidated statements of operations and comprehensive loss, redeemable convertible preferred stock and stockholders' deficit, and cash flows for the year ended December 31, 2012. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement. We were not engaged to perform an audit of the Company's internal control over financial reporting. Our audit included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall consolidated financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the consolidated financial position of Onconova Therapeutics, Inc. at December 31, 2012, and the consolidated results of its operations and its cash flows for the year ended December 31, 2012, in conformity with U.S. generally accepted accounting principles.

The consolidated financial statements referred to above have been prepared assuming that the Company will continue as a going concern. As more fully described in Note 1 to the consolidated financial statements, the Company has incurred losses from operations and will require additional capital to fund planned operations. In addition, certain series of the Company's Preferred Stock are currently redeemable. The Company does not have sufficient resources to fund planned operations and satisfy the redemption of Preferred Stock should the holders so elect. These conditions raise substantial doubt about the Company's ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

/s/ ERNST & YOUNG LLP

Philadelphia, PA
May 3, 2013

Report of Independent Registered Public Accounting Firm

Board of Directors and Stockholders of
Onconova Therapeutics, Inc.

We have audited the accompanying balance sheet of Onconova Therapeutics, Inc. (the "Company") as of December 31, 2011 and the related statements of operations and comprehensive loss, redeemable convertible preferred stock and stockholders' deficit, and cash flows for the year ended December 31, 2011. The financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. Our audits included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Onconova Therapeutics, Inc. as of December 31, 2011, and the results of its operations and its cash flows for the year ended December 31, 2011, in conformity with accounting principles generally accepted in the United States of America.

/s/ EISNERAMPER LLP

Edison, New Jersey
May 2, 2013

Onconova Therapeutics, Inc.

Consolidated Balance Sheets

	December 31,		Pro Forma
	2011	2012	December 31, 2012 (unaudited)
Assets			
Current assets:			
Cash and cash equivalents	$ 2,713,000	$ 81,527,000	
Grants receivable	78,000	—	
Prepaid expenses and other current assets	627,000	1,725,000	
Preferred stock subscription receivable	400,000	—	
Total current assets	3,818,000	83,252,000	
Property and equipment, net	507,000	463,000	
Restricted cash	125,000	125,000	
Other non-current assets	12,000	12,000	
Total assets	$ 4,462,000	$ 83,852,000	
Liabilities, redeemable convertible preferred stock and stockholders' (deficit) equity			
Current liabilities:			
Accounts payable	$ 5,614,000	$ 5,517,000	
Accrued expenses and other current liabilities	1,680,000	3,925,000	
Warrant liability	1,064,000	62,000	
Stock option liability	2,648,000	11,967,000	
Stockholder loan	620,000	—	
Deferred revenue	455,000	3,907,000	
Total current liabilities	12,081,000	25,378,000	
Deferred revenue, non-current	10,718,000	15,421,000	
Other	85,000	44,000	
Total liabilities	22,884,000	40,843,000	
Commitments and contingencies			
Redeemable convertible preferred stock, $0.01 par value per share, 12,817,950 and 18,548,253 shares authorized at December 31, 2011 and 2012, 11,227,169 and 16,912,199 shares issued and outstanding at December 31, 2011 and 2012, liquidation preference of $194,329,000 at December 31, 2012, and no shares issued and outstanding at December 31, 2012 (pro forma)	119,997,000	201,315,000	$ —
Stockholders' (deficit) equity:			
Common stock, $0.01 par value, 19,200,000 and 30,145,155 shares authorized at December 31, 2011 and 2012, 2,889,747 and 3,474,473 shares issued and outstanding at December 31, 2011 and 2012 and 20,587,954 shares issued and outstanding at December 31, 2012 (pro forma)	29,000	35,000	206,000
Additional paid in capital	—	10,019,000	211,163,000
Accumulated deficit	(138,448,000)	(168,360,000)	(168,360,000)
Total stockholders' (deficit) equity	(138,419,000)	(158,306,000)	43,009,000
Total liabilities, redeemable convertible preferred stock and stockholders' (deficit) equity	$ 4,462,000	$ 83,852,000	$ 83,852,000

See accompanying notes to consolidated financial statements.

Onconova Therapeutics, Inc.

Consolidated Statements of Operations and Comprehensive Loss

	Year Ended December 31,	
	2011	2012
Revenue	$ 1,487,000	$ 46,190,000
Operating expenses:		
General and administrative	6,436,000	15,707,000
Research and development	22,624,000	52,762,000
Total operating expenses	29,060,000	68,469,000
Loss from operations	(27,573,000)	(22,279,000)
Change in fair value of warrant liability	1,287,000	367,000
Interest expense	(19,000)	(8,608,000)
Other income, net	11,000	608,000
Net loss before income taxes	(26,294,000)	(29,912,000)
Income taxes	—	—
Net loss	(26,294,000)	(29,912,000)
Other comprehensive loss	—	—
Comprehensive loss	(26,294,000)	(29,912,000)
Accretion of redeemable convertible preferred stock	(4,020,000)	(3,953,000)
Net loss applicable to common stockholders	$ (30,314,000)	$ (33,865,000)
Per share information:		
Net loss per share of common stock, basic and diluted	$ (10.64)	$ (11.51)
Basic and diluted weighted average shares outstanding	2,849,159	2,941,782
Pro forma net loss per share of common stock, basic and diluted (unaudited)		$ (2.01)
Basic and diluted pro forma weighted average shares outstanding (unaudited)		16,887,329

See accompanying notes to consolidated financial statements.

Onconova Therapeutics, Inc.

Consolidated Statements of Redeemable Convertible Preferred Stock and Stockholders' Deficit

	Redeemable Convertible Preferred Stock			Stockholders' Deficit				
				Common Stock				
	Shares	Amount	Preferred Stock Subscribed	Shares	Amount	Additional Paid in Capital	Accumulated deficit	Total
Balance at January 1, 2011	10,211,835	$ 105,734,000	$ 300,000	2,756,585	$ 28,000	$ —	$ (108,745,000)	$ (108,717,000)
Issuance of preferred stock, net of issuance costs	819,329	7,917,000	(300,000)	—	—	—	—	—
Exercise of stock options	—	—	—	133,162	1,000	611,000	—	612,000
Issuance of preferred stock upon exercise of warrants	196,005	2,326,000	—	—	—	—	—	—
Accretion of preferred stock to redemption value	—	4,020,000	—	—	—	(611,000)	(3,409,000)	(4,020,000)
Net loss	—	—	—	—	—	—	(26,294,000)	(26,294,000)
Balance at December 31, 2011	11,227,169	119,997,000	—	2,889,747	29,000	—	(138,448,000)	(138,419,000)
Issuance of preferred stock, net of issuance costs	3,030,303	47,796,000	—	—	—	—	—	—
Exercise of stock options	—	—	—	584,726	6,000	4,688,000	—	4,694,000
Proceeds from stockholder in connection with settlement of stock option exercises	—	—	—	—	—	3,943,000	—	3,943,000
Settlement of stock option liabilities	—	—	—	—	—	(2,835,000)	—	(2,835,000)
Issuance of preferred stock upon exercise of warrants	221,399	2,802,000	—	—	—	—	—	—
Exchange of convertible debt and preferred stock	2,433,328	26,767,000	—	—	—	—	—	—
Beneficial conversion feature on convertible debt	—	—	—	—	—	8,176,000	—	8,176,000
Accretion of preferred stock to redemption value	—	3,953,000	—	—	—	(3,953,000)	—	(3,953,000)
Net loss	—	—	—	—	—	—	(29,912,000)	(29,912,000)
Balance at December 31, 2012	16,912,199	$ 201,315,000	$ —	3,474,473	$ 35,000	$ 10,019,000	$ (168,360,000)	$ (158,306,000)

See accompanying notes to consolidated financial statements.

Onconova Therapeutics, Inc.

Consolidated Statements of Cash Flows

	Year Ended December 31,	
	2011	2012
Operating activities:		
Net loss	$ (26,294,000)	$ (29,912,000)
Adjustment to reconcile net loss to net cash (used in) provided by operating activities:		
Depreciation and amortization	316,000	319,000
Loss on asset disposal	—	3,000
Amortization of deferred financing fees	21,000	15,000
Amortization of debt discount	—	8,176,000
Change in fair value of warrant liabilities	(1,287,000)	(367,000)
Stock compensation expense	6,000	13,844,000
Changes in assets and liabilities:		
Grants receivable	1,730,000	78,000
Prepaid expenses and other current assets	253,000	(1,098,000)
Other assets	—	(15,000)
Accounts payable	2,230,000	(97,000)
Accrued expenses	1,123,000	2,573,000
Other liabilites	58,000	(41,000)
Deferred revenue	7,673,000	8,155,000
Net cash (used in) provided by operating activities	(14,171,000)	1,633,000
Investing activities:		
Payments for purchase of property and equipment	(256,000)	(279,000)
Security deposits	15,000	—
Net cash used in investing activities	(241,000)	(279,000)
Financing activities:		
Proceeds from the exercise of stock options	154,000	165,000
Proceeds from stockholder in connection with settlement of stock option exercises	—	3,943,000
Settlement of stock options	—	(2,835,000)
Proceeds from the exercise of warrants	1,918,000	2,167,000
Proceeds from the sale of Series H preferred stock	7,218,000	400,000
Proceeds from the sale of Series J preferred stock	—	47,796,000
Repayments of long-term debt	(917,000)	—
Release of cash restricted for debt repayment	792,000	—
Proceeds from stockholder loan and convertible debt	620,000	25,824,000
Net cash provided by financing activities	9,785,000	77,460,000
Net (decrease) increase in cash and cash equivalents	(4,627,000)	78,814,000
Cash and cash equivalents at beginning of period	7,340,000	2,713,000
Cash and cash equivalents at end of period	$ 2,713,000	$ 81,527,000
Supplemental disclosures of cash flow information:		
Interest paid	$ 17,000	$ —

See accompanying notes to consolidated financial statements.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements

1. Nature of Business

The Company

Onconova Therapeutics, Inc. (the "Company") was incorporated in the State of Delaware on December 22, 1998 and commenced operations on January 1, 1999. The Company's headquarters are located in Newtown, Pennsylvania. The Company is a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule drug candidates to treat cancer. Using its proprietary chemistry platform, the Company has created an extensive library of targeted anti-cancer agents designed to work against specific cellular pathways that promote cancer. The Company believes that the drug candidates in its pipeline have the potential to be efficacious in a wide variety of cancers without causing harm to normal cells. The Company has three clinical-stage product candidates and six preclinical programs. To accelerate and broaden the development of rigosertib, the Company's most advanced product candidate, the Company entered into a collaboration and license agreement with Baxter Healthcare SA ("Baxter"), a subsidiary of Baxter International Inc., in 2012 to commercialize rigosertib in Europe. In 2011, the Company entered into a collaboration and license agreement with SymBio Pharmaceuticals Limited ("SymBio") to commercialize rigosertib in Japan and Korea. The Company has retained development and commercialization rights to rigosertib in the rest of the world, including the United States. During 2012, Onconova Europe GmbH was established as a wholly owned subsidiary of the Company for the purpose of further developing business in Europe.

During the year ended December 31, 2012, the Company began to generate significant revenue from its principal operations when it entered into the collaboration and licensing agreement with Baxter. Accordingly, it was determined that the Company emerged from the development stage.

Liquidity

The Company has incurred recurring operating losses since inception. For the year ended December 31, 2012, the Company incurred a net loss of $29,912,000 and as of December 31, 2012, the Company had generated an accumulated deficit of $168,360,000. The Company anticipates operating losses to continue for the foreseeable future due to, among other things, costs related to research funding, development of its product candidates and its preclinical programs, strategic alliances and the development of its administrative organization. The Company will require substantial additional financing to fund its operations and to continue to execute its strategy.

The Company has raised significant capital through the issuance of its redeemable convertible preferred stock, par value $0.01 per share, in ten series denominated as Series A through Series J ("Series A Preferred Stock" through "Series J Preferred Stock," respectively, and collectively the "Preferred Stock"). Upon written request of the holders of at least 66.67% of the then outstanding shares of Series A, Series B, and Series C Preferred Stock collectively, and upon written request of holders of at least a majority of the then outstanding shares of Series D, Series E, and Series F Preferred Stock collectively, as the case may be, the Company is required to redeem the requested number of outstanding shares of Series A Preferred Stock at $5.00 per share, Series B Preferred Stock at $11.50 per share, Series C Preferred Stock at $7.12 per share, and Series D, E and F Preferred Stock at $11.50 per share. Upon written request of holders of at least a majority of the then outstanding shares of Series G Preferred Stock, the Company is required to redeem the outstanding shares of Series G Preferred Stock at a price equal to $11.50 per share. At any time on or after September 21, 2013, upon written request of holders of at least a majority of the then outstanding shares of Series H Preferred Stock, the Company is required to redeem the outstanding shares of Series H Preferred

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

1. Nature of Business (Continued)

Stock at a price equal to $11.50 per share. At any time on or after July 25, 2015, upon written request of holders of at least a majority of the then outstanding shares of Series I Preferred Stock, the Company is required to redeem the outstanding shares of Series I Preferred Stock at a price equal to $11.50 per share. At any time on or after July 27, 2015, upon written request of holders of at least a majority of the then outstanding shares of Series J Preferred Stock, the Company is required to redeem the outstanding shares of Series J Preferred Stock at a price equal to $18.00 per share. At December 31, 2012, Preferred Stock with an aggregate redemption value of $103,122,000 was currently redeemable. During 2013, Preferred Stock with an aggregate redemption value of $23,154,000 will become redeemable at the option of the holder. The Company has not received any notice of redemption as of and through the date the financial statements were available for issuance.

The issued and outstanding shares of Preferred Stock contain conversion features which provide for automatic conversion into shares of common stock, par value $0.01 per share (''Common Stock''), of the Company upon the occurrence of a designated offering, which is defined as a publicly registered offering under the Securities Act of 1933, as amended, in which the gross proceeds after underwriting discount are not less than $25,000,000 at a per share price of at least $16.50 per share, or at a price of at least $11.50 per share with the consent of the holders of a majority of the outstanding Series J Preferred Stock. Due to this conversion provision, the Company expects the issued and outstanding shares of Preferred Stock to convert into shares of Common Stock upon the completion of a designated offering, at which time the redemption rights would terminate. However, there can be no assurances that the Company will complete a designated offering.

Management intends to fund future operations through additional equity offerings, licensing revenue, grants, government contracts and, if any of the Company's product candidates receive marketing approval, future sales of its products. There can be no assurance, however, that the Company will be successful in obtaining financing at the level needed to sustain operations or on terms acceptable to the Company, or that the Company will obtain approvals necessary to market its products or achieve profitability or sustainable, positive cash flow.

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern, which contemplates the realization of assets and satisfaction of liabilities in the normal course of business. The Company's ability to continue as a going concern is dependent on its ability to raise additional capital to fund its research and development and commercial programs and meet its obligations, including the potential obligation related to the redemption of the Preferred Stock, which is outside of the Company's control, on a timely basis. If the Company is unable to successfully raise sufficient additional capital, through future debt or equity financings or through strategic and collaborative ventures with third parties, the Company will not have sufficient cash flows and liquidity to fund its planned business operations. In that event, the Company might be forced to limit many, if not all, of its programs and consider other means of creating value for its stockholders, such as licensing to others the development and commercialization of products that it considers valuable and would otherwise likely develop itself. If the Company is unable to raise the necessary capital, it may be forced to curtail all of its activities and, ultimately, potentially cease operations. Even if the Company is able to raise additional capital, such financings may only be available on unattractive terms, or could result in significant dilution of stockholders' interests. The consolidated financial statements do not include any adjustments relating to recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should the Company be unable to continue in existence.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

1. Nature of Business (Continued)

The Company faces many risks associated with companies in the early stages. It also faces risks inherent in its business and its industry generally. These risks include, among others, the following:

- the Company's success is primarily dependent on the regulatory approval and commercialization of rigosertib;
- the Company is subject to regulatory approval processes that are lengthy, time consuming and unpredictable. The Company may not obtain approval for any of its product candidates from the U.S. Food and Drug Administration or foreign regulatory authorities;
- the Company has no significant source of product revenue, may never become profitable and may incur substantial and increasing net losses for the foreseeable future as it continues to develop and seek regulatory approvals for, and potentially begins to commercialize its product candidates;
- the Company may need to obtain additional funding to continue operations;
- it is difficult and costly to protect the Company's intellectual property rights;
- the Company may be unable to recruit or retain key employees, including its senior management team; and
- the Company depends on the performance of third parties, including contract research organizations and third-party manufacturers.

2. Summary of Significant Accounting Policies

Basis of Presentation

The consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States ("GAAP"). The information reported within the Company's financial statements through December 31, 2011 was based solely on the accounts of Onconova Therapeutics, Inc. In December 2012, Onconova Europe GmbH was established as a wholly owned subsidiary of the Company. The financial statements include the consolidated accounts of the Company and its wholly owned subsidiary. All significant intercompany transactions have been eliminated.

Unaudited Pro Forma Presentation

On May 1, 2013, the Company's board of directors authorized management of the Company to confidentially submit a registration statement to the Securities and Exchange Commission (the "SEC") for the Company to sell shares of Common Stock to the public. The unaudited pro forma balance sheet information as of December 31, 2012 assumes the conversion of all outstanding shares of Preferred Stock as of that date into 17,113,481 shares of Common Stock.

The unaudited pro forma net loss per share is computed using the weighted-average number of shares of Common Stock outstanding after giving pro forma effect to the conversion of all issued and outstanding shares of Preferred Stock during the year ended December 31, 2012 into shares of Common Stock as if such conversion had occurred at January 1, 2012, or the date of original issuance, if later.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

Segment Information

Operating segments are defined as components of an enterprise about which separate discrete information is available for evaluation by the chief operating decision maker, or decision-making group, in deciding how to allocate resources and in assessing performance. The Company views its operations and manages its business in one segment, which is the identification and development of oncology therapeutics.

Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues, expenses, other comprehensive income and related disclosures. On an ongoing basis, management evaluates its estimates, including estimates related to clinical trial accruals, warrant liability, option liability and allocation of consideration to multiple element collaborative arrangements. The Company bases its estimates on historical experience and other market-specific or other relevant assumptions that it believes to be reasonable under the circumstances. Actual results may differ from those estimates or assumptions.

In addition, the Company utilizes estimates and assumptions in determining the fair value of its Common Stock. The Company granted stock options at exercise prices not less than the fair value of its Common Stock as determined by the board of directors, with input from management. Management uses the assistance of a third-party valuation firm in estimating the fair value of the Common Stock. The board of directors has determined the estimated fair value of the Common Stock based on a number of objective and subjective factors, including external market conditions affecting the biotechnology industry sector and the historic prices at which the Company sold shares of Preferred Stock.

Concentrations of Credit Risk and Off-Balance Sheet Risk

Financial instruments that potentially subject the Company to concentrations of credit risk are primarily cash, cash equivalents and restricted cash. The Company maintains a portion of its cash and cash equivalent balances in the form of money market accounts with financial institutions that management believes are creditworthy. The Company has no financial instruments with off-balance sheet risk of loss.

Cash and Cash Equivalents

The Company considers all highly liquid investments with original or remaining maturity from the date of purchase of three months or less to be cash equivalents. Cash and cash equivalents include bank demand deposits, marketable securities with maturities of three months or less at purchase, and money market funds that invest primarily in certificates of deposit, commercial paper and U.S. government and U.S. government agency obligations. Cash equivalents are reported at fair value.

Fair Value of Financial Instruments

The carrying amounts reported in the accompanying consolidated financial statements for cash and cash equivalents, accounts payable and accrued liabilities approximate their respective fair values

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

because of the short-term nature of these accounts. The fair value of the warrant liability is discussed in Note 4, "Fair Value Measurements."

Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation. Property and equipment are depreciated using the straight-line method over the estimated useful lives of the assets. Leasehold improvements are amortized over the useful life of the asset or the lease term, whichever is shorter. Maintenance and repairs are expensed as incurred. The following estimated useful lives were used to depreciate the Company's assets:

	Estimated Useful Life
Lab equipment	5-6 years
Software	3 years
Computer and office equipment	5-6 years
Leasehold improvements	Shorter of the lease term or estimated useful life

Upon retirement or sale, the cost of the disposed asset and the related accumulated depreciation are removed from the accounts and any resulting gain or loss recognized.

The Company reviews long-lived assets for impairment when events or changes in circumstances indicate that the carrying value of the assets may not be recoverable. Recoverability is measured by comparison of the assets' book value to future net undiscounted cash flows that the assets are expected to generate. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the book value of the assets exceeds their fair value, which is measured based on the projected discounted future net cash flows generated from the assets. No impairment losses have been recorded through December 31, 2012.

Restricted Cash

Under the Company's office lease, the Company is required to provide the landlord a $125,000 letter of credit, which is recorded as restricted cash on the consolidated balance sheets as of each of December 31, 2011 and 2012.

Revenue Recognition

Currently, the Company's revenue is generated primarily through collaborative research and license agreements. The terms of these agreements contain multiple deliverables which may include (i) licenses, (ii) research and development activities, (iii) participation in joint steering committees and (iv) product supply. The terms of these agreements may include nonrefundable upfront license fees, payments for research and development activities, payments based upon the achievement of certain milestones, royalty payments based on product sales derived from the collaboration, and payments for supplying product. In all instances, revenue is recognized only when the price is fixed or determinable, persuasive evidence of an arrangement exists, delivery has occurred or the services have been rendered, collectability of the resulting receivable is reasonably assured, and the Company has fulfilled its performance obligations under the contract.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

Effective January 1, 2011, the Company adopted the Financial Accounting Standards Board ("FASB") Accounting Standards Update ("ASU") No. 2009-13, *Multiple-Deliverable Revenue Arrangements* ("ASU 2009-13"). This guidance, which applies to multiple element arrangements entered into or materially modified on or after January 1, 2011, amends the criteria for separating and allocating consideration in a multiple element arrangement by modifying the fair value requirements for revenue recognition and eliminating the use of the residual value method. The selling prices of deliverables under an arrangement may be derived using third-party evidence ("TPE"), or a best estimate of selling price ("BESP"), if vendor-specific objective evidence of selling price ("VSOE") is not available. The objective of BESP is to determine the price at which the Company would transact a sale if the element within the license agreement was sold on a standalone basis. Establishing BESP involves management's judgment and considers multiple factors, including market conditions and company-specific factors, including those factors contemplated in negotiating the agreements, as well as internally developed models that include assumptions related to market opportunity, discounted cash flows, estimated development costs, probability of success and the time needed to commercialize a product candidate pursuant to the license. In validating the BESP, management considers whether changes in key assumptions used to determine the BESP will have a significant effect on the allocation of the arrangement consideration between the multiple deliverables. The Company may use third-party valuation specialists to assist it in determining BESP. Deliverables under the arrangement are separate units of accounting if (i) the delivered item has value to the customer on a standalone basis and (ii) if the arrangement includes a general right of return relative to the delivered item, delivery or performance of the undelivered item is considered probable and substantially within the Company's control. The arrangement consideration that is fixed or determinable at the inception of the arrangement is allocated to the separate units of accounting based on their relative selling prices. The appropriate revenue recognition model is applied to each element and revenue is accordingly recognized as each element is delivered. Management exercises significant judgment in determining whether a deliverable is a separate unit of accounting.

In determining the separate units of accounting, the Company evaluated whether the license had standalone value to the collaborator based on consideration of the relevant facts and circumstances for each arrangement. Factors considered in this determination included the research and development capabilities of the collaborator and the availability of relevant research expertise in the marketplace. In addition, the Company considered whether or not (i) the collaborator could use the license for its intended purpose without the receipt of the remaining deliverables, (ii) the value of the license was dependent on the undelivered items and (iii) the collaborator or other vendors could provide the undelivered items.

Under a collaborative research and license agreement, a steering committee is typically responsible for overseeing the general working relationships, determining the protocols to be followed in the research and development performed and evaluating the results from the continued development of the product. The Company evaluates whether its participation in joint steering committees is a substantive obligation or whether the services are considered inconsequential or perfunctory. The factors the Company considers in determining if its participation in a joint steering committee is a substantive obligation include: (i) which party negotiated or requested the steering committee, (ii) how frequently the steering committee meets, (iii) whether or not there are any penalties or other recourse if the Company does not attend the steering committee meetings, (iv) which party has decision making authority on the steering committee and (v) whether or not the collaborator has the requisite

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

experience and expertise associated with the research and development of the licensed intellectual property.

For all periods presented, whenever the Company determined that an element is delivered over a period of time, revenue was recognized using either a proportional performance model, if a pattern of performance can be determined or a straight-line model over the period of performance, which is typically the research and development term. Progress achieved under the Company's various clinical research organization contracts are typically used as the measure of performance when applying the proportional performance method. At the end of each reporting period, the Company reassessed its cumulative measure of performance and made appropriate adjustments, if necessary. The Company recognized revenue using the proportional performance model whenever the Company could make reasonably reliable estimates of the level of effort required to complete its performance obligations under an arrangement. Revenue recognized under the proportional performance model at each reporting period was determined by multiplying the total expected payments under the contract (excluding royalties and payments contingent upon achievement of milestones) by the ratio of the level of effort incurred to date to the estimated total level of effort required to complete the performance obligations under the arrangement. Revenue was limited to the lesser of the cumulative amount of payments received or the cumulative amount of revenue earned, as determined using the proportional performance model as of each reporting period. Alternatively, if the Company could not make reasonably reliable estimates of the level of effort required to complete its performance obligations under an arrangement, then revenue under the arrangement is recognized on a straight-line basis over the period expected to be required to complete the Company's performance obligations.

Incentive milestone payments may be triggered either by the results of the Company's research efforts or by events external to it, such as regulatory approval to market a product or attaining agreed-upon sales levels. Consideration that is contingent upon achievement of a milestone was recognized in its entirety as revenue in the period in which the milestone was achieved, but only if the consideration earned from the achievement of a milestone meets all the criteria for the milestone to be considered substantive at the inception of the arrangement. For a milestone to be considered substantive, the consideration earned by achieving the milestone must (i) be commensurate with either the Company's performance to achieve the milestone or the enhancement of the value of the item delivered as a result of a specific outcome resulting from the Company's performance to achieve the milestone, (ii) relate solely to past performance and (iii) be reasonable relative to all deliverables and payment terms in the collaboration agreement.

For events for which the occurrences are contingent solely upon the passage of time or are the result of performance by a third party, the contingent payments will be recognized as revenue when payments are earned, the amounts are fixed and determinable and collectability is reasonably assured.

Royalties are recorded as earned in accordance with the contract terms when third party sales can be reliably measured and collectability is reasonably assured.

The Company recognized revenue of $45,490,000 during the year ended December 31, 2012 as a result of its license and collaboration agreement with Baxter. The Company recognized revenue of $227,000 and $503,000 during the years ended December 31, 2011 and 2012, respectively, as a result of its license and collaboration agreement with SymBio. The remaining revenue recognized during the years ended December 31, 2011 and 2012 of $1,260,000 and $197,000, respectively, pertained to research and development services provided by the Company under certain research grants. The Baxter

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

and SymBio agreements are the only agreements that are being accounted for under ASU 2009-13. See Note 15, "License and Collaboration Agreements," for a further discussion of the agreements with Baxter and SymBio.

Research and Development Expenses

Research and development costs are charged to expense as incurred. These costs include, but are not limited to, license fees related to the acquisition of in-licensed products; employee-related expenses, including salaries, benefits and travel; expenses incurred under agreements with contract research organizations and investigative sites that conduct clinical trials and preclinical studies; the cost of acquiring, developing and manufacturing clinical trial materials; facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities, insurance and other supplies; and costs associated with preclinical activities and regulatory operations.

Costs for certain development activities, such as clinical trials, are recognized based on an evaluation of the progress to completion of specific tasks using data such as patient enrollment, clinical site activations, or information provided to the Company by its vendors with respect to their actual costs incurred. Payments for these activities are based on the terms of the individual arrangements, which may differ from the pattern of costs incurred, and are reflected in the consolidated financial statements as prepaid or accrued research and development expense, as the case may be.

Comprehensive Loss

Comprehensive loss is defined as the change in equity of a business enterprise during a period from transactions and other events and circumstances from non-owner sources. Comprehensive loss was equal to net loss for all periods presented.

Income Taxes

The Company accounts for income taxes under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases using enacted tax rates in effect for the year in which the differences are expected to affect taxable income. The deferred tax asset primarily includes net operating loss and tax credit carry forwards, accrued expenses not currently deductible and the cumulative temporary differences related to certain research and patent costs, which have been charged to expense in the accompanying statements of operations but have been recorded as assets for income tax purposes. The portion of any deferred tax asset for which it is more likely than not that a tax benefit will not be realized must then be offset by recording a valuation allowance. A full valuation allowance has been established against all of the deferred tax assets (see Note 8, "Income Taxes"), as it is more likely than not that these assets will not be realized given the Company's history of operating losses. The Company recognizes the tax benefit from an uncertain tax position only if it is more likely than not to be sustained upon examination based on the technical merits of the position. The amount for which an exposure exists is measured as the largest amount of benefit determined on a cumulative probability basis that the Company believes is more likely than not to be realized upon ultimate settlement of the position.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

Preferred Stock

The Company accounts for the redemption premium and issuance costs on its Preferred Stock using the effective interest method, accreting such amounts to its Preferred Stock from the date of issuance to the earliest date of redemption.

Preferred Stock Warrants

Freestanding warrants that are related to the purchase of Preferred Stock are classified as liabilities and recorded at fair value regardless of the timing of the redemption feature or the redemption price or the likelihood of redemption. The warrants are subject to re-measurement at each balance sheet date and any change in fair value is recognized as a component of change in fair value of warrant liability in the consolidated statements of operations and comprehensive loss. Pursuant to the terms of these warrants, upon the conversion to Common Stock of the series of Preferred Stock underlying the warrant, the warrants automatically become exercisable for shares of Common Stock based upon the conversion ratio of the underlying Preferred Stock. The consummation of a designated offering (as described in Note 1) will result in the conversion of all outstanding shares of Preferred Stock into shares of Common Stock. Upon such conversion of the underlying series of Preferred Stock, the warrants will be classified as a component of equity and will no longer be subject to re-measurement. The Company will continue to adjust the liability for changes in fair value until the earlier of the exercise or expiration of the warrants or the conversion of the underlying Preferred Stock. The Preferred Stock warrants are classified as Level 3 liabilities (see Note 4 for a discussion of the fair value hierarchy).

Stock-Based Compensation Expense

The Company applies the provisions of FASB Accounting Standards Codification ("ASC") Topic 718, Compensation—Stock Compensation ("ASC 718"), which requires the measurement and recognition of compensation expense for all stock-based awards made to employees and non-employees, including employee stock options. Under certain circumstances, shares acquired upon the exercise of the Company's stock option awards have been purchased by the Company's chairman of the board, who is also a significant stockholder of the Company (See Note 11). As a result, the Company has established a pattern of providing cash settlement alternatives for option holders, and thus the Company's stock-based compensation awards have been accounted for as liability awards. The Company measures liability awards based on the award's intrinsic value on the grant date and then re-measures them at each reporting date until the date of settlement. Compensation expense is recognized on a straight-line basis over the requisite service period for each separately vesting portion of the award. Compensation expense for each period until settlement is based on the change in intrinsic value (or a portion of the change in intrinsic value, depending on the percentage of the requisite service that has been rendered at the reporting date). Changes in the intrinsic value of a liability that occur after the end of the requisite service period are considered compensation expense in the period in which the changes occur.

Clinical Trial Expense Accruals

As part of the process of preparing its financial statements, the Company is required to estimate its expenses resulting from its obligations under contracts with vendors, clinical research organizations

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

and consultants and under clinical site agreements in connection with conducting clinical trials. The financial terms of these contracts are subject to negotiations, which vary from contract to contract and may result in payment flows that do not match the periods over which materials or services are provided under such contracts. The Company's objective is to reflect the appropriate trial expenses in its financial statements by matching those expenses with the period in which services are performed and efforts are expended. The Company accounts for these expenses according to the progress of the trial as measured by patient progression and the timing of various aspects of the trial. The Company determines accrual estimates through financial models taking into account discussion with applicable personnel and outside service providers as to the progress or state of consummation of trials, or the services completed. During the course of a clinical trial, the Company adjusts its clinical expense recognition if actual results differ from its estimates. The Company makes estimates of its accrued expenses as of each balance sheet date based on the facts and circumstances known to it at that time. The Company's clinical trial accruals are dependent upon the timely and accurate reporting of contract research organizations and other third-party vendors. Although the Company does not expect its estimates to be materially different from amounts actually incurred, its understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may result in it reporting amounts that are too high or too low for any particular period. For the years ended December 31, 2011 and 2012, there were no material adjustments to the Company's prior period estimates of accrued expenses for clinical trials.

Collaboration Arrangements

A collaboration arrangement is defined as a contractual arrangement that has or may have significant financial milestones associated with success-based development, which include certain arrangements the Company has entered into regarding the research and development, manufacture and/or commercialization of products and product candidates. These collaborations generally provide for non-refundable, upfront license fees, research and development and commercial performance milestone payments, cost sharing and royalty payments. The collaboration agreements with third-parties are performed on a "best efforts" basis with no guarantee of either technological or commercial success. The Company evaluates whether an arrangement is a collaboration arrangement at its inception based on the facts and circumstances specific to the arrangement. The Company reevaluates whether an arrangement qualifies or continues to qualify as a collaboration arrangement whenever there is a change in the anticipated or actual ultimate commercial success of the endeavor. See Note 15, "License and Collaboration Agreements," for a discussion of the Company's current collaborations with Baxter and SymBio.

Basic and Diluted Net Loss Per Share of Common Stock

Basic net loss per share of common stock is computed by dividing net loss applicable to common stockholders by the weighted-average number of shares of Common Stock outstanding during the period, excluding the dilutive effects of Preferred Stock, warrants to purchase Preferred Stock and stock options. Diluted net loss per share of common stock is computed by dividing the net loss applicable to common stockholders by the sum of the weighted-average number of shares of Common Stock outstanding during the period plus the potential dilutive effects of Preferred Stock and warrants to purchase Preferred Stock, and stock options outstanding during the period calculated in accordance with the treasury stock method, but are excluded if their effect is anti-dilutive. Because the impact of

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

these items is anti-dilutive during periods of net loss, there was no difference between basic and diluted net loss per share of Common Stock for the years ended December 31, 2011 and 2012.

Recent Accounting Pronouncements

As described above, effective January 1, 2011, the Company prospectively adopted ASU 2009-13. The amendments in this guidance enable vendors to account for products or services separately rather than as a combined unit upon meeting certain criteria and to establish a hierarchy for determining the selling price of a deliverable. In addition, a vendor can determine a best estimate of selling price, in a manner that is consistent with that used to determine the price to sell the deliverable on a standalone basis, if the vendor does not have vendor-specific objective evidence or third-party evidence of selling price. This guidance also eliminates the use of the residual method and requires a vendor to allocate revenue using the relative selling price method. The Company's adoption of ASU 2009-13 did not have a significant impact on its consolidated financial position, results of operations or cash flows.

In June 2011, FASB issued ASU No. 2011-05, "Comprehensive Income (ASC Topic 220): Presentation of Comprehensive Income" ("ASU 2011-05"). This accounting update eliminates the option to present the components of other comprehensive income as part of the statement of stockholders' equity. Instead, comprehensive income must be presented in either a single continuous statement of comprehensive income, which contains two sections, net income and other comprehensive income, or in two separate but consecutive statements. ASU 2011-05 was effective for fiscal periods beginning after December 15, 2011 with early adoption permitted. The Company's retrospective adoption of ASU 2011-05 did not have a significant impact on its consolidated financial position, results of operations or cash flows.

In February 2013, FASB issued ASU No. 2013-02, "Comprehensive Income (Topic 220): Reporting of Amounts Reclassified Out of Accumulated Other Comprehensive Income" ("ASU 2013-02"). ASU 2013-02 requires companies to present either in a single note or parenthetically on the face of the financial statements, the effect of significant amounts reclassified from each component of accumulated other comprehensive income based on its source and the income statement line items affected by the reclassification. This guidance is effective for annual reporting periods beginning after December 15, 2012. The Company believes the adoption of this standard will not have a significant impact on its consolidated financial position, results of operations or cash flows.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

3. Property and Equipment

Property and equipment and related accumulated depreciation are as follows:

	December 31,	
	2011	2012
Laboratory equipment	$ 729,000	$ 764,000
Software	82,000	91,000
Computer and office equipment	359,000	323,000
Leasehold improvements	468,000	633,000
	1,638,000	1,811,000
Less accumulated depreciation	(1,131,000)	(1,348,000)
Property and equipment, net	$ 507,000	$ 463,000

Depreciation and amortization expense was $316,000 and $319,000 for the years ended December 31, 2011 and 2012, respectively.

4. Fair Value Measurements

The Company applies various valuation approaches in determining the fair value of its financial assets and liabilities within a hierarchy that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that observable inputs be used when available. Observable inputs are inputs that market participants would use in pricing the asset or liability based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the inputs that market participants would use in pricing the asset or liability and are developed based on the best information available under the circumstances. The fair value hierarchy is broken down into three levels based on the source of inputs as follows:

Level 1—Valuations based on unadjusted quoted prices in active markets for identical assets or liabilities that the Company has the ability to access.

Level 2—Valuations based on quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active and models for which all significant inputs are observable, either directly or indirectly.

Level 3—Valuations based on inputs that are unobservable and significant to the overall fair value measurement.

The availability of observable inputs can vary among the various types of financial assets and liabilities. To the extent that the valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair value requires more judgment. In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, for financial statement disclosure purposes, the level in the fair value hierarchy within which the fair value measurement is classified is based on the lowest level input that is significant to the overall fair value measurement.

The Company had no assets or liabilities classified as Level 1 or Level 2. The Series G Preferred Stock warrants (see Note 10) are classified as Level 3. The fair values of these instruments are determined using models based on market observable inputs and management judgment. There were

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

4. Fair Value Measurements (Continued)

no material re-measurements of fair value during the years ended December 31, 2011 and 2012 with respect to financial assets and liabilities, other than those assets and liabilities that are measured at fair value on a recurring basis.

The Company has classified the Series G Preferred Stock warrants as a liability and has re-measured the liability to estimated fair value at December 31, 2011 and 2012, using the Black-Scholes option pricing model using the following assumptions: contractual life according to the remaining terms of the warrants, no dividend yield, weighted average risk-free interest rate of 0.01% and 0.31% at December 31, 2011 and 2012, respectively, and weighted average volatility of 62.42% and 64.87% at December 31, 2011 and 2012, respectively

The following fair value hierarchy table presents information about the Company's financial assets and liabilities measured at fair value on a recurring basis as of December 31, 2011 and 2012.

	Fair Value Measurement As of December 31, 2011			Balance As of December 31, 2011
	Level 1	Level 2	Level 3	
Warrant liability	$ —	$ —	$ 1,064,000	$ 1,064,000
Total	$ —	$ —	$ 1,064,000	$ 1,064,000

	Fair Value Measurement As of December 31, 2012			Balance As of December 31, 2012
	Level 1	Level 2	Level 3	
Warrant liability	$ —	$ —	$ 62,000	$ 62,000
Total	$ —	$ —	$ 62,000	$ 62,000

The following table presents a reconciliation of the Company's liabilities measured at fair value on a recurring basis using significant unobservable inputs (Level 3) for the years ended December 31, 2011 and 2012:

	Warrant Liability
Balance at December 31, 2010	$ 2,758,000
Settlements of warrant liability awards	(407,000)
Change in fair value upon re-measurement	(1,287,000)
Balance at December 31, 2011	1,064,000
Settlements of warrant liability awards	(635,000)
Expiration of warrant liability awards	(975,000)
Change in fair value upon re-measurement	608,000
Balance at December 31, 2012	$ 62,000

The fair values of cash equivalents, accounts payable and accrued liabilities approximate their respective carrying values due to the short-term nature of these accounts. Based on the borrowing rates currently available to the Company for debt with similar terms and consideration of default and credit risk, the carrying value of the stockholder loan (see Note 7) approximated its fair value at

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

4. Fair Value Measurements (Continued)

December 31, 2011. There were no transfers between Level 1 and Level 2 in any of the periods reported.

5. Net Loss Per Share of Common Stock

The following table sets forth the computation of basic and diluted earnings per share for the years ended December 31, 2011 and 2012:

	Year Ended December 31,	
	2011	2012
Basic and diluted net loss per share of common stock:		
Net loss	$ (26,294,000)	$ (29,912,000)
Accretion to redemption value of preferred stock	(4,020,000)	(3,953,000)
Net loss applicable to common stockholders	$ (30,314,000)	$ (33,865,000)
Weighted average shares of common stock outstanding	2,849,159	2,941,782
Net loss per share of common stock—basic and diluted	$ (10.64)	$ (11.51)

The following potentially dilutive securities outstanding at December 31, 2011 and 2012 have been excluded from the computation of diluted weighted average shares outstanding, as they would be antidilutive:

	December 31,	
	2011	2012
Preferred Stock	11,431,700	17,113,481
Warrants	568,577	6,128
Stock options	2,702,468	3,418,228
	14,702,745	20,537,837

6. Accrued Expenses

Accrued expenses are as follows:

	December 31,	
	2011	2012
Research and development	$ 931,000	$ 3,521,000
Payroll	431,000	247,000
Other	318,000	157,000
	$ 1,680,000	$ 3,925,000

7. Debt

The Company had a Loan and Security Agreement with a bank, the outstanding principal of which was $917,000 at December 31, 2010. Interest on the loan was payable at a rate of London Inter Bank

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

7. Debt (Continued)

Offering Rate ("LIBOR") plus 2.75%. In connection with the Loan and Security Agreement, the Company issued 6,128 Series G Preferred Stock warrants (see Note 10). On August 11, 2011, the Company paid off the outstanding balance of the loan.

In December 2011, the chairman of the Company's board of directors, who is also a significant stockholder of the Company, advanced $620,000 to the Company to fund operations. Interest accrued at 10% per annum. The stockholder loan was exchanged for convertible promissory notes in April 2012 (see Note 9).

8. Income Taxes

The Company accounts for income taxes under FASB ASC 740 ("ASC 740"). Deferred income tax assets and liabilities are determined based upon differences between financial reporting and tax bases of assets and liabilities, which are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse.

As of December 31, 2012, the Company had federal net operating loss ("NOL") carry forwards of $91,261,000, state NOL carry forwards of $75,147,000 and research and development tax credit carry forwards of $13,923,000, which are available to reduce future taxable income. The federal NOL and tax credit carry forwards will begin to expire at various dates starting in 2019. The state NOL carry forwards will begin to expire at various dates starting in 2016. The NOL carry forwards are subject to review and possible adjustment by the Internal Revenue Service and state tax authorities. NOL and tax credit carry forwards may become subject to an annual limitation in the event of certain cumulative changes in the ownership interest of significant shareholders over a three-year period in excess of 50%, as defined under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, as well as similar state tax provisions. This could limit the amount of NOLs that the Company can utilize annually to offset future taxable income or tax liabilities. The amount of the annual limitation, if any, will be determined based on the value of the Company immediately prior to the ownership change. Subsequent ownership changes may further affect the limitation in future years.

The Company's reserves related to taxes are based on a determination of whether and how much of a tax benefit taken by the Company in its tax filings or positions is more likely than not to be realized. The Company recognized no material adjustment for unrecognized income tax benefits. Through December 31, 2012, the Company had no unrecognized tax benefits or related interest and penalties accrued.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

8. Income Taxes (Continued)

The principal components of the Company's deferred tax assets are as follows:

	December 31,	
	2011	2012
Deferred tax assets:		
Net operating loss carryovers	$ 36,018,000	$ 35,921,000
R&D tax credits	8,326,000	13,868,000
Non-qualified stock options	610,000	1,057,000
Deferred revenue	1,436,000	4,246,000
Charitable contributions	2,000	6,000
Accrued expenses	110,000	40,000
Fixed assets	77,000	159,000
Deferred tax assets	46,579,000	55,297,000
Less valuation allowance	(46,579,000)	(55,297,000)
Net deferred tax assets	$ —	$ —

ASC 740 requires a valuation allowance to reduce the deferred tax assets reported if, based on the weight of available evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized. After consideration of all the evidence, both positive and negative, the Company has recorded a full valuation allowance against its deferred tax assets at December 31, 2011 and 2012, respectively, because the Company's management has determined that is it more likely than not that these assets will not be fully realized.

A reconciliation of income tax expense (benefit) at the statutory federal income tax rate and income taxes as reflected in the financial statements is as follows:

	Year Ended December 31,	
	2011	2012
Federal income tax expense at statutory rate	34.0%	34.0%
Permanent items	(5.6)	(25.1)
State income tax, net of federal benefit	6.2	1.8
Tax credits	22.1	18.5
Deferred true-ups	(5.1)	—
Change in valuation allowance	(51.6)	(29.1)
Other	—	(0.1)
Effective income tax rate	0%	0%

9. Convertible Promissory Notes

In March 2012, the Company offered to its stockholders the opportunity to participate in a $30,000,000 private placement of convertible promissory notes (the "Convertible Debt Offering"). From April through July 2012, the Company had aggregate closings of the Convertible Debt Offering of $26,444,000, including $620,000 from the principal that remained outstanding on a stockholder loan at December 31, 2011.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

9. Convertible Promissory Notes (Continued)

The convertible promissory notes issued in the Convertible Debt Offering carried a 10% interest rate calculated on the basis of a 360-day year and were scheduled to mature on June 29, 2013. The convertible promissory notes provided the holder the right to convert any portion of the outstanding principal and interest in exchange for equity instruments upon the completion of an initial public offering that generated aggregate proceeds in excess of $25,000,000 (the "IPO Scenario") or upon the completion of an equity offering that generated aggregate proceeds in excess of $15,000,000 (the "Equity Scenario"). In the event of a conversion under the IPO Scenario, the holder would have received shares of Common Stock equal to the offering price that was initially offered to the public. In the event of a conversion under the Equity Scenario, the holder would have received equity instruments equivalent to those issued in the Equity Scenario at a conversion price equal to the lower of $11.00 per share or the original issuance price of the underlying equity instrument. If the Company merged with another company while the convertible promissory notes were still outstanding, immediately after which the Company's stockholders owned less than 50% of the voting stock of the surviving company, then each convertible promissory note would have been required to be redeemed for an amount equal to two times the outstanding principal amount together with any unpaid and accrued interest.

In July 2012, the Company amended and restated its certificate of incorporation and designated Series I Preferred Stock. The Company and the holders of the convertible promissory notes amended the Equity Scenario provision of the notes to permit the holders to convert the convertible promissory notes into shares of Series I Preferred Stock at a conversion price of $11.00 per share.

In connection with the amendment of the convertible promissory notes, the notes were also analyzed to determine the existence of a beneficial conversion feature. The Company concluded that an $8,176,000 contingent beneficial conversion feature existed related to the Equity Scenario as of July 2012. The fair value of the Series I Preferred Stock used to calculate the value of the beneficial conversion feature was determined by management with the assistance of a third-party valuation firm.

On July 27, 2012, the holders of the convertible promissory notes exercised their right to convert the outstanding principal and interest into Series I Preferred Stock. Upon conversion, the holders received 2,443,328 shares of Series I Preferred Stock, and the Company recorded interest expense of $8,176,000, which was equal to the amount of the unamortized contingent beneficial conversion feature.

10. Preferred Stock and Stockholders' Deficit

Capitalization

As of December 31, 2012, the Company's ninth amended and restated certificate of incorporation reflected the following authorized shares: 48,693,408 shares of capital stock, consisting of (i) 400,000 shares of Series A Preferred Stock, (ii) 1,200,000 shares of Series B Preferred Stock, (iii) 1,200,000 shares of Series C Preferred Stock, (iv) 1,625,000 shares of Series D Preferred Stock, (v) 1,650,000 shares of Series E Preferred Stock, (vi) 2,000,000 shares of Series F Preferred Stock, (vii) 2,700,000 shares of Series G Preferred Stock, (viii) 2,042,950 of Series H Preferred Stock, (ix) 2,700,000 shares of Series I Preferred Stock, (x) 3,030,303 shares of Series J Preferred Stock and (xi) 30,145,155 shares of Common Stock.

The Company issued shares of Series H Preferred Stock in three closings in 2011: On February 17, 2011, the Company raised $700,000 in gross proceeds from the issuance of 71,488 shares of Series H Preferred Stock; On June 2, 2011, the Company raised $1,326,000 in gross proceeds from the issuance

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

10. Preferred Stock and Stockholders' Deficit (Continued)

of 135,391 shares of Series H Preferred Stock; and on September 19, 2011, the Company raised $5,996,000 in gross proceeds from the issuance of 612,450 shares of Series H Preferred Stock.

In July 2012, the Company issued 2,433,328 shares of Series I Preferred Stock in exchange for the conversion of the convertible promissory notes and accrued interest in the amount of $26,444,000 and $323,000, respectively (See Note 9, "Convertible Promissory Notes"). The effective conversion price was $11.00 per share. Additionally, in July 2012, the Company issued 3,030,303 shares of Series J Preferred Stock at $16.50 per share for gross proceeds of $50,000,000. Issuance costs associated with this offering were $2,204,000.

Series A Preferred Stock was originally issued at $5.00 per share; Series B Preferred Stock was issued at $5.75 per share; Series C Preferred Stock was issued at $3.56 per share; Series D Preferred Stock was issued at $4.67 per share; Series E Preferred Stock was issued at $9.76 per share; Series F Preferred Stock was issued at $11.00 per share; Series G and Series H Preferred Stock was issued at a price of $9.79 per share; Series I Preferred Stock was issued at a price of $11.00 per share; and Series J Preferred Stock was issued at a price of $16.50 per share.

The following is the composition of share capital as of the dates indicated:

	Authorized December 31,		Issued and Outstanding December 31,	
	2011	2012	2011	2012
Shares of $0.01 par value per share:				
Common stock	19,200,000	30,145,155	2,889,747	3,474,473
Series A Preferred Stock	400,000	400,000	107,000	107,000
Series B Preferred Stock	1,200,000	1,200,000	1,107,189	1,107,189
Series C Preferred Stock	1,200,000	1,200,000	1,069,946	1,069,946
Series D Preferred Stock	1,625,000	1,625,000	1,583,568	1,583,568
Series E Preferred Stock	1,650,000	1,650,000	1,633,082	1,633,082
Series F Preferred Stock	2,000,000	2,000,000	2,000,000	2,000,000
Series G Preferred Stock	2,700,000	2,700,000	1,712,960	1,934,359
Series H Preferred Stock	2,042,950	2,042,950	2,013,424	2,013,424
Series I Preferred Stock	—	2,700,000	—	2,433,328
Series J Preferred Stock	—	3,030,303	—	3,030,303
Total Preferred Stock	12,817,950	18,548,253	11,227,169	16,912,199
Total	32,017,950	48,693,408	14,116,916	20,386,672

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

10. Preferred Stock and Stockholders' Deficit (Continued)

The following is the activity of the Preferred Stock for the years ended December 31, 2011 and 2012:

	January 1, 2011	Issuance of Preferred Stock	Exercise of warrants	Accretion of redemption premium and issuance costs on Preferred Stock	December 31, 2011
Series A					
Shares	107,000	—	—	—	107,000
Amount	$ 535,000	$ —	$ —	$ —	$ 535,000
Series B					
Shares	1,107,189	—	—	—	1,107,189
Amount	$ 12,733,000	$ —	$ —	$ —	$ 12,733,000
Series C					
Shares	1,069,946	—	—	—	1,069,946
Amount	$ 7,618,000	$ —	$ —	$ —	$ 7,618,000
Series D					
Shares	1,583,568	—	—	—	1,583,568
Amount	$ 18,211,000	$ —	$ —	$ —	$ 18,211,000
Series E					
Shares	1,633,082	—	—	—	1,633,082
Amount	$ 18,780,000	$ —	$ —	$ —	$ 18,780,000
Series F					
Shares	2,000,000	—	—	—	2,000,000
Amount	$ 23,000,000	$ —	$ —	$ —	$ 23,000,000
Series G					
Shares	1,516,955	—	196,005	—	1,712,960
Amount	$ 13,183,000	$ —	$ 2,325,000	$ 3,066,000	$ 18,574,000
Series H					
Shares	1,194,095	819,329	—	—	2,013,424
Amount	$ 11,674,000	$ 7,918,000	$ —	$ 954,000	$ 20,546,000
Series I					
Shares	—	—	—	—	—
Amount	$ —	$ —	$ —	$ —	$ —
Series J					
Shares	—	—	—	—	—
Amount	$ —	$ —	$ —	$ —	$ —
Total					
Shares	10,211,835	819,329	196,005	—	11,227,169
Amount	$ 105,734,000	$ 7,918,000	$ 2,325,000	$ 4,020,000	$ 119,997,000

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

10. Preferred Stock and Stockholders' Deficit (Continued)

	January 1, 2012	Issuance of Preferred Stock	Exercise of warrants	Accretion of redemption premium and issuance costs on Preferred Stock	December 31, 2012
Series A					
Shares	107,000	—	—	—	107,000
Amount	$ 535,000	$ —	$ —	$ —	$ 535,000
Series B					
Shares	1,107,189	—	—	—	1,107,189
Amount	$ 12,733,000	$ —	$ —	$ —	$ 12,733,000
Series C					
Shares	1,069,946	—	—	—	1,069,946
Amount	$ 7,618,000	$ —	$ —	$ —	$ 7,618,000
Series D					
Shares	1,583,568	—	—	—	1,583,568
Amount	$ 18,211,000	$ —	$ —	$ —	$ 18,211,000
Series E					
Shares	1,633,082	—	—	—	1,633,082
Amount	$ 18,780,000	$ —	$ —	$ —	$ 18,780,000
Series F					
Shares	2,000,000	—	—	—	2,000,000
Amount	$ 23,000,000	$ —	$ —	$ —	$ 23,000,000
Series G					
Shares	1,712,960	—	221,399	—	1,934,359
Amount	$ 18,574,000	$ —	$ 2,802,000	$ 1,443,000	$ 22,819,000
Series H					
Shares	2,013,424	—	—	—	2,013,424
Amount	$ 20,546,000	$ —	$ —	$ 1,459,000	$ 22,005,000
Series I					
Shares	—	2,433,328	—	—	2,433,328
Amount	$ —	$ 26,767,000	$ —	$ 166,000	$ 26,933,000
Series J					
Shares	—	3,030,303	—	—	3,030,303
Amount	$ —	$ 47,796,000	$ —	$ 885,000	$ 48,681,000
Total					
Shares	11,227,169	5,463,631	221,399	—	16,912,199
Amount	$ 119,997,000	$ 74,563,000	$ 2,802,000	$ 3,953,000	$ 201,315,000

Voting

Each holder of outstanding shares of Preferred Stock has the right to one vote for each share of Common Stock into which such Preferred Stock could then be converted. The holders of shares of Preferred Stock have full voting rights and powers equal to the voting rights and powers of shares of Common Stock and are entitled to notice of any stockholders' meeting and vote together with the

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

10. Preferred Stock and Stockholders' Deficit (Continued)

holders of Common Stock, with respect to any question upon which holders of shares of Common Stock have the right to vote, as a single class, including without limitation, actions to increase or decrease the aggregate number of authorized shares of Common Stock and/or Preferred Stock.

Dividends

The holders of each share of Series A, Series B, Series C, Series D, Series E, Series F, Series G, Series H, Series I and Series J Preferred Stock are entitled to receive dividends when, as, and if declared by the Company's board of directors in the following order of preference: (i) the Series D, Series E, Series F Series G, Series H, Series I and Series J Preferred Stock, which rank pari passu; (ii) the Series B and Series C Preferred Stock, which rank pari passu; (iii) the Series A Preferred Stock; and then (iv) Common Stock.

Liquidation

The assets of the Company legally available for distribution to stockholders will be distributed in the following order of priority: (i) the holders of the shares of Series D, Series E, Series F, Series G, Series H, Series I and Series J Preferred Stock, which rank pari passu; (ii) the holders of the shares of Series B and Series C Preferred Stock, which rank pari passu; (iii) the holders of the shares of Series A Preferred Stock; and (iv) the holders of the shares of Common Stock. Each series of Preferred Stock is entitled to receive an amount per share equal to the greater of (1) the original issuance price for such series, plus all declared but unpaid dividends thereon, or (2) the amount that the holders of such series would receive per share of Common Stock if all shares of such series of Preferred Stock were converted to Common Stock immediately prior to such liquidation. If upon a deemed liquidation event, the assets of the Company are insufficient to make payment in full to all holders of a series of Preferred Stock, then such assets shall be distributed among the holders of such series of Preferred Stock at the time outstanding ratably in proportion to the full amount to which they would otherwise be respectively entitled. The holders of Common Stock are entitled to receive, after the payment of the liquidation preference of all Preferred Stock outstanding, the remaining assets of the Company on a pro rata basis.

Conversion

Each issued and outstanding share of Preferred Stock is convertible into Common Stock at the holder's option at any time after the date of issuance or automatically upon the occurrence of certain events as defined in the Company's ninth amended and restated certificate of incorporation, at a defined conversion rate. At December 31, 2012, the number of shares of Common Stock into which one share of each series of Preferred Stock was convertible was as follows: the Series A Preferred Stock, 1.07; the Series B Preferred Stock, 1.13; the Series C Preferred Stock, 1.00; the Series D Preferred Stock, 1.00; the Series E Preferred Stock, 1.00; the Series F Preferred Stock, 1.03; the Series G Preferred Stock, 1.00; the Series H Preferred Stock, 1.00; the Series I Preferred Stock, 1.00; and the Series J Preferred Stock, 1.00.

The conversion price for each share of Preferred Stock is subject to adjustment upon the occurrence of certain events. The conversion price of each share of a series of Preferred Stock is adjusted if the Company issues additional shares, subject to specified exceptions, at a price lower than

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

10. Preferred Stock and Stockholders' Deficit (Continued)

the current conversion price for such series, which is measured and recognized if the contingency occurs.

Redemption

To the extent it is then lawfully able to do so, the Company is required at any time, upon written request of the holders of at least 66.67% of the then outstanding Series A, Series B and Series C Preferred Stock collectively, or upon written request of at least a majority of the then outstanding shares of Series D, Series E and Series F Preferred Stock collectively, in each case as determined on an as-converted to common stock basis, to redeem the requested number of outstanding shares of Series A Preferred Stock at $5.00 per share, Series B Preferred Stock at $11.50 per share, and Series C Preferred Stock at $7.12 per share, and/or Series D, E and F Preferred Stock at $11.50 per share, as the case may be.

In addition, to the extent it is lawfully able to do so, the Company is required at any time, upon written request of the holders of at least a majority of the then outstanding shares of Series G Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series G Preferred Stock at $11.50 per share.

To the extent it is lawfully able to do so, the Company is required at any time on or after September 21, 2013, upon written request of the holders of at least a majority of the then outstanding shares of Series H Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series H Preferred Stock at $11.50 per share.

To the extent it is lawfully able to do so, the Company is required at any time on or after July 25, 2015, upon written request of the holders of at least a majority of the then outstanding shares of Series I Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series I Preferred Stock at $11.50 per share.

To the extent it is lawfully able to do so, the Company is required at any time on or after July 27, 2015, upon written request of the holders of at least a majority of the then outstanding shares of Series J Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series J Preferred Stock at $18.00 per share.

If, upon any applicable redemption date, defined as sixty days after the Company receives the written request for redemption, the funds of the Company legally available for redemption of Preferred Stock are insufficient to redeem the total number of shares to be redeemed on that date, those funds that are legally available shall be used to redeem the maximum possible number of shares, ratably among the holders of such shares to be redeemed. All remaining shares not redeemed shall remain outstanding until such time as additional funds become legally available for redemption.

If more than one series of Preferred Stock is contemporaneously subject to redemption, the redemption rights of the Preferred Stock shall follow the liquidation order of priority.

As of December 31, 2012, Preferred Stock with an aggregate redemption value of $103,122,000 was currently redeemable. During 2013 and 2015, additional shares of Preferred Stock with an aggregate redemption value of $23,154,000 and $82,529,000, respectively, will become redeemable at the option of the holders of Preferred Stock.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

10. Preferred Stock and Stockholders' Deficit (Continued)

Series G Preferred Stock warrant transactions

The Company issued 6,128 Series G Preferred Stock warrants in connection with a Loan and Security Agreement (see Note 7). Additionally, the Company issued one Series G Preferred Stock warrant for every two shares of Series G Preferred Stock purchased in 2009 and 2010. The warrants were initially recorded at their fair value calculated using the Black-Scholes model, with the following weighted average assumptions: exercise price of $9.79, share price of $9.79, expected term of three years, risk-free rate of 1.52% and volatility of 85.46%. The warrants are classified as liabilities because they are exercisable for Preferred Stock, and the value of the warrants is adjusted to current fair value at each reporting period end. For the years ended December 31, 2011 and 2012, the Company recorded $1,287,000 and $367,000, respectively, in the consolidated statements of operations and comprehensive loss related to the change in the fair value of the outstanding warrants.

Series G Preferred Stock warrant transactions for the years ended December 31, 2011 and 2012 consisted of the following:

	Warrants
Warrants outstanding as of December 31, 2010	764,582
Exercised	(196,005)
Warrants outstanding as of December 31, 2011	568,577
Exercised	(221,339)
Forfeited	(341,110)
Warrants outstanding as of December 31, 2012	6,128

11. Stock-Based Compensation

In January 2008, the board of directors approved the 2007 Equity Compensation Plan (the "Plan"), which amended and restated the Company's 1999 Stock Based Compensation Plan, which provides for the granting of incentive and nonqualified stock options and restricted stock to its employees, directors and consultants at the discretion of the board of directors. Under the Plan, the Company increases the number of shares reserved for issuance under the Plan such that the number of reserved shares is equal to 17% of the fully diluted shares calculated annually on December 10th. At December 31, 2011 and 2012, 3,498,579 and 4,107,831 shares of Common Stock were reserved under the Plan, respectively. Stock options may be granted with exercise prices of not less than the estimated fair value of the Company's common stock on the date of grant and generally vest over a period of up to four years. Stock options granted under the Plan generally expire no later than ten years from the

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

11. Stock-Based Compensation (Continued)

date of grant. A summary of stock option activity for the years ended December 31, 2011 and 2012 is as follows:

	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)
Outstanding at December 31, 2010	2,430,659	$ 3.31	6.09
Granted	459,233	4.60	
Exercised	(133,162)	1.15	
Forfeited	(54,262)	4.33	
Outstanding at December 31, 2011	2,702,468	3.61	6.39
Granted	1,303,486	9.38	
Exercised	(584,726)	2.27	
Forfeited	(3,000)	1.15	
Outstanding at December 31, 2012	3,418,228	$ 6.04	7.52
Vested or expected to vest at December 31, 2012	3,418,228	$ 6.04	7.52
Exercisable at December 31, 2012	2,251,304	$ 4.63	6.47

At December 31, 2011 and 2012, the aggregate intrinsic value of the option liability recorded was $2,648,000 and $11,967,000, respectively. During 2011 and 2012, the Company granted 459,233 and 1,303,486 options, respectively, at an intrinsic value of $0 at the grant date. At certain times throughout the Company's history, the chairman of the Company's board of directors, who is also a significant stockholder of the Company (the "Significant Holder"), has afforded option holders the opportunity for liquidity in transactions in which options were exercised and the shares of Common Stock issued in connection therewith were simultaneously purchased by the Significant Holder (each, a "Purchase Transaction"). The Company issued an aggregate of 584,726 shares of Common Stock upon the exercise of options in 2012, of which 395,863 shares were then purchased by the Significant Holder in Purchase Transactions. The Company received proceeds of $3,943,000 from the Significant Holder of which $2,835,000 was paid to the option holders upon exercise and settlement of the option liabilities. Because the Company has established a pattern of providing cash settlement alternatives for option holders, the Company has accounted for its stock-based compensation awards as liability awards, the fair value of which is then re-measured at each balance sheet date. Upon the exercise of stock options in 2011 and 2012, stock option liabilities of $458,000 and $4,525,000, respectively, were reclassified to stockholders' deficit.

Stock-based compensation expense includes stock options granted to employees and non-employees and has been reported in the Company's statements of operations and comprehensive loss in either research and development expenses or general and administrative expenses depending on the function performed by the optionee. For the years ended December 31, 2011 and 2012, $3,000 and $6,645,000 was recorded in research and development expenses, respectively. For the years ended December 31, 2011 and 2012, $3,000 and $7,199,000 was recorded in general and administrative expenses, respectively. As of December 31, 2012, the Company had unrecognized stock-based compensation of $1,338,000 related to unvested stock options held by employees and non-employees which is expected to vest over

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

11. Stock-Based Compensation (Continued)

a weighted average period of 1.93 years. No net tax benefits related to the stock-based compensation costs have been recognized since the Company's inception.

A roll forward of the stock option liability balance for the years ended December 31, 2011 and 2012 is as follows:

Balance at December 31, 2010	$ 3,100,000
Change in intrinsic value upon re-measurement	6,000
Settlements of option liability awards	(458,000)
Balance at December 31, 2011	2,648,000
Change in intrinsic value upon re-measurement	13,844,000
Settlements of option liability awards	(4,525,000)
Balance at December 31, 2012	$ 11,967,000

Information with respect to stock options outstanding and exercisable at December 31, 2012 is as follows:

Exercise Price	Shares	Weighted Average Remaining Contractual Life (years)	Exercisable
$ 0.75	4,000	0.01	4,000
1.00	217,445	1.53	217,445
1.15	2,000	0.01	2,000
2.00	88,934	3.07	88,934
4.32	529,150	7.19	462,849
4.50	560,250	4.68	560,250
4.60	790,414	8.33	622,121
5.65	66,635	9.31	41,158
9.96	1,159,400	9.72	252,547
Total	3,418,228	7.52	2,251,304

12. Employee Benefit Plan

In October 2007, the Company established a 401(k) Retirement Savings Plan. Employees are eligible to participate in the plan as soon as they join the Company if they are at least 21 years of age and work a minimum of 1,000 hours per year. The Company matches $0.50 for every dollar of the first 6% of payroll that employees invest, up to the legal limit. Employer contributions vest over four years at the rate of 25% per year. For the years ended December 31, 2011 and 2012, the Company contributed $131,000, and $159,000, respectively.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

13. Commitments and Contingencies

Operating leases

In November 2010, the Company entered into a lease for 3,117 square feet of office space in Pennington, New Jersey. The lease had an original term of two years, with an option for two additional years. For the first two years of the lease, the Company was obligated to pay $4,400 per month, or $53,000 annually, beginning when possession of the facility was taken on February 1, 2011. The Company was required to provide the landlord a $125,000 letter of credit, the collateral for which is recorded as restricted cash on the consolidated balance sheets. This lease was renewed on February 1, 2012 with a 3.5% increase in the rent, to $5,000 per month. On October 2, 2012, the Company leased an additional 2,130 square feet of office space for $3,100 per month, or $38,000 annually.

In January 2007, the Company entered into a lease for 8,100 square feet of office and lab space in Newtown, Pennsylvania, and in October 2009, the Company and the landlord amended the lease to add three additional one-year options to extend the lease term. The Company exercised the first option for the period from April 1, 2012 to March 31, 2013 and the second option for the period from April 1, 2013 to March 31, 2014 for rent of $11,000 per month. In September 2012, the Company sub-leased an additional 1,356 square feet of office space for one year for $1,600 per month, or $19,000 annually.

Future minimum lease payments under these non-cancellable leases having terms in excess of one year as of December 31, 2012 are as follows:

	December 31, 2012
2013	$ 256,000
2014	103,000
2015	6,000
Total minimum lease payments	$ 365,000

Rent expense was $186,000 and $233,000 for the years ended December 31, 2011 and 2012, respectively.

Employment agreements

The Company has entered into employment agreements with certain of its executives. The agreements provide for, among other things, salary, bonus and severance payments.

14. Research Agreements

The Company has entered into various licensing and right-to-sublicense agreements with educational institutions for the exclusive use of patents and patent applications, as well as any patents that may develop from research being conducted by such educational institutions in the field of anticancer therapy, genes and proteins. Results from this research have been licensed to the Company pursuant to these agreements. Under one of these agreements with Temple University ("Temple"), the Company is required to make annual maintenance payments to Temple and royalty payments based upon a percentage of sales generated from any products covered by the licensed patents, with minimum specified royalty payments. As no sales had been generated through December 31, 2012 under the licensed patents, the Company did not incur any royalty expenses for the years ended December 31, 2011 and 2012. In addition, the Company is required to pay Temple 25% of any sublicensing fees received by the Company. In September 2011, the Company made a payment to Temple in the amount

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

14. Research Agreements (Continued)

of $1,875,000 in connection with the collaboration agreement the Company executed in July 2011 with SymBio. Such payment was recorded in the consolidated statement of operations as research and development expenses. In 2012, the Company became obligated to pay Temple $12,500,000 in connection with the collaboration agreement the Company executed in 2012 with Baxter. Such expense was recorded in the consolidated statement of operations as research and development expenses. As of December 31, 2012, $1,405,000 of this amount was not yet paid and was included in accrued expenses and other current liabilities in the consolidated balance sheets.

In May 2010, the Company signed a funding agreement with the Leukemia and Lymphoma Society ("LLS") to fund the development of rigosertib. Under this agreement, the Company was entitled to receive milestone payments of up to $10,000,000 through 2013 in connection with clinical trials to be conducted. The aggregate milestone payment amount was subsequently reduced to $8,000,000 pursuant to an amendment signed in January 2013, after which LLS was not obligated to fund any further amounts. In the event that the research is successful, the Company must proceed with commercialization of the licensed product or repay the amount funded. In addition, LLS is entitled to receive regulatory and commercial milestone payments and royalties from the Company based on the Company's net sales of the licensed product, with the amount of such royalties not to exceed three times the amount funded ($24,000,000). During the year ended December 31, 2012, in connection with the execution of the Baxter agreement (Note 15), the Company paid $1,000,000 to LLS and has recorded this amount in research and development expenses. This payment reduced the maximum milestone and royalty payment obligation under this agreement to $23,000,000 at December 31, 2012. During the years ended December 31, 2011 and 2012, the Company received milestone payments of $1,900,000 and $4,100,000, respectively. As a result of the potential obligation to repay the funds under this arrangement, the milestone payments received through December 31, 2012 amounting to $8,000,000 have been recorded as deferred revenue and will be recognized as revenue commencing with the resolution of the repayment contingency.

15. License and Collaboration Agreements

Baxter Agreement

In September 2012, the Company entered into a development and license agreement with Baxter granting Baxter an exclusive, royalty-bearing license for the research, development, commercialization and manufacture (in specified instances) of rigosertib in all therapeutic indications in Europe (the "Baxter Territory"). Baxter is a shareholder in the Company and invested in Series J Preferred Stock issued in July 2012.

Under the terms of the agreement, the Company is initially required to perform research and development to advance three initial rigosertib indications, rigosertib intravenous ("IV") in higher risk myelodysplastic syndrome ("MDS") patients, rigosertib IV in pancreatic cancer patients and rigosertib oral in lower risk MDS patients, through phase 3, phase 3 and phase 2 clinical trials, respectively.

If an additional phase 3 clinical trial beyond the current phase 3 clinical trial in process for rigosertib IV in higher risk MDS patients is required to obtain marketing approval in the Baxter Territory, the Company could require Baxter to fund a percentage of the costs of such additional trial up to a specified maximum. At the completion of the current phase 3 trial for rigosertib IV in pancreatic cancer and the current phase 2 trial for rigosertib oral in lower risk MDS patients and the review of the resulting data and findings, the Company and Baxter will decide whether or not to pursue

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

15. License and Collaboration Agreements (Continued)

further development of rigosertib for these indications. If the Company and Baxter mutually agree to progress the development of rigosertib IV in pancreatic cancer patients and rigosertib oral in lower risk MDS patients, then certain milestone payments will be payable to the Company, and the Company will be required to use its commercially reasonable efforts to progress the development of rigosertib for these indications to a drug approval application in the Baxter Territory. The Company and Baxter will work together for potential future rigosertib indications, beyond the initial indications noted above. Generally, if Baxter chooses to participate in the development of additional indications, Baxter will be responsible for a percentage of all research and development costs and expenses and the Company could earn additional milestone payments. Baxter has full responsibility for all commercialization activities for the product in the Baxter Territory, at Baxter's sole cost and expense.

The Company and Baxter have agreed to negotiate a supply agreement under terms satisfactory to both parties whereby the Company will supply Baxter with Baxter's required levels of product to support commercialization efforts in the Baxter Territory. Baxter also has the right to engage third parties for the manufacture and supply of its requirements for the licensed product.

Under the terms of the agreement, Baxter made an upfront payment of $50,000,000. The Company is eligible to receive pre-commercial milestone payments of up to an aggregate of $512,500,000 if specified development and regulatory milestones are achieved. The potential pre-commercial development milestone payments to us include the following:

- $50,000,000 for successful completion of a Phase 3 clinical trial for rigosertib IV in higher risk MDS patients (the "MDS IV indication");
- $25,000,000 for each of the two joint decisions to proceed with the development of rigosertib for certain indications specified in the arrangement with Baxter; and
- $25,000,000 for each drug approval application filed for indications specified in the arrangement with Baxter.

The Company may also receive up to $337,500,000 in milestone payments for regulatory approvals of the three rigosertib indications specified in the arrangement with Baxter, each of which may be up to and in excess of $100,000,000. The Company is also potentially eligible to receive an additional $20,000,000 pre-commercial milestone payment related to the timing of regulatory approval of the MDS IV indication in Europe. In addition to these pre-commercial milestones, the Company is eligible to receive up to an aggregate of $250,000,000 in milestone payments based on Baxter's achievement of pre-specified threshold levels of annual net sales of rigosertib. The Company will also be entitled to receive royalties at percentage rates ranging from the low-teens to the low-twenties on net sales of rigosertib by Baxter in the Baxter Territory.

The agreement with Baxter will remain in effect until the expiration of all applicable royalty terms and satisfaction of all payment obligations in each licensed country, unless terminated earlier due to the uncured material breach or bankruptcy of a party, force majeure, or in the event of a specified commercial failure. The Company may terminate the agreement in the event that Baxter brings a challenge against it in relation to the licensed patents. Baxter may terminate the agreement without cause commencing after a specified period of time from the execution of the agreement.

The Company determined that the deliverables under the Baxter agreement include the exclusive, royalty-bearing, sublicensable license to rigosertib and the research and development services to be performed by the Company. The Company concluded that the license had standalone value to Baxter

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

15. License and Collaboration Agreements (Continued)

and was separable from the research and development services because the license is sublicensable, there are no restrictions as to Baxter's use of the license and Baxter has significant research capabilities in this field. The Company was not able to establish VSOE or TPE for either the license or the research and development services and instead allocated the arrangement consideration between the license and research and development services based on their relative selling prices using BESP. Management developed the BESP of the license using a discounted cash flow model, taking into consideration assumptions including the development and commercialization timeline, discount rate and probability of success. Management utilized a third party valuation specialist to assist with the determination of BESP of the license. Management estimated the selling price of the research and development services using third party costs and a discounted cash flow model. The estimated selling prices utilized assumptions including internal estimates of research and development personnel needed to perform the research and development services; and estimates of expected cash outflows to third parties for services and supplies over the expected period that the services will be performed.

The key assumptions in these models included the following market conditions and entity-specific factors: (a) the specific rights provided under the license, (b) the stage of development of rigosertib and estimated remaining development and commercialization timelines, (c) the probability of successfully developing and commercializing rigosertib, (d) the market size including the associated sales figures which generate royalty revenue, (e) cost of goods sold, which was assumed to be a specified percentage of revenues based on estimated cost of goods sold of a typical oncology product, (f) sales and marketing costs, which were based on the costs required to field an oncology sales force and marketing group, including external costs required to promote an oncology product, (g) the expected product life of rigosertib assuming commercialization and (h) the competitive environment. The Company utilized a discount rate of 16%, representing the cost of capital derived from returns on equity for comparable companies.

Based on management's analyses, it was determined that the BESP of the license was $120,000,000 and the BESP of the research and development services was $20,600,000. As noted above, the Company received an up-front payment of $50,000,000 under the Baxter agreement, which represents the allocable agreement consideration. Based on the respective BESPs, this payment was allocated $42,400,000 to the license and $7,600,000 to the research and development services. Since the delivery of the license occurred upon the execution of the Baxter agreement and there was no general right of return, $42,400,000 of the $50,000,000 upfront payment was recognized upon the execution of the Baxter agreement. The portion allocated to research and development services is being recognized over the period of performance on a proportional performance basis through March 31, 2014. Management estimated the period of performance to be the period necessary for completion of the non-contingent obligations to perform research and development services required to advance the three formulations of rigosertib described above. For the year ended December 31, 2012, the Company recognized $3,100,000 of research and development revenue under the Baxter agreement.

The Company and Baxter have agreed to establish a joint committee to facilitate the governance and oversight of the parties' activities under the agreements. Management considered whether participation on the joint committee may be a deliverable and determined that it was not a deliverable. Had management considered participation on the joint committee as a deliverable, it would not have had a material impact on the accounting for the arrangement based on the analysis of the estimated selling price of such participation.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

15. License and Collaboration Agreements (Continued)

As noted above, in July 2012, Baxter purchased Series J Preferred Stock. Because the Series J Preferred Stock was acquired within several months of the Baxter development and license agreement, management considered whether the Preferred Stock was issued at fair value and if not, whether the consideration received for the Preferred Stock ($50,000,000) or for the collaboration and license agreement ($50,000,000) should be allocated in the financial statements in a manner differently than the prices stated in the agreements. Management, with the assistance of an outside valuation specialist, determined that the price paid by Baxter for the Series J Preferred Stock approximated its fair value, and therefore the consideration received under the agreements was allocated in accordance with terms of the individual agreements.

SymBio Agreement

In July 2011, the Company entered into a license agreement with SymBio, as subsequently amended, granting SymBio an exclusive, royalty-bearing license for the development and commercialization of rigosertib in Japan and Korea. Under the SymBio license agreement, SymBio is obligated to use commercially reasonable efforts to develop and obtain market approval for rigosertib inside the licensed territory and the Company has similar obligations outside of the licensed territory. The Company has also entered into an agreement with SymBio providing for it to supply SymBio with development-stage product. Under the SymBio license agreement, the Company also agreed to supply commercial product to SymBio under specified terms that will be included in a commercial supply agreement to be negotiated prior to the first commercial sale of rigosertib. The supply of development-stage product and the supply of commercial product will be at the Company's cost plus a defined profit margin. Sales of development-stage product have been de minimis. The Company has additionally granted SymBio a right of first negotiation to license or obtain the rights to develop and commercialize compounds having a chemical structure similar to rigosertib in the licensed territory.

Under the terms of the SymBio license agreement, the Company received an upfront payment of $7,500,000. The Company is eligible to receive milestone payments of up to an aggregate of $33,000,000 from SymBio upon the achievement of specified development and regulatory milestones for specified indications. Of the development milestones, $3,000,000 is due after enrollment of the first patient in the event a decision is made, after the Company's interim analysis, to start a phase 3 clinical trial of rigosertib IV in combination with gemcitabine for pancreatic cancer patients in the United States. Of the regulatory milestones, $5,000,000 is due upon receipt of marketing approval in the United States for rigosertib IV in higher risk MDS patients, $3,000,000 is due upon receipt of marketing approval in Japan for rigosertib IV in higher risk MDS patients, $5,000,000 is due upon receipt of marketing approval in the United States for rigosertib oral in lower risk MDS patients, $5,000,000 is due upon receipt of marketing approval in Japan for rigosertib oral in lower risk MDS patients, $5,000,000 is due upon receipt of marketing approval in the United States for rigosertib IV in combination with gemcitabine in pancreatic cancer patients, and $3,000,000 is due upon receipt of marketing approval in Japan for rigosertib IV in combination with gemcitabine in pancreatic cancer patients. Furthermore, upon receipt of marketing approval in the United States and Japan for an additional specified indication of rigosertib, which we are currently not pursuing, an aggregate of $4,000,000 would be due. In addition to these pre-commercial milestones, the Company is eligible to receive tiered milestone payments based upon annual net sales of rigosertib by SymBio of up to an aggregate of $30,000,000. Further, under the terms of the SymBio license agreement, SymBio will make royalty payments to the Company at percentage rates ranging from the mid-teens to 20% based on net sales of rigosertib by SymBio.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

15. License and Collaboration Agreements (Continued)

Royalties will be payable under the SymBio agreement on a country-by-country basis in the licensed territory, until the later of the expiration of marketing exclusivity in those countries, a specified period of time after first commercial sale of rigosertib in such country, or the expiration of all valid claims of the licensed patents covering rigosertib or the manufacture or use of rigosertib in such country. If no valid claim exists covering the composition of matter of rigosertib or the use of or treatment with rigosertib in a particular country before the expiration of the royalty term, and specified competing products achieve a specified market share percentage in such country, SymBio's obligation to pay the Company royalties will continue at a reduced royalty rate until the end of the royalty term. In addition, the applicable royalties payable to the Company may be reduced if SymBio is required to pay royalties to third-parties for licenses to intellectual property rights necessary to develop, use, manufacture or commercialize rigosertib in the licensed territory. The license agreement with SymBio will remain in effect until the expiration of the royalty term. However, the SymBio license agreement may be terminated earlier due to the uncured material breach or bankruptcy of a party, or force majeure. If SymBio terminates the license agreement in these circumstances, its licenses to rigosertib will survive, subject to SymBio's milestone and royalty obligations, which SymBio may elect to defer and offset against any damages that may be determined to be due from the Company. In addition, the Company may terminate the license agreement in the event that SymBio brings a challenge against it in relation to the licensed patents, and SymBio may terminate the license agreement without cause by providing the Company with written notice within a specified period of time in advance of termination.

The Company determined that the deliverables under the SymBio agreement include the exclusive, royalty-bearing, sublicensable license to rigosertib, the research and development services to be provided by the Company and its obligation to serve on a joint committee. The Company concluded that the license did not have standalone value to SymBio and was not separable from the research and development services, because of the uncertainty of SymBio's ability to develop rigosertib in the SymBio territory on its own and the uncertainty of SymBio's ability to sublicense rigosertib and recover a substantial portion of the original upfront payment of $7,500,000 paid by SymBio to the Company.

The supply of rigosertib for SymBio's commercial requirements is contingent upon the receipt of regulatory approvals to commercialize rigosertib in Japan and Korea. Because the Company's commercial supply obligation was contingent upon the receipt of future regulatory approvals, and there were no binding commitments or firm purchase orders pending for commercial supply at or near the execution of the agreement, the commercial supply obligation is deemed to be contingent and is not valued as a deliverable under the SymBio agreement. If SymBio orders the supplies from the Company, the Company expects the pricing for this supply to equal its third-party manufacturing cost plus a pre-negotiated percentage, which will not result in a significant incremental discount to market rates.

Due to the lack of standalone value for the license, research and development services, and joint committee obligation, the upfront payment is being recognized ratably using the straight line method through December 2027, the expected term of the agreement. For the year ended December 31, 2011 and 2012, the Company recognized revenues of $227,000 and $455,000, respectively, under this agreement. In addition, the Company recognized revenues of $48,000 for the year ended December 31, 2012 related to the supply agreement with SymBio.

16. Joint Venture

In December 2012, the Company agreed to create a joint venture with GVK Biosciences Private Limited ("GVK BIO"), a private limited company located in India. The resulting joint venture,

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

16. Joint Venture (Continued)

GBO, LLC, a Delaware limited liability company ("GBO"), was formed on April 1, 2013. The purpose of GBO is to collaborate on and develop two new programs through filing of an investigational new drug application ("IND") and/or conducting proof of concept studies using the Company's technology platform.

GVK BIO will make an initial capital contribution of $500,000 in exchange for a 10% interest in GBO, and the Company will make an initial capital contribution of a sub-license to all the intellectual property controlled by the Company related to the two specified programs in exchange for a 90% interest. In addition, GVK BIO will make additional capital contributions (with a minimum of $500,000) necessary to complete the major studies plus the exercise of the proof on concept study option leading to deliverables under the programs including an IND approval for one product and completion of IND studies for the other product. The GVK BIO percentage interest in GBO accordingly may change from the initial 10% to up to 50%, depending on the amount of its total capital contributions.

For thirty days following the 15-month anniversary of the commencement of either of the two programs, the Company will have an option to (i) cancel the license and (ii) purchase all rights in and to that program. There are three of these buy-back scenarios depending on the stage of development of the underlying assets. GVK BIO will have operational control of GBO and the Company will have strategic and scientific controls. As of December 31, 2012, neither the Company nor GVK BIO had contributed any property to GBO.

17. Related-Party Transactions

In May 2010, the Company entered into a research agreement with the Mount Sinai School of Medicine ("Mount Sinai"), with which certain of its stockholders are affiliated. Mount Sinai is undertaking research on behalf of the Company on the terms set forth in the agreement. Mount Sinai, in connection with the Company, will prepare applications for patents generated from the research. Results from all projects will belong exclusively to Mount Sinai, but the Company will have an exclusive option to license any inventions. The initial term of this research agreement was one year, with options to extend by mutual agreement. The Company's initial payment to Mount Sinai under the agreement for the period of May 2010 to May 2011 was $738,000, to be paid in quarterly installments of $185,000. The agreement was subsequently amended to include the period of May 2011 through July 2012, for additional total consideration of $738,000 to be paid by the Company in quarterly installments of $185,000. The Company entered into a second amendment to the agreement during 2012, further extending the agreement period from July 2012 through July 2013 for additional total consideration of $758,000 to be paid in quarterly installments of $190,000. In 2011 and 2012, the Company paid Mount Sinai an aggregate of $554,000 and $1,230,000, respectively. At December 31, 2011 and 2012, the Company owed Mount Sinai $185,000 and $0, respectively, which is included in accounts payable on the consolidated balance sheets.

The Company outsources the synthesis of some of its chemical compounds to vendors in the United States and in foreign countries. A supplier, of which one of the Company's preferred stockholders is an owner, produces one of these compounds under contract. The Company's aggregate payments for these services for the years ended December 31, 2011 and 2012 were $6,000 and $157,000, respectively. The Company owed this supplier, as of December 31, 2011 and 2012, $0 and $107,000, respectively, which amounts are included in accounts payable in the accompanying consolidated balance sheets.

Onconova Therapeutics, Inc.

Notes to Consolidated Financial Statements (Continued)

17. Related-Party Transactions (Continued)

The Company purchases chemical compounds from a corporation owned by one of its stockholders. The Company's aggregate purchases from this supplier for the years ended December 31, 2011 and 2012 were $970,000 and $410,000, respectively. The Company owed this supplier, as of December 31, 2011 and 2012, $538,000 and $0, respectively, which amounts are included in accounts payable in the accompanying consolidated balance sheets. The Company also rents office space in Pennington, New Jersey from a related corporation.

18. Subsequent Events

The Company has completed an evaluation of all subsequent events through May 3, 2013, the date on which these financial statements were available to be issued, to ensure that these financial statements include appropriate disclosure of events both recognized in the consolidated financial statements as of December 31, 2012, and events which occurred subsequently but were not recognized in the financial statements.

As discussed in Note 11, at certain times throughout the Company's history, the Significant Holder has afforded option holders the opportunity for liquidity in Purchase Transactions. On April 23, 2013, the Company distributed a notification letter to all equity award holders under the Plan advising them that Purchase Transactions will no longer occur, unless, at the time of a Purchase Transaction, the option holder has held the Common Stock issued upon exercise of options for a period of greater than six months prior to selling such Common Stock to the Significant Holder and that any such sale to the Significant Holder would be at the fair value of the Common Stock on the date of such sale. Based on these new criteria for Purchase Transactions, the Company remeasured options outstanding under the Plan as of April 23, 2013 to their intrinsic value and reclassified such options from liabilities to stockholders' deficit within the Company's consolidated balance sheets.

Onconova Therapeutics, Inc.

Condensed Consolidated Balance Sheets

	December 31, 2012	March 31, 2013 (unaudited)	Pro Forma March 31, 2013 (unaudited)
Assets			
Current assets:			
Cash and cash equivalents	$ 81,527,000	$ 67,307,000	
Prepaid expenses and other current assets	1,725,000	2,666,000	
Total current assets	83,252,000	69,973,000	
Property and equipment, net	463,000	649,000	
Restricted cash	125,000	125,000	
Other non-current assets	12,000	12,000	
Total assets	$ 83,852,000	$ 70,759,000	
Liabilities, redeemable convertible preferred stock and stockholders' (deficit) equity			
Current liabilities:			
Accounts payable	$ 5,517,000	$ 4,243,000	
Accrued expenses and other current liabilities	3,925,000	5,559,000	
Warrant liability	62,000	48,000	
Stock option liability	11,967,000	14,394,000	
Deferred revenue	3,907,000	3,986,000	
Total current liabilities	25,378,000	28,230,000	
Deferred revenue, non-current	15,421,000	14,250,000	
Other	44,000	64,000	
Total liabilities	40,843,000	42,544,000	
Commitments and contingencies			
Redeemable convertible preferred stock, $0.01 par value per share, 18,548,253 shares authorized at December 31, 2012 and March 31, 2013, 16,912,199 shares issued and outstanding at December 31, 2012 and March 31, 2013, liquidation preference of $205,760,000 at March 31, 2013, and no shares issued and outstanding at March 31, 2013 (pro forma)	201,315,000	202,334,000	$ —
Stockholders' (deficit) equity:			
Common stock, $0.01 par value, 30,145,155 shares authorized at December 31, 2012 and March 31, 2013, 3,474,473 and 3,478,473 shares issued and outstanding at December 31, 2012 and March 31, 2013 and 20,591,954 shares issued and outstanding at March 31, 2013 (pro forma)	35,000	35,000	206,000
Additional paid in capital	10,019,000	9,044,000	211,207,000
Accumulated other comprehensive income	—	7,000	7,000
Accumulated deficit	(168,360,000)	(183,205,000)	(183,205,000)
Total stockholders' (deficit) equity	(158,306,000)	(174,119,000)	28,215,000
Total liabilities, redeemable convertible preferred stock and stockholders' (deficit) equity	$ 83,852,000	$ 70,759,000	$ 70,759,000

See accompanying notes to condensed consolidated financial statements.

Onconova Therapeutics, Inc.

Condensed Consolidated Statements of Operations and Comprehensive Loss (unaudited)

	Three Months Ended March 31,	
	2012	2013
Revenue	$ 198,000	$ 1,116,000
Operating expenses:		
General and administrative	2,460,000	3,346,000
Research and development	8,448,000	12,756,000
Total operating expenses	10,908,000	16,102,000
Loss from operations	(10,710,000)	(14,986,000)
Change in fair value of warrant liability	(609,000)	14,000
Interest expense	(21,000)	—
Other income, net	541,000	127,000
Net loss before income taxes	(10,799,000)	(14,845,000)
Income taxes	—	—
Net loss	(10,799,000)	(14,845,000)
Other comprehensive income:		
Foreign currency translation	—	7,000
Comprehensive loss	$ (10,799,000)	$ (14,838,000)
Reconciliation of net loss to net loss applicable to common stockholders:		
Net loss	$ (10,799,000)	$ (14,845,000)
Accretion of redeemable convertible preferred stock	(1,231,000)	(1,019,000)
Net loss applicable to common stockholders	$ (12,030,000)	$ (15,864,000)
Net loss per share of common stock, basic and diluted	$ (4.15)	$ (4.56)
Basic and diluted weighted average shares outstanding	2,897,347	3,475,673
Pro forma net loss per share of common stock, basic and diluted		$ (0.77)
Basic and diluted pro forma weighted average shares outstanding		20,589,154

See accompanying notes to condensed consolidated financial statements.

Onconova Therapeutics, Inc.

Condensed Consolidated Statements of Redeemable Convertible Preferred Stock and Stockholders' Deficit

	Redeemable Convertible Preferred Stock		Stockholders' Deficit					
			Common Stock		Additional Paid in Capital	Accumulated other comprehensive income	Accumulated deficit	Total
	Shares	Amount	Shares	Amount				
Balance at December 31, 2011	11,227,169	$ 119,997,000	2,889,747	$ 29,000	$ —	$ —	$ (138,448,000)	$ (138,419,000)
Issuance of preferred stock, net of issuance costs	3,030,303	47,796,000	—	—	—	—	—	—
Exercise of stock options	—	—	584,726	6,000	4,688,000	—	—	4,694,000
Proceeds from stockholder in connection with settlement of stock option exercises	—	—	—	—	3,943,000	—	—	3,943,000
Settlement of stock option liabilities	—	—	—	—	(2,835,000)	—	—	(2,835,000)
Issuance of preferred stock upon exercise of warrants	221,399	2,802,000	—	—	—	—	—	—
Exchange of convertible debt and preferred stock	2,433,328	26,767,000	—	—	—	—	—	—
Beneficial conversion feature on convertible debt	—	—	—	—	8,176,000	—	—	8,176,000
Accretion of preferred stock to redemption value	—	3,953,000	—	—	(3,953,000)	—	—	(3,953,000)
Net loss	—	—	—	—	—	—	(29,912,000)	(29,912,000)
Balance at December 31, 2012	16,912,199	201,315,000	3,474,473	35,000	10,019,000	—	(168,360,000)	(158,306,000)
Exercise of stock options	—	—	4,000	—	44,000	—	—	44,000
Accretion of preferred stock to redemption value	—	1,019,000	—	—	(1,019,000)	—	—	(1,019,000)
Other comprehensive income	—	—	—	—	—	7,000	—	7,000
Net loss	—	—	—	—	—	—	(14,845,000)	(14,845,000)
Balance at March 31, 2013 (unaudited)	16,912,199	$ 202,334,000	3,478,473	$ 35,000	$ 9,044,000	$ 7,000	$ (183,205,000)	$ (174,119,000)

See accompanying notes to condensed consolidated financial statements.

Onconova Therapeutics, Inc.

Condensed Consolidated Statements of Cash Flows (unaudited)

	Three Months Ended March 31,	
	2012	2013
Operating activities:		
Net loss	$ (10,799,000)	$ (14,845,000)
Adjustment to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	79,000	98,000
Change in fair value of warrant liabilities	609,000	(14,000)
Stock compensation expense	2,437,000	2,465,000
Changes in assets and liabilities:		
Grants receivable	60,000	—
Prepaid expenses and other current assets	198,000	(941,000)
Accounts payable	221,000	(1,274,000)
Accrued expenses	160,000	1,634,000
Other liabilites	(40,000)	20,000
Deferred revenue	987,000	(1,092,000)
Net cash used in operating activities	(6,088,000)	(13,949,000)
Investing activities:		
Payments for purchase of property and equipment	(4,000)	(284,000)
Net cash used in investing activities	(4,000)	(284,000)
Financing activities:		
Proceeds from the exercise of stock options	9,000	6,000
Proceeds from the exercise of warrants	428,000	—
Proceeds from the sale of Series H preferred stock	400,000	—
Proceeds from stockholder loan and convertible debt	2,800,000	—
Net cash provided by financing activities	3,637,000	6,000
Effect of foreign currency translation on cash	—	7,000
Net decrease in cash and cash equivalents	(2,455,000)	(14,220,000)
Cash and cash equivalents at beginning of period	2,713,000	81,527,000
Cash and cash equivalents at end of period	$ 258,000	$ 67,307,000

See accompanying notes to condensed consolidated financial statements.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements

(Unaudited)

1. Nature of Business

The Company

Onconova Therapeutics, Inc. (the "Company") was incorporated in the State of Delaware on December 22, 1998 and commenced operations on January 1, 1999. The Company's headquarters are located in Newtown, Pennsylvania. The Company is a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule drug candidates to treat cancer. Using its proprietary chemistry platform, the Company has created an extensive library of targeted anti-cancer agents designed to work against specific cellular pathways that promote cancer. The Company believes that the drug candidates in its pipeline have the potential to be efficacious in a wide variety of cancers without causing harm to normal cells. The Company has three clinical-stage product candidates and six preclinical programs. To accelerate and broaden the development of rigosertib, the Company's most advanced product candidate, the Company entered into a collaboration and license agreement with Baxter Healthcare SA ("Baxter"), a subsidiary of Baxter International Inc., in 2012 to commercialize rigosertib in Europe. In 2011, the Company entered into a collaboration and license agreement with SymBio Pharmaceuticals Limited ("SymBio") to commercialize rigosertib in Japan and Korea. The Company has retained development and commercialization rights to rigosertib in the rest of the world, including the United States. During 2012, Onconova Europe GmbH was established as a wholly owned subsidiary of the Company for the purpose of further developing business in Europe.

Liquidity

The Company has incurred recurring operating losses since inception. For the three months ended March 31, 2013, the Company incurred a net loss of $14,845,000 and as of March 31, 2013, the Company had generated an accumulated deficit of $183,205,000. The Company anticipates operating losses to continue for the foreseeable future due to, among other things, costs related to research funding, development of its product candidates and its preclinical programs, strategic alliances and the development of its administrative organization. The Company will require substantial additional financing to fund its operations and to continue to execute its strategy.

The Company has raised significant capital through the issuance of its redeemable convertible preferred stock, par value $0.01 per share, in ten series denominated as Series A through Series J ("Series A Preferred Stock" through "Series J Preferred Stock," respectively, and collectively the "Preferred Stock"). Upon written request of the holders of at least 66.67% of the then outstanding shares of Series A, Series B, and Series C Preferred Stock collectively, and upon written request of holders of at least a majority of the then outstanding shares of Series D, Series E, and Series F Preferred Stock collectively, as the case may be, the Company is required to redeem the requested number of outstanding shares of Series A Preferred Stock at $5.00 per share, Series B Preferred Stock at $11.50 per share, Series C Preferred Stock at $7.12 per share, and Series D, E and F Preferred Stock at $11.50 per share. Upon written request of holders of at least a majority of the then outstanding shares of Series G Preferred Stock, the Company is required to redeem the outstanding shares of Series G Preferred Stock at a price equal to $11.50 per share. At any time on or after September 21, 2013, upon written request of holders of at least a majority of the then outstanding shares of Series H Preferred Stock, the Company is required to redeem the outstanding shares of Series H Preferred Stock at a price equal to $11.50 per share. At any time on or after July 25, 2015, upon written request of holders of at least a majority of the then outstanding shares of Series I Preferred Stock, the Company is required to redeem the outstanding shares of Series I Preferred Stock at a price equal to

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

1. Nature of Business (Continued)

$11.50 per share. At any time on or after July 27, 2015, upon written request of holders of at least a majority of the then outstanding shares of Series J Preferred Stock, the Company is required to redeem the outstanding shares of Series J Preferred Stock at a price equal to $18.00 per share. At March 31, 2013, Preferred Stock with an aggregate redemption value of $103,122,000 was currently redeemable. During 2013, Preferred Stock with an aggregate redemption value of $23,154,000 will become redeemable at the option of the holder. The Company has not received any notice of redemption as of and through the date the financial statements were available for issuance.

The issued and outstanding shares of Preferred Stock contain conversion features which provide for automatic conversion into shares of common stock, par value $0.01 per share ("Common Stock"), of the Company upon the occurrence of a designated offering, which is defined as a publicly registered offering under the Securities Act of 1933, as amended, in which the gross proceeds after underwriting discount are not less than $25,000,000 at a per share price of at least $16.50 per share, or at a price of at least $11.50 per share with the consent of the holders of a majority of the outstanding Series J Preferred Stock. Due to this conversion provision, the Company expects the issued and outstanding shares of Preferred Stock to convert into shares of Common Stock upon the completion of a designated offering, at which time the redemption rights would terminate. However, there can be no assurances that the Company will complete a designated offering.

Management intends to fund future operations through additional equity offerings, licensing revenue, grants, government contracts and, if any of the Company's product candidates receive marketing approval, future sales of its products. There can be no assurance, however, that the Company will be successful in obtaining financing at the level needed to sustain operations or on terms acceptable to the Company, or that the Company will obtain approvals necessary to market its products or achieve profitability or sustainable, positive cash flow.

The accompanying condensed consolidated financial statements have been prepared assuming that the Company will continue as a going concern, which contemplates the realization of assets and satisfaction of liabilities in the normal course of business. The Company's ability to continue as a going concern is dependent on its ability to raise additional capital to fund its research and development and commercial programs and meet its obligations, including the potential obligation related to the redemption of the Preferred Stock, which is outside of the Company's control, on a timely basis. If the Company is unable to successfully raise sufficient additional capital, through future debt or equity financings or through strategic and collaborative ventures with third parties, the Company will not have sufficient cash flows and liquidity to fund its planned business operations. In that event, the Company might be forced to limit many, if not all, of its programs and consider other means of creating value for its stockholders, such as licensing to others the development and commercialization of products that it considers valuable and would otherwise likely develop itself. If the Company is unable to raise the necessary capital, it may be forced to curtail all of its activities and, ultimately, potentially cease operations. Even if the Company is able to raise additional capital, such financings may only be available on unattractive terms, or could result in significant dilution of stockholders' interests. The consolidated financial statements do not include any adjustments relating to recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should the Company be unable to continue in existence.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

1. Nature of Business (Continued)

The Company faces many risks associated with companies in the early stages. It also faces risks inherent in its business and its industry generally. These risks include, among others, the following:

- the Company's success is primarily dependent on the regulatory approval and commercialization of rigosertib;
- the Company is subject to regulatory approval processes that are lengthy, time consuming and unpredictable. The Company may not obtain approval for any of its product candidates from the U.S. Food and Drug Administration or foreign regulatory authorities;
- the Company has no significant source of product revenue, may never become profitable and may incur substantial and increasing net losses for the foreseeable future as it continues to develop and seek regulatory approvals for, and potentially begins to commercialize its product candidates;
- the Company may need to obtain additional funding to continue operations;
- it is difficult and costly to protect the Company's intellectual property rights;
- the Company may be unable to recruit or retain key employees, including its senior management team; and
- the Company depends on the performance of third parties, including contract research organizations and third-party manufacturers.

2. Summary of Significant Accounting Policies

Basis of Presentation

The condensed consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States ("GAAP") for interim financial information. Certain information and footnotes normally included in financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to the rules and regulations of the Securities and Exchange Commission. In December 2012, Onconova Europe GmbH was established as a wholly owned subsidiary of the Company. The financial statements include the consolidated accounts of the Company and its wholly owned subsidiary. All significant intercompany transactions have been eliminated.

Unaudited Interim Financial Information

The accompanying condensed consolidated balance sheet as of March 31, 2013, condensed consolidated statements of operations and comprehensive loss and condensed consolidated statements of cash flows for the three months ended March 31, 2012 and 2013, and the condensed consolidated statement of redeemable convertible preferred stock and stockholders' deficit for the three months ended March 31, 2013 are unaudited. The interim unaudited condensed consolidated financial statements have been prepared on the same basis as the annual audited consolidated financial statements and, in the opinion of management, reflect all adjustments, which include only normal recurring adjustments, necessary for the fair statement of the Company's financial position as of March 31, 2013 and the results of its operations, its comprehensive loss and its cash flows for the three months ended March 31, 2012 and 2013. The financial data and other information disclosed in these

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

2. Summary of Significant Accounting Policies (Continued)

notes related to the three months ended March 31, 2012 and 2013 are unaudited. The results for the three months ended March 31, 2013 are not necessarily indicative of results to be expected for the year ending December 31, 2013, any other interim periods, or any future year or period.

Unaudited Pro Forma Presentation

On May 1, 2013, the Company's board of directors authorized management of the Company to confidentially submit a registration statement to the Securities and Exchange Commission (the "SEC") for the Company to sell shares of Common Stock to the public. The unaudited pro forma balance sheet information as of March 31, 2013 assumes the conversion of all outstanding shares of Preferred Stock as of that date into 17,113,481 shares of Common Stock.

The unaudited pro forma net loss per share is computed using the weighted-average number of shares of Common Stock outstanding after giving pro forma effect to the conversion of all issued and outstanding shares of Preferred Stock during the three months ended March 31, 2013 into shares of Common Stock as if such conversion had occurred at January 1, 2013, or the date of original issuance, if later.

Segment Information

Operating segments are defined as components of an enterprise about which separate discrete information is available for evaluation by the chief operating decision maker, or decision-making group, in deciding how to allocate resources and in assessing performance. The Company views its operations and manages its business in one segment, which is the identification and development of oncology therapeutics.

Significant Accounting Policies

The Company's significant accounting policies are disclosed in the audited consolidated financial statements for the year ended December 31, 2012 included elsewhere in this prospectus. Since the date of those financial statements, there have been no changes to the Company's significant accounting policies.

Foreign Currency Translation

The reporting currency of the Company and its U.S. subsidiary is the U.S. dollar. The functional currency of the Company's non-U.S. subsidiary is the local currency. Assets and liabilities of the foreign subsidiary are translated into U.S. dollars based on exchange rates at the end of the period. Revenues and expenses are translated at average exchange rates during the reporting period. Gains and losses arising from the translation of assets and liabilities are included as a component of accumulated other comprehensive income. Gains and losses resulting from foreign currency transactions are reflected within the Company's results of operations. The Company has not utilized any foreign currency hedging strategies to mitigate the effect of its foreign currency exposure.

Recent Accounting Pronouncements

Effective January 1, 2011, the Company prospectively adopted the Financial Accounting Standards Board ("FASB") Accounting Standards Update ("ASU") No. 2009-13, Multiple-Deliverable Revenue

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

2. Summary of Significant Accounting Policies (Continued)

Arrangements ("ASU 2009-13"). The amendments in this guidance enable vendors to account for products or services separately rather than as a combined unit upon meeting certain criteria and to establish a hierarchy for determining the selling price of a deliverable. In addition, a vendor can determine a best estimate of selling price, in a manner that is consistent with that used to determine the price to sell the deliverable on a standalone basis, if the vendor does not have vendor-specific objective evidence or third-party evidence of selling price. This guidance also eliminates the use of the residual method and requires a vendor to allocate revenue using the relative selling price method. The Company's adoption of ASU 2009-13 did not have a significant impact on its consolidated financial position, results of operations or cash flows.

In June 2011, FASB issued ASU No. 2011-05, "Comprehensive Income (ASC Topic 220): Presentation of Comprehensive Income" ("ASU 2011-05"). This accounting update eliminates the option to present the components of other comprehensive income as part of the statement of stockholders' equity. Instead, comprehensive income must be presented in either a single continuous statement of comprehensive income, which contains two sections, net income and other comprehensive income, or in two separate but consecutive statements. ASU 2011-05 was effective for fiscal periods beginning after December 15, 2011 with early adoption permitted. The Company's retrospective adoption of ASU 2011-05 did not have a significant impact on its consolidated financial position, results of operations or cash flows.

In February 2013, FASB issued ASU No. 2013-02, "Comprehensive Income (Topic 220): Reporting of Amounts Reclassified Out of Accumulated Other Comprehensive Income" ("ASU 2013-02"). ASU 2013-02 requires companies to present either in a single note or parenthetically on the face of the financial statements, the effect of significant amounts reclassified from each component of accumulated other comprehensive income based on its source and the income statement line items affected by the reclassification. This guidance is effective for annual reporting periods beginning after December 15, 2012. The Company's adoption of ASU 2013-02 did not have a significant impact on its consolidated financial position, results of operations or cash flows.

3. Fair Value Measurements

The Company applies various valuation approaches in determining the fair value of its financial assets and liabilities within a hierarchy that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that observable inputs be used when available. Observable inputs are inputs that market participants would use in pricing the asset or liability based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the inputs that market participants would use in pricing the asset or liability and are developed based on the best information available under the circumstances. The fair value hierarchy is broken down into three levels based on the source of inputs as follows:

Level 1—Valuations based on unadjusted quoted prices in active markets for identical assets or liabilities that the Company has the ability to access.

Level 2—Valuations based on quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active and models for which all significant inputs are observable, either directly or indirectly.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

3. Fair Value Measurements (Continued)

Level 3—Valuations based on inputs that are unobservable and significant to the overall fair value measurement.

The availability of observable inputs can vary among the various types of financial assets and liabilities. To the extent that the valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair value requires more judgment. In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, for financial statement disclosure purposes, the level in the fair value hierarchy within which the fair value measurement is classified is based on the lowest level input that is significant to the overall fair value measurement.

The Company had no assets or liabilities classified as Level 1 or Level 2. The Series G Preferred Stock warrants (see Note 6) are classified as Level 3. The fair values of these instruments are determined using models based on market observable inputs and management judgment. There were no material re-measurements of fair value during the year ended December 31, 2012 and the three months ended March 31, 2013 with respect to financial assets and liabilities, other than those assets and liabilities that are measured at fair value on a recurring basis.

The Company has classified the Series G Preferred Stock warrants as a liability and has re-measured the liability to estimated fair value at December 31, 2012 and March 31, 2013, using the Black-Scholes option pricing model with the following assumptions: contractual life according to the remaining terms of the warrants, no dividend yield, weighted average risk-free interest rates of 0.31% and 0.26% at December 31, 2012 and March 31, 2013, respectively, and weighted average volatility of 64.87% and 63.70% at December 31, 2012 and March 31, 2013, respectively.

The following fair value hierarchy table presents information about the Company's financial assets and liabilities measured at fair value on a recurring basis as of December 31, 2012 and March 31, 2013:

	Fair Value Measurement As of December 31, 2012			Balance As of December 31, 2012
	Level 1	Level 2	Level 3	
Warrant liability	$ —	$ —	$ 62,000	$ 62,000
Total	$ —	$ —	$ 62,000	$ 62,000

	Fair Value Measurement As of March 31, 2013			Balance As of March 31, 2013
	Level 1	Level 2	Level 3	
Warrant liability	$ —	$ —	$ 48,000	$ 48,000
Total	$ —	$ —	$ 48,000	$ 48,000

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

3. Fair Value Measurements (Continued)

The following table presents a reconciliation of the Company's liabilities measured at fair value on a recurring basis using significant unobservable inputs (Level 3) for the three months ended March 31, 2013:

	Warrant Liability
Balance at December 31, 2012	$ 62,000
Change in fair value upon re-measurement	(14,000)
Balance at March 31, 2013	$ 48,000

The fair values of cash equivalents, accounts payable and accrued liabilities approximate their respective carrying values due to the short-term nature of these accounts. There were no transfers between Level 1 and Level 2 in any of the periods reported.

4. Net Loss Per Share of Common Stock

The following table sets forth the computation of basic and diluted earnings per share for the three months ended March 31, 2012 and 2013:

	Three Months Ended March 31,	
	2012	2013
Basic and diluted net loss per share of common stock:		
Net loss	$ (10,799,000	$ (14,845,000)
Accretion to redemption value of preferred stock	(1,231,000)	(1,019,000)
Net loss applicable to common stockholders	$ (12,030,000)	$ (15,864,000)
Weighted average shares of common stock outstanding	2,897,347	3,475,673
Net loss per share of common stock—basic and diluted	$ (4.15)	$ (4.56)

The following potentially dilutive securities outstanding at March 31, 2012 and 2013 have been excluded from the computation of diluted weighted average shares outstanding, as they would be antidilutive:

	March 31,	
	2012	2013
Preferred Stock	11,475,875	17,113,481
Warrants	524,402	6,128
Stock options	2,788,004	3,722,188
	14,788,281	20,841,197

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

5. Accrued Expenses

Accrued expenses are as follows:

	December 31, 2012	March 31, 2013
Research and development	$ 3,521,000	$ 4,575,000
Payroll	247,000	574,000
Other	157,000	410,000
	$ 3,925,000	$ 5,559,000

6. Preferred Stock and Stockholders' Deficit

Capitalization

As of March 31, 2013, the Company's ninth amended and restated certificate of incorporation reflected the following authorized shares: 48,693,408 shares of capital stock, consisting of (i) 400,000 shares of Series A Preferred Stock, (ii) 1,200,000 shares of Series B Preferred Stock, (iii) 1,200,000 shares of Series C Preferred Stock, (iv) 1,625,000 shares of Series D Preferred Stock, (v) 1,650,000 shares of Series E Preferred Stock, (vi) 2,000,000 shares of Series F Preferred Stock, (vii) 2,700,000 shares of Series G Preferred Stock, (viii) 2,042,950 of Series H Preferred Stock, (ix) 2,700,000 shares of Series I Preferred Stock, (x) 3,030,303 shares of Series J Preferred Stock and (xi) 30,145,155 shares of Common Stock.

The Company issued shares of Series H Preferred Stock in three closings in 2011: On February 17, 2011, the Company raised $700,000 in gross proceeds from the issuance of 71,488 shares of Series H Preferred Stock; On June 2, 2011, the Company raised $1,326,000 in gross proceeds from the issuance of 135,391 shares of Series H Preferred Stock; and on September 19, 2011, the Company raised $5,996,000 in gross proceeds from the issuance of 612,450 shares of Series H Preferred Stock.

In July 2012, the Company issued 2,433,328 shares of Series I Preferred Stock in exchange for the conversion of the convertible promissory notes and accrued interest in the amount of $26,444,000 and $323,000, respectively. The effective conversion price was $11.00 per share. Additionally, in July 2012, the Company issued 3,030,303 shares of Series J Preferred Stock at $16.50 per share for gross proceeds of $50,000,000. Issuance costs associated with this offering were $2,204,000.

Series A Preferred Stock was originally issued at $5.00 per share; Series B Preferred Stock was issued at $5.75 per share; Series C Preferred Stock was issued at $3.56 per share; Series D Preferred Stock was issued at $4.67 per share; Series E Preferred Stock was issued at $9.76 per share; Series F Preferred Stock was issued at $11.00 per share; Series G and Series H Preferred Stock were issued at $9.79 per share; Series I Preferred Stock was issued at $11.00 per share; and Series J Preferred Stock was issued at $16.50 per share.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

6. Preferred Stock and Stockholders' Deficit (Continued)

The following is the composition of share capital as of the dates indicated:

	Authorized		Issued and Outstanding	
	December 31, 2012	March 31, 2013	December 31, 2012	March 31, 2013
Shares of $0.01 par value per share:				
Common stock	30,145,155	30,145,155	3,474,473	3,478,473
Series A Preferred Stock	400,000	400,000	107,000	107,000
Series B Preferred Stock	1,200,000	1,200,000	1,107,189	1,107,189
Series C Preferred Stock	1,200,000	1,200,000	1,069,946	1,069,946
Series D Preferred Stock	1,625,000	1,625,000	1,583,568	1,583,568
Series E Preferred Stock	1,650,000	1,650,000	1,633,082	1,633,082
Series F Preferred Stock	2,000,000	2,000,000	2,000,000	2,000,000
Series G Preferred Stock	2,700,000	2,700,000	1,934,359	1,934,359
Series H Preferred Stock	2,042,950	2,042,950	2,013,424	2,013,424
Series I Preferred Stock	2,700,000	2,700,000	2,433,328	2,433,328
Series J Preferred Stock	3,030,303	3,030,303	3,030,303	3,030,303
Total Preferred Stock	18,548,253	18,548,253	16,912,199	16,912,199
Total	48,693,408	48,693,408	20,386,672	20,390,672

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

6. Preferred Stock and Stockholders' Deficit (Continued)

The following is the activity of the Preferred Stock for the three months ended March 31, 2013:

	December 31, 2012	Issuance of Preferred Stock	Exercise of warrants	Accretion of redemption premium and issuance costs on Preferred Stock	March 31, 2013
Series A					
Shares	107,000	—	—	—	107,000
Amount	$ 535,000	$ —	$ —	$ —	$ 535,000
Series B					
Shares	1,107,189	—	—	—	1,107,189
Amount	$ 12,733,000	$ —	$ —	$ —	$ 12,733,000
Series C					
Shares	1,069,946	—	—	—	1,069,946
Amount	$ 7,618,000	$ —	$ —	$ —	$ 7,618,000
Series D					
Shares	1,583,568	—	—	—	1,583,568
Amount	$ 18,211,000	$ —	$ —	$ —	$ 18,211,000
Series E					
Shares	1,633,082	—	—	—	1,633,082
Amount	$ 18,780,000	$ —	$ —	$ —	$ 18,780,000
Series F					
Shares	2,000,000	—	—	—	2,000,000
Amount	$ 23,000,000	$ —	$ —	$ —	$ 23,000,000
Series G					
Shares	1,934,359	—	—	—	1,934,359
Amount	$ 22,819,000	$ —	$ —	$ —	$ 22,819,000
Series H					
Shares	2,013,424	—	—	—	2,013,424
Amount	$ 22,005,000	$ —	$ —	$ 380,000	$ 22,385,000
Series I					
Shares	2,433,328	—	—	—	2,433,328
Amount	$ 26,933,000	$ —	$ —	$ 100,000	$ 27,033,000
Series J					
Shares	3,030,303	—	—	—	3,030,303
Amount	$ 48,681,000	$ —	$ —	$ 539,000	$ 49,220,000
Total					
Shares	16,912,199	—	—	—	16,912,199
Amount	$ 201,315,000	$ —	$ —	$ 1,019,000	$ 202,334,000

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

6. Preferred Stock and Stockholders' Deficit (Continued)

Voting

Each holder of outstanding shares of Preferred Stock has the right to one vote for each share of Common Stock into which such Preferred Stock could then be converted. The holders of shares of Preferred Stock have full voting rights and powers equal to the voting rights and powers of shares of Common Stock and are entitled to notice of any stockholders' meeting and vote together with the holders of Common Stock, with respect to any question upon which holders of shares of Common Stock have the right to vote, as a single class, including without limitation, actions to increase or decrease the aggregate number of authorized shares of Common Stock and/or Preferred Stock.

Dividends

The holders of each share of Series A, Series B, Series C, Series D, Series E, Series F, Series G, Series H, Series I and Series J Preferred Stock are entitled to receive dividends when, as, and if declared by the Company's board of directors in the following order of preference: (i) the Series D, Series E, Series F Series G, Series H, Series I and Series J Preferred Stock, which rank pari passu; (ii) the Series B and Series C Preferred Stock, which rank pari passu; (iii) the Series A Preferred Stock; and then (iv) Common Stock.

Liquidation

The assets of the Company legally available for distribution to stockholders will be distributed in the following order of priority: (i) the holders of the shares of Series D, Series E, Series F, Series G, Series H, Series I and Series J Preferred Stock, which rank pari passu; (ii) the holders of the shares of Series B and Series C Preferred Stock, which rank pari passu; (iii) the holders of the shares of Series A Preferred Stock; and (iv) the holders of the shares of Common Stock. Each series of Preferred Stock is entitled to receive an amount per share equal to the greater of (1) the original issuance price for such series, plus all declared but unpaid dividends thereon, or (2) the amount that the holders of such series would receive per share of Common Stock if all shares of such series of Preferred Stock were converted to Common Stock immediately prior to such liquidation. If upon a deemed liquidation event, the assets of the Company are insufficient to make payment in full to all holders of a series of Preferred Stock, then such assets shall be distributed among the holders of such series of Preferred Stock at the time outstanding ratably in proportion to the full amount to which they would otherwise be respectively entitled. The holders of Common Stock are entitled to receive, after the payment of the liquidation preference of all Preferred Stock outstanding, the remaining assets of the Company on a pro rata basis.

Conversion

Each issued and outstanding share of Preferred Stock is convertible into Common Stock at the holder's option at any time after the date of issuance or automatically upon the occurrence of certain events as defined in the Company's ninth amended and restated certificate of incorporation, at a defined conversion rate. At March 31, 2013, the number of shares of Common Stock into which one share of each series of Preferred Stock was convertible was as follows: the Series A Preferred Stock, 1.07; the Series B Preferred Stock, 1.13; the Series C Preferred Stock, 1.00; the Series D Preferred Stock, 1.00; the Series E Preferred Stock, 1.00; the Series F Preferred Stock, 1.03; the Series G

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

6. Preferred Stock and Stockholders' Deficit (Continued)

Preferred Stock, 1.00; the Series H Preferred Stock, 1.00; the Series I Preferred Stock, 1.00; and the Series J Preferred Stock, 1.00.

The conversion price for each share of Preferred Stock is subject to adjustment upon the occurrence of certain events. The conversion price of each share of a series of Preferred Stock is adjusted if the Company issues additional shares, subject to specified exceptions, at a price lower than the current conversion price for such series, which is measured and recognized if the contingency occurs.

Redemption

To the extent it is then lawfully able to do so, the Company is required at any time, upon written request of the holders of at least 66.67% of the then outstanding Series A, Series B and Series C Preferred Stock collectively, or upon written request of the holders of at least a majority of the then outstanding shares of Series D, Series E and Series F Preferred Stock collectively, in each case as determined on an as-converted to Common Stock basis, to redeem the requested number of outstanding shares of Series A Preferred Stock at $5.00 per share, Series B Preferred Stock at $11.50 per share, and Series C Preferred Stock at $7.12 per share, and/or Series D, E and F Preferred Stock at $11.50 per share, as the case may be.

In addition, to the extent it is lawfully able to do so, the Company is required at any time, upon written request of the holders of at least a majority of the then outstanding shares of Series G Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series G Preferred Stock at $11.50 per share.

To the extent it is lawfully able to do so, the Company is required at any time on or after September 21, 2013, upon written request of the holders of at least a majority of the then outstanding shares of Series H Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series H Preferred Stock at $11.50 per share.

To the extent it is lawfully able to do so, the Company is required at any time on or after July 25, 2015, upon written request of the holders of at least a majority of the then outstanding shares of Series I Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series I Preferred Stock at $11.50 per share.

To the extent it is lawfully able to do so, the Company is required at any time on or after July 27, 2015, upon written request of the holders of at least a majority of the then outstanding shares of Series J Preferred Stock, to redeem, from the holders requesting such redemption, the requested number of outstanding shares of Series J Preferred Stock at $18.00 per share.

If, upon any applicable redemption date, defined as sixty days after the Company receives the written request for redemption, the funds of the Company legally available for redemption of Preferred Stock are insufficient to redeem the total number of shares to be redeemed on that date, those funds that are legally available shall be used to redeem the maximum possible number of shares, ratably among the holders of such shares to be redeemed. All remaining shares not redeemed shall remain outstanding until such time as additional funds become legally available for redemption.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

6. Preferred Stock and Stockholders' Deficit (Continued)

If more than one series of Preferred Stock is contemporaneously subject to redemption, the redemption rights of the Preferred Stock shall follow the liquidation order of priority.

As of March 31, 2013, Preferred Stock with an aggregate redemption value of $103,122,000 was redeemable. During 2013 and 2015, additional shares of Preferred Stock with an aggregate redemption value of $23,154,000 and $82,529,000, respectively, will become redeemable at the option of the holders of Preferred Stock.

Series G Preferred Stock Warrant Transactions

The Company issued 6,128 Series G Preferred Stock warrants in connection with a Loan and Security Agreement. Additionally, the Company issued one Series G Preferred Stock warrant for every two shares of Series G Preferred Stock purchased in 2009 and 2010. The warrants were initially recorded at their fair value calculated using the Black-Scholes model, with the following weighted average assumptions: exercise price of $9.79, share price of $9.79, expected term of three years, risk-free rate of 1.52% and volatility of 85.46%. The warrants are classified as liabilities because they are exercisable for Preferred Stock, and the value of the warrants is adjusted to current fair value at each reporting period end. For the three months ended March 31, 2012 and 2013, the Company recorded $(609,000) and $14,000, respectively, in the consolidated statements of operations and comprehensive loss related to the change in the fair value of the outstanding warrants.

There were no Series G Preferred Stock warrant transactions during the three months ended March 31, 2013.

7. Stock-Based Compensation

In January 2008, the board of directors approved the 2007 Equity Compensation Plan (the "Plan"), which amended and restated the Company's 1999 Stock Based Compensation Plan, which provides for the granting of incentive and nonqualified stock options and restricted stock to its employees, directors and consultants at the discretion of the board of directors. Under the Plan, the Company increases the number of shares reserved for issuance under the Plan such that the number of reserved shares is equal to 17% of the fully diluted shares calculated annually on December 10th. At December 31, 2011 and 2012 and March 31, 2012 and 2013, 3,498,579, 4,107,831, 3,498,579 and 4,107,831 shares of Common Stock were reserved under the Plan, respectively. Stock options may be granted with exercise prices of not less than the estimated fair value of the Company's common stock on the date of grant and generally vest over a period of up to four years. Stock options granted under the Plan generally expire no later than ten years from the date of grant. A summary of stock option

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

7. Stock-Based Compensation (Continued)

activity for the year ended December 31, 2012 and the three months ended March 31, 2013 is as follows:

	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)
Outstanding at December 31, 2012	3,418,228	$ 6.04	7.52
Granted	413,960	9.96	
Exercised	(4,000)	1.50	
Forfeited	(106,000)	9.45	
Outstanding at March 31, 2013	3,722,188	$ 6.41	7.32
Vested or expected to vest at March 31, 2013	3,722,188	$ 6.41	7.32
Exercisable at March 31, 2013	2,334,784	$ 4.83	6.37

At December 31, 2012 and March 31, 2013, the aggregate intrinsic value of the option liability recorded was $11,967,000 and $14,394,000, respectively. During the year ended December 31, 2012 and the three months ended March 31, 2013, the Company granted 1,303,486 and 413,960 options, respectively, at an intrinsic value of $0 at the grant date. At certain times throughout the Company's history, the chairman of the Company's board of directors, who is also a significant stockholder of the Company (the "Significant Holder"), has afforded option holders the opportunity for liquidity in transactions in which options were exercised and the shares of Common Stock issued in connection therewith were simultaneously purchased by the Significant Holder (each, a "Purchase Transaction"). The Company issued an aggregate of 584,726 shares of Common Stock upon the exercise of options in 2012, of which 395,863 shares were then purchased by the Significant Holder in Purchase Transactions. The Company received proceeds of $3,943,000 from the Significant Holder of which $2,835,000 was paid to the option holders upon exercise and settlement of the option liabilities. Because the Company has established a pattern of providing cash settlement alternatives for option holders, the Company has accounted for its stock-based compensation awards as liability awards, the fair value of which is then re-measured at each balance sheet date. Upon the exercise of stock options in 2012 and the three months ended March 31, 2013, stock option liabilities of $4,525,000 and $38,000, respectively, were reclassified to stockholders' deficit.

Stock-based compensation expense includes stock options granted to employees and non-employees and has been reported in the Company's statements of operations and comprehensive loss in either research and development expenses or general and administrative expenses depending on the function performed by the optionee. For the three months ended March 31, 2012 and 2013, $1,170,000 and $1,158,000 was recorded in research and development expenses, respectively. For the three months ended March 31, 2012 and 2013, $1,267,000 and $1,306,000 was recorded in general and administrative expenses, respectively. As of March 31, 2013, the Company had unrecognized stock-based compensation of $2,918,000 related to unvested stock options held by employees and non-employees which is expected to vest over a weighted average period of 2.20 years. No net tax benefits related to the stock-based compensation costs have been recognized since the Company's inception.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

7. Stock-Based Compensation (Continued)

A roll forward of the stock option liability balance for the three months ended March 31, 2013 is as follows:

Balance at December 31, 2012	$ 11,967,000
Change in intrinsic value upon re-measurement	2,465,000
Settlements of option liability awards	(38,000)
Balance at March 31, 2013	$ 14,394,000

Information with respect to stock options outstanding and exercisable at March 31, 2013 is as follows:

Exercise Price	Shares	Weighted Average Remaining Contractual Life (years)	Exercisable
$ 1.00	215,445	1.29	215,445
2.00	86,934	2.82	86,934
4.32	529,150	6.94	476,410
4.50	560,250	4.43	560,250
4.60	810,072	6.95	645,433
5.65	46,977	9.16	34,541
9.96	1,473,360	9.83	315,771
	3,722,188	7.32	2,334,784

On April 23, 2013, the Company distributed a notification letter to all equity award holders under the Plan advising them that Purchase Transactions will no longer occur, unless, at the time of a Purchase Transaction, the option holder has held the Common Stock issued upon exercise of options for a period of greater than six months prior to selling such Common Stock to the Significant Holder and that any such sale to the Significant Holder would be at the fair value of the Common Stock on the date of such sale. Based on these new criteria for Purchase Transactions, the Company remeasured options outstanding under the Plan as of April 23, 2013 to their intrinsic value and reclassified such options from liabilities to stockholders' deficit within the Company's consolidated balance sheets, which amounted to $14,480,000. The Company will recognize $2,831,000 of compensation expense over a weighted average vesting period of 2.16 years related to these modified awards.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

8. Employee Benefit Plan

In October 2007, the Company established a 401(k) Retirement Savings Plan. Employees are eligible to participate in the plan as soon as they join the Company if they are at least 21 years of age and work a minimum of 1,000 hours per year. The Company matches $0.50 for every dollar of the first 6% of payroll that employees invest, up to the legal limit. Employer contributions vest over four years at the rate of 25% per year during the employees' first four years. Thereafter, contributions vest 100% immediately. For the three months ended March 31, 2012 and 2013, the Company contributed $24,000, and $36,000, respectively.

9. Commitments and Contingencies

Operating leases

In November 2010, the Company entered into a lease for 3,117 square feet of office space in Pennington, New Jersey. The lease had an original term of two years, with an option for two additional years. For the first two years of the lease, the Company was obligated to pay $4,400 per month, or $53,000 annually, beginning when possession of the facility was taken on February 1, 2011. The Company was required to provide the landlord a $125,000 letter of credit, the collateral for which is recorded as restricted cash on the consolidated balance sheets. This lease was renewed on February 1, 2012 with a 3.5% increase in the rent, to $5,000 per month. On October 2, 2012, the Company leased an additional 2,130 square feet of office space for $3,100 per month, or $38,000 annually.

In January 2007, the Company entered into a lease for 8,100 square feet of office and lab space in Newtown, Pennsylvania, and in October 2009, the Company and the landlord amended the lease to add three additional one-year options to extend the lease term. The Company exercised the first option for the period from April 1, 2012 to March 31, 2013 and the second option for the period from April 1, 2013 to March 31, 2014 for rent of $11,000 per month. In September 2012, the Company sub-leased an additional 1,356 square feet of office space for one year for $1,600 per month, or $19,000 annually.

Future minimum lease payments under these non-cancellable leases having terms in excess of one year as of December 31, 2012 are as follows:

	December 31, 2012
2013	$ 256,000
2014	103,000
2015	6,000
Total minimum lease payments	$ 365,000

Rent expense was $47,000 and $76,000 for the three months ended March 31, 2012 and 2013, respectively.

Employment agreements

The Company has entered into employment agreements with certain of its executives. The agreements provide for, among other things, salary, bonus and severance payments.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

10. License and Collaboration Agreements

Baxter Agreement

In September 2012, the Company entered into a development and license agreement with Baxter granting Baxter an exclusive, royalty-bearing license for the research, development, commercialization and manufacture (in specified instances) of rigosertib in all therapeutic indications in Europe (the "Baxter Territory"). Baxter is a shareholder in the Company and invested in Series J Preferred Stock issued in July 2012.

Under the terms of the agreement, the Company is initially required to perform research and development to advance three initial rigosertib indications, rigosertib intravenous ("IV") in higher risk myelodysplastic syndrome ("MDS") patients, rigosertib IV in pancreatic cancer patients and rigosertib oral in lower risk MDS patients, through phase 3, phase 3 and phase 2 clinical trials, respectively.

If an additional phase 3 clinical trial beyond the current phase 3 clinical trial in process for rigosertib IV in higher risk MDS patients is required to obtain marketing approval in the Baxter Territory, the Company could require Baxter to fund a percentage of the costs of such additional trial up to a specified maximum. At the completion of the current phase 3 trial for rigosertib IV in pancreatic cancer and the current phase 2 trial for rigosertib oral in lower risk MDS patients and the review of the resulting data and findings, the Company and Baxter will decide whether or not to pursue further development of rigosertib for these indications. If the Company and Baxter mutually agree to progress the development of rigosertib IV in pancreatic cancer patients and rigosertib oral in lower risk MDS patients, then certain milestone payments will be payable to the Company, and the Company will be required to use its commercially reasonable efforts to progress the development of rigosertib for these indications to a drug approval application in the Baxter Territory. The Company and Baxter will work together for potential future rigosertib indications, beyond the initial indications noted above. Generally, if Baxter chooses to participate in the development of additional indications, Baxter will be responsible for a percentage of all research and development costs and expenses and the Company could earn additional milestone payments. Baxter has full responsibility for all commercialization activities for the product in the Baxter Territory, at Baxter's sole cost and expense.

The Company and Baxter have agreed to negotiate a supply agreement under terms satisfactory to both parties whereby the Company will supply Baxter with Baxter's required levels of product to support commercialization efforts in the Baxter Territory. Baxter also has the right to engage third parties for the manufacture and supply of its requirements for the licensed product.

Under the terms of the agreement, Baxter made an upfront payment of $50,000,000. The Company is eligible to receive pre-commercial milestone payments of up to an aggregate of $512,500,000 if specified development and regulatory milestones are achieved. The potential pre-commercial development milestone payments to us include the following:

- $50,000,000 for successful completion of a Phase 3 clinical trial for rigosertib IV in higher risk MDS patients (the "MDS IV indication");
- $25,000,000 for each of the two joint decisions to proceed with the development of rigosertib for certain indications specified in the arrangement with Baxter; and
- $25,000,000 for each drug approval application filed for indications specified in the arrangement with Baxter.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

10. License and Collaboration Agreements (Continued)

The Company may also receive up to $337,500,000 in milestone payments for regulatory approvals of the three rigosertib indications specified in the arrangement with Baxter, each of which may be up to and in excess of $100,000,000. The Company is also potentially eligible to receive an additional $20,000,000 pre-commercial milestone payment related to the timing of regulatory approval of the MDS IV indication in Europe. In addition to these pre-commercial milestones, the Company is eligible to receive up to an aggregate of $250,000,000 in milestone payments based on Baxter's achievement of pre-specified threshold levels of annual net sales of rigosertib. The Company will also be entitled to receive royalties at percentage rates ranging from the low-teens to the low-twenties on net sales of rigosertib by Baxter in the Baxter Territory.

The agreement with Baxter will remain in effect until the expiration of all applicable royalty terms and satisfaction of all payment obligations in each licensed country, unless terminated earlier due to the uncured material breach or bankruptcy of a party, force majeure, or in the event of a specified commercial failure. The Company may terminate the agreement in the event that Baxter brings a challenge against it in relation to the licensed patents. Baxter may terminate the agreement without cause commencing after a specified period of time from the execution of the agreement.

The Company determined that the deliverables under the Baxter agreement include the exclusive, royalty-bearing, sublicensable license to rigosertib and the research and development services to be performed by the Company. The Company concluded that the license had standalone value to Baxter and was separable from the research and development services because the license is sublicensable, there are no restrictions as to Baxter's use of the license and Baxter has significant research capabilities in this field. The Company was not able to establish vendor-specific objective evidence of selling price or third-party evidence for either the license or the research and development services and instead allocated the arrangement consideration between the license and research and development services based on their relative selling prices using best estimate of selling price ("BESP"). Management developed the BESP of the license using a discounted cash flow model, taking into consideration assumptions including the development and commercialization timeline, discount rate and probability of success. Management utilized a third party valuation specialist to assist with the determination of BESP of the license. Management estimated the selling price of the research and development services using third party costs and a discounted cash flow model. The estimated selling prices utilized assumptions including internal estimates of research and development personnel needed to perform the research and development services; and estimates of expected cash outflows to third parties for services and supplies over the expected period that the services will be performed.

The key assumptions in these models included the following market conditions and entity-specific factors: (a) the specific rights provided under the license, (b) the stage of development of rigosertib and estimated remaining development and commercialization timelines, (c) the probability of successfully developing and commercializing rigosertib, (d) the market size including the associated sales figures which generate royalty revenue, (e) cost of goods sold, which was assumed to be a specified percentage of revenues based on estimated cost of goods sold of a typical oncology product, (f) sales and marketing costs, which were based on the costs required to field an oncology sales force and marketing group, including external costs required to promote an oncology product, (g) the expected product life of rigosertib assuming commercialization and (h) the competitive environment.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

10. License and Collaboration Agreements (Continued)

The Company utilized a discount rate of 16%, representing the cost of capital derived from returns on equity for comparable companies.

Based on management's analyses, it was determined that the BESP of the license was $120,000,000 and the BESP of the research and development services was $20,600,000. As noted above, the Company received an up-front payment of $50,000,000 under the Baxter agreement, which represents the allocable agreement consideration. Based on the respective BESPs, this payment was allocated $42,400,000 to the license and $7,600,000 to the research and development services. Since the delivery of the license occurred upon the execution of the Baxter agreement and there was no general right of return, $42,400,000 of the $50,000,000 upfront payment was recognized upon the execution of the Baxter agreement. The portion allocated to research and development services is being recognized over the period of performance on a proportional performance basis through March 31, 2014. Management estimated the period of performance to be the period necessary for completion of the non-contingent obligations to perform research and development services required to advance the three formulations of rigosertib described above. For the three months ended March 31, 2013, the Company recognized $978,000 of research and development revenue under the Baxter agreement.

The Company and Baxter have agreed to establish a joint committee to facilitate the governance and oversight of the parties' activities under the agreements. Management considered whether participation on the joint committee may be a deliverable and determined that it was not a deliverable. Had management considered participation on the joint committee as a deliverable, it would not have had a material impact on the accounting for the arrangement based on the analysis of the estimated selling price of such participation.

As noted above, in July 2012, Baxter purchased Series J Preferred Stock. Because the Series J Preferred Stock was acquired within several months of the Baxter development and license agreement, management considered whether the Preferred Stock was issued at fair value and if not, whether the consideration received for the Preferred Stock ($50,000,000) or for the collaboration and license agreement ($50,000,000) should be allocated in the financial statements in a manner differently than the prices stated in the agreements. Management, with the assistance of an outside valuation specialist, determined that the price paid by Baxter for the Series J Preferred Stock approximated its fair value, and therefore the consideration received under the agreements was allocated in accordance with terms of the individual agreements.

SymBio Agreement

In July 2011, the Company entered into a license agreement with SymBio, as subsequently amended, granting SymBio an exclusive, royalty-bearing license for the development and commercialization of rigosertib in Japan and Korea. Under the SymBio license agreement, SymBio is obligated to use commercially reasonable efforts to develop and obtain market approval for rigosertib inside the licensed territory and the Company has similar obligations outside of the licensed territory. The Company has also entered into an agreement with SymBio providing for it to supply SymBio with development-stage product. Under the SymBio license agreement, the Company also agreed to supply commercial product to SymBio under specified terms that will be included in a commercial supply agreement to be negotiated prior to the first commercial sale of rigosertib. The supply of development-stage product and the supply of commercial product will be at the Company's cost plus a defined profit

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

10. License and Collaboration Agreements (Continued)

margin. Sales of development-stage product have been de minimis. The Company has additionally granted SymBio a right of first negotiation to license or obtain the rights to develop and commercialize compounds having a chemical structure similar to rigosertib in the licensed territory.

Under the terms of the SymBio license agreement, the Company received an upfront payment of $7,500,000. The Company is eligible to receive milestone payments of up to an aggregate of $33,000,000 from SymBio upon the achievement of specified development and regulatory milestones for specified indications. Of the development milestones, $3,000,000 is due after enrollment of the first patient in the event a decision is made, after the Company's interim analysis, to start a phase 3 clinical trial of rigosertib IV in combination with gemcitabine for pancreatic cancer patients in the United States. Of the regulatory milestones, $5,000,000 is due upon receipt of marketing approval in the United States for rigosertib IV in higher risk MDS patients, $3,000,000 is due upon receipt of marketing approval in Japan for rigosertib IV in higher risk MDS patients, $5,000,000 is due upon receipt of marketing approval in the United States for rigosertib oral in lower risk MDS patients, $5,000,000 is due upon receipt of marketing approval in Japan for rigosertib oral in lower risk MDS patients, $5,000,000 is due upon receipt of marketing approval in the United States for rigosertib IV in combination with gemcitabine in pancreatic cancer patients, and $3,000,000 is due upon receipt of marketing approval in Japan for rigosertib IV in combination with gemcitabine for pancreatic cancer patients. Furthermore, upon receipt of marketing approval in the United States and Japan for an additional indication of rigosertib, which we are currently not pursuing, an aggregate of $4,000,000 would be due. In addition to these pre-commercial milestones, the Company is eligible to receive tiered milestone payments based upon annual net sales of rigosertib by SymBio of up to an aggregate of $30,000,000. Further, under the terms of the SymBio license agreement, SymBio will make royalty payments to the Company at percentage rates ranging from the mid-teens to 20% based on net sales of rigosertib by SymBio.

Royalties will be payable under the SymBio agreement on a country-by-country basis in the licensed territory, until the later of the expiration of marketing exclusivity in those countries, a specified period of time after first commercial sale of rigosertib in such country, or the expiration of all valid claims of the licensed patents covering rigosertib or the manufacture or use of rigosertib in such country. If no valid claim exists covering the composition of matter of rigosertib or the use of or treatment with rigosertib in a particular country before the expiration of the royalty term, and specified competing products achieve a specified market share percentage in such country, SymBio's obligation to pay the Company royalties will continue at a reduced royalty rate until the end of the royalty term. In addition, the applicable royalties payable to the Company may be reduced if SymBio is required to pay royalties to third-parties for licenses to intellectual property rights necessary to develop, use, manufacture or commercialize rigosertib in the licensed territory. The license agreement with SymBio will remain in effect until the expiration of the royalty term. However, the SymBio license agreement may be terminated earlier due to the uncured material breach or bankruptcy of a party, or force majeure. If SymBio terminates the license agreement in these circumstances, its licenses to rigosertib will survive, subject to SymBio's milestone and royalty obligations, which SymBio may elect to defer and offset against any damages that may be determined to be due from the Company. In addition, the Company may terminate the license agreement in the event that SymBio brings a challenge against it in relation to the licensed patents, and SymBio may terminate the license agreement without cause by providing the Company with written notice within a specified period of time in advance of termination.

Onconova Therapeutics, Inc.

Notes to Condensed Consolidated Financial Statements (Continued)

(Unaudited)

10. License and Collaboration Agreements (Continued)

The Company determined that the deliverables under the SymBio agreement include the exclusive, royalty-bearing, sublicensable license to rigosertib, the research and development services to be provided by the Company and its obligation to serve on a joint committee. The Company concluded that the license did not have standalone value to SymBio and was not separable from the research and development services, because of the uncertainty of SymBio's ability to develop rigosertib in the SymBio territory on its own and the uncertainty of SymBio's ability to sublicense rigosertib and recover a substantial portion of the original upfront payment of $7,500,000 paid by SymBio to the Company.

The supply of rigosertib for SymBio's commercial requirements is contingent upon the receipt of regulatory approvals to commercialize rigosertib in Japan and Korea. Because the Company's commercial supply obligation was contingent upon the receipt of future regulatory approvals, and there were no binding commitments or firm purchase orders pending for commercial supply at or near the execution of the agreement, the commercial supply obligation is deemed to be contingent and is not valued as a deliverable under the SymBio agreement. If SymBio orders the supplies from the Company, the Company expects the pricing for this supply to equal its third-party manufacturing cost plus a pre-negotiated percentage, which will not result in a significant incremental discount to market rates.

Due to the lack of standalone value for the license, research and development services, and joint committee obligation, the upfront payment is being recognized ratably using the straight line method through December 2027, the expected term of the agreement. For each of the three months ended March 31, 2012 and 2013, the Company recognized revenues of $113,000 under this agreement. In addition, the Company recognized revenues of $25,000 for the three months ended March 31, 2013 related to the supply agreement with SymBio.

Shares

Common Stock

PRELIMINARY PROSPECTUS

, 2013

Citigroup

Leerink Swann

Piper Jaffray

Janney Montgomery Scott

Through and including , 2013 (25 days after the commencement of this offering), all dealers that buy, sell or trade shares of our common stock, whether or not participating in this offering, may be required to deliver a prospectus. This delivery requirement is in addition to the dealers' obligation to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth all costs and expenses, other than underwriting discounts and commissions, paid or payable by us in connection with the sale of the common stock being registered. All amounts shown are estimates except for the SEC registration fee, the Financial Industry Regulatory Authority, or FINRA, filing fee and the initial listing fee for the NASDAQ Global Market.

	Amount
SEC registration fee	$ 10,230
FINRA filing fee	8,000
NASDAQ Global Market listing fee	*
Blue sky qualification fees and expenses	*
Printing expenses	*
Legal fees and expenses	*
Accounting fees and expenses	*
Transfer agent and registrar fees and expenses	*
Miscellaneous expenses	*
Total	$ *

* To be completed by amendment.

Item 14. Indemnification of Directors and Officers.

We are incorporated under the laws of the State of Delaware. Section 145 of the Delaware General Corporation Law provides that a Delaware corporation may indemnify any persons who are, or are threatened to be made, parties to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of such corporation), by reason of the fact that such person was an officer, director, employee or agent of such corporation, or is or was serving at the request of such person as an officer, director, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit or proceeding, provided that such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests and, with respect to any criminal action or proceeding, had no reasonable cause to believe that his or her conduct was illegal. A Delaware corporation may indemnify any persons who are, or are threatened to be made, a party to any threatened, pending or completed action or suit by or in the right of the corporation by reason of the fact that such person was a director, officer, employee or agent of such corporation, or is or was serving at the request of such corporation as a director, officer, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees) actually and reasonably incurred by such person in connection with the defense or settlement of such action or suit provided that such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests except that no indemnification is permitted without judicial approval if the officer or director is adjudged to be liable to the corporation. Where an officer or director is successful on the merits or otherwise in the defense of any action referred to above, the corporation must indemnify him or her against the expenses which such officer or director has actually and reasonably incurred. Our certificate of incorporation and bylaws, each of which will become effective upon consummation of this offering, provide for the indemnification of our directors and officers to the fullest extent permitted under the Delaware General Corporation Law.

Section 102(b)(7) of the Delaware General Corporation Law permits a corporation to provide in its certificate of incorporation that a director of the corporation shall not be personally liable to the corporation or its stockholders for monetary damages for breach of fiduciary duties as a director, except for liability for any:

- transaction from which the director derives an improper personal benefit;
- act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payment of dividends or redemption of shares; or
- breach of a director's duty of loyalty to the corporation or its stockholders.

Our certificate of incorporation includes such a provision. Expenses incurred by any officer or director in defending any such action, suit or proceeding in advance of its final disposition shall be paid by us upon delivery to us of an undertaking, by or on behalf of such director or officer, to repay all amounts so advanced if it shall ultimately be determined that such director or officer is not entitled to be indemnified by us.

As permitted by the Delaware General Corporation Law, we intend to enter into indemnification agreements with our directors and executive officers. These agreements, among other things, will require us to indemnify each director and officer to the fullest extent permitted by law and advance expenses to each indemnitee in connection with any proceeding in which indemnification is available.

At present, there is no pending litigation or proceeding involving any of our directors or executive officers as to which indemnification is required or permitted, and we are not aware of any threatened litigation or proceeding that may result in a claim for indemnification.

We have an insurance policy covering our officers and directors with respect to certain liabilities, including liabilities arising under the Securities Act of 1933, as amended, or the Securities Act, or otherwise.

Item 15. Recent Sales of Unregistered Securities.

Set forth below is information regarding shares of preferred stock and convertible promissory notes issued and options granted by us within the past three years that were not registered under the Securities Act. Also included is the consideration, if any, received by us for such shares, notes and options and information relating to the section of the Securities Act, or rule of the SEC, under which exemption from registration was claimed.

(a) Issuances of Capital Stock:

(1) On September 21, 2010, we issued an aggregate of 668,602 shares of our Series H convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $6,545,613.58.

(2) On November 4, 2010, we issued an aggregate of 299,797 shares of our Series H convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $2,935,012.63.

(3) On December 22, 2010, we issued an aggregate of 225,696 shares of our Series H convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $2,209,563.84.

(4) On February 17, 2011, we issued 71,488 shares of our shares of our Series H convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $699,867.52.

(5) On June 6, 2011, we issued an aggregate of 135,391 shares of our Series H convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $1,325,477.89.

(6) On September 19, 2011, we issued an aggregate of 612,450 shares of our Series H convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $5,995,885.50.

(7) On July 25, 2012, $26,444,316.00 aggregate principal amount and accrued interest thereon of our convertible promissory notes were converted into 2,433,328 shares of our Series I convertible preferred stock at a price per share of $11.00.

(8) On July 27, 2012, we issued an aggregate of 3,030,303 shares of our Series J convertible preferred stock at a price per share of $16.50 for an aggregate purchase price of $49,999,999.50.

(9) Since May 1, 2010, we issued an aggregate of 417,404 shares of our Series G convertible preferred stock at a price per share of $9.79 for an aggregate purchase price of $4,086,385 pursuant to the exercise of warrants.

(10) Since May 1, 2010, we issued an aggregate of 965,627 shares of our common stock at prices ranging from $0.75 to $5.65 per share to certain of our employees, consultants and directors pursuant to the exercise of stock options under the Onconova Therapeutics, Inc. 2007 Equity Compensation Plan, for an aggregate purchase price of $1,703,824.

(b) Issuance of Convertible Notes

(1) On April 27, 2012, we sold $7,050,000.00 aggregate principal amount of our convertible promissory notes for an aggregate purchase price of $7,050,000.00.

(2) On June 29, 2012, we sold $4,619,000.00 aggregate principal amount of our convertible promissory notes for an aggregate purchase price of $4,619,000.00.

(3) On July 18, 2012, we sold $14,775,316.00 aggregate principal amount of our convertible promissory notes for an aggregate purchase price of $14,775,316.00.

(c) Grants of Stock Options:

(1) Since May 1, 2010, we have granted stock options to purchase an aggregate of 2,607,812 shares of our common stock with exercise prices ranging from $4.32 to $11.06 per share, to certain of our employees, consultants and directors in connection with services provided by such parties to us.

We deemed the offers, sales and issuances of the securities described in paragraphs (a)(1) through (a)(9) and (b)(1) through (b)(3) above to be exempt from registration under the Securities Act in reliance on Section 4(2) of the Securities Act, including in some cases, Regulation D and Rule 506 promulgated thereunder and/or Regulation S promulgated thereunder, relative to transactions by an issuer not involving a public offering, to the extent an exemption from such registration was required.

We deemed the issuance of the securities described in paragraph (a)(10) above and the grant of stock options described in paragraph (c)(1) above to be exempt from registration under the Securities Act in reliance on Rule 701 promulgated under the Securities Act as offers and sales of securities under written compensatory benefit plans and contracts relating to compensation in compliance with Rule 701 promulgated under the Securities Act and/or Section 4(2) of the Securities Act, relative to transactions by an issuer not involving a public offering, to the extent an exemption from such registration was required. Each of the recipients of securities in any transaction exempt from registration either received or had adequate access, through employment, business or other relationships, to information about us.

All purchasers of securities in transactions exempt from registration pursuant to Regulation D promulgated under the Securities Act described above represented to us in connection with their purchase that they were accredited investors and were acquiring the securities for investment purposes only and not with a view to, or for sale in connection with, any distribution thereof and that they could bear the risks of the investment and could hold the securities for an indefinite period of time. The purchasers received written disclosures that the securities had not been registered under the Securities Act and that any resale must be made pursuant to a registration statement or an available exemption from the registration requirements of the Securities Act.

All of the foregoing securities are deemed restricted securities for purposes of the Securities Act. The certificates representing the issued securities described in this Item 15 included appropriate legends setting forth that the applicable securities have not been registered and reciting the applicable restrictions on transfer. There were no underwriters employed in connection with any of the transactions set forth in this Item 15.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits. See the Index to Exhibits attached to this registration statement, which is incorporated by reference herein.

(b) Financial statement schedule. No financial statement schedules are provided because the information called for is not required or is shown either in the financial statements or notes.

Item 17. Undertakings.

The undersigned Registrant hereby undertakes to provide to the underwriter at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriter to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

The undersigned Registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this Registration Statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

SIGNATURES

Pursuant to the requirements of the Securities Act, the Registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Newtown, Commonwealth of Pennsylvania, on the 14th day of June, 2013.

ONCONOVA THERAPEUTICS, INC.

By: /s/ RAMESH KUMAR, PH.D.

Ramesh Kumar, Ph.D.
President and Chief Executive Officer

POWER OF ATTORNEY

Each of the undersigned directors and officers of Onconova Therapeutics, Inc. hereby constitutes and appoints each of Ramesh Kumar, Ph.D. and Ajay Bansal, his true and lawful attorneys-in-fact and agents with full power of substitution and resubstitution, for him and his name, place and stead, in any and all capacities, to execute any and all amendments (including post-effective amendments) to this registration statement, to sign any registration statement related to this registration statement filed pursuant to Rule 462(b) of the Securities Act of 1933, and to cause the same to be filed with all exhibits thereto, and all documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and desirable to be done in and about the premises as fully and to all intents and purposes as the undersigned might or could do in person, hereby ratifying and confirming all acts and things that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
/s/ RAMESH KUMAR, PH.D. Ramesh Kumar, Ph.D.	Director, President and Chief Executive Officer (Principal Executive Officer)	June 14, 2013
/s/ AJAY BANSAL Ajay Bansal	Director and Chief Financial Officer (Principal Financial Officer)	June 14, 2013
/s/ JAMES R. ALTLAND James R. Altland	Senior Vice President, Finance & Corporate Development (Principal Accounting Officer)	June 14, 2013
/s/ MICHAEL B. HOFFMAN Michael B. Hoffman	Chairman, Board of Directors	June 14, 2013
/s/ HENRY S. BIENEN, PH.D. Henry S. Bienen, Ph.D.	Director	June 14, 2013

Signature	Title	Date
/s/ VIREN MEHTA Viren Mehta	Director	June 14, 2013
/s/ SARATH NARU Sarath Naru	Director	June 14, 2013
/s/ PANKAJ R. PATEL Pankaj R. Patel	Director	June 14, 2013
/s/ E. PREMKUMAR REDDY, PH.D. E. Premkumar Reddy, Ph.D.	Director	June 14, 2013
/s/ ALAN R. WILLIAMSON, PH.D. Alan R. Williamson, Ph.D.	Director	June 14, 2013

INDEX TO EXHIBITS

Exhibit Number	Exhibit Description
1.1†	Form of Underwriting Agreement.
3.1†	Form of Tenth Amended and Restated Certificate of Incorporation of Onconova Therapeutics, Inc., to be effective upon consummation of this offering.
3.2†	Form of Amended and Restated Bylaws of Onconova Therapeutics, Inc., to be effective upon consummation of this offering.
4.1†	Form of Certificate of Common Stock.
4.2	Eighth Amended and Restated Stockholders' Agreement, effective as of July 27, 2012, by and among Onconova Therapeutics, Inc. and certain stockholders named therein.
5.1†	Form of opinion of Dechert LLP regarding the validity of the securities being registered.
10.1*	Development and License Agreement, effective as of September 19, 2012, by and between Onconova Therapeutics, Inc. and Baxter Healthcare SA.
10.2*	License Agreement, effective as of July 5, 2011, by and between Onconova Therapeutics, Inc. and SymBio Pharmaceuticals Limited.
10.3*	First Amendment to License Agreement, effective as of September 2, 2011, by and between Onconova Therapeutics, Inc. and SymBio Pharmaceuticals Limited.
10.4*	License Agreement, effective as of January 1, 1999, by and between Onconova Therapeutics, Inc. and Temple University—Of The Commonwealth System of Higher Education.
10.5*	Amendment to License Agreement, effective as of September 1, 2000, by and between Temple University—Of The Commonwealth System of Higher Education and Onconova Therapeutics, Inc.
10.6*	Amendment #1 to Exclusive License Agreement, effective as of March 21, 2013, by and between Temple University—Of The Commonwealth System of Higher Education and Onconova Therapeutics, Inc.
10.7*	Definitive Agreement, effective as of May 12, 2010, by and between Onconova Therapeutics, Inc. and The Leukemia and Lymphoma Society.
10.8*	First Amendment to Definitive Agreement, effective as of June 23, 2011, by and between Onconova Therapeutics, Inc. and The Leukemia and Lymphoma Society.
10.9*	Second Amendment to Definitive Agreement, effective as of May 29, 2012, by and between Onconova Therapeutics, Inc. and The Leukemia and Lymphoma Society.
10.10*	Third Amendment to Definitive Agreement, effective as of January 5, 2013, by and between Onconova Therapeutics, Inc. and The Leukemia and Lymphoma Society.
10.11	Termination of Agreement, effective as of February 5, 2013, by and between Onconova Therapeutics, Inc. and The Leukemia and Lymphoma Society.
10.12*	Limited Liability Company Agreement of GBO, LLC, dated as of December 12, 2012, by and between Onconova Therapeutics, Inc. and GVK Biosciences Private Limited.
10.13†+	Amended and Restated Onconova Therapeutics, Inc. 2007 Equity Compensation Plan, and forms of agreement thereunder.

Exhibit Number	Exhibit Description
10.14+	Employment Agreement, effective as of April 1, 2007, by and between Onconova Therapeutics, Inc. and Ramesh Kumar, Ph.D., including extension letter, dated April 10, 2010, and Employment Agreement Renewal, dated January 10, 2013.
10.15+	Amendment to Employment Agreement, effective as of December 21, 2012, by and between Onconova Therapeutics, Inc. and Ramesh Kumar, Ph.D.
10.16+	Employment Agreement, effective as of September 1, 2012, by and between Onconova Therapeutics, Inc. and Thomas McKearn, M.D., Ph.D.
10.17+	Amendment to Employment Agreement, effective as of April 9, 2013, by and between Onconova Therapeutics, Inc. and Thomas McKearn, M.D., Ph.D.
10.18+	Employment Agreement, effective as of April 17, 2008, by and between Onconova Therapeutics, Inc. and François Wilhelm, M.D., including Employment Agreement Renewals, dated March 30, 2010 and January 10, 2013.
10.19+	Amendment to Employment Agreement, effective as of December 21, 2012, by and between Onconova Therapeutics, Inc. and Francois Wilhelm, M.D.
10.20+	Employment Agreement, effective as of January 1, 2007, by and between Onconova Therapeutics, Inc. and Dr. Manoj Maniar, including Employment Agreement Renewals, dated March 30, 2010 and January 10, 2013.
10.21+	Amendment to Employment Agreement, effective as of December 21, 2012, by and between Onconova Therapeutics, Inc. and Dr. Manoj Maniar.
10.22+	Employment Agreement, effective as of March 20, 2013, by and between Onconova Therapeutics, Inc. and Ajay Bansal.
10.23+	Consulting Agreement, effective as of January 1, 2012, by and between Onconova Therapeutics, Inc. and E. Premkumar Reddy, Ph.D., including Consultant Agreement Renewal, dated February 27, 2013.
10.24†	Form of Indemnification Agreement.
16.1	Letter from EisnerAmper LLP, as to the change in certifying accountant, dated as of June 14, 2013.
21.1	Subsidiaries of Onconova Therapeutics, Inc.
23.1	Consent of Ernst & Young LLP.
23.2	Consent of EisnerAmper LLP.
23.3†	Consent of Dechert LLP (included in Exhibit 5.1).
24.1	Power of Attorney (included on the signature page).

† To be filed by amendment.

+ Indicates management contract or compensatory plan.

* Confidential treatment has been requested with respect to certain portions of this exhibit. Omitted portions have been filed separately with the Securities and Exchange Commission.

EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

THIS EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT (this "Agreement") made as of July 27, 2012, by and among Onconova Therapeutics, Inc., a Delaware corporation (the "Corporation"), the persons listed as owners of Series A Preferred Stock on Schedule I hereto (the "Series A Investors"), the persons listed as owners of Series B Preferred Stock on Schedule I hereto (the "Series B Investors"), the persons listed as owners of Series C Preferred Stock on Schedule I hereto (the "Series C Investors"), the persons listed as owners of Series D Preferred Stock on Schedule I hereto (the "Series D Investors"), the persons listed as owners of Series E Preferred Stock on Schedule I hereto (the "Series E Investors"), the persons listed as owners of Series F Preferred Stock on Schedule I hereto (the "Series F Investors"), the persons listed as owners of Series G Preferred Stock and/or Warrants to purchase Series G Preferred Stock (the "Series G Warrants") on Schedule I hereto (the "Series G Investors"), the persons listed as owners of Series H Preferred Stock on Schedule I hereto (the "Series H Investors"), the persons listed as owners of Series I Preferred Stock on Schedule I hereto (the "Series I Investors") and the persons listed as owners of Series J Preferred Stock on Schedule I hereto (the "Series J Investors" and, together with the Series A Investors, Series B Investors, Series C Investors, Series D Investors, Series E Investors, Series F Investors, Series G Investors, Series H Investors and Series I Investors, collectively, the "Investors"), and the persons listed as Common Stockholders on Schedule I hereto (with the Investors, the "Stockholders").

BACKGROUND

Each of the Stockholders owns that number of shares of Common Stock, Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock and/or Series G Warrants, Series H Preferred Stock, Series I Preferred Stock and Series J Preferred Stock (together with any other shares of capital stock of the Corporation now owned or hereafter acquired by the Stockholders and their successors or assigns from any Person by any means, including without limitation, any acquisition by gift, purchase, dividend, conversion, stock split, recapitalization or otherwise, collectively, the "Shares") set forth opposite the name of each such Stockholder on Schedule I attached hereto. It is deemed to be in the best interest of the Corporation and the Stockholders that provision be made for the continuity and stability of the business and policies of the Corporation and, to that end, the Corporation and the Stockholders hereby set forth their agreement with respect to the Shares.

NOW, THEREFORE, in consideration of the premises and of the mutual consents and obligations hereinafter set forth, the parties hereto hereby agree as follows:

SECTION 1. Definitions. All capitalized terms used in this Agreement shall have the meanings assigned to them elsewhere in this Agreement or as specified below:

"Affiliate" of any Person shall mean any Person directly or indirectly controlling, controlled by or under common control with such Person.

"Certificate of Incorporation" shall mean the Corporation's Ninth Amended and Restated Certificate of Incorporation, setting forth, among other things, the designations, rights, preferences and privileges and qualifications, limitations and restrictions of Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and Series J Preferred Stock.

"Commission" shall mean the United States Securities and Exchange Commission.

"Common Stock" shall mean (a) the Corporation's Common Stock, par value $.0l per share, as authorized on the date of this Agreement, (b) any other capital stock of any class or classes (however designated) of the Corporation, authorized on or after the date hereof, the holders of which shall have the right, without limitation as to amount, either to all or to a share of the balance of current dividends and liquidating distributions after the payment of dividends and distributions on any shares entitled to preference under the Certificate of Incorporation (as the same may be further amended from time to time), and (c) any other securities into which or for which any of the securities described in clause (a) or (b) of this definition may be converted or exchanged pursuant to a plan of recapitalization, reorganization, merger, sale of assets or otherwise.

"Corporation Notice" shall have the meaning set forth in Section 3(b) hereof.

"Demand Holder" shall mean any holder of Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock (or shares of Common Stock issued upon conversion of shares of Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock) owning of record Registrable Securities that have not been sold to the public and, for purposes of this Agreement, a record holder of the Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock convertible into such Registrable Securities shall be deemed to be the Demand Holder of such Registrable Securities; provided, however, that the Corporation shall in no event be obligated to register the Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock or Series J Preferred Stock, and that Demand Holders of Registrable Securities shall not be required to convert their shares of Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock into Common Stock in order to exercise the registration rights granted under Section 5(f) hereof, until immediately before the closing of the offering to which the registration relates.

"Designated Offering" shall mean a firmly underwritten public offering registered under the Securities Act, where the gross proceeds to the Corporation from such offering, after

deducting underwriters discounts, are not less than $25,000,000, and at a per share price (determined on a common stock equivalent basis) of at least $16.50 (or such lower price, down to $11.50, to which the holders of a majority of the outstanding shares of Series J Preferred Stock may consent in writing) as adjusted for stock splits, stock dividends, stock combinations or stock reclassifications.

"Equity Securities" shall have the meaning set forth in Section 2(a) hereof.

"Exchange Act" shall mean the Securities Exchange Act of 1934, as amended, and the rules and regulations of the Commission promulgated thereunder, all as the same shall be in effect at the time.

"Excluded Form" shall mean a registration statement filed pursuant to the Securities Act on Form S-8, S-4 or any similar or successor forms.

"Excluded Securities" shall mean those securities described in Section 2(f) hereof.

"Form S-3" shall mean such form under the Securities Act as is in effect on the date hereof or any successor registration form under the Securities Act subsequently adopted by the Commission that permits inclusion or incorporation of substantial information by reference to other documents filed by the Corporation with the Commission.

"Founders" shall mean the following individuals: Dr. E. Premkumar Reddy, Dr. John R. Jenkins and Dr. Ramesh Kumar, each of whom has an address specified on Schedule I hereto.

"Founders Notice" shall have the meaning set forth in Section 3(c) hereof.

"Holder" shall mean any holder of Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series G Warrants, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock (or shares of Common Stock issued (either directly or indirectly) upon conversion thereof) owning of record Registrable Securities that have not been sold to the public and, for purposes of this Agreement, a record holder of the Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series G Warrants, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock convertible (either directly or indirectly) into such Registrable Securities shall be deemed to be the Holder of such Registrable Securities; provided, however, that the Corporation shall in no event be obligated to register the Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series G Warrants, Series H Preferred Stock, Series I Preferred Stock or Series J Preferred Stock, and that Holders of Registrable Securities shall not be required to convert their shares of Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock into Common Stock, or exercise their Series G Warrants and convert the shares issued thereunder into

Common Stock, in order to exercise the registration rights granted under Section 5 hereof, until immediately before the closing of the offering to which the registration relates.

"Investor Oversubscription Rights" shall have the meaning set forth in Section 2(b) hereof.

"Majority Investors" shall have the meaning set forth in Section 2 hereof.

"Mehta Investors" shall mean Mehta Partners, LLC and/or its affiliates that are parties to the Series B Purchase Agreement.

"Non-Principal Transferring Stockholder" shall have the meaning set forth in Section 3(a) hereof.

"Notice of Acceptance" shall have the meaning set forth in Section 2(c) hereof.

"Offer" shall have the meaning set forth in Section 2(a) hereof.

"Oversubscribing Investor" shall have the meaning set forth in Section 2(b) hereof.

"Permitted Transfer" and "Permitted Transferee" shall have the meanings set forth in Section 3(d) hereof.

"Person" shall mean and include an individual, a corporation, a limited liability company, a partnership, a trust, an unincorporated organization and a government or any department, agency or political subdivision thereof.

"Preferred Stock" shall mean, collectively, the Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and Series J Preferred Stock.

"Principal Stockholders" shall mean the following individuals: Dr. E. Premkumar Reddy and Dr. Ramesh Kumar, each of whom has an address specified on Schedule I hereto.

"Principal Transferring Stockholder" shall have the meaning set forth in Section 3(a) hereof.

"Register", "registered" and "registration" shall refer to a registration effected by preparing and filing a registration statement in compliance with the Securities Act, and the declaration or ordering of effectiveness of such registration statement.

"Registrable Securities" shall mean: (a) all the shares of Common Stock of the Corporation issued or issuable upon the conversion of the shares of Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock that are now owned or may hereafter be acquired

by any Holder or its permitted successors and assigns, including upon exercise of the Series G Warrants; and (b) any shares of Common Stock of the Corporation issued as (or issuable upon the conversion or exercise of any warrant, right or other security which is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, all such shares of Common Stock described in clause (a) of this definition; excluding in all cases, however, (i) any Registrable Securities sold pursuant to registration under the Securities Act or (ii) any Registrable Securities sold, subsequent to the Corporation's initial public offering of securities registered under the Securities Act, pursuant to Rule 144 (or similar or successor rule) promulgated under the Securities Act.

"Registrable Securities then outstanding" shall mean the number of shares of Registrable Securities that are then issued and outstanding or are then issuable pursuant to the exercise or conversion of then outstanding and then exercisable options, warrants or convertible securities.

"Remaining Securities" shall have the meaning set forth in Section 2(d) hereof.

"Sale Shares" shall have the meaning set forth in Section 3(a) hereof.

"Securities Act" shall mean the Securities Act of 1933, as amended, and the rules and regulations of the Commission promulgated thereunder, all as the same shall be in effect at the time.

"Series A Preferred Stock" shall mean the Corporation's authorized 400,000 shares of Series A Convertible Preferred Stock, par value $.0l per share, having the designations, rights, preferences and privileges and qualifications, limitations and restrictions of preferred stock set forth in the Certificate of Incorporation.

"Series A Purchase Agreement" shall mean either the Stock Purchase and Subscription Agreement dated as of December 3, 1999 or the Stock Purchase and Subscription Agreement dated as of January 20, 2000, between the Corporation and the Series A Investors, as the same may be amended from time to time individually, or both such agreements together, as the context may require.

"Series B Directors" shall have the meaning set forth in Section 15(b) hereof.

"Series B Preferred Stock" shall mean the Corporation's authorized 1,200,000 shares of Series B Convertible Preferred Stock, par value $.01 per share, having the designations, rights, preferences and privileges and qualifications, limitations and restrictions of preferred stock set forth in the Certificate of Incorporation.

"Series B Purchase Agreement" shall mean the Series B Convertible Preferred Stock Purchase Agreement dated as of November 14, 2000, between the Corporation and the Series B Investors, as the same may be amended from time to time.

"Series C Preferred Stock" shall mean the Corporation's authorized 1,200,000 shares of Series C Convertible Preferred Stock, par value $.01 per share, having the designations,

rights, preferences and privileges and qualifications, limitations and restrictions of preferred stock set forth in the Certificate of Incorporation.

"Series C Purchase Agreement" shall mean the Series C Convertible Preferred Stock Purchase Agreement, dated as of December 27, 2002, between the Corporation and the Series C Investors, as the same may be amended from time to time.

"Series D Director" shall have the meaning set forth in Section 15(b) hereof.

"Series D Preferred Stock" shall mean the Corporation's authorized 1,625,000 shares of Series D Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series D Purchase Agreement" shall mean the Series D Convertible Preferred Stock Purchase Agreement, dated as of March 19, 2004, between the Corporation and the Series D Investors, as amended by that certain First Amendment to Series D Convertible Preferred Stock Purchase Agreement, between the Corporation and the Series D Investors, dated July 15, 2004.

"Series E Preferred Stock" shall mean the Corporation's authorized 1,650,000 shares of Series E Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series E Purchase Agreement" shall mean each of the Series E Convertible Preferred Stock Purchase Agreement, dated as of March 18, 2005, between the Corporation and the Series E Investors and the Second Series E Stock Purchase Agreement, as amended, dated as of December 1, 2005, between the Corporation and the Series E Investors.

"Series F Preferred Stock" shall mean the Corporation's authorized 2,000,000 shares of Series F Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series F Purchase Agreement" shall mean the Series F Convertible Preferred Stock Purchase Agreement, dated as of May 15, 2007, between the Corporation and the Series F Investors.

"Series G Preferred Stock" shall mean the Corporation's authorized 2,700,000 shares of Series G Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series G Purchase Agreement" shall mean the Series G Convertible Preferred Stock Purchase Agreement, dated as of May 12, 2009, between the Corporation and certain of the Series G Investors, as the same has been amended and may be further amended from time to time.

"Series H Director" shall have the meaning set forth in Section 15(b)(i) hereof.

"Series H Preferred Stock" shall mean the Corporation's authorized 2,042,950 shares of Series H Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series H Purchase Agreement" shall mean the Series H Convertible Preferred Stock Purchase Agreement, dated as of September 21, 2010, between the Corporation and the Series H Investors, as the same has been amended and may be further amended from time to time.

"Series I Preferred Stock" shall mean the Corporation's authorized 2,700,000 shares of Series I Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series I Conversion Agreement" shall mean that Second Amendment to Convertible Note Purchase Agreement and Amendment to Convertible Notes made as of July 20, 2012, by and among the Corporation and the holders of Convertible Notes representing at least a majority of the principal amount under all Convertible Notes, as defined therein, then outstanding.

"Series J Preferred Stock" shall mean the Corporation's authorized 3,030,303 shares of Series J Convertible Preferred Stock, $0.01 par value, having the designations, rights, preferences, privileges, qualifications, limitations and restrictions set forth in the Certificate of Incorporation.

"Series J Purchase Agreement" shall mean the Series J Convertible Preferred Stock Purchase Agreement, dated as of July 27, 2012, between the Corporation and the Series J Investors, as the same has been amended and may be further amended from time to time.

"Shares Transfer" shall have the meaning set forth in Section 3(a) hereof.

"Subsection (c) Resignation" shall have the meaning set forth in Section 15(c) hereof.

"Transfer" shall mean any sale, assignment, transfer, disposition, donation, pledge, bequest, hypothecation, gift, conveyance, encumbrance or any other disposition or transfer of a Share or any interest or rights (legal or equitable) therein by any means whatsoever, whether direct or indirect, absolute or conditional, voluntary or involuntary, by operation of law (including without limitation, by operation of the laws of descent and distribution) or otherwise.

"TS Notice" shall have the meaning set forth in Section 3(a) hereof.

"Unsubscribed Shares" shall have the meaning set forth in Section 2(b) hereof.

"Violation" shall have the meaning set forth in Section 5(i) hereof.

SECTION 2. Right of First Offer. Each Series A Investor owning ten percent (10%) or more of the Series A Preferred Stock originally purchased by such Investor under the Series A Purchase Agreement, each Series B Investor owning ten percent (10%) or more of the Series B Preferred Stock originally purchased by such Investor under the Series B Purchase Agreement, each Series C Investor owning ten percent (10%) or more of the Series C Preferred Stock originally purchased by such Investor under the Series C Purchase Agreement, each Series D Investor owning ten percent (10%) or more of the Series D Preferred Stock originally purchased by such Investor under the Series D Purchase Agreement, each Series E Investor owning ten percent (10%) or more of the Series E Preferred Stock originally purchased by such Investor under the Series E Purchase Agreement, each Series F Investor owning ten percent (10%) or more of the Series F Preferred Stock originally purchased by such Investor under the Series F Purchase Agreement, each Series G Investor owning ten percent (10%) or more of the Series G Preferred Stock originally purchased by such Investor under the Series G Purchase Agreement (including shares issued or issuable upon exercise of the Series G Warrant purchased thereunder), each Series H Investor owning ten percent (10%) or more of the Series H Preferred Stock originally purchased by such Investor under the Series H Purchase Agreement, each Series I Investor owning ten percent (10%) or more of the Series I Preferred Stock originally received by such Investor under the Series I Conversion Agreement and each Series J Investor owning ten percent (10%) or more of the Series J Preferred Stock originally purchased by such Investor under the Series J Purchase Agreement (each, a "Majority Investor"), shall be entitled to the following right of first offer, except with respect to issuances of Excluded Securities, in connection with which there shall be no right of first offer:

(a) The Corporation shall not issue, sell or exchange, agree to issue, sell or exchange, or reserve or set aside for issuance, sale or exchange, (i) any shares of Common Stock, (ii) any other equity security of the Corporation, (iii) any debt security of the Corporation which by its terms is convertible into or exchangeable for, with or without consideration, any equity security of the Corporation, (iv) any security of the Corporation that is a combination of debt and equity or (v) any option, warrant or other right to subscribe for, purchase or otherwise acquire any equity security or any such debt security of the Corporation (collectively, the "Equity Securities"), unless in each case the Corporation shall have first offered to sell to the Majority Investors the Equity Securities, at a price and on such other terms as shall have been specified by the Corporation in a writing delivered to the Majority Investors (the "Offer"), which Offer by its terms shall remain open and irrevocable for a period of thirty (30) days from the date the Offer is received by the Majority Investors.

(b) The Majority Investors shall have the right to purchase up to their pro rata share of the Equity Securities. For these purposes, a Majority Investor's "pro rata share" shall be that amount of the Equity Securities which would result in the Majority Investor's owning the same percentage of the Corporation's issued and outstanding Common Stock after the issuance of Equity Securities as the Majority Investor owned immediately prior to the issuance (assuming in each case the issuance of all shares of Common Stock issuable upon the conversion or exchange of all outstanding securities convertible into or exchangeable for Common Stock, including, if applicable, the Equity Securities). However, each Majority Investor may, in his notice delivered pursuant to Section 2(c), subscribe for any number of the Equity Securities being offered by the Corporation. Any Equity Securities which are not purchased as part of a Majority Investor's pro rata share ("Unsubscribed Shares") may be purchased by the other

Majority Investors ("Oversubscribing Investors") who indicated the desire to purchase more (specifying the number of shares) than their respective pro rata shares of the Equity Securities in their respective notices of exercise ("Investor Oversubscription Rights"). If not enough Equity Securities are offered for sale to satisfy all properly exercised Investor Oversubscription Rights, the Unsubscribed Shares shall be sold to and purchased by Majority Investors exercising Investor Oversubscription Rights pro rata. For the purpose of Investor Oversubscription Rights each Oversubscribing Investor's pro rata portion will be equal to the total number of shares of Common Stock held by such Oversubscribing Investor as a percentage of the total number of shares of Common Stock held by all Oversubscribing Investors (assuming in each case the issuance of all shares of Common Stock issuable upon the conversion or exercise of all securities convertible into or exchangeable for Common Stock held by the Oversubscribing Investors).

(c) Notice of a Majority Investor's intention to accept, in whole or in part, an Offer shall be evidenced by a writing signed by the Majority Investor and delivered to the Corporation at or prior to the end of the 30-day period commencing with the date the Offer is sent by the Corporation (or, if later, within 10 days after the sending of any written notice of a material change in such Offer), setting forth such portion (specifying number of shares, principal amount or the like) of the Equity Securities as the Majority Investor elects to purchase and giving notice of any exercise of Investor Oversubscription Rights (the "Notice of Acceptance").

(d) The Corporation shall have 60 days from the expiration of the foregoing 30-day period to sell all or any part of such Equity Securities as to which a Notice of Acceptance has not been given by the Majority Investors (the "Remaining Securities") to any other Person or Persons, but only upon terms and conditions which are no more favorable, in the aggregate, to such other Person or Persons or less favorable to the Corporation than those set forth in the Offer;

provided, however, that in the event the Corporation concludes that such terms and conditions are no more favorable, in the aggregate, to such other Person or Persons or less favorable to the Corporation than those set forth in the Offer, but such terms and conditions contain material (whether individually or in the aggregate) modifications to the terms and conditions of the Offer, then the Corporation shall provide to the Majority Investors written notice of such modifications and each Majority Investor shall, by a writing signed by such Majority Investor and delivered to the Corporation at or prior to the end of the five (5)-day period commencing with the date such notice of the Corporation's conclusion is sent by the Corporation, indicate whether they agree with the Corporation's conclusion. A failure to respond within such five (5)-day period shall be deemed an acceptance of the Corporation's conclusion. If the holders of a majority of the shares held by the Majority Investors indicate that they disagree with the Corporation's conclusion, then the Majority Investors shall have the right set forth in subsection (c) above and the notice of the Corporation's conclusion hereunder shall be deemed to constitute the written notice of material change in such Offer thereunder. Upon the closing of the sale to such other Person or Persons of all the Remaining Securities, which shall include payment of the purchase price to the Corporation in accordance with the terms of the Offer, if a Majority Investor has timely submitted a Notice of Acceptance, he shall purchase from the Corporation, and the Corporation shall sell to the Majority Investor, the Equity Securities (including Unsubscribed Shares) in respect of which a Notice of Acceptance was delivered to the Corporation by the Majority Investor, at the terms specified in the Offer.

(e) In each case, any Equity Securities not purchased by a Majority Investor or by a Person or Persons in accordance with Section 2(d) may not be sold or otherwise disposed of until they are again offered to the Majority Investors under the procedures specified in Sections 2(a), (b), (c) and (d) hereof.

(f) The rights of the Investor under this Section 2 shall not apply to the following securities (the "Excluded Securities"):

(i) Common Stock or options to purchase shares of Common Stock issued to officers, employees or directors of, or consultants or advisors to, the Corporation, pursuant to any agreement, plan or arrangement approved by the Board of Directors of the Corporation; provided, however, that the maximum number of shares of Common Stock heretofore or hereafter issued or issuable pursuant to all such agreements, plans and arrangements shall not exceed in the aggregate the number of shares constituting the Fully-Diluted Option Pool (as defined in the Certificate of Incorporation).

(ii) Common Stock issued as a stock dividend or upon any stock split or other subdivision or combination of shares of Common Stock;

(iii) Common Stock issued upon conversion of any shares of Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock or Series J Preferred Stock;

(iv) any securities issued pursuant to a merger, consolidation, acquisition or similar business combination or a joint venture, corporate partnering, strategic alliance or other similar arrangement (including without limitation, a licensing arrangement); or

(v) Common Stock issued in connection with a public offering.

(g) Notwithstanding the foregoing provisions of this Section 2, the rights of the Majority Investors and the obligations of the Corporation under this Section 2 shall terminate as to all Majority Investors upon the consummation of a Designated Offering.

(h) By execution of this Agreement, the Stockholders hereby waive any and all rights of first offer to purchase any and all shares of Series I Preferred Stock and Series J Preferred Stock issued and sold by the Corporation, whether under the terms of that certain Series I Conversion Agreement or that certain Series J Purchase Agreement dated as of the date of this Agreement or otherwise, at any closing to be held for the sale of such securities. This waiver also extends to any and all of the shares of Common Stock issuable upon conversion of such shares of Series I Preferred Stock or Series J Preferred Stock and to any notice period required in connection with such right of first offer.

SECTION 3. Right of First Refusal. The Corporation, the Founders and the Series D Investors shall be entitled to the following right of first refusal, except with respect to Permitted Transfers in connection with which there shall be no right of first refusal:

(a) Transfer of Shares. An Investor (including Dr. John R. Jenkins but other than a Principal Stockholder) shall not transfer (each, a "Non-Principal Transferring Stockholder") and each Principal Stockholder shall not transfer (each, a "Principal Transferring Stockholder" and together with the Non-Principal Transferring Stockholders, the "Transferring Stockholders") any or all of the Shares or any right or interest therein then owned by him (each, a "Shares Transfer") except by a Transfer that meets the requirements of this Section 3 and of this Agreement generally. If a Transferring Stockholder proposes to effect a Shares Transfer, whether voluntarily or involuntarily, then at least sixty (60) days prior to any Shares Transfer, each Non-Principal Transferring Stockholder shall give notice to the Corporation and the Founders and each Principal Transferring Stockholder shall give notice to the Corporation, the Founders and the Series D Investors of his intention to effect the Shares Transfer (in each case, the "TS Notice"). The TS Notice shall set forth (i) the number, class and series of shares to be sold by the Transferring Stockholder (the "Sale Shares"), (ii) the date or proposed date of the Shares Transfer and the name and address of the proposed transferee, (iii) the principal terms of the Shares Transfer, including the cash or other property or consideration to be received upon such Shares Transfer, and (iv) the percentage which the number of Sale Shares constitutes with respect to the aggregate number of Shares then held by the Transferring Stockholder. In the case of a proposed Transfer by way of gift or if the nature of the Transfer is such that no readily determinable consideration is to be paid for the Transfer of the Sale Shares, then a bona fide Transfer price for purposes of this Section 3(a) shall be determined by the Board of Directors of the Corporation promptly upon the Corporation's receipt of, and as of the date of, the TS Notice (the "Board Price").

(b) Corporation's Option. The Corporation shall have the option, but not the obligation, to purchase any or all of the Sale Shares on the same terms as specified in the TS Notice. Within fifteen (15) days after the receipt of the TS Notice, the Corporation shall give written notice to the Transferring Stockholder, the Founders and, in the case of a Principal Transferring Stockholder, to the Series D Investors (the "Corporation Notice") stating whether or not it elects to exercise its option to purchase, the number of Sale Shares, if any, it elects to purchase, a date and time for consummation of the purchase not more than fifteen (15) days after the receipt of the Corporation Notice by the Transferring Stockholder, and any Board Price determined pursuant to Section 3(a). Failure by the Corporation to give such notice within such time period shall be deemed an election by it not to exercise its option. Within five (5) days following the receipt of the Corporation Notice, the Transferring Stockholder shall have the right to rescind the TS Notice and the proposed Transfer if the Board Price is deemed to be unacceptable, as determined in the sole discretion of the Transferring Stockholder. The Transferring Stockholder shall not be entitled to vote, either as a stockholder or a director (if applicable), in connection with the decision of the Corporation whether to exercise its option to purchase the Sale Shares, provided that, if his vote is required for valid corporate action, then he shall vote in accordance with the decision of the majority of the other directors or stockholders, as the case may be.

(c) Founders' Option. If the Corporation fails to exercise its right to purchase under Section 3(b) hereof, or exercises its right to purchase for less than all of the Sale Shares and the Transferring Stockholder has not rescinded the TS Notice as described in Section 3(b) hereof, then the Founders shall each have the option, but not the obligation, to purchase up to their pro rata share of all of the remaining Sale Shares on the same terms as specified in the TS

Notice. Each Founder's pro rata portion of such remaining Sale Shares will be equal to the total number of shares of Common Stock held by such Founder as a percentage of the total number of shares of Common Stock held by all Founders (assuming in each case the conversion or exchange of all securities held by the Founders that are convertible into or exchangeable for Common Stock). Not later than fifteen (15) days after the Founders receive the Corporation Notice, each Founder shall give written notice to the Transferring Stockholder, the Corporation and, in the case of a Principal Transferring Stockholder, to the Series D Investors (the "Founders Notice") stating whether or not he elects to exercise his option to purchase, the number of Sale Shares, if any, he elects to purchase, and a date and time for consummation of the purchase not more than fifteen (15) days after the receipt of the Founders Notice by the Transferring Stockholder. Failure by a Founder to give such notice within such time period shall be deemed an election by him not to exercise his option. If a Founder elects not to purchase all of his pro rata share of the remaining Sale Shares, then the other Founders shall have the right to purchase any or all such unsubscribed Sale Shares ("Unsubscribed Sale Shares"). To purchase any Unsubscribed Sale Shares, the Founder must have specified in his Founders Notice that he wished to exercise his right to purchase more (specifying the number of shares) than his pro rata share of the Sale Shares (a "Founder Oversubscription Right"). If not enough Sale Shares remain to satisfy all properly exercised Founder Oversubscription Rights, then the Unsubscribed Sale Shares shall be sold to and purchased by Founders exercising Founder Oversubscription Rights pro rata. For these purposes, a Founder's pro rata share will be equal to the total number of shares of Common Stock held by such Founder as a percentage of the total number of shares of Common Stock held by all Founders exercising Founder Oversubscription Rights (assuming in each case the issuance of all shares of Common Stock issuable upon the conversion or exchange of all securities convertible into or exchangeable for Common Stock held by the Founders exercising Founder Oversubscription Rights). Subject to Section 3(d) in the case of Principal Transferring Stockholders, if the Corporation and the Founders do not purchase all the Sale Shares (including any Unsubscribed Sale Shares), then the Transferring Stockholder shall thereafter, for a period of ninety (90) days, be free to transfer all the Sale Shares on the terms provided in the TS Notice (subject to the provisions of Section 5); provided, however, that the Sale Shares shall continue to be subject to the terms of this Agreement and any such transferee shall agree in writing to be bound by the obligations imposed upon Stockholders under this Agreement as if such transferee were originally a signatory to this Agreement.

(d) Series D Option. If, in the case of a Principal Transferring Stockholder, (i) the Corporation fails to exercise its right to purchase under Section 3(b) hereof, or exercises its rights to purchase for less than all of the Sale Shares, (ii) the Founders fail to exercise their right to purchase under Section 3(c) hereof, or exercise their right to purchase for less than all of the Sale Shares and (iii) the Principal Transferring Shareholder has not rescinded the TS Notice as described in Section 3(b) hereof, then the Series D Investors shall each have the option, but not the obligation, to purchase up to their pro rata share of all of the remaining Sale Shares on the same terms as specified in the TS Notice. Each Series D Investor's pro rata portion of such remaining Sale Shares will be equal to the total number of shares of Common Stock held by such Series D Investor as a percentage of the total number of shares of Common Stock held by all Series D Investors (assuming in each case the conversion or exchange of all securities held by the Series D Investors are convertible or exchangeable into Common Stock). Not later than fifteen (15) days after the Series D Investors receive the Founders Notice, each Series D Investor

shall give written notice to the Principal Transferring Stockholder and the Corporation (the "Series D Notice") stating whether or not he elects to exercise his option to purchase, the number of Sale Shares, if any, he elects to purchase, and a date and time for consummation of the purchase not more than fifteen (15) days after the receipt of the Series D Notice by the Transferring Stockholder. Failure by a Series D Investor to give such notice within such time period shall be deemed an election by him not to exercise his option. If a Series D Investor elects not to purchase all of his pro rata share of the remaining Sale Shares, then the other Series D Investors shall have the right to purchase any or all Unsubscribed Sale Shares. To purchase any Unsubscribed Sale Shares, the Series D Investor must have specified in his Series D Notice that he wished to exercise his right to purchase more (specifying the number of shares) than his pro rata share of the Sale Shares (a "Series D Oversubscription Right"). If not enough Sale Shares remain to satisfy all properly exercised Series D Oversubscription Rights, then the Unsubscribed Sale Shares shall be sold to and purchased by Series D Investors exercising Series D Oversubscription Rights pro rata. For these purposes, a Series D Investor's pro rata share will be equal to the total number of shares of Common Stock held by such Series D Investor as a percentage of the total number of shares of Common Stock held by all Series D Investors exercising Series D Oversubscription Rights (assuming in each case the issuance of all shares of Common Stock issuable upon the conversion or exchange of all securities convertible into or exchangeable for Common Stock held by the Series D Investors exercising Series D Oversubscription Rights). If the Corporation, the Founders and the Series D Investors do not purchase all the Sale Shares (including any Unsubscribed Sale Shares), then the Transferring Stockholder shall thereafter, for a period of ninety (90) days be free to transfer all the Sale Shares on the terms provided in the TS Notice (subject to the provisions of Sections 4 and 5); provided, however, that the Sale Shares shall continue to be subject to the terms of this Agreement and any such transferee shall agree in writing to be bound by the obligations imposed upon Stockholders under this Agreement as if such transferee were originally a signatory to this Agreement.

(e) Definitions. For purposes of this Agreement, the term "Permitted Transfer" shall mean a Shares Transfer (i) to an Affiliate of a Transferring Stockholder or pursuant to a merger, consolidation, acquisition or similar business combination or similar business arrangement of the Transferring Stockholder, (ii) to a spouse (other than pursuant to any divorce or separation proceedings or settlement), parents, brother, sister, children (natural or adopted), stepchildren or grandchildren or a trust for any of their benefit in the case of a Transferring Stockholder that is a natural person (individually, a "Family Member" and collectively, the "Family Members"), (iii) pursuant to an effective registration statement under the Securities Act; (iv) that, after giving effect to all such prior Shares Transfers by such Transferring Stockholder (and its, his or her transferee or predecessor-in-interest, if any) (other than those specified in the foregoing clauses (i), (ii) and (iii)), does not result in such Transferring Stockholder's transferring Shares representing in the aggregate more than ten percent (10%) of the Shares that such Transferring Stockholder owned on the date of this Agreement; (v) resulting from a Significant Investor's (as defined below) exercise of its co-sale rights under Section 4 hereof; or (vi) to an equity owner or liquidating trustee of a Transferring Stockholder upon the liquidation or winding up of the Transferring Stockholder (each recipient being a "Permitted Transferee"); provided, however, that for the sake of clarity, it is hereby confirmed that Ventureast Life Fund III, an entity organized under the laws of India and represented by its fund manager, APIDC Venture Capital Private Limited, shall be entitled to reallocate its holdings of Series H Preferred Stock between itself and Ventureast Life Fund III

LLC, an entity organized under the laws of Mauritius, in such proportion as shall be determined by the former, and such reallocation shall be deemed to be a Permitted Transfer hereunder; and provided, however, that prior to such Permitted Transfer, such Permitted Transferee shall agree in writing to be bound by the obligations imposed upon Stockholders under this Agreement as if such transferee were originally a signatory to this Agreement.

(f) Application of Provisions. In each case, any Sale Shares not purchased by the proposed transferee in accordance with Section 3(d) hereof may not be sold or otherwise disposed of until they are again offered to the Corporation and the Founders, and to the Series D Investors, if appropriate, under the procedures specified herein.

(g) Transfers Void. Any attempted Transfer in violation of the terms of this Section 3 shall be ineffective to vest in any transferee any interest held by the Transferring Stockholder in the Sale Shares. Without limiting the foregoing, any purported Shares Transfer in violation hereof shall be ineffective as against the Corporation and the Founders, and the Series D Investors, if appropriate, and the Corporation and the Founders, and the Series D Investors, if appropriate, shall have a continuing right and option (but not an obligation), until the restrictions contained in this Section 3 terminate, to purchase the Sale Shares purported to be transferred by the Transferring Stockholders for a price and on terms the same as those at which the purported Shares Transfer was effected.

(h) Termination of Restrictions. The restrictions in this Section 3 shall terminate upon the consummation of a Designated Offering.

(i) Founder/Investor. Notwithstanding the foregoing, a Founder who is also an Investor shall have no right to purchase Sale Shares with respect to any Shares Transfer for which he is the Transferring Stockholder. Such Founder and Investor shall, however, deliver the TS Notice and otherwise comply with this Section 3.

SECTION 4. Rights of Co-Sale. Each Series B Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series B Preferred Stock (each a "Significant Series B Investor" and, collectively, the "Significant Series B Investors"), each Series C Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series C Preferred Stock (each a "Significant Series C Investor" and collectively, the "Significant Series C Investors"), each Series D Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series D Preferred Stock (each a "Significant Series D Investor" and, collectively, the "Significant Series D Investors"), each Series E Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series E Preferred Stock (each a "Significant Series E Investor," collectively, the "Significant Series E Investors"), each Series F Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series F Preferred Stock (each a "Significant Series F Investor," collectively, the "Significant Series F Investors"), each Series G Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series G Preferred Stock (each a "Significant Series G Investor," collectively, the "Significant Series G Investors"), each Series H Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series H Preferred Stock (each a "Significant Series H Investor," collectively, the "Significant Series H Investors"), each Series I Investor that,

together with any Affiliates, owns not less than 5% of the then issued and outstanding Series I Preferred Stock (each a "Significant Series I Investor," collectively, the "Significant Series I Investors"), and each Series J Investor that, together with any Affiliates, owns not less than 5% of the then issued and outstanding Series J Preferred Stock (each a "Significant Series J Investor," collectively, the "Significant Series J Investors" and, together with the Significant Series B Investors, Significant Series C Investors, Significant Series D Investors, Significant Series E Investors, Significant Series F Investors, Significant Series G Investors, Significant Series H Investors and Significant Series I Investors, the "Significant Investors") shall be entitled to the following co-sale rights, except with respect to Excluded Transfers (defined below) in connection with which there shall be no co-sale rights:

(a) Transfer of Shares. A Founder shall not Transfer (each, a "Transferring Founder") any or all of the Shares or any right or interest therein then owned by him (each, a "Founder Shares Transfer") except by a Transfer that meets the requirements of this Section 4 and of this Agreement generally. If a Transferring Founder proposes to effect a Founder Shares Transfer, whether voluntarily or involuntarily, then at least sixty (60) days prior to any Founder Shares Transfer, such Transferring Founder shall deliver the TS Notice in accordance with Section 3 above and shall also deliver the TS Notice to the Significant Investors notifying them of his intention to effect the Founder Shares Transfer.

(b) Exercise of Co-Sale Rights. To the extent that the Corporation, the other Founders and the Series D Investors fail to exercise their right of first refusal under Section 3 hereof, then a Significant Investor may exercise its co-sale rights under this Section 4 by delivery of a written notice (the "Co-Sale Notice") to the Transferring Founder within fifteen (15) days of the date of Founder's sending the TS Notice. The Co-Sale Notice shall state the number of Shares that the Significant Investor proposes to include in the proposed sale, up to its Significant Investor's Share (as defined below). If a Significant Investor entitled to participate in such sale delivers a Co-Sale Notice, such Significant Investor shall be obligated to sell that number of Shares specified in the Co-Sale Notice upon the same terms and conditions as the Transferring Founder is selling, conditioned upon and contemporaneously with completion of the Transferring Founder's sale of his Founder Sale Shares (except as provided in Section 4(d)). The number of Founder Sale Shares that the Founder may actually Transfer to the proposed transferee (after the application of this Section 4) shall be reduced by the number of Significant Investors' Shares that the proposed transferee purchases pursuant to this Section 4(b). If no Co-Sale Notice is received within the 15-day period referred to above, the Transferring Founder shall have the right for a one hundred twenty (120)-day period to effect the proposed sale of the Founder Sale Shares on terms and conditions set forth in the Founder Notice and in accordance with the provisions of this Section 4; provided, however, that the Shares shall continue to be subject to the terms of this Agreement and any such transferee shall agree in writing to be bound by the obligations imposed upon the Stockholders under this Agreement as if such transferee were originally a signatory to this Agreement. "Significant Investor's Share" means the Shares owned by the Significant Investor multiplied by the percentage determined by dividing (A) the number of shares of Common Stock held by such Significant Investor (assuming conversion of the shares of Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and/or Series J Preferred Stock, as applicable, into Common Stock), by (B) the number of shares of Common Stock held by the Transferring Founder and all Significant Investors

participating in the co-sale right (assuming conversion of the shares of Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock, Series H Preferred Stock, Series I Preferred Stock and Series J Preferred Stock into Common Stock).

(c) Excluded Transfers. Notwithstanding anything herein to the contrary, a Transferring Founder may make any of the following Founder Shares Transfers without offering the Significant Investors the opportunity to participate (collectively, the "Excluded Transfers"): (i) Founder Shares Transfers to any Family Member or to a corporation, partnership, limited liability company or other entity that is controlled by the Transferring Founder and/or his Family Members, provided that such Family Member or entity agrees in writing to be bound by the provisions of this Agreement; (ii) Founder Shares Transfers to another Founder; (iii) Founder Shares Transfers pursuant to an effective registration statement under the Securities Act; (iv) Founder Shares Transfers that, after giving effect to all such prior Transfers by such Founder (and his or her transferee or predecessor-in-interest, if any) (other than those specified in the foregoing clauses (i), (ii) and (iii)), do not result in the Transferring Founder's transferring Shares representing in the aggregate more than ten percent (10%) of the Shares that such Transferring Founder owned on the date of this Agreement; or (v) shares transferred to the Corporation, the other Founders and/or the Series D Investors pursuant to their respective rights of first refusal under Section 3 hereof.

(d) Prohibited Transfers. If a Transferring Founder subject to this Section 4 Transfers any Founder Sale Shares in contravention of this Section 4 (a "Prohibited Transfer"), any Significant Investor may, by delivery of written notice to such Transferring Founder (a "Put Notice") within ten (10) days after the later of (i) the closing of such Prohibited Transfer, and (ii) the date on which such Significant Investor becomes aware of the Prohibited Transfer or the terms thereof, require the Transferring Founder to purchase from such Significant Investor, for cash and on the same terms, the number of Shares which such Significant Investor would have been entitled to sell (or such lesser amount requested by the Significant Investor) had the Transferring Founder complied with the provisions of this Section 4 at a per share price equal to the per share fair market value of the consideration received by the Transferring Founder in the Prohibited Transfer on the date of the closing of the Prohibited Transfer. The closing of such Transfer to such Transferring Founder will occur within ten (10) days after the date of such Significant Investor's Put Notice to such Transferring Founder.

(e) Notwithstanding the foregoing, the right of first refusal provided for in Section 3 and the co-sale right provided for in Section 4 shall be mutually exclusive and any Significant Investor that elects to exercise its rights with respect to any proposed Shares Transfer under either of such Sections shall not be entitled to exercise its rights, if any, under the other such Section with respect to such proposed sale.

(f) Termination. The co-sale rights arising under this Section 4 shall terminate upon the consummation of a Designated Offering.

SECTION 5. Transfer of Securities; Registration Rights.

(a) Restriction on Transfer. The Shares shall not be transferable except upon the conditions specified in this Section 5, which conditions are intended to ensure compliance with the provisions of the Securities Act and applicable state securities laws in respect of the Transfer thereof.

(b) Restrictive Legend. Each certificate for the Shares and each certificate for any such securities issued to subsequent transferees of any such certificate shall (unless otherwise permitted by the provisions of Section 5(c)) be stamped or otherwise imprinted with substantially the following legend:

> "THE SECURITIES REPRESENTED BY THIS CERTIFICATE HAVE BEEN ACQUIRED FOR INVESTMENT AND HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, OR ANY APPLICABLE STATE SECURITIES LAW. THESE SECURITIES MAY NOT BE SOLD OR TRANSFERRED IN THE ABSENCE OF SUCH REGISTRATION OR AN EXEMPTION THEREFROM UNDER SAID ACT. ADDITIONALLY, THE TRANSFER OF THESE SECURITIES IS SUBJECT TO THE CONDITIONS SPECIFIED IN THE EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT DATED AS OF JULY 27, 2012, AMONG ONCONOVA THERAPEUTICS, INC. AND CERTAIN OTHER SIGNATORIES THERETO (AS THE SAME MAY BE AMENDED AND/OR RESTATED FROM TIME TO TIME) AND NO TRANSFER OF THESE SECURITIES SHALL BE VALID OR EFFECTIVE UNTIL SUCH CONDITIONS HAVE BEEN FULFILLED. UPON THE FULFILLMENT OF CERTAIN OF SUCH CONDITIONS, ONCONOVA THERAPEUTICS, INC. HAS AGREED TO DELIVER TO THE HOLDER HEREOF A NEW CERTIFICATE, NOT BEARING THIS LEGEND, FOR THE SECURITIES REPRESENTED HEREBY REGISTERED IN THE NAME OF THE HOLDER HEREOF. COPIES OF SUCH AGREEMENT MAY BE OBTAINED AT NO COST BY WRITTEN REQUEST MADE BY THE HOLDER OF RECORD OF THIS CERTIFICATE TO THE SECRETARY OF ONCONOVA THERAPEUTICS, INC."

In addition, the certificate may be stamped with such legends as the Corporation's counsel may deem advisable in light of applicable state securities laws.

(c) Notice of Transfer. The holder of any Shares, by acceptance thereof agrees, prior to any Transfer thereof, to give written notice to the Corporation of such holder's intention to effect such Transfer and to comply in all other respects with the provisions of this Section 5(c) and the other applicable provisions of this Agreement. Each such notice shall describe the manner and circumstances of the proposed Transfer and shall be accompanied by

(i) the written opinion, addressed to the Corporation, of counsel for the holder of such Shares, as to whether in the opinion of such counsel (which counsel and opinion shall be reasonably satisfactory to counsel to the Corporation) such proposed Transfer involves a transaction requiring registration of such shares under the Securities Act, and (ii) in the case of Registrable Securities, if in the opinion of such counsel such registration is required, a written request addressed to the Corporation by the Holder of Registrable Securities, describing in detail the proposed method of disposition and requesting the Corporation to effect the registration of such Registrable Securities pursuant to the terms and conditions of Sections 5(d), 5(e) or 5(f), as the case may be; provided, however, that no such opinion shall be required in the case of a Transfer by any Holder of Registrable Securities (A) which is a (1) partnership or limited liability company to a partner or member of such Holder, or a retired partner or member of such Holder who retires after the date hereof, or the estate of any such partner or member or retired partner or member, if the transferee agrees in writing to be subject to the terms of this Section 5 to the same extent as if such transferee were originally a signatory to this Agreement, or (2) corporation to any Affiliate of such corporation, including without limitation, any officer, director or controlling stockholder of such corporation, or (B) in connection with a transaction complying with the requirements of Rule 144 (as amended from time to time) promulgated under the Securities Act (or successor rule thereto). If in such opinion of counsel the proposed Transfer may be effected without registration under the Securities Act, the holder shall thereupon be entitled to Transfer the Shares in accordance with the terms of the notice delivered by it to the Corporation, subject to the other requirements of this Agreement. Each certificate or other instrument evidencing the securities issued upon the Transfer of any Shares (and each certificate or other instrument evidencing any untransferred balance of such securities) shall bear the legend set forth in Section 5(b) unless (x) in such opinion of counsel registration of future Transfer is not required by the applicable provisions of the Securities Act or (y) the Corporation shall have waived the requirement of such legend; provided, however, that such legend shall not be required (1) on any certificate or other instrument evidencing the securities issued upon such Transfer in the event such Transfer shall be made in compliance with the requirements of Rule 144 (as amended from time to time) promulgated under the Securities Act (or successor rule thereto) or (2) on any certificate or other instrument which is immediately resalable without restrictions (whether or not such resale is proposed) under Rule 144 or successor thereto. Notwithstanding the foregoing, as a condition to any Transfer of Shares, the transferee must agree to be bound by the terms hereof as if it were a signatory hereto, and the shares held by such transferee shall constitute Shares hereunder.

(d) Piggyback Registrations.

(i) The Corporation shall notify all Holders of Registrable Securities in writing at least thirty (30) days prior to filing any registration statement under the Securities Act for purposes of effecting a public offering of securities of the Corporation (including, but not limited to, registration statements relating to secondary offerings of securities of the Corporation, but excluding registration statements on an Excluded Form or relating to any employee benefit plan or a corporate reorganization) and shall afford each such Holder an opportunity to include in such registration statement all or any part of the Registrable Securities then held by such Holder. Each Holder desiring to include in any such registration statement all or any part of the Registrable Securities held by such Holder shall, within fourteen (14) days after receipt of the above-described notice

from the Corporation, so notify the Corporation in writing, and in such notice shall inform the Corporation of the number of Registrable Securities such Holder wishes to include in such registration statement. If a Holder decides not to include all of its Registrable Securities in any registration statement thereafter filed by the Corporation, such Holder shall nevertheless continue to have the right to include any Registrable Securities in any subsequent registration statement or registration statements as may be filed by the Corporation with respect to offerings of its securities, all upon the terms and conditions set forth herein.

(ii) If the registration statement under which the Corporation gives notice under this Section 5(d) is for an underwritten offering, the Corporation shall so advise the Holders of Registrable Securities. In such event, the right of any such Holder's Registrable Securities to be included in a registration pursuant to this Section 5(d) shall be conditioned upon such Holder's participation in such underwriting and the inclusion of such Holder's Registrable Securities in the underwriting to the extent provided herein. All Holders proposing to distribute their Registrable Securities through such underwriting shall enter into an underwriting agreement in customary form with the managing underwriter or underwriters selected for such underwriting by the Corporation. Notwithstanding any other provision of this Agreement, if the managing underwriter(s) determine(s) in good faith that marketing factors require a limitation of the number of shares to be underwritten, the number of shares that may be included in said underwriting shall be allocated, first, to the Corporation, and second, to each of the Holders requesting inclusion of their Registrable Securities in such registration statement on a pro rata basis based on the total number of Registrable Securities held by each such Holder; provided, however, that the right of the underwriters to exclude Registrable Securities from the registration and underwriting as described above shall be restricted so that the number of Registrable Securities included in any such registration is not reduced below twenty percent (20%) of the shares included in the registration, except for a registration relating to the Corporation's initial public offering from which all Registrable Securities may be excluded. In the event that underwriters exclude Registrable Securities from the registration and underwriting as described above, the Corporation shall use its commercially reasonable efforts to cause the underwriters to furnish a certificate indicating the reasons for such exclusion. If any Holder disapproves of the terms of any such underwriting, such Holder may elect to withdraw therefrom by written notice to the Corporation and the underwriter, delivered at least five (5) business days prior to the effective date of the registration statement. Any Registrable Securities excluded or withdrawn from such underwriting shall be excluded and withdrawn from the registration.

(iii) All registration expenses incurred in connection with a registration pursuant to this Section 5(d) (other than underwriters' discounts and commissions which shall be borne proportionately by Holders participating in a registration pursuant to this Section 5(d) on the basis of the number of the shares so registered) shall be borne by the Corporation.

(e) Form S-3 Registration. In case the Corporation receives from the Demand Holders a written request or requests that the Corporation effect a registration on Form S-3 with

respect to all or part of the Registrable Securities owned by such Demand Holders, then the Corporation shall:

(i) Promptly give written notice of the proposed registration and the Demand Holders request therefor to all Holders of Registrable Securities; and

(ii) As soon as practicable effect such registration; provided, however, that the Corporation shall not be obligated to effect any such registration, qualification or compliance pursuant to this Section 5(e): (A) if Form S-3 is not available for such offering by the Holders; (B) if the Holders propose to sell Registrable Securities at an aggregate gross offering price to the public of less than $500,000.00; (C) if the Corporation has, within the six (6)-month period preceding the date of such request, already effected one registration on Form S-3 for the Holders pursuant to this Section 5(e); (D) if the Corporation furnishes to the Holders of Registrable Securities a certificate signed by the President or Chief Executive Officer of the Corporation stating that (1) the Corporation is planning to file a registration statement in connection with an underwritten public offering within 120 days of such request for registration, or (2) in the good faith judgment of the Board of Directors of the Corporation, it would be detrimental to the Corporation and its stockholders for such Form S-3 registration statement to be filed at such time, in which event the Corporation shall have the right to defer the filing of the Form S-3 registration statement for a period of not more than 120 days after receipt of the request of the holders of Registrable Securities under this Section 5(e); provided, however, that the Company may not utilize this right more than once in any twelve (12)-month period; or (E) in any particular jurisdiction in which the Corporation would be required to qualify to do business or to execute a general consent to service of process in order to effect such registration in compliance with all applicable laws.

(iii) Subject to the foregoing, the Corporation shall file a Form S-3 registration statement covering the Registrable Securities to be registered pursuant to this Section 5(e) as soon as practicable after receipt of the request or requests of the requisite Holders for such registration. All registration expenses incurred in connection with a registration pursuant to this Section 5(e) (other than underwriters' discounts and commissions which shall be borne proportionately by Holders participating in a registration pursuant to this Section 5(e)) shall be borne by the Corporation.

(f) Demand Registration.

(i) If the Corporation receives at any time after six (6) months following the effective date of the Corporation's initial public offering, a written request from the Demand Holders of at least twenty-five percent (25%) of the Registrable Securities then outstanding that the Corporation file a registration statement under the Securities Act covering the registration of the Registrable Securities, then the Corporation shall, within ten (10) business days after the receipt thereof, give written notice of such request to all Demand Holders, and effect, as soon as practicable, the registration under the Securities Act of all Registrable Securities which the Demand Holders request to be registered and included in such registration, subject only to the limitations of this Section 5(f);

(ii) If the Demand Holders initiating the registration request under this Section 5(f) ("Initiating Holders") intend to distribute the Registrable Securities covered by their request by means of an underwriting, they shall so advise the Corporation as a part of their request made pursuant to this Section 5(f) and the Corporation shall include such information in the written notice referred to in Section 5(f)(i) hereof. In such event, the right of any Demand Holder to include such Demand Holder's Registrable Securities in such registration shall be conditioned upon such Demand Holder's participation in such underwriting and the inclusion of such Demand Holder's Registrable Securities in the underwriting (unless otherwise mutually agreed by a majority in interest of the Initiating Holders and such Demand Holder) to the extent provided herein. All Demand Holders proposing to distribute their securities through such underwriting shall enter into an underwriting agreement in customary form with the managing underwriter or underwriters selected for such underwriting by the Corporation. Notwithstanding any other provision of this Section 5(f), if the underwriter(s) advise(s) the Corporation in writing that

marketing factors require a limitation of the number of securities to be underwritten, then the Corporation shall also advise all Demand Holders of Registrable Securities which would otherwise be underwritten pursuant hereto, and the number of Registrable Securities that may be included in the underwriting shall be reduced as required by the underwriter(s) and allocated among the Demand Holders of Registrable Securities on a pro rata basis according to the number of Registrable Securities then outstanding held by each Demand Holder requesting registration (including the Initiating Holders); provided, however, that the number of shares of Registrable Securities to be included in such underwriting and registration shall not be reduced unless all other securities of the Corporation and other stockholders are first entirely excluded from the underwriting and registration. Any Registrable Securities excluded and withdrawn from such underwriting shall be withdrawn from the registration.

(iii) The Corporation is obligated to effect only two (2) such registrations pursuant to this Section 5(f).

(iv) Notwithstanding the foregoing, if the Corporation furnishes to Demand Holders requesting the filing of a registration statement pursuant to this Section 5(f) a certificate signed by the President or Chief Executive Officer of the Corporation stating that in the good faith judgment of the Board of Directors of the Corporation, it would be seriously detrimental to the Corporation and its stockholders for such registration statement to be filed and it is therefore essential to defer the filing of such registration statement, then the Corporation shall have the right to defer such filing for a period of not more than one hundred and twenty (120) days after receipt of the request of the Initiating Holders; provided, however, that the Corporation may not utilize this right more than once in any twelve (12) month period.

(v) All expenses incurred in connection with a registration pursuant to this Section 5(f), including without limitation, all federal and "blue sky" registration and qualification fees, printers' and accounting fees, fees and disbursements of counsel for the Corporation, and of one counsel for the participating Demand Holders (but excluding underwriters' discounts and commissions), shall be borne by the Corporation. Each Holder participating in a registration pursuant to this Section 5(f) shall bear its

proportionate share of all discounts, commissions or other amounts payable to underwriters or brokers in connection with such offering. Notwithstanding the foregoing, the Corporation shall not be required to pay for any expenses of any registration proceeding begun pursuant to this Section 5(f) if the registration request is subsequently withdrawn at the request of the Demand Holders of a majority of the Registrable Securities to be registered; provided, however, that if at the time of such withdrawal, the Holders have learned of a material adverse change in the condition, business, or prospects of the Corporation not known to the Demand Holders at the time of their request for such registration and have withdrawn their request for registration with reasonable promptness after learning of such material adverse change, then the Demand Holders shall not be required to pay any of such expenses and shall retain their rights pursuant to this Section 5(f).

(g) Obligations of the Corporation. Whenever required to effect the registration of any Registrable Securities under this Agreement, the Corporation shall, as expeditiously as reasonably possible:

(i) Prepare and file with the Commission a registration statement with respect to such Registrable Securities and use its best efforts to cause such registration statement to become and remain effective.

(ii) Prepare and file with the Commission such amendments and supplements to such registration statement and the prospectus used in connection with such registration statement as may be necessary to comply with the provisions of the Securities Act with respect to the disposition of all securities covered by such registration statement and to keep such registration statement effective, in the case of a firm commitment underwriting, until each underwriter has completed the distribution of all securities purchased by it and, in the case of any other offering, until the earlier of the sale of all Registrable Securities covered thereby or one hundred eighty (180) days after the effective date thereof; provided, however, that such 180-day period shall be extended for a period of time equal to the period the Holder refrains from selling any Registrable Securities included in such registration at the request of an underwriter of the Common Stock or if the Corporation has provided the notice described in subparagraph (vii) below.

(iii) Furnish to the Holders such number of copies of a prospectus, including a preliminary prospectus, in conformity with the requirements of the Securities Act, and such other documents as they may reasonably request in order to facilitate the disposition of the Registrable Securities owned by them that are included in such registration.

(iv) Use its best efforts to register and qualify the securities covered by such registration statement under such other securities or blue sky laws of such jurisdictions as shall be reasonably requested by the Holders, provided, that the Corporation shall not be required in connection therewith or as a condition thereto to qualify to do business or to file a general consent to service of process in any such states or jurisdictions.

(v) Use its best efforts to list the securities covered by such registration statement with the securities exchange, if any, on which the Common Stock is then listed.

(vi) In the event of any underwritten public offering, enter into and perform its obligations under an underwriting agreement, in usual and customary form, with the managing underwriter(s) of such offering. Each Holder participating in such underwriting shall also enter into and perform its obligations under such an agreement.

(vii) Notify each Holder of Registrable Securities and each underwriter under such registration statement at any time when a prospectus relating thereto is required to be delivered under the Securities Act of the happening of any event as a result of which the prospectus included in such registration statement, as then in effect, includes an untrue statement of a material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing.

(h) Furnish Information. It shall be a condition precedent to the obligations of the Corporation to take any action pursuant to Sections 5(d), 5(e), and 5(f) that the selling Holders shall furnish to the Corporation such information regarding themselves, the Registrable Securities held by them, and the intended method of disposition of such securities as shall be required to effect the registration of their Registrable Securities.

(i) Indemnification. In the event any Registrable Securities are included in a registration statement under Sections 5(d), 5(e) or 5(f):

(i) To the extent permitted by law, the Corporation shall indemnify and hold harmless each Holder, the partners, officers and directors of each Holder, any underwriter (as defined in the Securities Act) for such Holder and each Person, if any, who controls such Holder or underwriter within the

meaning of the Securities Act or the Exchange Act (collectively, "Indemnified Persons"), against any losses, claims, damages, or liabilities (joint or several) to which they may become subject under the Securities Act, the Exchange Act or other federal or state law, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon any of the following statements, omissions or violations (collectively, a "Violation"):

(A) any untrue statement or alleged untrue statement of a material fact contained in such registration statement, including any preliminary prospectus or final prospectus contained therein or any amendments or supplements thereto,

(B) the omission or alleged omission to state therein a material fact required to be stated therein, or necessary to make the statements therein not misleading, or

(C) any violation or alleged violation by the Corporation of the Securities Act, the Exchange Act, any federal or state securities law or any rule or

regulation promulgated under the Securities Act, the Exchange Act or any federal or state securities law in connection with the offering covered by such registration statement,

and the Corporation shall reimburse each such Indemnified Person for any legal or other expenses reasonably incurred by it, as incurred, in connection with investigating or defending any such loss, claim, damage, liability or action; provided, however, that the indemnity agreement contained in this Section 5(i) shall not apply to amounts paid in settlement of any such loss, claim, damage, liability or action if such settlement is effected without the consent of the Corporation (which consent shall not be unreasonably withheld), nor shall the Corporation be liable in any case for any such loss, claim, damage, liability or action to the extent that it arises out of or is based upon a Violation which occurs in reliance upon and in conformity with written information furnished expressly for use in connection with such registration by an Indemnified Person.

(ii) To the extent permitted by law, each selling Holder shall indemnify and hold harmless the Corporation, each of its directors and officers who have signed the registration statement, each Person, if any, who controls the Corporation within the meaning of the Securities Act, any underwriter and any other Holder selling securities under such registration statement or any of such other Holder's partners, directors or officers or any Person who controls such Holder within the meaning of the Securities Act or the Exchange Act, against any losses, claims, damages or liabilities (joint or several) to which the Corporation or any such Person may become subject under the Securities Act, the Exchange Act or other federal or state law, insofar as such losses, claims, damages or liabilities (or actions in respect thereto) arise out of or are based upon any Violation, in each case to the extent that such Violation occurs in reliance upon and in conformity with written information furnished by such Holder expressly for use in connection with such registration; and each such Holder shall reimburse any legal or other expenses reasonably incurred by the Corporation or any such Person in connection with investigating or defending any such loss, claim, damage, liability or action; provided, however, that the indemnity agreement contained in this Section 5(i) shall not apply to amounts paid in settlement of any such loss, claim, damage, liability or action if such settlement is effected without the consent of the Holder, which consent shall not be unreasonably withheld.

(iii) Promptly after receipt by an indemnified party under this Section 5(i) of notice of the commencement of any action (including any governmental action), such indemnified party shall, if a claim in respect thereof is to be made against any indemnifying party under this Section 5(i), deliver to the indemnifying party a written notice of the commencement thereof and the indemnifying party shall have the right to participate in, and, to the extent the indemnifying party so desires, jointly with any other indemnifying party similarly noticed, to assume the defense thereof with counsel mutually satisfactory to the parties; provided, however, that an indemnified party shall have the right to retain its own counsel, with the fees and expenses to be paid by the indemnifying party, if representation of such indemnified party by the counsel retained by the indemnifying party would be inappropriate due to actual or potential differing interests between such indemnified party and any other party represented by such counsel in such proceeding. The failure to deliver written notice to the indemnifying party within

a reasonable time of the commencement of any such action, if prejudicial to its ability to defend such action, shall relieve such indemnifying party of any liability to the indemnified party under this Section 5(i), but the omission so to deliver written notice to the indemnifying party shall not relieve it of any liability that it may have to any indemnified party otherwise than under this Section 5(i).

(iv) If the indemnification provided for in Section 5(i) is unavailable to a party entitled to indemnification in respect of any losses referred to herein, then each indemnifying party, in lieu of indemnifying such indemnified party, shall contribute to the aggregate losses as is appropriate to reflect the relative fault of the indemnified party and the indemnifying party, as well as any other relevant equitable considerations. The relative fault of such indemnifying party and indemnified parties shall be determined by reference to, among other things, whether any action in question, including any untrue or alleged untrue statement of a material fact or omission or alleged omission to state a material fact, has been made by, or relates to information supplied by, such indemnifying party or indemnified parties, and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such action; provided, however, that, in any such case, (1) no Holder shall be required to contribute any amount in excess of the public offering price of all such Registrable Securities offered and sold by such Holder pursuant to such registration statement; and (2) no person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any Person who was not guilty of such fraudulent misrepresentation.

(v) The obligations of the Corporation and Holders under this Section 5(i) shall survive the completion of any offering of Registrable Securities in a registration statement, and the termination of this Agreement.

(j) "Market Stand-Off" Agreement. Each Holder hereby agrees that it shall not, to the extent requested by the Corporation and an underwriter of Common Stock of the Corporation, sell or otherwise Transfer any Registrable Securities (other than Registrable Securities being registered in such offering) for up to that period of time following the effective date of a registration statement of the Corporation filed under the Securities Act as is requested by the managing underwriter(s) of such offering, not to exceed one hundred eighty (180) days; provided, however, that all officers, directors and five percent (5%) or greater stockholders of the Corporation then holding Common Stock of the Corporation shall enter into similar agreements. In order to enforce the foregoing covenant, the Corporation may impose stop transfer instructions with respect to the then-remaining Registrable Securities of each Holder (and the shares or securities of every other Person subject to the foregoing restriction) until the end of such period.

(k) Assignment of Registration Rights. The rights of a Holder under Sections 5(d), (e) and (f) may be assigned by any Holder in connection with any Transfer by a Holder of Registrable Securities provided that: (i) such Transfer may otherwise be effected in accordance with applicable securities laws;

(ii) such Transfer is effected in compliance with the restrictions on Transfer contained in this Agreement and in any other agreement between the Corporation and the Holder; (iii) notice of such Transfer is given to the Corporation; (iv) such assignee or transferee (a) acquires pursuant to such Transfer not less than 50,000 shares of Registrable

Securities (as adjusted for combinations, stock dividends, subdivisions or split-ups), or (b) such assignee or transferee is an Affiliate or a Family Member of a Holder; and (v) such assignee or transferee agrees in writing with the Corporation to be bound by all of the provisions of this Agreement.

SECTION 6. Duration of Agreement. Except for those provisions that, by their terms, terminate sooner, all rights and obligations of each Stockholder under this Agreement shall terminate as to such Stockholder upon the earlier of (a) the Transfer in accordance with this Agreement of all Shares held by such Stockholder, or (b) upon written consent of (i) the Stockholders holding at least a majority of the shares of Series A Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (ii) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series B Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (iii) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series C Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (iv) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series D Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (v) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series E Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (vi) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series F Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (vii) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series G Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (viii) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series H Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (ix) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series I Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (x) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series J Preferred Stock subject to this Agreement (including shares of Common Stock into which converted) and (xi) the Stockholders holding at least a majority of the shares of Common Stock subject to this Agreement (other than those shares specified in subparagraphs (i), (ii), (iii), (iv), (v), (vi), (vii), (viii), (ix) and (x) above).

SECTION 7. Severability; Governing Law. If any provisions of this Agreement shall be determined to be illegal and unenforceable by any court of law, the remaining provisions shall be severable and enforceable in accordance with their terms. This Agreement shall be governed by, and construed in accordance with, the laws of the State of Delaware, without giving effect to the conflicts of laws principles thereof.

SECTION 8. Benefits of Agreement. This Agreement shall be binding upon and inure to the benefit of the parties and their respective successors and assigns, legal representatives and heirs; provided, that, except as otherwise specifically permitted pursuant to this Agreement, neither this Agreement nor any of the rights, interests or obligations hereunder shall be assigned by any party hereto without the prior written consent of the other parties. This Agreement sets forth the entire agreement and understanding among the parties as to the subject

matter hereof and merges and supersedes all prior discussions, agreements and understandings of any and every nature among them.

SECTION 9. Notices. All notices, requests, consents and other communications hereunder to any party shall be deemed to be sufficient if contained in a written instrument delivered in person, sent by overnight courier, or duly sent by first class registered or certified mail (or air mail, if to a party not located in North America), return receipt requested, postage prepaid, addressed to such party at the address set forth below or such other address as may hereafter be designated in writing by the addressee to the addressor listing all parties:

(a) If to the Corporation, to:

Onconova Therapeutics, Inc.
375 Pheasant Run
Newtown, PA 18940

Attention: Dr. Ramesh Kumar

with a copy to:

Dechert LLP
902 Carnegie Center
Suite 500
Princeton, NJ 08540-6531

Attention: James J. Marino, Esq.

(b) If to the Stockholders, to the names and addresses set forth on Schedule I.

All such notices, advises and communications shall be deemed to have been received (a) in the case of personal delivery or by overnight courier, on the date of such delivery and (b) in the case of mailing, on the third day after the posting thereof.

SECTION 10. Changes. The terms and provisions of this Agreement may not be modified or amended, or any of the provisions hereof waived (either generally or in a particular instance and either retroactively or prospectively), except pursuant to the written consent of (a) the Corporation, (b) the Stockholders holding at least a majority of the shares of Series A Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (c) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series B Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (d) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series C Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (e) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series D Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (f) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series E Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (g) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series F Preferred Stock subject to this

Agreement (including shares of Common Stock into which converted), (h) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series G Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (i) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series H Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (j) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series I Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), (k) the Stockholders holding at least sixty-six and 67/100 percent (66.67%) of the shares of Series J Preferred Stock subject to this Agreement (including shares of Common Stock into which converted), and (l) the Stockholders holding at least a majority of the shares of Common Stock subject to this Agreement (other than those shares specified in Sections 10(b), (c), (d), (e) (f), (g), (h), (i), (j) and (k) above); provided, however, that any rights that inure specifically to the benefit of the Series A Investors as a group, the Series B Investors as a group, the Series C Investors as a group, the Series D Investors as a group, the Series E Investors as a group, the Series F Investors as a group, the Series G Investors as a group, the Series H Investors as a group, the Series I Investors as a group, the Series J Investors as a group, or the Founders as a group, may be effectively waived by the Stockholders holding at least a majority of the shares of the Series A Preferred Stock subject to this Agreement in the case of the Series A Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of the Series B Preferred Stock subject to this Agreement in the case of the Series B Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of the Series C Preferred Stock subject to this Agreement in the case of the Series C Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of the Series D Preferred Stock subject to this Agreement in the case of Series D Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of Series E Preferred Stock subject to this Agreement in the case of Series E Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of Series F Preferred Stock subject to this Agreement in the case of Series F Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of Series G Preferred Stock subject to this Agreement in the case of Series G Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of Series H Preferred Stock subject to this Agreement in the case of Series H Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of Series I Preferred Stock subject to this Agreement in the case of Series I Investors, at least sixty-six and 67/100 percent (66.67%) of the shares of Series J Preferred Stock subject to this Agreement in the case of Series J Investors and at least a majority of the shares of Common Stock owned by the Founders and subject to this Agreement in the case of the Founders, respectively, without the need for the required vote of any other group.

SECTION 11. Captions. The captions herein are inserted for convenience only and shall not define, limit, extend or describe the scope of this Agreement or affect the construction hereof.

SECTION 12. Nouns and Pronouns. Whenever the context may require, any pronouns used herein shall include the corresponding masculine, feminine or neuter forms and the singular form of names and pronouns shall include the plural and vice-versa.

SECTION 13. Merger Provision. This Agreement (as the same may be amended from time to time) constitutes the entire agreement among the parties pertaining to the subject matter hereof and supersedes all prior and contemporaneous agreements therewith, including

without limitation, the Seventh Amended and Restated Stockholders' Agreement dated as of September 21, 2010, as amended (the "Original Agreement"), among the Corporation and certain stockholders named therein, which Original Agreement is hereby terminated and no longer of any force or effect. By execution of this Agreement, the holders of the Series A Preferred Stock, Series B Preferred Stock, Series C Preferred Stock, Series D Preferred Stock, Series E Preferred Stock, Series F Preferred Stock, Series G Preferred Stock and Series H Preferred Stock hereby waive their rights of first offer and any related notice and/or closing requirements (including without limitation the timing of such closing) required under Section 2 of the Original Agreement with respect to the issuance and sale of the Series I Preferred Stock and the Series J Preferred Stock.

SECTION 14. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed to be an original, but all of which taken together shall constitute one and the same instrument.

SECTION 15. Board of Directors.

(a) The Board of Directors of the Corporation shall consist of ten (10) directors.

(b) At each annual meeting of the stockholders of the Corporation, and at each special meeting of the stockholders of the Corporation called for the purpose of electing directors of the Corporation, and at any time at which stockholders of the Corporation shall have the right to, or shall, vote for or consent in writing to the election of directors of the Corporation, then, and in each such event the Stockholders agree that they shall vote all shares owned by them for the election of the Board of Directors in the following manner:

(i) The Series H Investors agree to elect directors as set forth in this Section 15(b)(i). The holders of record of Series H Preferred Stock voting together as a separate class shall elect one (1) director (the "Series H Director"), which Series H Director shall be designated for nomination by VenturEast Life Fund III LLC ("VenturEast") for so long as VenturEast continues to own, in the aggregate, at least fifty percent (50%) of the Series H Preferred Stock originally purchased from the Corporation under the Series H Purchase Agreement. In the event VenturEast owns less than fifty percent (50%) of the Series H Preferred Stock originally purchased by them from the Corporation under the Series H Purchase Agreement, then the holders of record of Series H Preferred Stock shall not have the right to elect any Series H Director.

(ii) The Series D Investors agree to elect directors as set forth in this Section 15(b)(ii). The holders of record of Series D Preferred Stock voting together as a separate class shall elect one (1) director (the "Series D Director"), which Series D Director shall be designated for nomination by ICICI Venture Funds Management Company Limited and/or its Affiliates ("ICICI") for so long as ICICI continues to own, in the aggregate, at least fifty percent (50%) of the Series D Preferred Stock originally purchased by them from the Corporation under the Series D Purchase Agreement. In the event ICICI owns less than fifty percent (50%) of the Series D Preferred Stock originally purchased by them from the Corporation under the Series D Purchase Agreement, the

holders of Series D Preferred Stock voting together as a separate class shall have the right to elect the Series D Director, who shall be designated for nomination by the holders of record of a majority of the shares of Series D Preferred Stock then outstanding.

(iii) The Series B Investors agree to elect directors as set forth in this Section 15(b)(iii). For so long as the Series B Investors continue to own, in the aggregate, more than fifty percent (50%) of the Series B Preferred Stock originally purchased by them from the Corporation under the Series B Purchase Agreement, the holders of record of the Series B Preferred Stock voting together as a separate class shall elect two (2) directors (the "Series B Directors"), one of whom shall be designated for nomination by the Mehta Investors and the other of whom shall be designated for nomination by Cadila Healthcare Limited ("Cadila"). In the event the Series B Investors own, in the aggregate, no less than twenty five percent (25%) but no more than fifty percent (50%) of the Series B Preferred Stock originally purchased by them from the Corporation under the Series B Purchase Agreement, the holders of record of the Series B Preferred Stock voting together as a separate class shall elect only one (1) Series B Director, who shall be designated for nomination by the following Persons:

(A) if, at that time, Cadila owns no less than 260,870 shares of Series B Preferred Stock, then by Cadila; and

(B) in all other cases, by the holders of record of a majority of the shares of Series B Preferred Stock then outstanding and held by the original Series B Investors.

In the event the Series B Investors own, in the aggregate, less than twenty-five percent (25%) of the Series B Preferred Stock originally purchased by them from the Corporation under the Series B Purchase Agreement, the holders of record of Series B Preferred Stock shall not have the right to elect any Series B Director.

(iv) The holders of record of Common Stock and Series A Preferred Stock voting together as a separate class (on an as-converted basis) shall elect the remaining directors (collectively, the "Common Directors") (and if the holders of Series B Preferred Stock or the holders of Series H Preferred Stock are no longer entitled to elect a Series B Director(s) or the Series H Director, as the case may be, then the holders of record of shares of Common Stock and Series A Preferred Stock voting together as a separate class (on an as-converted basis) shall vote to fill that directorship(s) with a Common Director as well), all of whom shall be designated for nomination by the holders of record of a majority of the shares of Common Stock and Series A Preferred Stock then outstanding (on an as-converted basis).

The Corporation agrees that it shall cause its Board of Directors to nominate for election all such nominees so designated by the Stockholders in accordance with subsections (i) through (iv) above.

(c) At such time as the holders of Series B Preferred Stock or Series H Preferred Stock are no longer entitled to designate for nomination and elect the Series B

Director(s) or the Series H Director, as the case may be, the Corporation shall so advise the Series B Director(s) or the Series H Director, as appropriate, and each such Director shall be required to promptly tender his resignation to the Corporation (and the holders of Series B Preferred Stock or Series H Preferred Stock, as the case may be, shall cause their designee to so resign) (a "Subsection (c) Resignation").

(d) At any such meeting called for the purpose of electing directors, the presence in person or by proxy of (A) the holders of a majority of the shares of Series H Preferred Stock then outstanding, in the case of the election of the Series H Director, (B) the holders of a majority of the shares of Series D Preferred Stock then outstanding, in the case of the election of the Series D Director, (C) the holders of a majority of the shares of Series B Preferred Stock then outstanding, in the case of the election of a Series B Director(s), and (D) the holders of a majority of the shares of Common Stock and Series A Preferred Stock then outstanding (on an as-converted to Common Stock basis), in the case of the election of a Common Director), shall constitute a quorum for the election of directors to be elected by such holders.

(e) The Series H Director who shall have been elected as provided in this Section 15 may be removed during his term of office, whether with or without cause, only by the holders of record of a majority of Series H Preferred Stock then outstanding; the Series D Director who shall have been elected as provided in this Section 15 may be removed during his term of office, whether with or without cause, only by the holders of record of a majority of Series D Preferred Stock then outstanding; each Series B Director who shall have been elected as provided in this Section 15 may be removed during his term of office, whether with or without cause, only by the holders of record of a majority of the shares of Series B Preferred Stock then outstanding; and each Common Director who shall have been elected as provided in this Section 15 may be removed during his term of office, whether with or without cause, only by the holders of record of a majority of the shares of Common Stock and Series A Preferred Stock then outstanding (on an as-converted basis).

(f) A vacancy in any directorship (whether as a result of death, permanent disability, resignation (other than a Subsection (c) Resignation) or removal) elected by the holders of shares of Series H Preferred Stock shall be filled only by vote or written consent of the holders of shares of Series H Preferred Stock in the manner set forth in this Section 15. A vacancy in the directorship (whether as a result of death, permanent disability, resignation or removal) elected by the holders of shares of Series D Preferred Stock shall be filled only by vote or written consent of holders of shares of Series D Preferred Stock in the manner set forth in this Section 15. A vacancy in any directorship (whether as a result of death, permanent disability, resignation (other than a Subsection (c) Resignation) or removal) elected by the holders of shares of Series B Preferred Stock shall be filled only by vote or written consent of the holders of shares of Series B Preferred Stock in the manner set forth in this Section 15. A vacancy in any directorship (whether as a result of death, permanent disability, resignation (including as a result of a Subsection (c) Resignation) or removal) elected by the holders of record of shares of Common Stock and Series A Preferred Stock shall be filled by the remaining Common Directors then in office or, if there is none, then by vote or written consent of the holders of record of shares of Common Stock and Series A Preferred Stock, in the manner set forth in this Section 15.

(g) Each Series H Director, Series D Director, Series B Director and Common Director shall be entitled to one (1) vote. Holders of the Series C Preferred Stock, holders of the Series E Preferred Stock, holders of the Series F Preferred Stock, holders of the Series G Preferred Stock, holders of the Series I Preferred Stock and holders of the Series J Preferred Stock are not entitled to vote for directors.

(h) The Series B Investors, the Series D Investors and the Series J Investors shall each have the right to designate one person as an observer to the Board of Directors (the "Board Observers"). The Board Observers shall be given the same notices regarding Board and committee meetings (or written consents or other Board actions), shall be given the same materials and shall be entitled to attend all Board meetings and any executive session thereof (but not to vote thereat) as if he/she were a director, subject to the execution of confidentiality agreements. Notwithstanding the foregoing, the Corporation may withhold any information and exclude any such Board Observer from any portion of any meeting of its Board of Directors or any committee meeting thereof where access to any such information or attendance at any such portion of a meeting would (i) present a direct conflict of interest for such Board Observer, including, but not limited to, in connection with any license, manufacturing or other agreement with any Series J Investor or any Affiliate thereof, or (ii) expose him or her to competitively sensitive business information which, if known to an industry competitor, would reasonably be expected to adversely affect the business or prospects of the Corporation.

(i) The Corporation shall provide to each director and Board Observer:

(i) Quarterly progress reports on the Corporation's scientific work;

(ii) Reports, if any, from the Corporation's Scientific Advisory Committee;

(iii) Copies of all material documents filed with government agencies (including the Internal Revenue Service, the Environmental Protection Agency and the Securities and Exchange Commission) within sixty (60) days after such filing; provided that routine filings, including, but not limited to, the filing of tax returns, will only be provided upon written request to the Corporation;

(iv) Pleadings in any material lawsuits filed by or against the Corporation;

(v) Copies of any notice regarding material defaults of any material agreement to which the Corporation is a party within sixty (60) days of receipt of such notice by the Corporation;

(vi) Prompt notice of any material adverse change or effect on the operations or financial position of the Corporation; and

(vii) The Corporation's annual operating plan and budget, including monthly projections, at least thirty (30) days before the beginning of each fiscal year of the Corporation.

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SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

IN WITNESS WHEREOF, the undersigned parties representing the Series I Investors, the Series J Investors and the Stockholders holding at least (a) a majority of the shares of Series A Preferred Stock subject to this Agreement, (b) 66.67% of the shares of Series B Preferred Stock subject to this Agreement, (c) 66.67% of the shares of Series C Preferred Stock, (d) 66.67% of the shares of Series D Preferred Stock, (e) 66.67% of the shares of Series E Preferred Stock, (f) 66.67% of the shares of Series F Preferred Stock, (g) 66.67% of the shares of Series G Preferred Stock, (h) 66.67% of the shares of Series H Preferred Stock and (i) a majority of the shares of Common Stock subject to this Agreement, have caused this Agreement to be duly executed on their behalf as of the day first above written.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Name: Ramesh Kumar, Ph.D.
Title: President

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STOCKHOLDERS' AGREEMENT

SERIES F, G and H CONVERTIBLE PREFERRED STOCKHOLDER:

2007 Health, LLC

By: /s/ Eric Aroesty
Name: Eric Aroesty
Title: Manager

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES C, D, E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

21st Century, L.L.C.

By: /s/ J. Christopher Bumgarner
Name: J. Christopher Bumgarner
Title: Manager

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STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Anandh R. Haridh
Anandh R. Haridh

/s/ Muthu Krishnan
Muthu Krishnan

/s/ Kalyan Narayanan
Kalyan Narayanan

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STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

Baker NYE, LP

By: /s/ Richard Nye
Name: Richard Nye
Title: Managing G.P.

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Bala Shiva Prasad
Bala Shiva Prasad

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES J CONVERTIBLE PREFERRED STOCKHOLDER:

BAXTER HEALTHCARE SA

By: /s/ Benedikt Kubik
Name: Benedikt Kubik
Title: Finance Director

By: /s/ Sarah Byrne-Quinn
Name: Sarah Byrne-Quinn
Title: VP Business Development & Strategy

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Bhoopal Reddy Benjaram
Bhoopal Reddy Benjaram

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Brian T. Bristol
Brian T. Bristol

/s/ Susannah B. Bristol
Susannah B. Bristol

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B and C CONVERTIBLE PREFERRED STOCKHOLDER:

Cadila Healthcare Limited

By: /s/ Pankaj R. Patel
Name: Pankaj R. Patel
Title: Chairman and Mg. Director

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES E, F and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Carol Lili Lynton
Carol Lili Lynton

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES A CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Catherine G. Fine
Catherine G. Fine, Ph.D.

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Chepyala Anuradha
Chepyala Anuradha

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Anurag Gard

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Christopher Wilson
Christopher Wilson

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D, E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

Coneway Investment Partners, L.P.

By: /s/ Peter Coneway
Name: Peter Coneway
Title: General Partner

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Daniel Motulsky
Daniel Motulsky

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ David Ward
David Ward

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B CONVERTIBLE PREFERRED STOCKHOLDER:

Delta Partners

By: Delta Partners MS, LLP

By: JBS Managers, LLC
Title: Managing Partner

By: /s/ James Thomas
Name: James Thomas
Title: Member

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Diwakar Reddy Onteddu
Diwakar Reddy Onteddu

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ D.L. Subhardramma
D. L. Subhadramma

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D and E CONVERTIBLE PREFERRED STOCKHOLDER and COMMON STOCKHOLDER:

/s/ Alan R. Williamson
Dr. Alan R. Williamson

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Ramalakshmi Marri
Dr. Ramalakshmi Marri

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Drew Katz
Drew Katz

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES A, B, C, D, E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER and COMMON STOCKHOLDER:

/s/ E. Premkumar Reddy
E. Premkumar Reddy, Ph.D.

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Ellen F. McLean

Ellen F. McLean

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B, D and F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Ernest H. Pomerantz
Ernest H. Pomerantz

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES E and G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Estate of Stanley C. Bell, Ph.D, by Janice W. Bell, Executrix
Estate of Stanley C. Bell, Ph.D., by Janice W. Bell, Executrix

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STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ G. Yeshwanth Reddy
G. Yeshwanth Reddy

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Geoffrey G. Jones
Geoffrey G. Jones

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B CONVERTIBLE PREFERRED STOCKHOLDER:

Gerlach & Co.

By: /s/ Keith Whyte
Name: Keith Whyte
Title: A-VP

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Gregory A. Beard
Gregory A. Beard

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Gulab Shrimal
Gulab Shrimal

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Gulab Shrimal
Gulab Shrimal

/s/ Prashant Shrimal
Prashant Shrimal

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Hanimi Reddy Mettu
Hanimi Reddy Mettu

/s/ M. Satyavathy
Satyavathy Mettu

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Hanumanth K. Reddy
Hanumanth K. Reddy

/s/ Geetha Reddy
Geetha R. Komatireddy

HANUMANTH & GEETHA KOMATIREDDY
TRUST

By: /s/ Geetha Reddy
Name: Geetha Komatireddy
Title: Member

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Henry S. Bienen
Henry S. Bienen

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B and F CONVERTIBLE PREFERRED STOCKHOLDER:

ICMC Strategic Asset Fund, Ltd.

By: /s/ Ralph Heffelman
Name: Ralph Heffelman
Title: President ICMC, ICMC General Partner

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D, E and F CONVERTIBLE PREFERRED STOCKHOLDER:

I-Ven Biotech Ltd.

By: /s/ T.S. Suresh
Name: T.S. Suresh
Title: Director

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ James R. Jones
James R. Jones

/s/ Olivia Barclay Jones
Olivia Barclay Jones

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

COMMON STOCKHOLDER:

/s/ Janice W. Bell
Janice W. Bell

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Jeffrey Halis
Jeffrey Halis

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STOCKHOLDERS' AGREEMENT

SERIES A, C, F, G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Joel A. Fein
Joel A. Fein, M.D.

/s/ Victoria A. Levin
Victoria A. Levin

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STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ John Bertuzzi
John Bertuzzi

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES E CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ John French
John French

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ John Kunze
John Kunze

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ John Motulsky
John Motulsky

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES A, B, D, E, F and H CONVERTIBLE PREFERRED STOCKHOLDER and COMMON STOCKHOLDER:

/s/ John R. Jenkins
John R. Jenkins, Ph.D.

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Jude A. Olinger
Jude A. Olinger

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Kalpana Onteddu
Kalpana Onteddu

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Kavitha Mandadi
Kavitha Mandadi

/s/ John Stayapaul Gunja
John Stayapaul Gunja

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Kiran Kalakata
Kiran Kalakata

/s/ Aishwarya Ganapa
Aishwarya Ganapa

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STOCKHOLDERS' AGREEMENT

SERIES E and G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Lee H. Carson
Lee H. Carson

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STOCKHOLDERS' AGREEMENT

COMMON STOCKHOLDER:

M.V. Ramana Reddy

/s/ M.V. Ramana Reddy

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Madhava R. Marri
Madhava R. Marri

/s/ Jeffrey Choppin
Jeffrey Choppin

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Madhava R. Marri
Madhava R. Marri

/s/ Sarala R. Marri
Sarala R. Marri

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Marlene Hess
Marlene Hess

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D CONVERTIBLE PREFERRED STOCKHOLDER and COMMON STOCKHOLDER:

/s/ Marvin L. Miller
Marvin L. Miller

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STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

Michael and Jane Hoffman 2012 Descendants Trust

By: /s/ Michael B. Hoffman
Name: Michael B. Hoffman
Title:

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

MOHAN KOKA, TRUSTEE OF THE MOHAN KOKA REVOCABLE TRUST AND SAYEE KOKA, TRUSTEE OF THE SAYEE KOKA REVOCABLE TRUST, AS EQUAL TENANTS IN COMMON

By: /s/ Mohan Koka
Mohan Koka

By: /s/ Sayee Koka
Sayee Koka

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Mohan Krishna Reddy Aryabumi
Mohan Krishna Reddy Aryabumi

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STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ N. John Lancaster
N. John Lancaster

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STOCKHOLDERS' AGREEMENT

SERIES D, E, F, G and H CONVERTIBLE PREFERRED STOCKHOLDER:

Naftali Investments Ltd.

By: /s/ Meir Hadar
Name: Meir Hadar
Title: President & CEO

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STOCKHOLDERS' AGREEMENT

SERIES G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Nathaniel A. Bristol
Nathaniel A. Bristol

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STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Neil Weiss
Neil Weiss

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STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

New Cavendish Finance Corporation

By: /s/ Marcio Fainziliber
Name: Marcio Fainziliber
Title: Attorney-in-fact

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Nirmala Onteddu
Nirmala Onteddu

/s/ Ramakrishna Reddy Pulimamidi
Ramakrishna Reddy Pulimamidi

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Prabhat Kumar
Prabhat Kumar

/s/ Shirly Dsilva
Shirly Dsilva

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

Quod Erat Demonstrandum (QED) Limited

By: /s/ N.R. Landor
Name: N.R. Landor
Title: Director for Consortia Directors Limited

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Radha Reddy Gurram
Radha Reddy Gurram

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Rajender Benjaram
Rajender Benjaram

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Ramakrishna Reddy Pulimamidi
Ramakrishna Reddy Pulimamidi

/s/ Nirmala Onteddu
Nirmala Onteddu

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Ramakrishna Reddy Pulimamidi
Ramakrishna Reddy Pulimamidi

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES A, B, C, D, E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER and COMMON STOCKHOLDER:

/s/ Ramesh Kumar
Ramesh Kumar, Ph.D.

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Robert Hotz
Robert Hotz

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Robert S. Mancini
Robert S. Mancini

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

Robert T. Clutterbuck, Trustee, Robert T. Clutterbuck Trust Dtd 11/07/1994

By: /s/ Robert T. Clutterbuck
Name:
Title:

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B, C, E and F CONVERTIBLE PREFERRED STOCKHOLDER:

Rocky Way Partners, L.P.

By: /s/ David S. Steiner
Name: David S. Steiner
Title: General Partner

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B and C CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Roy M. Ambinder
Roy M. Ambinder, M.D.

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Rupinder Singh Gill
Rupinder Singh Gill

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Rupinder Gill
Rupinder Gill

/s/ Raminder Gill
Raminder Gill

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Sanford A. Bristol
Sanford A. Bristol

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Saroja Koppala
Saroja Koppala

/s/ K. Sudhir Reddy

K. Sudhir Reddy

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Sasanka Reddy Sirigireddy
Sasanka Reddy Sirigireddy

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Satish Kumar Thulla
Satish Kumar Thulla

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D, E, F and G CONVERTIBLE PREFERRED STOCKHOLDER:

Select Equity Advisory Services Pvt. Ltd.

By: /s/ Arjun Sharma
Name: Arjun Sharma
Title: Director

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D, E, F and G CONVERTIBLE PREFERRED STOCKHOLDER:

Select Synergies and Services Pvt. Ltd.

By: /s/ Arjun Sharma
Name: Arjun Sharma
Title: Authorized Signatory

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Shravan K. Mettu
Shravan K. Mettu

/s/ Varun Radhakrishnan
Varun Radhakrishnan

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F and I CONVERTIBLE PREFERRED STOCKHOLDER:

SLATER CAPITAL I, LLC

By: /s/ Steven L. Martin
Name: Steven L. Martin
Title: Managing Member

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Vijay Bhasker Reddy Lachagari
Vijay Bhasker Reddy Lachagari

/s/ Raji Reddy Nalla
Raji Reddy Nalla

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Thomas S. Riggs
Thomas S. Riggs

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Sreedevi Avuku
Sreedevi Avuku

/s/ Venkata Vijaya Kumar Reddy Avuku
Venkata Vijaya Kumar Reddy Avuku

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES D, E, F and G CONVERTIBLE PREFERRED STOCKHOLDER:

Starec Trust

By: /s/ Michael Recanati
Name: Michael Recanati
Title: Trustee

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES E, F and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Stephen J. Schaefer

Stephen J. Schaefer

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES E, G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Stephen T. Kelly
Stephen T. Kelly

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

Steven J. Hefter Trustee of the Steven J. Hefter Trust

By: /s/ Steven J. Hefter
Name:
Title:

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Steven L. Martin
Steven L. Martin

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G CONVERTIBLE PREFERRED STOCKHOLDER:

Sylvia Steiner 1999 Trust

By: /s/ David S. Steiner
Name: David S. Steiner
Title: Trustee

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H and I CONVERTIBLE PREFERRED STOCKHOLDER:

The Beutner Family 2001 Long-Term Trust

By: /s/ Austin M. Beutner
Name: Austin M. Beutner
Title:

By: /s/ Steven L. Martin
Name: Steven L. Martin
Title: Trustee

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B, C, D, E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER and COMMON STOCKHOLDER:

The Jane & Michael B. Hoffman 1998 Trust For Issue

By: /s/ Jane S. Hoffman
Name: Jane S. Hoffman
Title: Trustee

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

The Michael Recanati Trust

By: /s/ Michael Recanati
Name: Michael Recanati
Title: Trustee

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES C, E and F CONVERTIBLE PREFERRED STOCKHOLDER:

The Testa Family Limited Partnership

By: /s/ Robert Testa
Name: Robert Testa
Title: General Partner

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

Thunderhill Associates, LLC

By: /s/ Paul B. Guenther
Name: Paul B. Guenther
Title: Managing Member

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B, C, D, E, F, G, H and I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Timothy G. Lalonde
Timothy G. Lalonde

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES G and I CONVERTIBLE PREFERRED STOCKHOLDER:

TRUST UNDER DEED OF WILLIAM M. BRISTOL III AS AMENDED AND RESTATED ON AUGUST 16, 2003

By: /s/ Mary Jayne Comey
Name: Mary Jayne Comey
Title:

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Tulla Kishore
Tulla Kishore

/s/ Raghavendra Goud Vaggu
Raghavendra Goud Vaggu

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Utkarsh Palnitkar
Utkarsh Palnitkar

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

SERIES H CONVERTIBLE PREFERRED STOCKHOLDER:

VenturEast Life Fund III LLC

By: /s/ Akshar Maherally
Name: Akshar Maherally
Title: Director

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

Vieco 3 Limited

By: /s/ Alison Renouf
Name: Alison Renouf
Title: Director

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

SERIES G and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Vijay Kumar Reddy Bondugula
Vijay Kumar Reddy Bondugula

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES B, C and D CONVERTIBLE PREFERRED STOCKHOLDER:

Viram Foundation

By: /s/ Amita Rodman Mehta
Name: Amita Rodman Mehta
Title: Trustee

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F and H CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Wayne J.D. Teetsel
Wayne J.D. Teetsel

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES F CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Wesley R. Edens
Wesley R. Edens

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

Wyandanch Partners, L.P.,
By: Gollust Management Inc., its General Partner

By: /s/ Keith R. Gollust
Name: Keith R. Gollust
Title: President

SIGNATURE PAGE TO EIGHTH AMENDED AND RESTATED
STOCKHOLDERS' AGREEMENT

SERIES I CONVERTIBLE PREFERRED STOCKHOLDER:

/s/ Yarlagadda Manoj Kumar
Yarlagadda Manoj Kumar

CONSENT OF SPOUSE TO EIGHTH AMENDED AND RESTATED STOCKHOLDERS' AGREEMENT

CONSENT OF SPOUSE

I, , spouse of , acknowledge that I have read the Eighth Amended and Restated Stockholders' Agreement, dated as of July 27, 2012, by and among Onconova Therapeutics, Inc. (the "Corporation") and the stockholders signatory thereto (as may be amended from time to time, the "Agreement"), which is attached as Exhibit A hereto, and that I know the contents of the Agreement. I am aware that the Agreement contains provisions regarding the voting and transfer of shares of capital stock of the Corporation that my spouse may own, including any interest I might have therein.

I hereby agree that my interest, if any, in any shares of capital stock of the Corporation subject to the Agreement shall be irrevocably bound by the Agreement and further understand and agree that any community property interest I may have in such shares of capital stock of the Corporation shall be similarly bound by the Agreement.

I am aware that the legal, financial and related matters contained in the Agreement are complex and that I am free to seek independent professional guidance or counsel with respect to this Consent. I have either sought such guidance or counsel or determined after reviewing the Agreement carefully that I will waive such right.

Dated: _____ _____
[Name]

JOINDER AGREEMENT

Joinder Agreement

The undersigned, the holder of shares of [Series] Convertible Preferred Stock, par value $.01 per share, of Onconova Therapeutics, Inc., a Delaware corporation (the "Corporation"), hereby agrees with the Corporation that it is hereby a party to the Eighth Amended and Restated Stockholders' Agreement, dated as of July 27, 2012, by and among the Corporation and the stockholders signatory thereto (as may be amended from time to time, the "Stockholders' Agreement") and it is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a ["Series A Investor",] [a "Series B Investor",] [a "Series C Investor",] [a "Series D Investor",] [a "Series E Investor",] [a "Series F Investor",] [a "Series G Investor",] [a "Series H Investor",] [a "Series I Investor"], an "Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

Dated as of , 20

By: _____
Name:
Title:

EXHIBIT A TO CONSENT OF SPOUSE

Exhibit A

Eighth Amended and Restated Stockholders' Agreement

JOINDER AGREEMENT

THIS AGREEMENT, dated as of December 21, 2012, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), and Citco Global Custody (NA) NV ref Altair Stars LP (together, "**Transferee**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, as the same may be amended from time to time, dated as of July 27, 2012, between the Company and the other stockholders named therein (the "**Stockholders' Agreement**").

WHEREAS, Citco Global Custody (NA) NV ref Altair Stars Fund Ltd. ("**Transferor**") is the holder of 3,379 shares of the Company's Series B Convertible Preferred Stock, par value $.01 per share (the "**Series B Stock**");

WHEREAS, Transferor desires to transfer to Transferee without consideration 3,379 shares of the Series B Stock;

WHEREAS, Transferor has determined that Transferee is a Permitted Transferee as defined in Section 3(e)(i) of the Stockholders' Agreement; and

WHEREAS, Transferee desires to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys and assigns to Transferee as of the date hereof all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Series B Stock, except as provided for in the Stockholders' Agreement. Transferee hereby agrees with the Company that, by signing this Joinder Agreement, it is hereby a party to the Stockholders' Agreement and it is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a "Series B Investor", an

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"Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

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[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Ramesh Kumar, Ph.D.
President

CITCO GLOBAL CUSTODY (NA) NV REF ALTAIR STARS LP

By: /s/ Ray Creedon
Name: Ray Creedon
Title: Authorized Signatory

By: /s/ Cristina Silva
Name: Cristina Silva
Title: Authorized Signatory

AGREED TO AND ACCEPTED as of the date first above written.

CITCO GLOBAL CUSTODY (NA) NV REF ALTAIR STARS FUND LTD.

By: /s/ Ray Creedon
Name: Ray Creedon
Title: Authorized Signatory

By: /s/ Cristina Silva
Name: Cristina Silva
Title: Authorized Signatory

JOINDER AGREEMENT

THIS AGREEMENT, dated as of February 28, 2013, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), and The Michael and Jane Hoffman 2013 Descendants Trust ("**Transferee**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, as the same may be amended from time to time, dated as of July 27, 2012, between the Company and the other stockholders named therein (the "**Stockholders' Agreement**").

WHEREAS, The Jane & Michael B. Hoffman 1998 Trust for Issue ("**Transferor**") is the holder of those shares of the Company's capital stock listed on Schedule A attached hereto (collectively, the "**Stock**");

WHEREAS, Transferor desires to transfer to Transferee, without consideration, the Stock;

WHEREAS, Transferor has determined that Transferee is a Permitted Transferee as defined in Section 3(e)(i) of the Stockholders' Agreement; and

WHEREAS, Transferee desires to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys, transfers and assigns to the Transferee as of the date hereof all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Stock, except as provided for in the Stockholders' Agreement. The Transferee hereby agrees with the Company that, by signing this Joinder Agreement, it is hereby a party to the Stockholders' Agreement and it is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a

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"Common Stockholder", a "Series B Investor", a "Series C Investor", a "Series D Investor", a "Series E Investor", a "Series F Investor", a "Series G Investor", a "Series H Investor", a "Series I Investor", an "Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Ramesh Kumar, Ph.D.
President

THE MICHAEL AND JANE HOFFMAN 2013 DESCENDANTS TRUST

By: /s/ Jane Hoffman
Name: Jane Hoffman
Title: Trustee

[SIGNATURE PAGE TO JOINDER AGREEMENT]

AGREED TO AND ACCEPTED as of the date first above written.

THE JANE & MICHAEL B. HOFFMAN 1998 TRUST FOR ISSUE

By: /s/ Jane Hoffman
Name: Jane Hoffman
Title: Trustee

[SIGNATURE PAGE TO JOINDER AGREEMENT]

Schedule A

DATE BECAME OWNER OF RECORD	CERT. NO.	CLASS OR SERIES OF SHARES	NO. OF SHARES
12/27/06	19	Common	322,765
6/23/10	40	Common	128,204
9/24/12	57	Common	12,500
12/31/12	85	Common	395,863
11/14/00	BCP5	Series B	43,478
12/11/06	BCP68	Series B	2,855
12/11/06	BCP69	Series B	1,162
12/11/06	BCP70	Series B	1,855
12/5/11	BCP93	Series B	50,000
12/27/02	CP1	Series C	140,449
3/19/04	DP4	Series D	141,396
7/15/04	DP15	Series D	214,132
3/18/05	EP2	Series E	102,460
12/1/05	EP28	Series E	204,919
10/31/06	EP52	Series E	10,246
9/26/11	EP55	Series E	317,000
8/30/07	FP50	Series F	39,062
2/22/12	FP67	Series F	72,165
5/12/09	G14	Series G	102,145

10/5/11	G91	Series G	51,072
10/28/11	G92	Series G	76,608
9/21/10	H27	Series H	199,144
6/6/11	H85	Series H	102,146
7/25/12	I3	Series I	1,635,514

JOINDER AGREEMENT

THIS AGREEMENT, dated as of December 17, 2012, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), Ramesh Kumar, Ph.D. ("**Transferor**"), and The Ramesh Kumar 2012 Trust ("**Transferee**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, dated as of July 27, 2012, between the Company and the other stockholders named therein, as the same may be amended from time to time (the "**Stockholders' Agreement**").

WHEREAS, Transferor is the holder of 323,853 shares of the Company's Common Stock, par value $.01 per share ("**Transferor's Shares**");

WHEREAS, Transferor desires to transfer to Transferee without consideration 200,000 shares of Transferor's Shares (the "**Shares**");

WHEREAS, Transferor has determined that Transferee is a Permitted Transferee as defined in Section 3(e)(ii) of the Stockholders' Agreement and said transfer is an Excluded Transfer as defined in Section 4(c)(i) of the Stockholders' Agreement; and

WHEREAS, Transferee desires to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys and assigns to the Transferee, as of the date hereof, all of his rights, title and interest in the Shares, free and clear of all liens, claims, and encumbrances, except as provided for in the Stockholders' Agreement. The Transferee hereby agrees with the Company that, by signing this Joinder Agreement, it is hereby a party to the Stockholders' Agreement and it is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a "**Founder**" and a "**Stockholder**," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

[The rest of this page intentionally left blank.]

[SIGNATURE PAGE TO JOINDER AGREEMENT]

IN WITNESS WHEREOF, the undersigned have executed this Joinder Agreement as of the date first above written.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Name: Ramesh Kumar, Ph.D.
Title: President

TRANSFEROR:

/s/ Ramesh Kumar
Ramesh Kumar, Ph.D.

[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

AGREED TO AND ACCEPTED as of the date first above written.

TRANSFEREE:

THE RAMESH KUMAR 2012 TRUST

By: /s/ Ramesh Kumar
Name: Ramesh Kumar, Ph.D.
Title: Trustee

JOINDER AGREEMENT

THIS AGREEMENT, dated as of December 28, 2012, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**") and Thomas F. Diorio and Citicorp Trust, N.A., as trustees of the Mancini Family 2012 Trust ("**Transferee**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, as the same may be amended from time to time, dated as of July 27, 2012, between the Company and the other stockholders named therein (the "**Stockholders' Agreement**").

WHEREAS, Robert S. Mancini ("**Transferor**") is the holder of 22,727 shares of the Company's Series F Convertible Preferred Stock, par value $.01 per share (the "**Series F Stock**"), 24,514 shares of the Company's Series G Convertible Preferred Stock, par value $.01 per share (the "**Series G Stock**"), 10,215 shares of the Company's Series H Convertible Preferred Stock, par value $.01 per share (the "**Series H Stock**"), and 9,109 shares of the Company's Series I Convertible Preferred Stock, par value $.01 per share (the "**Series I Stock**");

WHEREAS, Transferor desires to transfer to Transferee, without consideration, the Series F Stock, the Series G Stock, the Series H Stock, and the Series I Stock;

WHEREAS, Transferor has determined that Transferee is a Permitted Transferee as defined in Section 3(e)(ii) of the Stockholders' Agreement; and

WHEREAS, Transferee desires to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys, transfers and assigns to the Transferee as of the date hereof all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Series F Stock, the Series G

Stock, the Series H Stock, and the Series I Stock, except as provided for in the Stockholders' Agreement. The Transferee hereby agrees with the Company that, by signing this Joinder Agreement, it is hereby a party to the Stockholders' Agreement and it is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a "Series F Investor", a "Series G Investor", a "Series H Investor", a "Series I Investor", an "Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Ramesh Kumar, Ph.D.
President

THE MANCINI FAMILY 2012 TRUST

By: /s/ Thomas F. Diorio
Name: Thomas F. Diorio
Title: Trustee

By: Citicorp Trust, N. A., Trustee

By: /s/ Jane Monahan
Name: Jane Monahan
Title: Director and Senior Trust Officer

AGREED TO AND ACCEPTED as of the date first above written.

/s/ Robert S. Mancini
ROBERT S. MANCINI

JOINDER AGREEMENT

THIS AGREEMENT, dated as of May 20, 2013, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), and Monte F. Bourjaily, III Family Trust and Dr. Nicholas Babiak (together, "**Transferees**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, as the same may be amended from time to time, dated as of July 27, 2012, between the Company and the other stockholders named therein (the "**Stockholders' Agreement**").

WHEREAS, Ritter & Bourjaily, Inc. ("**Transferor**") is the holder of 6,260 shares of the Company's Series B Convertible Preferred Stock, par value $.01 per share (the "**Series B Stock**");

WHEREAS, Transferor desires to transfer for value to each Transferee 3,130 shares of the Series B Stock; and

WHEREAS, Transferees desire to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby transfers, conveys and assigns to the Transferees as of the date hereof all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Series B Stock, except as provided for in the Stockholders' Agreement. Each Transferee hereby agrees with the Company that it is hereby a party to the Stockholders' Agreement and it is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a "Series B Investor", an "Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar, Ph.D.
Ramesh Kumar, Ph.D.
President

MONTE F. BOURJAILY, III FAMILY TRUST

By: /s/ Margaret Bourjaily
Name: Margaret Bourjaily
Title: Trustee

/s/ Dr. Nicholas Babiak
Dr. Nicholas Babiak

[SIGNATURE PAGE TO JOINDER AGREEMENT]

AGREED TO AND ACCEPTED as of the date first above written.

RITTER & BOURJAILY, INC.

By: /s/ Margaret Bourjaily
Name: Margaret Bourjaily
Title: Vice President

JOINDER AGREEMENT

THIS JOINDER AGREEMENT, dated as of January 1, 2013, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), and Clay B. Lifflander and Alan L. Rivera ("**Transferees**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, dated as of July 27, 2012, between the Company and the other stockholders named therein, as the same may be amended from time to time (the "**Stockholders' Agreement**").

WHEREAS, MMI Partners, L.L.C. ("**Transferor**") is the holder of 43,478 shares of the Company's Series B Convertible Preferred Stock, par value $.01 per share (the "**Series B Stock**");

WHEREAS, Transferor desires to transfer to Transferees, without consideration, the Series B Stock as follows: 39,130 shares to Clay B. Lifflander and 4,348 shares to Alan L. Rivera;

WHEREAS, Transferor has determined that Transferees are Permitted Transferees as defined in Section 3(e)(i) of the Stockholders' Agreement; and

WHEREAS, Transferees desire to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys, transfers and assigns to the Transferees as of the date hereof all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Series B Stock, except as provided for in the Stockholders' Agreement. The Transferees hereby agree with the Company that, by signing this Joinder Agreement, each is hereby a party to the Stockholders' Agreement and each is bound by the obligations therein imposed upon, and entitled to the benefits therein of,

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a "Series B Investor", an "Investor" and a "Stockholder," with the same effect as if each had executed the Stockholders' Agreement on the original date thereof.

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[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar, Ph.D.
Ramesh Kumar, Ph.D.
President

/s/ Clay B. Lifflander
Clay B. Lifflander

/s/ Alan L. Rivera
Alan L. Rivera

[SIGNATURE PAGE TO JOINDER AGREEMENT]

AGREED TO AND ACCEPTED as of the date first above written.

MMI PARTNERS, L.L.C.

By: /s/ Alan L. Rivera
Name: Alan L. Rivera
Title: Vice President

JOINDER AGREEMENT

THIS JOINDER AGREEMENT, dated as of March 19, 2013, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), and Select Holiday Resorts Private Limited ("**Transferee**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, dated as of July 27, 2012, between the Company and the other stockholders named therein, as the same may be amended from time to time (the "**Stockholders' Agreement**").

WHEREAS, Select Synergies & Services Pvt. Ltd. ("**Transferor**") is the holder of (a) 160,599 shares of the Company's Series D Convertible Preferred Stock, par value $.01 per share (the "**Series D Stock**"), (b) 17,076 shares of the Company's Series E Convertible Preferred Stock, par value $.01 per share (the "**Series E Stock**"), (c) 43,854 shares of the Company's Series F Convertible Preferred Stock, par value $.01 per share (the "**Series F Stock**"), and (d) 43,399 shares of the Company's Series G Convertible Preferred Stock, par value $.01 per share (the "**Series G Stock**");

WHEREAS, Transferor desires to transfer to Transferee, at cost, 80,300 shares of the Series D Stock, 8,538 shares of the Series E Stock, 21,927 shares of the Series F Stock, and 21,699 shares of the Series G Stock;

WHEREAS, Transferor has determined that Transferee is a Permitted Transferee as defined in Section 3(e)(i) of the Stockholders' Agreement; and

WHEREAS, Transferee desires to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys, transfers and assigns to Transferee, as of the date hereof, all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Series D Stock, the Series E Stock, the Series F Stock, and the Series G Stock, except as provided for in the Stockholders' Agreement. The Transferee hereby agrees with the Company that, by signing this Joinder Agreement, it is hereby a party

to the Stockholders' Agreement and is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a "Series D Investor", a "Series E Investor" , a "Series F Investor", a "Series G Investor", an "Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

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[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar, Ph.D.
Ramesh Kumar, Ph.D.
President

SELECT HOLIDAY RESORTS PRIVATE LIMITED

By: /s/ Brijesh Saxena
Name: Brijesh Saxena
Title:

[SIGNATURE PAGE TO JOINDER AGREEMENT]

AGREED TO AND ACCEPTED as of the date first above written.

SELECT SYNERGIES & SERVICES PVT. LTD.

By: /s/ Neeraj Ghei
Name: Neeraj Ghei
Title: Director

JOINDER AGREEMENT

THIS JOINDER AGREEMENT, dated as of April 17, 2013, is made by Onconova Therapeutics, Inc., a Delaware corporation (the "**Company**"), and Peter A. Solomon 2010 Trust ("**Transferee**"). Capitalized terms used but not defined herein shall have the same meanings assigned to them in that certain Eighth Amended and Restated Stockholders' Agreement, dated as of July 27, 2012, between the Company and the other stockholders named therein, as the same may be amended from time to time (the "**Stockholders' Agreement**").

WHEREAS, Peter Solomon ("**Transferor**") is the holder of Eight Hundred (800) shares of the Company's Series F Convertible Preferred Stock, par value $.01 per share (the "**Series F Stock**");

WHEREAS, Transferor desires to transfer to Transferee, without consideration, the Series F Stock;

WHEREAS, Transferor has determined that Transferee is a Permitted Transferee as defined in Section 3(e)(ii) of the Stockholders' Agreement; and

WHEREAS, Transferee desires to become bound by the obligations imposed by, and entitled to the benefits under, the Stockholders' Agreement.

NOW THEREFORE, for good and valuable consideration, Transferor hereby conveys, transfers and assigns to Transferee, as of the date hereof, all of its right, title and interest, free and clear of all liens, claims, and encumbrances in the Series F Stock, except as provided for in the Stockholders' Agreement. The Transferee hereby agrees with the Company that, by signing this Joinder Agreement, it is hereby a party to the Stockholders' Agreement and is bound by the obligations therein imposed upon, and entitled to the benefits therein of, a

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"Series F Investor", an "Investor" and a "Stockholder," with the same effect as if it had executed the Stockholders' Agreement on the original date thereof.

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[SIGNATURE PAGE TO JOINDER AGREEMENT]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this Joinder Agreement, whereupon the Stockholders' Agreement shall be a binding agreement between the Company and you.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar, Ph.D.
Ramesh Kumar, Ph.D.
President

PETER A. SOLOMON 2010 TRUST

By: /s/ Peter Solomon and /s/ Jamie Fanelli
Name: Peter Solomon and Jamie Fanelli
Title: Trustees

[SIGNATURE PAGE TO JOINDER AGREEMENT]

AGREED TO AND ACCEPTED as of the date first above written.

/s/ Peter Solomon
Peter Solomon

Exhibit 10.1

Execution Version

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

DEVELOPMENT AND LICENSE AGREEMENT

This DEVELOPMENT AND LICENSE AGREEMENT (this "Agreement") is entered into on this 19th day of September, 2012 (the "Effective Date"), by and between Onconova Therapeutics, Inc., a company organized under the laws of the State of Delaware with its principal place of business at 375 Pheasant Run, Newtown, PA 18490 ("Onconova") and Baxter Healthcare SA, a company organized under the laws of the Switzerland with its principal place of business at Thurgauerstrasse 130 8152 Glattpark (Opfikon) Switzerland ("Baxter"). Onconova and Baxter may each be referred to herein individually as a "Party" and collectively as the "Parties."

RECITALS

WHEREAS, Onconova is developing a pharmaceutical product under the trademark Estybon® (also known as rigosertib or ON 01910.Na) for use in oncology, and owns or controls certain proprietary patents, technology, know-how and information relating to such product; and

WHEREAS, Baxter is engaged in the research, development and commercialization of pharmaceutical products, and desires to acquire an exclusive license in the Licensed Territory (as defined below) under Onconova's patents, technology, know-how and other information relating to such product, and Onconova desires to grant such exclusive license, on the terms and conditions of this Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the mutual promises and covenants set forth below and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

ARTICLE I.
DEFINITIONS

The following terms as used in this Agreement shall have the meanings set forth in this Section (which meanings shall be applicable both to the singular and the plural forms of such terms):

1.1. "Additional Indication" has the meaning set forth in Section 4.3.1.

1.2. "Affiliate" means with respect to each Party, any Person that directly or indirectly is controlled by, controls or is under common control with a Party. For the purposes of this definition only, the term "control" (including, with correlative meanings, the terms "controlled by" and "under common control with") as used with respect to a Person means (a) in the case of a corporate entity, direct or indirect ownership of voting securities entitled to cast at least fifty percent (50%) of the votes in the election of directors or (b) in the case of a non-corporate entity, direct or indirect ownership of at least fifty percent (50%) of

the equity interests or (c) with respect to any Person, the power to direct the management and policies of such entity.

1.3. "Baxter Confidential Information" has the meaning set forth in Section 13.2.1(a).

1.4. "Baxter Improvements" has the meaning set forth in Section 10.1.3.1.

1.5. "Baxter Indemnitees" has the meaning set forth in Section 14.1.

1.6. "Baxter Know-How" means Information Controlled by Baxter or its Affiliates that is necessary for the development, manufacture, use, sale, offer for sale and/or importation of the Licensed Products in the Licensed Field. Notwithstanding anything herein to the contrary, Baxter Know-How shall exclude Baxter Patents.

1.7. "Baxter Patents" means Patents Controlled by Baxter or its Affiliates that claim inventions necessary for the development, manufacture, use, sale, offer for sale and/or importation of Licensed Products within the Licensed Field, including without limitation Baxter's interest in any Joint Patents.

1.8. "Baxter Trademarks" has the meaning set forth in Section 11.1.

1.9. "Big Five EU Countries" means **.

1.10. "Business Day" means a day other than Saturday, Sunday or other day on which commercial banks in New York, New York are authorized or required by Law to close.

1.11. "Clinical Trial" means a human clinical study conducted on sufficient numbers of human subjects that is designed to (a) establish that a pharmaceutical product is reasonably safe for continued testing; (b) investigate the safety and efficacy of the pharmaceutical product for its intended use, and to define warnings, precautions and adverse reactions that may be associated with the pharmaceutical product in the dosage range to be prescribed; or (c) support Marketing Approval of such pharmaceutical product or label expansion of such pharmaceutical product.

1.12. "Combination Product" means the Licensed Product that includes the Compound and at least one (1) additional therapeutically active pharmaceutical ingredient other than the Compound. Except for those drug delivery vehicles, adjuvants or excipients that are recognized by the applicable Regulatory Authority as active ingredients, drug delivery vehicles, adjuvants, and excipients are hereby deemed not to be "therapeutically active pharmaceutical ingredients," and their presence shall not be deemed to create a Combination Product for purposes of this Section 1.12.

1.13. "Commercial Failure" means (a) the failure of the Licensed Product to meet the specifications for the Licensed Product as set forth in Schedule 1.13(a) and/or the failure of the Licensed Product to meet other criteria for the Licensed Product identified in the Development Plan, including meeting clinical endpoints, in each case if such failure materially and adversely alters the ability to develop the Licensed Product as contemplated by the Development Plan or to commercialize the Licensed Product, (b) an issue involving safety, toxicity, efficacy, or pharmacokinetics of the Licensed Product that materially and

adversely alters the development of the Licensed Product as contemplated by the Development Plan or commercialization of such Licensed Product, (c) determination by an independent expert that it is not technically feasible to scale up manufacturing for a Licensed Product to a production lot size that is consistent with what is required to continuously meeting the Licensed Territory demands for the applicable Licensed Product throughout the Term, (d) a regulatory requirement comes into effect after the Effective Date that would materially and adversely alter the development of a Licensed Product as contemplated by the Development Plan or commercialization of such Licensed Product or (e) the failure of Licensed Product to achieve at least ** of projected Net Sales, as set forth in Schedule 1.13(e), in the Licensed Territory for any calendar year following ** after receipt of Marketing Approval for the Licensed Product in the European Union.

1.14. "Commercialization Plan" shall have the meaning set forth in Section 7.1.4.

1.15. "Commercially Reasonable Efforts" means with respect to either Party, those efforts and resources that such Party would normally devote to a product or compound owned by it or to which it has rights of the type it has hereunder, which is of similar market potential at a similar stage in its development or product life, taking into account the competitiveness of the global and local marketplace, the pricing and launching strategy for the respective product, the proprietary position of the product, the profitability and the relative potential safety and efficacy of the product and other relevant factors, including technical, legal, scientific, regulatory or medical factors then prevailing. "Commercially Reasonable" as used herein shall be interpreted in a corresponding manner.

1.16. "Competing Product" shall have the meaning set forth in Section 2.9.

1.17. "Compound" means the substance that is a sodium salt of (E)-2,4,6-trimethoxystyryl-3-carboxymethylamino-4-methoxybenzyl sulfone, or any Derivative/Improvement thereof.

1.18. "Confidentiality Agreement" means that certain Mutual Confidential Disclosure Agreement between Baxter and Onconova dated April 17, 2012.

1.19. "Control" means the possession of the ability to grant a license, sublicense or access as provided for under this Agreement without (a) violating the terms of any agreement or other arrangement with any Third Party or (b) increasing at any time the amount of any payments required under any such agreement or arrangement; provided that this clause (b) shall not apply (i) if the other Party elects in writing to be responsible for all such increased payments as provided in Section 2.8, or (ii) to the Upstream Agreements.

1.20. "Damages" has the meaning set forth in Section 14.1.

1.21. "Derivative/Improvement" means **.

1.22. "Development Milestone" has the meaning set forth in Section 9.2.1.

1.23. "Development Plan" means the development plan attached hereto as Schedule 1.23.

1.24. "Direct License" has the meaning set forth in Section 12.3.3.2.

1.25. "** Royalty Rates" has the meaning set forth in Section 9.3.1.

1.26. "Drug Approval Application" means an application for Marketing Approval required before commercial sale or use of a pharmaceutical product as a drug in a regulatory jurisdiction or country.

1.27. "Election Time Period" has the meaning set forth in Section 14.3.1.

1.28. "EMA" means the European Medicines Agency or any successor agencies thereto.

1.29. "Enforcing Party" has the meaning set forth in Section 10.5.4.

1.30. "European Union" or "EU" means all countries of the European Union, as may be included from time to time.

1.31. "Executive Officers" has the meaning set forth in Section 3.2.

1.32. "FDA" means the United States Food and Drug Administration or any successor agencies thereto.

1.33. "Field Correction" means any action taken or changes performed affecting a distributed product to mitigate a risk to health or correct issues with misbranded or non-conforming product.

1.34. "First Commercial Sale" means, with respect to a Licensed Product and any country in the Licensed Territory, the first sale of such Licensed Product under this Agreement for use in the Licensed Field to a Third Party in such country, after such Licensed Product has been granted Marketing Approval in the Licensed Field. For avoidance of doubt, First Commercial Sales excludes transfers or dispositions of a Licensed Product for charitable, promotional (including samples), pre-clinical, clinical or regulatory purposes and transfers among Baxter and any of its Affiliates or from Baxter or any of its Affiliates to any of their respective Sublicensees.

1.35. "Force Majeure" has the meaning set forth in Section 15.4.1.

1.36. "Governmental Authority" means any nation or government, any state, local or other political subdivision thereof, and any entity, department, commission, bureau, agency, authority, board, court, official or officer, domestic or foreign, exercising executive, judicial, regulatory or administrative governmental

functions.

1.37. "Improvement" means any improvement or modification of the Licensed Product or Compound, including any Derivative/Improvement, that is developed by (a) Onconova or, if rights thereto are obtained by Onconova pursuant to Section 10.1.2, its Licensees or (b) Baxter or, if rights thereto are obtained by Baxter pursuant to Section 10.1.3, its Sublicensees, for use in the Licensed Field.

1.38. "Indemnification Claim Notice" has the meaning set forth in Section 14.3.1.

1.39. "Indemnified Party" has the meaning set forth in Section 14.3.1.

1.40. "Indemnifying Party" has the meaning set forth in Section 14.3.1.

1.41. "Information" means techniques, data, inventions, practices, methods, knowledge, know-how, skill, experience, test data including pharmacological, toxicological and pre-clinical and clinical test data, analytical and quality control data or descriptions, including all proprietary information submitted to relevant Regulatory Authorities to support a Drug Approval Application.

1.42. "Initial Indications" means MDS Oral, MDS IV and Pancreatic Cancer.

1.43. "Invention" means any and all discoveries, developments, improvements, modifications, formulations, analogs, homologs, compositions of matter, cell lines, processes, manufactures and other inventions (whether patentable or not patentable) made in the course of activities performed under this Agreement by or on behalf of either Party or both Parties.

1.44. "Joint Inventions" has the meaning set forth in Section 10.2.

1.45. "Joint Patent" has the meaning set forth in Section 10.4.3.

1.46. "Joint Steering Committee" or "JSC" means the joint steering committee established pursuant to Section 3.1.

1.47. "Law" means all applicable laws, statutes, rules, regulations, ordinances and other pronouncements having the effect of law of any federal, national, multinational, state, provincial, county, city or other political subdivision, domestic or foreign.

1.48. "Licensed Field" means all therapeutic indications.

1.49. "Licensed Product" means a pharmaceutical product in finished form that contains the Compound and all present and future formulations, dosages and dosage forms thereof.

1.50. "Licensed Rights" has the meaning set forth in Section 2.1.

1.51. "Licensed Territory" means (a) Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom, and (b) Liechtenstein, Monaco, Norway, San Marino, Switzerland and Turkey.

1.52. "Licensee" means any Third Party to which Onconova has granted rights under the Onconova Patents or Onconova Know-How for the Licensed Product in the Licensed Field outside of the Licensed Territory.

1.53. "Licensee Improvements" has the meaning set forth in Section 10.1.3.1.

1.54. "Litigation Conditions" has the meaning set forth in Section 14.3.1.

1.55. "Marketing Approval" means, with respect to a particular country or regulatory jurisdiction, the registrations, authorizations and approvals of the applicable Regulatory Authority or Governmental Authority in such country or regulatory jurisdiction (including, but not limited to, the EMA) that are necessary to market and sell the Licensed Product in such country or regulatory jurisdiction (e.g., a "Marketing Authorization" in the EMA).

1.56. "MDS" means myelodysplastic syndromes.

1.57. "MDS IV" means the treatment, amelioration and/or prevention of MDS using the Licensed Product in an intravenous formulation.

1.58. "MDS IV Bonus Condition" means **.

1.59. "MDS Oral" means the treatment, amelioration and/or prevention of MDS using the Licensed Product in an oral formulation (e.g., tablet or capsule).

1.60. "MDS Oral Phase 2 Clinical Trial" means the ONTARGET (Oral ON 01910.Na in TrAnsfusion-RequirinG patients with myElodysplasTic syndrome) trial having a Clinicaltrials.gov study identifier of NCT01584531.

1.61. "Net Sales" means the gross amounts invoiced or otherwise billed by Baxter and its Affiliates and Sublicensees in connection with the sale, lease or other transfer for value of Licensed Products to unaffiliated Third Parties in the applicable country of the Licensed Territory, less the following to the extent allocable to the Licensed Product and actually allowed, incurred or paid by the invoiced party during the applicable royalty period:

(a) customary trade and quantity discounts actually allowed and taken;

(b) amounts actually allowed or credited due to returns of Licensed Products previously sold as reflected in written invoices (and not to exceed the original invoice amount);

(c) shipping, freight and insurance, to the extent separately invoiced and charged;

(d) credits, allowances and rebates actually given pursuant to federal, state and/or government-mandated programs, which require a manufacturer/distributor rebate, and allowances for uncollectible accounts actually taken (it being understood that "Net Sales" will include all amounts received for any uncollectible accounts at a subsequent date); and

(e) value added or import/export taxes, sales taxes, excise taxes or customs duties, to the extent applicable to such sale, and included in the invoice in respect of such sale and actually paid;

provided that all of the foregoing deductions are incurred in the ordinary course and calculated in accordance with then-current Generally Accepted Accounting Principles or International Financial Reporting Standards, as applicable, consistently applied, during the applicable calculation period throughout the selling party's organization. All such discounts, allowances, credits, rebates, and other deductions granted for a range of products shall be fairly and equitably allocated to the Licensed Product and other products of Baxter and its Affiliates and Sublicensees such that the Licensed Product does not bear a disproportionate portion of such deductions.

Notwithstanding the foregoing, in the event the Licensed Product is sold in a country in the Licensed Territory as part of a Combination Product, Net Sales of the Licensed Product will be calculated as follows:

(i) If the Licensed Product and other therapeutically active pharmaceutical ingredient(s) included in the Combination Product each are sold separately in such country,

Net Sales will be calculated by multiplying the total Net Sales (as described above) of the Combination Product by the fraction A/(A+B), where A is the average gross selling price in such country of the Licensed Product sold separately in the same formulation and dosage, and B is the sum of the average gross selling prices in such country of such other therapeutically active pharmaceutical ingredient(s) sold separately in the same formulation and dosage, during the applicable calendar year.

(ii) If the Licensed Product is sold independently of the other therapeutically active pharmaceutical ingredient(s) included in the Combination Product in such country, but the average gross selling price of such other therapeutically active pharmaceutical ingredient(s) cannot be determined, Net Sales will be calculated by multiplying the total Net Sales (as described above) of the Combination Product by the fraction A/C where A is the average gross selling price in such country of such Licensed Product sold independently and C is the average gross selling price in such country of the entire Combination Product.

(iii) If the other therapeutically active pharmaceutical ingredient(s) included in the Combination Product are sold independently of the Licensed Product therein in such country, but the average gross selling price of such Licensed Product cannot be determined, Net Sales will be calculated by multiplying the total Net Sales (as described above) of the Combination Product by the fraction [1-B/C], where B is the average gross selling price in the Licensed Territory of such other therapeutically active pharmaceutical ingredient(s) and C is the average gross selling price in the Licensed Territory of the entire Combination Product.

(iv) If the Licensed Product and other therapeutically active pharmaceutical ingredient(s) included in the Combination Product are not sold separately, or if they are sold separately but the average gross selling price of neither such Licensed Product nor the other therapeutically active pharmaceutical ingredient(s) can be determined, in such country, Net Sales of the Combination Product shall be equal to Net Sales of the Combination Product multiplied by a mutually agreed percentage or, pending agreement on such a percentage, fifty percent (50%).

The average gross selling price for the product(s) contained in the Combination Product other than the Licensed Product shall be calculated for each applicable time period by dividing the gross aggregate sales revenues for such other product by the units of such other product(s) sold during such time period, as published by IMS or another mutually agreed independent source; provided that in the absence of appropriate IMS or other mutually agreed independent source of such data, such average gross selling price shall be calculated as follows: in the calendar year during which a Combination Product is first sold in a country, a forecasted average gross selling price shall be used for the Licensed Product and the other therapeutically active pharmaceutical ingredient(s), to be determined in good faith by Baxter. Any over- or under-payment due to a difference between forecasted and actual average gross selling prices in such country shall be paid or credited, as applicable, in the first royalty payment of the following calendar year. In the following calendar year the average gross selling price of both the Licensed Product and the other therapeutically active pharmaceutical ingredient(s) included in the Combination Product in the previous calendar year shall apply.

1.62. "Onconova Confidential Information" has the meaning set forth in Section 13.1.1(a).

1.63. "Onconova Improvements" has the meaning set forth in Section 10.1.3.2.

1.64. "Onconova Indemnitees" has the meaning set forth in Section 14.2.

1.65. "Onconova Know-How" means Information Controlled by Onconova or its Affiliates that is necessary for the development, manufacture, use, sale, offer for sale and/or importation of Licensed Products in the Licensed Field in the Licensed Territory. Notwithstanding anything herein to the contrary, Onconova Know-How shall exclude Onconova Patents.

1.66. "Onconova Patents" means all Patents Controlled by Onconova or its Affiliates that claim inventions necessary for the development, manufacture, use, sale, offer for sale and/or importation of Licensed Products within the Licensed Field in the Licensed Territory, including Onconova's interest in any Joint Patents. Onconova Patents include the Patents listed in Schedule 1.66.

1.67. "Onconova Trademarks" means the trademarks set forth on Schedule 1.67.

1.68. "ONTIME Phase 3 Clinical Trial" means the ONTIME (ON 01910.Na Trial In Myelodysplastic SyndromE) trial, having a Clinicaltrials.gov study identifier of NCT01241500.

1.69. "ONTRAC Interim Analysis" means the interim analysis to be performed by the Data Safety Monitoring Committee of the Pancreatic Cancer Phase 2/3 Clinical Trial after one hundred and fifty (150) patients have been enrolled in such trial and one hundred (100) deaths have occurred, as described in the clinical trial protocol for the Pancreatic Cancer Phase 2/3 Clinical Trial.

1.70. "Pancreatic Cancer" means the treatment, amelioration and/or prevention of pancreatic cancer using the Licensed Product in treatment of naïve patients having pancreatic cancer.

1.71. "Pancreatic Cancer Phase 2/3 Clinical Trial" means the ONTRAC (ON 01910.Na TRial in patients with Advanced pancreatic Cancer) trial, having a Clinicaltrials.gov study identifier of NCT01360853. This trial, originally commenced as a Phase 2/3 clinical trial, is now designated a Phase 3 Clinical Trial with a Data Safety Monitoring Committee review and go/no go decision (futility analysis) after 100 events in the first 150 patients.

1.72. **"**Patent" means (a) letters patent (or other equivalent legal instrument), including without limitation utility and design patents, and including without limitation any extension, substitution, registration, confirmation, reissue, re-examination or renewal thereof, (b) applications for letters patent, a reissue application, a continuation application, a continuation-in-part application, a divisional application or any equivalent of the foregoing applications, that are pending at any time during the term of this Agreement before a government patent authority and (c) all foreign or international equivalents of any of the foregoing in any country.

1.73. "Patent Term Extensions" has the meaning set forth in Section 10.8.

1.74. "Paying Party" has the meaning set forth in Section 9.6.

1.75. "Person" means any individual, firm, corporation, partnership, limited liability company, trust, business trust, joint venture, Governmental Authority, association or other entity.

1.76. **"**Phase 2 Clinical Trial**"** means a Clinical Trial as defined in 21 C.F.R. 312.21(b), as may be amended from time to time, or any equivalent thereto in any other jurisdiction in the Licensed Territory.

1.77. "Phase 3 Clinical Trial" means a Clinical Trial as defined in 21 C.F.R. 312.21(c), as may be amended from time to time, or any equivalent thereto in any jurisdiction in the Licensed Territory.

1.78. "Phase 4 Clinical Trial" means a Clinical Trial conducted after a submission of an application for Marketing Approval of a Licensed Product, carried out for purposes of conducting safety surveillance, ongoing technical support of the Licensed Product or market access.

1.79. "Product Infringement" has the meaning set forth in Section 10.5.2(a).

1.80. "Prosecuting Party" has the meaning set forth in Section 10.4.3.

1.81. "Publications" has the meaning set forth in Section 13.1.3.

1.82. "Recipient Party" has the meaning set forth in Section 9.6.

1.83. "Recall" means the removal or correction of a marketed product that the FDA or other Regulatory Authority considers to be in violation of the laws it administers and against which the agency would initiate legal action (e.g., seizure) and may be conducted on a firm's own initiative, by FDA or other Regulatory Authority request, or by FDA or other Regulatory Authority order under statutory authority. The words 'recalled' 'recalling', etc. shall have correlative meanings.

1.84. "Recall Costs" means all out-of-pocket expenses directly relating to or arising out of compliance with any order of a Regulatory Authority for a Recall, Withdrawal or Field Correction and out-of-pocket expenses incurred by either Party relative to notification, shipping, disposal and return of the Recalled or Withdrawn product and the notification and correction of any product subject to a Field Correction.

1.85. "Regulatory Authority" means any national, supra-national, regional, state or local regulatory authority, department, bureau, commission, council or other Governmental Authority in such country (including, but not limited to, the FDA and EMA) that is responsible for overseeing the development (including the conduct of clinical trials), manufacture, distribution, importation, exportation, transport, storage, marketing, promotion, offer for sale, use, or sale of the Compound and/or the Licensed Product.

1.86. "Regulatory Exclusivity" means any rights or protections which are recognized, afforded or granted by any Regulatory Authority in any country or region of the Licensed Territory in association with the Marketing Approval of the Licensed Product, providing such Licensed Product: (a) a period of marketing exclusivity during which the applicable Regulatory Authority shall refrain from either reviewing or approving a marketing authorization application or similar regulatory submission submitted by a Third Party seeking

to market a competing product, or (b) a period of data exclusivity during which a Third Party seeking to market a competing product is precluded from either referencing or relying upon, without an express right of reference from the dossier holder, such Licensed Product's clinical dossier or relying on previous Regulatory Authority findings of safety or effectiveness with respect to such Licensed Product to support the submission, review or approval of a marketing authorization application or similar regulatory submission before the applicable Regulatory Authority. Regulatory Exclusivity shall include rights conferred in the European Union pursuant to Section 10.1(a)(iii) of Directive 2001/EC/83.

1.87. "Regulatory Filings" means any application for Marketing Approval, notification or other submission made to or with a Regulatory Authority that is necessary or reasonably desirable to develop, manufacture or commercialize the Licensed Product in the Licensed Field in a particular country or regulatory jurisdiction, whether made before or after receipt of Marketing Approval in the country or regulatory jurisdiction. The term 'Regulatory Filings' shall include Drug Approval Applications, and amendments and supplements to any of the foregoing, applications for pricing and reimbursement approvals, and all proposed labels, labeling, package inserts, monographs and packaging for a Licensed Product in a particular country.

1.88. "Royalty Term" has the meaning set forth in Section 9.3.2

1.89. "Sales Milestone" has the meaning set forth in Section 9.2.2.

1.90. "Sales Report" means with respect to each calendar quarter a report detailing:

(a) the relevant gross amounts invoiced or billed in each local currency by Baxter or its Affiliates or Sublicensees to Third Parties, including wholesalers, hospitals or other intermediate Third Parties, indicating the breakdown of sales by each type of the Licensed Product;

(b) the deductions from gross amounts invoiced or billed used to calculate Net Sales;

(c) the Net Sales in each local currency;

(d) the currency exchange rates used; and

(e) the sum of royalties due pursuant to Section 9.3.

1.91. "Sole Inventions" has the meaning set forth in Section 10.2.

1.92. "** Royalty Rates" has the meaning set forth in Section 9.3.1.

1.93. "Sublicensee" means, with respect to Baxter, any Affiliate or Third Party to which Baxter sublicenses the Licensed Rights and, with respect to Onconova, any Affiliate or Third Party to which Onconova sublicenses the rights granted under Section 2.2.

1.94. "Sublicensee Improvements" has the meaning set forth in Section 10.1.3.2.

1.95. "Success Criteria" means either: (a) the achievement of **, or (b) mutual agreement of the Parties to file for any Marketing Approval in either the European Union as a whole or in all of the Big Five EU Countries **.

1.96. "Supply Agreement" means a Manufacturing and Supply Agreement between Onconova and Baxter pursuant to which Onconova will, by itself or through a Third Party contract manufacturing organization acceptable to Baxter and Onconova, supply to Baxter its requirements of Licensed Product for sale and distribution in the Licensed Territory.

1.97. "Third Party" means any person or corporation or unincorporated body other than Onconova and Baxter and their respective Affiliates, including Governmental Authorities.

1.98. "Trademark Infringement" has the meaning set forth in Section 11.2.5.

1.99. "Temple Agreement" means the January 1, 1999 License Agreement between Temple University and Onconova, as amended from time to time.

1.100. "Term" has the meaning set forth in Section 15.1.

1.101. "Upstream Agreement" means each agreement existing as of the Effective Date under which Onconova obtains a license or other right from a Third Party to develop, make, use, sell, offer for sale or import the Compound and/or the Licensed Product in the Licensed Territory. Schedule 1.101 sets forth a true and complete list of all Upstream Agreements.

1.102. "USD" means United States Dollar.

1.103. "U.S." means the United States of America, its territories and possessions.

1.104. "Valid Claim" means, for a country, a claim of an issued and unexpired Patent, or a Patent application (excluding provisional Patent applications) that has not been pending for more than ** after its priority date, in each case, that is within the Onconova Patents (including the Joint Patents), and that has not been held unpatentable, invalid, or unenforceable by a final unappealable or unappealed decision of a court or other Governmental Authority of competent jurisdiction, or admitted to be invalid or unenforceable through reissue, re-examination, disclaimer, or otherwise.

1.105. "Withdrawal" means a removal or correction of a distributed product which involves a minor violation that would not be subject to legal action by the FDA or other Regulatory Authority, or which involves no violation of a Law. The words 'withdrawn' 'withdrawing', etc. shall have correlative meanings.

1.106. "Withholding Taxes" has the meaning set forth in Section 9.6.

ARTICLE II.

GRANT OF LICENSES

2.1. License to Baxter. Subject to the terms and conditions of this Agreement, Onconova hereby grants to Baxter, and Baxter accepts, an exclusive (even as to Onconova except as provided in Section 2.3), royalty-bearing, non-transferable (except pursuant to Section 16.1) right and license under Onconova Know-How and Onconova Patents, with the right to, subject to Section 2.4, grant sublicenses through multiple tiers of Sublicensees, to research, develop, make, have made, import, export, use, sell, offer for sale, have sold and otherwise commercialize the Licensed Product in the Licensed Field in the Licensed Territory

(the "Licensed Rights"). Notwithstanding the foregoing, Baxter agrees that it shall not exercise its right to "make or have made" with respect to the Licensed Product unless (a) there has been a "Failure to Supply" as such term is defined in the Supply Agreement or (b) the Parties have not entered into the Supply Agreement by ** (or ** if such date is extended pursuant to Section 8.1.2).

2.2. License to Onconova. Subject to the terms and conditions of this Agreement, Baxter hereby grants to Onconova, and Onconova accepts, (a) a non-exclusive, royalty-free, non-transferable (except pursuant to Section 16.1) right and license under Baxter Know-How and Baxter Patents, with the right to, subject to Section 2.4, grant sublicenses through multiple tiers of Sublicensees, to (i) conduct research and development activities with respect to the Licensed Products in the Licensed Territory as contemplated under the Development Plan and as contemplated under Section 4.2, (ii) research and develop the Licensed Product in the Licensed Territory solely to support development and commercialization of the Licensed Product outside of the Licensed Territory, and (iii) manufacture and have

manufactured the Licensed Product in the Licensed Territory (x) to fulfill its obligations under the Supply Agreement and (y) to support the development and commercialization of the Licensed Product outside of the Licensed Territory, and (b) an exclusive, royalty-free, non-transferable (except pursuant to Section 16.1) right and license under Baxter Know-How and Baxter Patents, with the right to, subject to Section 2.4, grant sublicenses through multiple tiers of Sublicensees, to research, develop, make, have made, import, export, use, sell, offer for sale, have sold and otherwise commercialize the Licensed Product in the Licensed Field outside of the Licensed Territory.

2.3. Onconova Reservation of Rights. Onconova hereby retains the right under the Onconova Patents and Onconova Know-How to (a) conduct research and development activities with respect to the Licensed Products in the Licensed Territory as contemplated under the Development Plan and as contemplated under Section 4.2, (b) research and develop the Licensed Product in the Licensed Territory solely to support development and commercialization of the Licensed Product outside of the Licensed Territory, and (c) subject to the rights granted to Baxter to manufacture or have manufactured Licensed Products in the event of a Failure (as such term is defined in the Supply Agreement) manufacture and have manufactured the Licensed Product in the Licensed Territory (i) to, subject to Section 8.1.2, fulfill its obligations under the Supply Agreement and (ii) to support the development and commercialization of the Licensed Product outside of the Licensed Territory.

2.4. Sublicenses.

2.4.1. Baxter shall have the right to sublicense its rights under Section 2.1 to its Affiliates and to Third Parties; provided that if Baxter proposes to grant a sublicense to a Third Party granting the Third Party the right to commercialize the Licensed Product in **, Baxter shall provide Onconova with written notice of such sublicense at least ** in advance of executing such sublicense, which notice shall include a reasonable level of detail regarding the terms of the proposed sublicense, and during such ** period Baxter agrees to discuss in good faith any concerns identified by Onconova regarding such sublicense and to reasonably consider any comments provided by Onconova with respect to such sublicense. Each agreement between Baxter and a Sublicensee (a) shall be in writing and subject and subordinate to, and consistent with, the terms and conditions of this Agreement; (b) shall not diminish, reduce or eliminate any of Baxter's obligations under this Agreement; (c) shall require the Sublicensee(s) to comply with all applicable terms of this Agreement (except for the payment obligations, for which Baxter shall remain financially responsible); and (d) shall

prohibit further sublicensing except on terms consistent with this Section 2.4.1. Baxter shall provide written notice to Onconova of any agreement entered into with a Sublicensee, and shall provide a complete copy of such agreement to Onconova within ** of its execution, which copy may be redacted by Baxter to the extent that such redactions do not reasonably impair Onconova's ability to ensure compliance with this Agreement. Baxter shall be responsible for the performance of each Sublicensee and shall ensure that each Sublicensee complies with all relevant provisions of this Agreement.

2.4.2. Onconova shall have the right to sublicense its rights under Section 2.2 to its Affiliates and to Third Parties. Each agreement between Onconova and a Sublicensee (a) shall be in writing and subject and subordinate to, and consistent with, the terms and conditions of this Agreement; (b) shall not diminish, reduce or eliminate any of Onconova's obligations under this Agreement; (c) shall require the Sublicensee(s) to comply with all applicable terms of this Agreement; and (d) shall prohibit further sublicensing except on terms consistent with this Section 2.4.2. Onconova shall provide written notice to Baxter of any agreement entered into with a Sublicensee, and shall provide a complete copy of such agreement to Baxter within ** of its execution, which copy may be redacted by Onconova to the extent that such redactions do not reasonably impair Baxter's ability to ensure compliance with this Agreement. Onconova shall be responsible for the performance of each Sublicensee and shall ensure that each Sublicensee complies with all relevant provisions of this Agreement.

2.5. Temple University. The licenses granted by Onconova pursuant to Section 2.1 are, with respect to any Onconova Know-How and Onconova Patents licensed to Onconova under the Temple Agreement, subject to Temple's reserved rights for non-commercial educational and research purposes under Section 3.1 of the Temple Agreement. The Parties acknowledge that inventions that are included in the Onconova Patents that are Controlled, but not owned, by Onconova that are licensed to Onconova pursuant to the Temple Agreement may have resulted from United States Government funding, and any such Onconova Patents shall be subject to any applicable Laws of the United States related to federally funded inventions.

2.6. No Other Licenses. Neither Party grants to the other Party any rights, licenses or covenants in or to any intellectual property, whether by implication, estoppel, or otherwise, other than the license rights that are expressly granted under this Agreement or the Supply Agreement. Notwithstanding anything to the contrary herein, neither Party grants to the other Party any license or other right to manufacture, develop or commercialize any active ingredients other than the Compound (or any Derivative/Improvement thereof), including without limitation any method of making any active ingredients other than the Compound (or any Derivative/Improvement thereof), any composition or formulations of any active ingredients other than the Compound (or any Derivative/Improvement thereof), or any method of using or administering any active ingredients other than the Compound (or any Derivative/Improvement thereof).

2.7. Third Party IP. Baxter and Onconova will ** for any economics related to any obligations owed to Third Parties (other than the Upstream Agreements which shall remain the sole responsibility of Onconova pursuant to Sections 2.7.1 and 9.4) in respect of Third Party intellectual property rights that are necessary for the commercialization of the Licensed Product as set forth in this Section 2.7. If either Party reasonably determines that a license to the intellectual property rights of a Third Party is necessary in order to commercialize the License Product, such Party shall provide written notice thereof to the other Party.

2.7.1. If the other Party *agrees* with such determination, then the Parties shall negotiate in good faith to determine which Party shall secure such license and the terms on which such license shall be obtained, and the Parties agree ** the costs and expenses of obtaining and maintaining such license; provided that:

(a) to the extent that Licensees also benefit from such license, then the Parties shall mutually agree upon an appropriate allocation of such IP costs and expenses;

(b) such Third Party license shall be reviewed on an annual basis to determine whether or not it continues to be necessary in order to commercialize the Licensed Product;

(c) Onconova shall be responsible for any payments required to be made **; and

(d) Baxter shall be responsible for any payments required to be made to any Third Party for a license to ** that Baxter licenses.

2.7.2. If the other Party *does not agree* with such determination, then the Party making such determination may **.

2.8. Controlled IP. Subject to Section 2.7, if, after the Effective Date, either Party enters into an agreement or other arrangement to obtain a license or other rights to or under Information or Patents that are owned or controlled by a Third Party and that would, solely but for the operation of Section 1.19(b), in the case of Onconova be included in the Onconova Information or Onconova Patents or, in the case of Baxter, be included in the Baxter Information or Baxter Patents, then the Party obtaining such license or rights shall promptly notify the other Party and shall specify in such notice the type and amount of payments that would be due to such Third Party by reason of the practice or use of, or access to, such Information or Patents by the other Party pursuant to the license set forth in Section 2.1 or 2.2, as applicable (but not by reason of the practice or use of, or access to, such Information or Patents outside the scope of such license). The Party receiving such notice may elect in writing to bear the responsibility for such additional payments, and upon such receiving Party's written election to bear such responsibility, the Information or Patents as applicable, shall thereafter be deemed "Controlled" by the Party originally obtaining such license or rights (notwithstanding Section 1.19(b)), and shall be subject to the license under Section 2.1 or 2.2, as applicable.

2.9. Exclusivity. During the Term, each Party covenants and **.

ARTICLE III.
JOINT STEERING COMMITTEE

3.1. Joint Steering Committee.

3.1.1. Within** after the Effective Date, each Party shall appoint ** of its senior employees to serve on the JSC. Each Party may replace its JSC representatives by written notice to the other Party. The chairperson of the JSC shall, during **, be a JSC member appointed by Onconova, and thereafter shall alternate on a meeting by meeting basis between Onconova and Baxter (beginning with Baxter). The chairperson will be responsible for calling meetings and, after seeking input from the other Party, setting the agenda (which

shall include a list of all participants expected at a meeting) and circulating such agenda at least ** prior to each meeting and distributing minutes of the meetings within ** following such meeting, but will not otherwise have any greater power or authority than any other member of the JSC. JSC members shall have such expertise as appropriate to the activities of the JSC from time to time, and the JSC may invite personnel of the Parties having non-clinical safety and animal pharmacology, pharmaceutical development, clinical, biostatistical, regulatory affairs, pharmacovigilance, formulation, manufacturing, commercial, marketing and other expertise to participate in discussions of the JSC from time to time as appropriate to assist in the activities of the JSC. The JSC may appoint committees and subcommittees as desired, such committees and subcommittees to have equal representation from the Parties and subject to governance by the JSC. Promptly after the Effective Date, the JSC shall appoint: (a) an intellectual property sub-committee that shall be responsible for developing a patent strategy for the Licensed Product in the Licensed Territory and (b) a regulatory sub-committee that shall be responsible for developing the regulatory strategy for the Licensed Product in the Licensed Territory.

3.1.2. The JSC shall oversee and direct the development, regulatory and commercialization strategy of the Licensed Product in the Licensed Field in the Licensed Territory, and shall coordinate communications among the Parties' and the exchange of Information regarding the development and marketing activities pursuant to the Agreement as further specified in Articles VI and VII. The JSC's responsibilities shall include:

(a) reviewing and evaluating progress under the Development Plan on a ** basis;

(b) reviewing and approving amendments to the Development Plan;

(c) performing ** monitoring of progress of pre-clinical, pharmaceutical and clinical studies of the Licensed Product and proposing additional studies for the Licensed Product;

(d) reviewing and commenting on regulatory submissions in the Licensed Territory relating to the Licensed Products;

(e) establishing procedures regarding the collection, sharing and reporting of Adverse Event information related to the Licensed Product consistent with the Pharmacovigilance Agreement to be entered into in accordance with the terms of the Supply Agreement or Section 8.1.2, as applicable;

(f) reviewing and commenting on worldwide publication strategy with respect to the Compound and Licensed Product;

(g) reviewing and discussing each version of the Commercialization Plan pursuant to Section 7.1.4;

(h) identifying, prioritizing and approving future indications for the Licensed Product beyond the Initial Indications; and

(i) determining whether an Additional Indication falls outside hematology or oncology for purposes of Section 4.3.1(iv).

3.1.3. The JSC shall meet at least once every ** at times mutually agreed upon by the Parties. At least one (1) meeting each ** shall be held in person, and all other such meetings may be held by teleconference or videoconference. The location of the meetings of the JSC to be held in person shall be agreed upon by the Parties (with the intent that it should alternate between the Parties' headquarters locations). Each Party shall use reasonable efforts to cause its representatives to attend the meetings of the JSC. If a representative of a Party is unable to attend a meeting, such Party may designate an alternate to attend such meeting in place of the absent representative. Each Party shall bear all the expenses of its representatives on the JSC.

3.1.4. The minutes of each JSC meeting shall be distributed to the teams within ** after the completion of the relevant JSC meeting and shall provide a description in reasonable detail of the discussions held at the meeting and a list of any actions, decisions or determinations approved by the JSC. Minutes of each JSC meeting shall be approved or disapproved, and revised as necessary, within ** of the applicable JSC meeting.

3.2. Elevation and Dispute Resolution. Each Party's representatives on the JSC will collectively have one (1) vote on all matters that are within the responsibility of the JSC. The members of the JSC will use reasonable efforts to reach unanimous consensus on all decisions. In the event that the members of the JSC are unable to reach consensus on a particular issue within ** after such issue is first presented to the JSC, such issue shall be referred to an executive officer of each Party or their designees (the "Executive Officers") for resolution. If such Executive Officers are unable to resolve such issue within ** after such issue is referred to them, then (a) with respect to all** relating to the Licensed Product in the Licensed Field in the Licensed Territory (excluding, for the avoidance of doubt,**, the decision of **'s Executive Officer shall be final and determinative, and (b) with respect to all ** related to the Licensed Product in the Licensed Field in

the Licensed Territory, the decision of **'s Executive Officer shall be final and determinative. For the avoidance of doubt, the JSC shall have no power to amend or waive compliance with this Agreement nor, without the consent of the affected Party, materially increase or reduce the obligations of the Parties under this Agreement.

ARTICLE IV.
DEVELOPMENT RESPONSIBILITIES

4.1. Onconova Development Obligations. Subject to Section 4.2, Onconova shall, subject to the oversight of the JSC, use its Commercially Reasonable Efforts to direct, coordinate and manage the development of the Licensed Product for the Initial Indications in the Licensed Territory in accordance with the Development Plan. During the Term, Onconova shall develop, and the JSC shall have the authority to review and, if it deems appropriate, approve, amendments to the Development Plan on an ongoing basis as necessary; provided that the Development Plan shall at all times contain terms that are consistent with this Article IV. Baxter may suggest to Onconova changes and additions to the Development Plan and Onconova shall reasonably consider including such changes and additions when developing amendments to the Development Plan in accordance with this Section 4.1. Except as otherwise set forth in this Agreement (including Section 4.2), ** shall be responsible for all costs and expenses incurred by Onconova and its Affiliates in developing the Licensed Product for the Initial Indications in the Licensed Territory; provided that, without limitation of Section 6.2, **.

4.2. Additional Clinical Trials for Initial Indications; Safety Registration.

4.2.1. MDS IV. Onconova shall be responsible for and shall promptly, but in any case within ** of the final readout of survival data from the ONTIME Phase 3 Clinical Trial, undertake, if Commercially Reasonable, and shall **, any additional clinical studies (including any additional Phase 3 Clinical Trials) required to obtain Marketing Approval in the European Union for the Licensed Product for MDS IV (excluding, for avoidance of doubt, any safety registry obligations mandated in connection with obtaining or maintaining Marketing Approval in the European Union). Onconova shall keep Baxter fully-informed of the status of any feedback from the Regulatory Authorities with respect to such clinical trials, shall seek input from Baxter and shall, in good faith consider such input; provided, however, that, **. **. **.

4.2.2. MDS Oral and Pancreatic Cancer.

(a) Onconova shall use its Commercially Reasonable Efforts to develop the Licensed Product for MDS Oral through the MDS Oral Phase 2 Clinical Trial and for Pancreatic Cancer through the Pancreatic Cancer Phase 2/3 Clinical Trial, at **'s cost and expense (unless otherwise agreed by ** in writing). Promptly after completion of the final study report for the MDS Oral Phase 2 Clinical Trial, Onconova shall provide to Baxter the draft study report, raw data (excluding, for the avoidance of doubt, any private patient data), findings, conclusions and other results of such Phase 2 Clinical Trial within Onconova's possession or Control. Promptly after receipt of the Data and Safety Monitoring Committee's recommendation regarding the continued conduct of the Pancreatic Cancer Phase 2/3 Clinical Trial after the ONTRAC Interim Analysis has occurred, Onconova shall notify Baxter of such recommendation. During the ** period after Onconova's provision of such materials or recommendation, as applicable, to Baxter, the Parties shall discuss, in the case of MDS Oral, progressing the development of the Licensed Product for MDS Oral beyond the MDS Oral Phase 2 Clinical Trial (including additional Clinical Trials or submission of a Drug Approval Application for MDS Oral in the Licensed Territory) or, in the case of the Pancreatic Cancer Phase 2/3 Clinical Trial, continuing with the conduct of such trial after the ONTRAC Interim Analysis, conducting additional Clinical Trials or submission of a Drug Approval Application for Pancreatic Cancer. The Parties shall act reasonably and in good faith in such discussions and shall make their decision to pursue or not pursue further development of MDS Oral or Pancreatic Cancer solely based on the Clinical Trial data and a reasonable assessment of the likelihood of success of the Licensed Product for such indication based on the safety, toxicity, efficacy, or pharmacokinetics of the Licensed Product for such indications.

(b) If the Parties mutually agree in writing during ** to progress the development of the Licensed Product for MDS Oral or Pancreatic Cancer, as the case may be, as contemplated by Section 4.2.2(a) above (which includes, for avoidance of doubt, submission of a Drug Approval Application for MDS Oral or Pancreatic Cancer in the Licensed Territory and a decision to continue to conduct the Pancreatic Cancer Phase 2/3 Clinical Trial after the recommendation of the Data Safety Monitoring Committee), then **, and Onconova shall use its Commercially Reasonable Efforts to, consistent with the then-applicable Development Plan, progress the development of the Licensed Product for MDS Oral or Pancreatic Cancer, as the case may be, as contemplated by Section 4.2.2(a) (excluding, for avoidance of doubt, any safety registry obligations mandated in connection with obtaining or maintaining Marketing Approval in the European Union), all at **'s cost and expense. The Parties agree that Onconova shall not have the right to withhold its agreement

with respect to progressing the development of the Licensed Product for MDS Oral; provided, however, that if Onconova has informed Baxter of its desire not to progress the development of the Licensed Product for MDS Oral within ** period, in performing its obligations under this Section 4.2.2 for activities related to MDS Oral, **.

(c) If Baxter is the Party withholding its agreement during such ** period to progress the development of the Licensed Product for MDS Oral or Pancreatic Cancer, as the case may be, then Onconova shall have the right, but not the obligation, at its sole cost and expense, to progress the development of the Licensed Product for MDS Oral or Pancreatic Cancer, as the case may be, for purposes of obtaining Marketing Approval therefor and Baxter shall retain all rights to commercialize the Licensed Product.

(d) If Onconova is the Party withholding its agreement during such ** period to progress the development of the Licensed Product for Pancreatic Cancer (it being understood and agreed that Onconova shall not have the right to withhold its agreement with respect to MDS Oral), then Baxter shall have the right, but not the obligation, at its sole cost and expense, to progress the development of the Licensed Product for Pancreatic Cancer for purposes of obtaining Marketing Approval therefor and Baxter shall retain all rights to commercialize the Licensed Product. In such case, Onconova agrees to reasonably cooperate with Baxter in such further development of the Licensed Product, including by providing Baxter with access to Onconova subject matter experts, technical expertise and Information reasonably requested by Baxter and making any submissions to Regulatory Authorities that may be required to obtain Marketing Approval for Pancreatic Cancer. Baxter shall reimburse Onconova for its reasonable costs and expenses incurred in providing such cooperation.

4.2.3. Safety Registration Obligations. Baxter shall be responsible for any and all safety registry obligations mandated by a Regulatory Authority in connection with obtaining or maintaining Marketing Approval in the Licensed Territory for the Licensed Product, and Baxter shall bear all costs and expenses related to such safety registry obligations.

4.3. Additional Indications.

4.3.1. Baxter and Onconova shall work together in good faith to maximize the value of the Licensed Product in future indications in hematology, oncology and other indications (beyond the Initial Indications). Not less than once every **, Onconova shall review with Baxter potential new indications for the Licensed Product in the Licensed Field beyond the Initial Indications (each such indication, an "Additional Indication") within the Licensed Territory. Onconova shall inform Baxter in writing of such Additional Indication(s) and the Parties shall discuss the estimated timing, cost, revenue expectations, pre-clinical or clinical data and other relevant aspects of such Additional Indication(s). Baxter shall, within ** of receipt of Onconova's written proposal: (a) inform Onconova in writing of its intent to participate in the development of such Additional Indication(s) or (b) inform Onconova in writing that it is deferring the decision to participate in the clinical development for such Additional Indication(s). Baxter's failure to respond to Onconova's proposal within such ** period shall be deemed Baxter's deferring the decision to participate in the development for such Additional Indication(s).

(i) If Baxter chooses to participate in development of an Additional Indication at inception pursuant to Section 4.3.1, then:

(1) (A) Onconova and Baxter shall work jointly to develop the Licensed Product for the Additional Indication in the Licensed Territory, (B) the Additional Indication shall be developed pursuant to Onconova's written proposal provided under Section 4.3.1 (as such may be modified from time-to-time by mutual agreement of the Parties), and (C) except as provided in the last sentence of Section 6.2.1, ** shall be responsible for and shall pay for ** of all research and development costs and expenses allocable to the research and development of such Additional Indication for the Licensed Territory; and

(2) Upon receipt of Marketing Approval for an Additional Indication from the EMA Baxter shall pay to Onconova ** for such Additional Indication. If, instead of a centralized EMA filing, the Regulatory Approval was sought from individual countries within the Licensed Territory, then (A) upon receipt of Marketing Approval for an Additional Indication from the applicable Regulatory Authorities in the earlier to occur of either **, Baxter shall pay to Onconova ** for such Additional Indication and (B) upon receipt of Marketing Approval for an Additional Indication from the applicable Regulatory Authorit(y/ies) for **, as applicable, for such Additional Indication, Baxter shall pay to Onconova **for such Additional Indication.

Further, all Net Sales of the Licensed Product for such Additional Indication shall be aggregated with all other Licensed Product Net Sales, but shall bear royalties at **.

(ii) If Baxter defers the decision to participate in development of the Additional Indication at inception pursuant to Section 4.3.1, Onconova shall have the exclusive right, but not the obligation, to further develop the Licensed Product for the Licensed Territory at its own cost and expense. Onconova will consult with Baxter during development and may advance such development, at Onconova's expense, until such time as Onconova has generated **. Prior to submission of a Drug Approval Application for the Additional Indication in the European Union, Onconova will provide Baxter in writing estimated timing, cost, pre-clinical or clinical data and other relevant aspects of such Additional Indication and the associated Drug Approval Application. Baxter shall have the right, within ** from the provision of such information by Onconova, to elect whether it wishes to participate in the further development of such Additional Indication, including filing of a Drug Approval Application in the European Union, or to again defer its decision, by providing written notice thereof to Onconova. If Baxter elects to participate in such further development of the Additional Indication, Baxter shall reimburse Onconova for ** of all of the research and development expenses incurred by Onconova and its Affiliates for such Additional Indication through such time that are allocable to the Licensed Territory and shall thereafter be responsible for and shall pay for ** of all additional research and development costs and expenses for such Additional Indication that are allocable to the Licensed Territory, including preparation and filing of Drug Approval Applications for the Licensed Territory. Upon receipt of Marketing Approval for the Additional Indication from the EMA, Baxter shall pay to Onconova ** for such Additional Indication. If, instead of a centralized EMA filing, the Regulatory Approval was sought from individual countries within the Licensed Territory, then (A) upon receipt of Marketing Approval for an Additional Indication from the applicable Regulatory Authorities in the earlier to occur of **, or (ii) **, Baxter shall pay to Onconova ** for such Additional Indication and (B) upon receipt of Marketing Approval for an Additional Indication from the applicable Regulatory Authorit(y/ies) for the remaining **, as applicable, for such Additional Indication, Baxter shall pay to Onconova ** for such Additional Indication (in either case, pursuant to Section 9.2.4)

Further, all Net Sales of Licensed Product for such Additional Indication(s) shall be aggregated with all other Licensed Product Net Sales, but **, and shall be calculated in the manner described in Section 4.3.1(i)(2) above. Baxter's failure to respond to Onconova's proposal within the ** period referenced above shall be deemed Baxter's deferring the decision to participate in the development for such Additional Indication.

(iii) If Baxter had previously deferred its decision to participate in the development of the Additional Indication and Onconova obtains a Marketing Approval for the Licensed Product for such Additional Indication from the EMA or, if filed separately in individual countries within the Licensed Territory, from the applicable Regulatory Authorities in the earlier to occur of **, Baxter shall reimburse Onconova for ** of all of the research and development expenses incurred by Onconova for such Additional Indication that are allocable to the Licensed Territory. Further, provided that the Additional Indication has estimated peak gross sales greater than or equal to ** (or such lesser amount as may be mutually agreed by the Parties) on a ** basis (as mutually agreed upon by the Parties in writing or, if the Parties are not able to mutually agree on such estimated peak gross sales, as determined pursuant to Section 16.14), Baxter shall be obligated to pay to Onconova: (A) ** for each such Additional Indication to Onconova if the Marketing Approval for the Licensed Product for the Additional Indication was received from the EMA or (B)(1) ** for each such Additional Indication if the Marketing Approval for the Licensed Product for such Additional Indication was received in the earlier to occur of either **, and (2) ** for each such Additional Indication upon receipt of the Marketing Approval for the Licensed Product for such Additional Indication in the remaining **, as applicable (in either case, pursuant to Section 9.2.4).

Further, all Net Sales of Licensed Product for such Additional Indication(s) shall be aggregated with all other Licensed Product Net Sales, but **, and shall be calculated in the manner described in Section 4.3.1(i)(2) above. Baxter shall thereafter be obligated to commercialize the Licensed Product for such Additional Indication(s) pursuant to Article VII.

(iv) The amount of the ** set forth in this Section 4.3 apply only to Additional Indications within hematology and oncology. For all Additional Indications outside hematology and oncology, the research and development cost participation and royalties would be the same as in hematology and oncology, but the approval milestone would be commensurate with the market opportunity for the Additional Indication, as determined by mutual agreement of the Parties, and in the absence of such mutual agreement, pursuant to Section 16.14.

(v) Under no circumstances shall Onconova have the right to commercialize the Licensed Product in the Licensed Territory, either by itself or through one or more Third Parties whether for the Initial Indications or any other indication including, without limitation, the Additional Indications.

(vi) For purposes of determining what portion of the costs and expenses for the development of an Additional Indication are 'allocable' to the Licensed Territory and should be borne by Baxter, consideration shall be given not only to the existing Licensees and licensed territories for such Additional Indication but also to potential worldwide sales for the Additional Indication and such other factors as the Parties reasonably determine in good faith. The portion that

is allocated to Baxter must be mutually agreed by the Parties in writing and any disputes as to the allocation of the costs and expenses shall be resolved pursuant to Section 16.14.

4.4. Investigator-Initiated Studies. Subject to Onconova's written approval on a case by case basis, Baxter and Onconova shall ** all costs and expenses related to the conduct and funding of investigator initiated studies for the Licensed Product that are recommended by Baxter.

4.5. Post-Approval Studies. Baxter shall be responsible for, and shall bear all expenses related to, any post-Marketing Approval studies (including Phase 4 Clinical Trials) required by individual countries in the Licensed Territory for the Licensed Product. Baxter shall bear all costs and expenses related to the establishment of any safety registry mandated as part of Marketing Approvals in the Licensed Territory.

4.6. Additional Development. Except as set forth in Section 4.1, Section 4.2 and Section 4.3, Onconova shall not have any obligation to develop the Licensed Product in the Licensed Territory.

ARTICLE V.
DEVELOPMENT COOPERATION

5.1. Sharing of Development Updates and Related Information.

5.1.1. Whenever any material event occurs in the course of the development of the Licensed Product by Onconova or its Licensees of which Onconova becomes aware, but in no event less than once every ** until such time as Marketing Approval for the Licensed Product has been obtained in each country of the Licensed Territory, Onconova shall disclose to Baxter Information regarding and resulting from all development activities with respect to the Compound and/or the Licensed Product conducted by Onconova or its Licensees, which Information is necessary or useful for development or commercialization of the Licensed Product in the Licensed Territory, and a description of the status of such development efforts.

5.1.2. Whenever any material event occurs in the course of the development of the Licensed Product by Baxter or its Sublicensees of which Baxter becomes aware, but in no event less than once every ** during the Term, Baxter shall disclose to Onconova Information regarding and resulting from all development activities with respect to the Compound and/or the Licensed Product conducted by Baxter or its Sublicensees which Information is necessary or useful for development or commercialization of the Licensed Product outside the Licensed Territory, and a description of the status of such development efforts.

5.1.3. Each Party shall have the right, at no additional expense, to use all Information disclosed to it pursuant to Section 5.1.1 or Section 5.1.2, as applicable, for the development and commercialization of the Licensed Product, and to grant to its Licensees (as to Onconova) or Sublicensees (as to Baxter) the right to use such Information for the development and commercialization of the Licensed Product, without any obligation to the other Party except as otherwise set forth in this Agreement.

5.1.4. Onconova and its Licensees shall have the right to cross-reference, for purposes of developing Licensed Products outside of the Licensed Territory, all Drug Approval Applications and other filings with Regulatory Authorities made by Baxter or its Sublicensees for Licensed Products. Baxter and its Sublicensees shall have the right to cross-reference, for purposes of developing Licensed Products in the Licensed Territory, all Drug

Approval Applications and other filings with Regulatory Authorities made by Onconova or its Licensees.

5.2. Interaction with Licensees and Sublicensees. Onconova shall facilitate Baxter's interaction with Onconova's Licensees involved in any development activities, by using Commercially Reasonable Efforts to coordinate, and if appropriate participate in, written and oral communications between Baxter and such Licensees, for purposes of developing Licensed Products in the Licensed Territory and enabling Baxter and such Licensees to comply with their respective obligations under applicable Law. Baxter shall facilitate Onconova's interaction with Baxter's Sublicensees involved in any development activities, by using Commercially Reasonable Efforts to coordinate, and if appropriate participate in, written and oral communications between Baxter and such Sublicensees, for purposes of developing Licensed Products outside of the Licensed Territory and enabling Onconova and such Sublicensees to comply with their respective obligations under applicable Law.

5.3. Information Sharing Coordination. The JSC shall coordinate the Parties' sharing of Information as required under this Agreement or under applicable Laws:

5.3.1. Except as set forth in Section 4.2.2, Onconova shall share with Baxter, free of charge (except for amounts becoming due and payable to Onconova pursuant to Article IX), any and all Onconova Information generated or compiled during the term of this Agreement for use in development and commercialization of the Licensed Product in the Licensed Territory.

5.3.2. Except as set forth in Section 15.3, Baxter shall share with Onconova, free of charge, any and all Baxter Information generated or compiled during the term of this Agreement for use in development and commercialization of the Licensed Product outside of the Licensed Territory.

5.3.3. Baxter agrees that all Onconova Information delivered by Onconova or any of its Affiliates or Licensees hereunder shall, as between the Parties, at all times be and remain sole and exclusive property of Onconova or its Affiliates or Licensees, respectively.

5.3.4. Onconova agrees that all Baxter Information delivered by Baxter or any of its Affiliates or Sublicensees hereunder shall, as between the Parties, at all times be and remain sole and exclusive property of Baxter or its Affiliates or Sublicensees, respectively.

ARTICLE VI.
REGULATORY MATTERS

6.1. Ownership of Regulatory Filings. Subject to the obligations of the Parties under ARTICLE XV, Onconova shall own all Marketing Approvals and Regulatory Filings related to the Licensed Product in the Licensed Territory.

6.2. Regulatory Filing Responsibility.

6.2.1. Onconova will be responsible for the creation of a global dossier that will be the basis for all worldwide license applications. Baxter will provide specific technical regulatory expertise for assistance in developing the submission strategy and defining

technical content. Baxter's global regulatory affairs representative will be invited to attend critical meetings with Regulatory Authorities in the Licensed Territory associated with the submission of Regulatory Filings for the Licensed Product in the Licensed Territory, and Onconova's regulatory affairs representative will be invited to attend all meetings with key health authorities related to the commercialization of the Licensed Product in the Licensed Territory.

6.2.2. Without limitation of Section 6.2.4, and except for any Regulatory Filings required to be made in relation to safety registration activities and post-Marketing Approval studies under Section 4.5, Onconova shall be responsible for and shall have final decision making authority with respect to the preparation and filing of Regulatory Filings for the Licensed Product in the Licensed Territory with respect to the Initial Indications and Additional Indications, utilizing the global dossier. Baxter shall be responsible for providing guidance and having final review (but not approval) of all Regulatory Filings for the Licensed Product in the Licensed Territory with respect to the Initial Indications and Additional Indications. In Europe, Baxter will collaborate with Onconova on the assessment for Rapporteur and Co-Rapporteur with Baxter having the final authority on selection. Onconova will designate Baxter as its authorized agent in the Licensed Territory for all regulatory matters for the Licensed Product. For global regulatory communications involving the Licensed Product, Baxter and Onconova will seek to develop such communications collaboratively and perform parallel reviews in accordance with mutually agreed upon defined timelines, subject to the rights of, and obligations owed to, Onconova Licensees. If Baxter is unable to meet the pre-defined timelines or is resource constrained, Onconova may submit such regulatory communications without formal Baxter review in any territory. Except as otherwise set forth in Section 4.2, Section 4.3 and in Section 6.2.3, each Party shall bear its own costs and expenses incurred in preparing and filing Regulatory Filings for the Licensed Product in the Licensed Territory.

6.2.3. Notwithstanding anything to the contrary herein, Baxter shall be responsible for (a) **, and (b) **, and Baxter shall reimburse Onconova for all such costs and expenses incurred by Onconova or its Affiliates within ** of Onconova's invoice therefor.

6.2.4. Baxter shall be responsible for and shall have final decision making authority with respect to discussions and negotiations with Regulatory Authorities in respect of Marketing Approval and labeling discussions for the Licensed Product in the Licensed Territory, all of which shall be conducted by Baxter consistent with its obligation to obtain Marketing Approval for the Licensed Products pursuant to Section 7.1.1.

6.2.5. Notwithstanding the foregoing, each Party shall keep the other Party reasonably well informed with respect to the contents of any Regulatory Filings related to the Licensed Products in the Licensed Territory and discussions with the applicable Regulatory Authorities. Onconova shall consider in good faith any comments that Baxter may provide with respect to the Regulatory Filings related to the Licensed Products in the Licensed Territory, and Baxter shall consider in good faith any comments that Onconova may provide with respect to Baxter's negotiations with Regulatory Authorities in respect of Marketing Approval and labeling discussions for the Licensed Product in the Licensed Territory.

6.3. Safety Information; Adverse Events.

6.3.1. Each Party shall provide to the other Party all information of which it becomes aware (including, as to Baxter, information provided by its Sublicensees, and in the

case of Onconova, information provided by its Licensees) relating to the occurrence of any serious adverse event or any adverse event in connection with the Licensed Product as further detailed in the Supply Agreement and the attachments thereto (including, without limitation, the Quality Agreement and/or the pharmacovigilance agreement contemplated therein).

6.3.2. If the Parties do not execute a Supply Agreement pursuant to Section 8.1, then (a) each Party shall provide to the other Party the information described in Section 6.3.1 promptly after becoming aware of such information, and (b) details regarding the adverse event reporting and recall procedures shall be set out in a pharmacovigilance agreement which shall be negotiated and entered into by and between Onconova and Baxter ** prior to the anticipated First Commercial Sale of the Licensed Product in the Licensed Territory.

6.3.3. The JSC will coordinate the maintenance of safety databases and the preparation of global safety reports.

ARTICLE VII.
LAUNCH AND COMMERCIALIZATION
OF LICENSED PRODUCT

7.1. Launch and Commercialization.

7.1.1. Baxter shall have full responsibility for all commercialization activities for the Licensed Product in the License Territory, at Baxter's sole cost and expense. Baxter shall market, promote, sell and otherwise commercialize the Licensed Product in the Licensed Territory in accordance with the terms of this Agreement and in material conformity with all applicable Laws. Baxter shall use Commercially Reasonable Efforts to obtain Marketing Approval for the Licensed Product in each country of the Licensed Territory.

7.1.2. After receiving Marketing Approval of the Licensed Product for a country in the Licensed Territory, Baxter shall use Commercially Reasonable Efforts to market, promote and sell the Licensed Product in such country. Baxter shall commence the marketing of the Licensed Product under either the Onconova Trademark or another trademark selected and owned or Controlled by Baxter, as Baxter in its sole discretion shall decide and as set forth in Article XI, in the Licensed Territory within ** after obtaining the first Marketing Approval of the Licensed Product. Baxter shall notify Onconova promptly of the date of First Commercial Sale of a Licensed Product in the Licensed Territory.

7.1.3. Baxter shall use Commercially Reasonable Efforts to obtain pricing reimbursement in accordance with the Commercialization Plan required under Section 7.1.4. Further, Baxter shall use Commercially Reasonable Efforts to (a) launch commercially a Licensed Product in a given country in the Licensed Territory no later than ** after ** for such Licensed Product in such country, and (b) not withdraw a Licensed Product from sale or abandon for more than ** the sale of a Licensed Product; provided that Baxter shall not be in breach of the foregoing obligations to the extent that Baxter's failure to launch or abandonment of the Licensed Product as described above results from: (y) the failure of Onconova to supply Licensed Product to Baxter pursuant to the terms of the Supply Agreement if executed pursuant to Section 8.1 or (z) any recall, withdrawal or field correction ordered by a Regulatory Authority or undertaken by Baxter on its own in good faith pursuant to Section 7.3, and further provided that if Section 15.4 applies, then Baxter

shall not be deemed in breach of this Section 7.1.3 and the Parties shall have the rights and obligations set forth in Section 15.4.

7.1.4. In addition to the foregoing requirements, Baxter shall undertake appropriate activities, reflecting Commercially Reasonable Efforts to commercialize and maximize sales of Licensed Product, related to pre-launch and launch commercialization of a Licensed Product in each of **, which activities may include the development of: (i) a market access strategy including Licensed Product pricing and reimbursement approval, (ii) a pre-launch and post launch publication strategy and the scheduling of targeted meetings for presentations of clinical data, (iii) a product supply chain distribution strategy, (iv) a patient education plan for the Licensed Products, (v) an overall sales and marketing strategy for the Licensed Product, (vi) patient support programs, (vii) a physician and hospital targeting plan and (viii) a sales execution plan. By **, Baxter shall have prepared and delivered to Onconova a preliminary, non-binding commercialization plan documenting the activities, plans and strategies that will be implemented, consistent with the first sentence of this Section 7.1.4, to market and commercialize such Licensed Product. Every ** thereafter, Baxter shall provide to Onconova an updated, non-binding version of such commercialization plan, and Baxter shall provide to Onconova a final, binding version of such commercialization plan (the "Commercialization Plan") not less than the earlier of ** after filing of a Drug Approval Application in the Licensed Territory for a Licensed Product or ** prior to the planned commercial launch of a Licensed Product in the Licensed Territory. The Parties shall review and discuss each version of the Commercialization Plan through the JSC, and Baxter will, in good faith, consider any proposed changes made by Onconova to each version of the Commercialization Plan. When finalized, the Commercialization Plan shall be incorporated into this Agreement as Schedule 7.1.4. Baxter shall use Commercially Reasonable Efforts to implement and execute the Commercialization Plan.

7.2. Coordination of Marketing Efforts. The JSC shall coordinate communications regarding certain aspects of the Parties' marketing efforts for the Licensed Product as follows:

7.2.1. Onconova shall share with Baxter free of charge any and all of marketing information in the Control of Onconova with respect to the Licensed Product, including, complete promotion plans and strategies, as well as all promotional and sales materials used for the launch and marketing of the Licensed Product outside the Licensed Territory. Onconova shall use its Commercially Reasonable Efforts to obtain from its Licensees the right to provide such marketing information generated by such Licensees.

7.2.2. Baxter shall share with Onconova free of charge any and all of marketing information in the Control of Baxter with respect to the Licensed Product, including without limitation, complete promotion plans and strategies, as well as all promotional and sales activities and materials used for the launch and marketing of the Licensed Product in the Licensed Territory, whether generated by Baxter or its Sublicensees; provided, however, that Onconova may only use such information and materials for non-commercial purposes, including to audit Baxter's compliance with the terms of this Agreement as well as to provide Baxter with any comments or recommendations. Notwithstanding the foregoing, Onconova and its Licensees may use such information and materials for commercial purposes upon payment to Baxter of: (a) ** and (b) **.

7.3. Recalls.

7.3.1. Generally. In the event that either Party:

7.3.1.1. determines that an event, incident, or circumstance has occurred which may result in the need for a Recall, Withdrawal, Field Correction or other removal of any Licensed Product or any lot or lots thereof from the market in the Licensed Territory;

7.3.1.2. determines that an event, incident, or circumstance that could reasonably adversely affect the Licensed Product in the Licensed Territory has occurred which is reasonably likely to result in the need for a Recall, Withdrawal Field Correction or other removal of any Licensed Product, or any lot or lots thereof from the market;

7.3.1.3. becomes aware that a Regulatory Authority is threatening or has initiated an action to remove the Licensed Product from the market in the Licensed Territory or, if such event could reasonably adversely affect the Licensed Product in the Licensed Territory, any Regulatory Authority is threatening or has initiated an action to remove the Licensed Product from the market; or

7.3.1.4. is required by any Regulatory Authority to distribute a "Dear Doctor" letter or its equivalent regarding use of the Licensed Product in the Licensed Territory or, if such event could reasonably adversely affect Licensed Product in the Licensed Territory, any Regulatory Authority has required distribution of a "Dear Doctor" letter or its equivalent regarding use of the Licensed Product outside the Licensed Territory,

it shall promptly advise the other Party in writing with respect thereto, and shall provide to the other Party copies of all relevant correspondence, notices, and the like in the possession or Control of such Party. In such event, Baxter shall have the sole authority to determine if a Recall or other removal of the Licensed Product is required in the Licensed Territory, and shall be responsible for conducting any such Recall, Withdrawal, Field Correction or other removal of any Licensed Product from the Licensed Territory, whether voluntary or involuntary, or taking such other remedial action required by applicable Laws in the Licensed Territory.

7.3.2. Onconova Assistance. At Baxter's reasonable request, Onconova shall assist Baxter with respect to any such recall or remedial action, and shall provide Baxter with all information that Baxter may reasonably request in connection with its dealings with a Regulatory Authority in connection with such recall or remedial action.

7.3.3. Recall Costs. Notwithstanding anything else contained in this Agreement to the contrary, if a Recall, Withdrawal, Field Correction or other removal of any Licensed Product or any lot or lots thereof from the market in the Licensed Territory:

7.3.3.1. **;

7.3.3.2. **;

7.3.3.3. **; and

7.3.3.4. **.

7.3.4. Activities Outside the Licensed Territory. For avoidance of doubt, Onconova shall have the sole authority to determine if a Recall, Withdrawal Field Correction or other removal of the Licensed Product is required outside of the Licensed Territory and shall bear all costs and expenses incurred therewith.

7.4. Parallel Imports.

7.4.1. Onconova shall not at any time during the Term enter into any agreement whereby it would: (a) sell, market, promote or distribute, directly or indirectly, the Licensed Product in the Licensed Field in the Licensed Territory; or (b) sell or distribute the Licensed Product to any Third Party outside the Licensed Territory if Onconova has knowledge that such person intends to sell such Licensed Product in the Licensed Field in the Licensed Territory. To the extent permitted by Law, Onconova shall secure from such Third Party its obligation to abide by the restrictions relating to inside the Licensed Territory contained in this Section 7.4.1, including refraining from knowingly engaging, directly or indirectly, in parallel importation or dealing in "grey market" products in connection with its sale and distribution of the Licensed Products. Onconova will use Commercially Reasonable Efforts to take legal action against its Licensees as is necessary to prevent the importation into the Licensed Territory of Licensed Product sold and intended for sale outside of the Licensed Territory.

7.4.2. Baxter shall not at any time during the Term enter into any agreement whereby it would: (a) sell, market, promote or distribute, directly or indirectly, the Licensed Product in the Licensed Field outside of the Licensed Territory; or (b) sell or distribute the Licensed Product to any Third Party inside the Licensed Territory if Baxter has knowledge that such person intends to sell such Licensed Product in the Licensed Field outside of the Licensed Territory. To the extent permitted by Law, Baxter shall secure from such Third Party its obligation to abide by the restrictions relating to inside the Licensed Territory contained in this Section 7.4.2, including refraining from knowingly engaging, directly or indirectly, in parallel importation or dealing in "grey market" products in connection with its sale and distribution of the Licensed Products. Baxter will use Commercially Reasonable Efforts to take legal action against its Sublicensees as is necessary to prevent the exportation outside of the Licensed Territory of Licensed Product sold and intended for sale inside of the Licensed Territory.

ARTICLE VIII.
MANUFACTURING AND SUPPLY

8.1. Supply Agreement Covenant.

8.1.1. The Parties acknowledge and agree that it was their original intent that the Supply Agreement would be executed concurrent with the execution of this Agreement. Due to the fact that,**, the Parties were unable to finalize the Supply Agreement. Notwithstanding the foregoing, the Parties agree that promptly following **, they shall enter into good faith negotiations directed toward the execution of a Supply Agreement that is satisfactory to the Parties in both form and substance. The Supply Agreement shall include: (a) representations, warranties, covenants and indemnities substantially consistent with the draft manufacturing and supply agreement delivered by Baxter to Onconova ** and (b) ** to ensure that all such Third Party contract manufacturers are qualified as Baxter suppliers.

8.1.2. If the Parties have not executed the Supply Agreement by **, which date may be extended one time ** upon Onconova's request, then Section 8.1.1 shall cease to apply and be null and void, and Baxter shall have the right, in its sole discretion, to continue such negotiations with Onconova (and Onconova shall in good faith participate therein) but shall also have the right to (a) negotiate with and enter into one or more agreements with Third Parties for the manufacture and supply to Baxter and its Affiliates and agents of their collective requirements for Licensed Product in the Licensed Territory and/or (b) manufacture the Licensed Products on its own or through its Affiliates. If Baxter engages a Third Party or elects to manufacture the Licensed Products on its own, Onconova shall cooperate with Baxter reasonable requests, **, to engage in a technology transfer to allow Baxter to manufacture Product (through the first commercial batch of Product) itself or by through its designated Third Party manufacturer by transferring all know-how, technology, trade secrets and patent rights owned or Controlled by Onconova that are necessary to manufacture Product (including, without limitation, the Onconova Know-How), thereby enabling Baxter (or such Third Party) to manufacture the Licensed Products.

ARTICLE IX.
PAYMENTS

9.1. Upfront Fee. In consideration of the licenses and other rights granted to Baxter under this Agreement, and to compensate Onconova for the costs and expenses it will incur in generating and compiling the Onconova Information and in further developing the Compound, Baxter shall pay to Onconova, no later than ** after the Effective Date, a one-time, non-refundable, non-creditable license fee equal to fifty million dollars (USD 50,000,000).

9.2. Milestones.

9.2.1. Development Milestones. As additional consideration for the licenses and other rights granted to Baxter under this Agreement, and to compensate Onconova for the costs and expenses it will incur in generating and compiling the Onconova Information and in further developing the Compound, Baxter shall pay to Onconova the following non-creditable, non-refundable amounts within ** after the first occurrence of each of the following events (each, a "Development Milestone"):

Event	Milestone Payment
(a) **	**
(b) **	**
(c) **	**
(d) **	
**	**
**	**

**	**
(e) **	
**	**
**	
- **	
**	**
- **	
**	
	**
	**
(f) **	**
(g) **	**

9.2.2. Sales Milestones. As additional consideration for the licenses and other rights granted to Baxter under this Agreement, Baxter shall pay to Onconova the following non-creditable, non-refundable amounts within ** ** after the first occurrence of each of the following events (each, a "Sales Milestone"):

Annual Calendar Year Net Sales Level	Milestone Payment
**	**
**	**
**	**
**	**

For purposes of clarity, Baxter shall only be obligated to make a Sales Milestone payment corresponding to each of the foregoing events only once, regardless of whether such Sales Milestone event occurs during more than one calendar year. If more than one Sales Milestone event are first achieved in the same calendar year, Baxter shall be obligated to pay the corresponding milestone payment for all such events.

9.2.3. Payment in Cash. All payments under this Section 9.2 shall be made in USD. All payments under Section 9.2 shall be made without setoff or deduction of any kind.

9.2.4. Milestone Notification. Baxter shall notify Onconova of the achievement of each of the Development Milestones within ** of its achievement, and each of the Sales Milestones within ** after Baxter or its Sublicensee closes its books for the relevant annual period in which such Sales Milestone payment becomes due. All payments under Section 9.2 shall be made within ** after achievement of the applicable Development Milestone or Sales Milestone, except as set forth below.

(a) With respect to the ** set forth in Section 9.2.1, if **, then no later than ** after **, Baxter shall pay to Onconova ** and shall pay royalties for Net Sales in respect of ** at the ** Royalty Rates.

(b) If no Competing Product for treatment, amelioration and/or prevention of refractory MDS has received Marketing Approval in any country in the European Union within ** for MDS IV by the EMA or, if filed separately in individual countries in the Licensed Territory, within ** for MDS IV (if granted by **), then on **, Baxter shall pay the ** to Onconova and a ** payment accounting for the difference between the ** that should have been paid and the ** that were paid to Onconova.

(c) If a Competing Product for the treatment, amelioration and/or prevention of refractory MDS receives Marketing Approval in the European Union within ** for MDS IV from the EMA or, if filed separately, from the applicable Regulatory Authorities for **, and Baxter had previously paid to Onconova the **, then Baxter shall withhold ** payable to Onconova until **, at which point Baxter shall resume paying ** due to Onconova under this Agreement.

9.3. Royalty Payment; Audits.

9.3.1. Royalty Payments. In addition to the payments specified in Sections 9.1 and 9.2, in consideration of the rights granted to Baxter under this Agreement, Baxter shall pay to Onconova the following incremental royalties on annual Net Sales of the Licensed Product in the Licensed Territory:

Annual Calendar Year Net Sales in the Licensed Territory	"** Royalty Rates"	"** Royalty Rates"
**	**	**
**	**	**
**	**	**
**	**	**

(a) If Onconova obtains Marketing Approval for the Licensed Product for MDS IV from the EMA or, if filed separately in individual countries in the Licensed Territory, from the applicable Regulatory Authorities for the earlier to occur of **, or (ii) **, without undertaking **, then the ** Royalty Rates above shall apply, (b) if Onconova **, have resulted in the granting of Marketing Approval for MDS IV from the EMA or, if filed separately in individual countries in the Licensed Territory, from the applicable Regulatory Authorities for the earlier to occur of either (i) **, or (ii) **, and no Competing Product for the treatment, amelioration and/or prevention of refractory MDS has received Marketing Approval from the EMA or from the applicable Regulatory Authorities for the **

referenced in clauses (i) or (ii) above, as applicable, where Marketing Approval for MDS IV was granted **, within ** of the granting of Marketing Approval for MDS IV, the ** Royalty Rates above shall apply or (c) if Onconova is required to ** for MDS IV in order to obtain Marketing Approval for MDS IV from the EMA or, if filed separately in individual countries in the Licensed Territory, from the applicable Regulatory Authorities for the earlier to occur of either (i) **, or (ii) any **, and the EMA Marketing Approval for MDS IV or the last Marketing Approval for ** referenced in clause (i) or clause (ii) above, as applicable, is granted **, then the ** Royalty Rates above shall apply.

9.3.2. Royalty Term. Baxter's obligation to pay royalties pursuant to Section 9.3.1 shall expire, on a country-by-country and Licensed Product-by-Licensed Product basis, upon the last to expire of (a) the last to expire Valid Claim of an Onconova Patent or Joint Patent in such country that covers the manufacture, use, sale, offer for sale or importing of such Licensed Product in the Licensed Field in such country, (b) all applicable Regulatory Exclusivity for such Licensed Product in the Licensed Field in such country, and (c) ** from the First Commercial Sale of such Licensed Product in such country (the "Royalty Term"). If, during any portion of the foregoing ** period from First Commercial Sale of a Licensed Product in a country in the Licensed Territory, there is no Valid Claim and no applicable Regulatory Exclusivity as described in clauses (a) and (b) above exists, then royalties shall be payable at the rate of ** of Net Sales.

9.3.3. Royalty Payment Timing; Royalty Reports. Payment of royalties pursuant to this Section 9.3 shall be due ** after the end of each calendar quarter and shall be made in USD. All payments under this Section 9.3 shall be made without setoff or deduction of any kind. Upon payment of royalties, Baxter shall deliver to Onconova the respective Sales Report.

9.3.4. Accounting.

(a) Baxter agrees to keep, and to require its Affiliates and Sublicensees to keep, full, clear and accurate records for a minimum period of ** after the relevant payment is owed pursuant to this Agreement, setting forth the sales and other disposition of Licensed Products sold or otherwise disposed of in sufficient detail to enable royalties and compensation payable to Onconova hereunder to be determined.

(b) Onconova and Temple University each shall have the right, no more than once during each calendar quarter during the Term and for ** thereafter, to have an independent certified public accountant ("Accountant") of its own selection (subject to Baxter's acceptance of such Accountant, not to be unreasonably withheld, conditioned or delayed) and at its own expense audit the relevant books and records of account of Baxter in connection with the payment of royalties and any other amounts under this Agreement during normal business hours, and upon reasonable prior notice, to determine whether appropriate

accounting has been performed and payments have been made to Onconova hereunder; provided that such Accountant shall be bound to treat all information reviewed during such audit as confidential, and does not disclose to Onconova any information other than information which shall have previously been given to Onconova pursuant to any provision of this Agreement or information regarding the payments due to or by Onconova as a result of such audit. Notwithstanding the right of Onconova and Temple University to each conduct the audit contemplated by this Section 9.3.4(b), Onconova shall endeavor to minimize the disruptions on Baxter's operations by conducting its audit at the same time that Temple University conducts its audit.

(c) If the Accountant determines that the Sales Report has not been true or accurate, then Baxter shall refund Onconova for the costs of the Accountant if Baxter has underpaid such royalties by more than **, and the royalties shall be re-calculated on the basis of the Accountant's findings. Such Accountant's findings shall be binding for both Parties absent manifest error.

(d) Royalties payable under this Section 9.3 shall be payable only once with respect to a particular unit of Licensed Product and shall be paid only once regardless of the number of Patents applicable to such Licensed Product.

9.4. Upstream Agreements. For clarity, Onconova shall be solely responsible for paying all amounts due pursuant to the Upstream Agreements.

9.5. Payment Mechanics.

9.5.1. Payment Account. All payments to be made to Onconova under this Agreement shall be made by wire transfer to the following account:

**

or such other account as may be specified by Onconova in writing to Baxter.

9.5.2. Currency Conversion. When calculating Net Sales, the amount of such sales in foreign currencies shall be converted into USD using the standard methodologies employed by Baxter for consolidation purposes. Baxter shall provide reasonable documentation of the calculation and reconciliation of the conversion figures on a Licensed Product-by-Licensed Product and country-by-country basis as part of its report of Net Sales for the period covered under the applicable report.

9.6. Taxes. All payments under this Agreement shall be made without any deduction or withholding for or on account of any tax, except as set forth in this Section 9.6. The Parties agree to cooperate with one another and use reasonable efforts to minimize under applicable Law obligations for any and all income or other taxes required by Law to be withheld or deducted from any of the royalty and other payments made by or on behalf of a Party hereunder ("Withholding Taxes"). The applicable paying Party under this Agreement (the "Paying Party") shall, if required by Law, deduct from any amounts that it is required to pay to the recipient Party hereunder (the "Recipient Party") an amount equal to such Withholding Taxes; provided that the Paying Party shall give the Recipient Party reasonable notice prior to paying any such Withholding Taxes. Such Withholding Taxes shall be paid to the proper taxing authority for the Recipient Party's account and, if available, evidence of such payment shall be secured and sent to recipient within ** of such payment. The Paying

Party shall, at the Recipient Party's cost and expense, do all such lawful acts and things and sign all such lawful deeds and documents as the Recipient Party may reasonably request to enable the Paying Party to avail itself of any applicable legal provision or any double taxation treaties with the goal of paying the sums due to the Recipient Party hereunder without deducting any Withholding Taxes.

Notwithstanding anything to the contrary herein:

(i) based on Onconova being a US corporation and thus, a resident of the United States as that term is defined in Article 4 of the US-Switzerland Income Tax Treaty, Baxter, who will make all payments under this Agreement to Onconova, will take the position that any such payment is treated for all tax purposes as being

sourced in Switzerland and being a royalty exempt from Withholding Taxes pursuant to Article 12 of the US-Switzerland Income Tax Treaty, provided that Onconova shall have provided Baxter on a timely basis with the documentation required to support such an exemption, and provided there are no changes to the treaty that would affect the exemption; and

(ii) if there is an assignment of the Agreement by Baxter or the payment of the royalty by a party other than Baxter that results in the imposition of a Withholding Tax then there will be an obligation on the party making such payment and Baxter to increase or "gross up" any payments made hereunder so that the net amount paid, after deduction of Withholding Taxes, shall equal the amount that would have been paid if no Withholding Taxes had been imposed.

9.7. Late Payments. If Onconova does not receive payment of any sum due to it under this Agreement on or before the due date, simple interest shall thereafter accrue on the sum due to Onconova from the due date until the date of payment at the ** per annum or the maximum rate allowable by applicable Law, whichever is less.

ARTICLE X.
INVENTIONS; ACCESS TO IMPROVEMENTS; PATENTS

10.1. Improvements and Inventions.

10.1.1. The Parties acknowledge that Baxter and its Sublicensees may improve or modify the Licensed Products or otherwise make Inventions in the course of exercising Baxter's rights and performing its obligations under this Agreement, and that Onconova and its Licensees may improve or modify the Licensed Products and otherwise make Inventions as Onconova and its Licensees continue to develop the Licensed Product outside the Licensed Territory and to manufacture Licensed Product for supply to Baxter for the Licensed Territory.

10.1.2. Onconova will use Commercially Reasonable Efforts to obtain from its Licensees Control of Improvements made or developed by or on behalf of such Licensees, as well as Control of all intellectual property rights therein that are owned or controlled by such Licensees, in each case as necessary to provide Baxter access to rights to such Improvements as part of the Onconova Information, Onconova Know-How or Onconova Patents, as applicable, in the Licensed Territory pursuant to this Agreement. Any such Improvements made by or on behalf of Onconova's Licensees of which Onconova obtains Control shall be included in the Onconova Know-How, and all Patents claiming such Improvements of which Onconova obtains Control shall be included in the Onconova Patents; provided that if any

royalties or other fees are required to be paid to a Licensee in respect of such rights, Baxter shall be responsible for such payments to the extent reasonably allocable to the Licensed Product in the Licensed Territory.

10.1.3. Baxter will use Commercially Reasonable Efforts to obtain from its Sublicensees Control of Improvements made or developed by or on behalf of such Sublicensees, as well as Control of all intellectual property rights therein that are owned or controlled by such Sublicensees, in each case as necessary to provide Onconova access to rights to such Improvements as part of the Baxter Information, Baxter Know-How or Baxter Patents, as applicable, pursuant to this Agreement. Any such Improvements made by or on behalf of Baxter's Sublicensees of which Baxter obtains Control shall be included in the Baxter Know-How, and all Patents claiming such Improvements of which Baxter obtains Control shall be included in the Baxter Patents; provided that if any royalties or other fees are required to be paid to a Sublicensee in respect of such rights, Onconova shall be responsible for such payments to the extent reasonably allocable to the Licensed Product outside the Licensed Territory.

10.1.3.1. Onconova shall have the right to grant sublicenses under Section 2.2 with respect to Baxter Know-How and Baxter Patents that constitute Improvements ("Baxter Improvements") to any Licensees who agree to provide to Onconova Control of Improvements made by or on behalf of such Licensee ("Licensee Improvements") on a royalty-free, fully-paid basis, enabling Onconova to provide to Baxter a sublicense pursuant to Section 2.1 under such Licensee Improvements at no additional cost to Baxter. If Onconova desires to grant sublicenses to Baxter Improvements under Section 2.2 to any Licensees who do not agree to provide to Onconova Control of Licensee Improvements made by or on behalf of such Licensee on such a royalty-free, fully-paid basis, the Parties will negotiate commercially reasonable terms under which Onconova may grant such a sublicense under Baxter Improvements to such Licensee for up to ** after Onconova requests that it have the right to grant such a sublicense to such Licensee. In such case, Onconova may only grant a sublicense under such Baxter Improvements to such Licensee after the Parties agree in writing on the applicable commercial terms.

10.1.3.2. Baxter shall have the right to grant sublicenses under Section 2.1 with respect to Onconova Know-How and Onconova Patents that constitute Improvements ("Onconova Improvements") to any Sublicensees who agree to provide to Baxter Control of Improvements made by or on behalf of such Sublicensee ("Sublicensee Improvements") on a royalty-free, fully-paid basis, enabling Baxter to provide to Onconova a sublicense pursuant to Section 2.2 under such Sublicensee Improvements at no additional cost to Onconova. If Baxter desires to grant sublicenses to Onconova Improvements under Section 2.1 to any Sublicensees who do not agree to provide to Baxter Control of Sublicensee Improvements made by or on behalf of such Sublicensee on such a royalty-free, fully-paid basis, the Parties will negotiate commercially reasonable terms under which Baxter may grant such a sublicense under Onconova Improvements to such Sublicensee for up to ** after Baxter requests that it have the right to grant such a sublicense to such Sublicensee. In such case, Baxter may only grant a sublicense under such Onconova Improvements to such Sublicensee after the Parties agree in writing on the applicable commercial terms.

10.2. Ownership of Inventions. Inventorship shall be determined in accordance with U.S. patent laws. Any Invention made solely by employees, agents, or independent contractors of a Party or its Affiliates in the course of performing activities under this Agreement, together with all intellectual property rights therein ("Sole Inventions") shall be

owned by such Party; provided that Onconova shall own, and Baxter (on behalf of itself and its Affiliates) hereby assigns to Onconova, all Sole Inventions related to the composition of matter or use of the Licensed Product and all other Sole Inventions specifically related to the Licensed Product. Any Invention made jointly by at least one (1) employee, agent, or independent contractor of each Party or such Party's Affiliate, together with all intellectual property rights therein ("Joint Inventions"), shall be owned jointly by the Parties in accordance with joint ownership interests of co-inventors under U.S. patent laws, with each joint Party having, unless otherwise set forth in this Agreement, the unrestricted right to license and grant rights to sublicense any such Joint Invention; provided that Onconova shall own, and Baxter (on behalf of itself and its Affiliates) hereby assigns to Onconova, all Joint Inventions related to the composition of matter or use of the Licensed Product and all other Joint Inventions specifically related to the Licensed Product. To the extent necessary to effect the foregoing, each Party hereby grants to the other party a nonexclusive, royalty-free, worldwide license, with the right to grant sublicenses, under such Party's interest in Joint Inventions, for any and all purposes; provided that the foregoing shall not apply to any uses of such Joint Inventions for which the receiving Party otherwise retains an exclusive license pursuant to this Agreement, with such proviso to apply only for so long as such receiving Party retains such exclusive license. For the avoidance of doubt, Baxter Inventions and Joint

Inventions relating generally to the formulation and/or administration of pharmaceutical products do not relate to the composition of matter or use of the Licensed Product and shall not be assigned solely to Onconova, but (in the case of Joint Inventions) shall remain jointly owned by the Parties or (in the case of Baxter Inventions) shall be deemed Baxter Know-How and, if the subject of patent rights, Baxter Patents.

10.3. Disclosure of Inventions. Each Party shall promptly disclose to the other Party in writing any Invention disclosures, or other similar documents, submitted to it by its employees, agents, or independent contractors describing each and every Invention that may be either a Sole Invention or a Joint Invention, and all Information relating to such Invention.

10.4. Prosecution of Patents.

10.4.1. Onconova Patents Other than Joint Patents. Onconova shall have the first right and authority to file, prosecute, and maintain Onconova Patents, other than Joint Patents, on a worldwide basis at its sole discretion, subject to this Section 10.4.1. The Parties shall ** all costs of such filing, prosecution and maintenance in the Licensed Territory; otherwise, **. To the extent that there are multiple parties benefiting from the Onconova Patents in the Licensed Territory, then the Parties shall mutually agree upon an appropriate allocation of such Patent expenses. Onconova shall provide Baxter with the opportunity to review and comment on any and all prosecution efforts, but in no case less than **, if reasonably practicable, prior to any filing deadlines, regarding the Onconova Patents within the Licensed Territory; provided that Onconova shall have final control over such prosecution efforts after reasonably considering Baxter's comments, if any. Onconova shall provide Baxter with a copy of material communications from patent authorities in the Licensed Territory regarding the Onconova Patents, and shall provide drafts of any material filings or responses to be made to such Patent authorities in a timely manner. Notwithstanding the foregoing, if Onconova determines in its sole discretion to abandon or not maintain in the Licensed Territory any Onconova Patent, other than a Joint Patent, Onconova shall provide Baxter with ** prior written notice of such determination and, if Baxter so requests, shall provide Baxter with the opportunity to prosecute and maintain such Onconova Patent in the Licensed Territory in the name of Onconova. Thereafter, the Parties shall ** all expenses of

filing, prosecuting and maintaining such Onconova Patent in the Licensed Territory.

10.4.2. Upstream Patents. Baxter acknowledges that certain of the Onconova Patents are subject to the rights of Onconova's licensors pursuant to the Upstream Agreements. Notwithstanding the provisions of Section 10.4.1, Baxter agrees that the rights of such licensors are precedent to Onconova's obligations, and Baxter's rights under Section 10.4.1, and Onconova compliance with the terms of the Upstream Agreements, shall not, if contrary to the terms of Section 10.4.1, constitute a breach hereof, including with respect to the ** review period described above; provided, however, that Onconova shall notify Onconova's licensors pursuant to the Upstream Agreements of its desire to abandon or not maintain any Onconova Patent in the Licensed Territory only after (a) Onconova first provides to Baxter ** prior written notice of such intent as provided in the preceding paragraph and (b) Baxter elects not to prosecute and maintain such Onconova Patents within such ** period.

10.4.3. Joint Patents. With respect to any potentially patentable Joint Invention, the Parties shall meet and agree upon which Party shall prosecute and maintain Patent applications covering such Joint Invention (any such Patent application and any Patents issuing therefrom, a "Joint Patent") in particular countries and jurisdictions throughout the world. Unless otherwise agreed by the Parties, Baxter will prosecute and maintain any Joint Patents in the Licensed Territory, and Onconova will prosecute and maintain the Joint Patents outside the Licensed Territory, subject to the Parties coordinating their efforts as appropriate to make such prosecution activities as efficient, convenient, and harmonious as possible. The Parties ** all expenses of filing, prosecuting and maintaining such Joint Patents. The Party that prosecutes a Joint Patent (the "Prosecuting Party") shall provide the other Party the opportunity to review and comment on any and all such prosecution efforts regarding the applicable Joint Patent in the particular jurisdictions, and such other Party shall provide the Prosecuting Party reasonable assistance in such efforts; provided that the Prosecuting Party shall have final control over such prosecution efforts after reasonably considering the other Party's comments, if any. The Prosecuting Party shall provide the other Party with a copy of all material communications from any Patent authority in the applicable jurisdictions regarding the Joint Patent being prosecuted by such Party, and shall provide drafts of any material filings or responses to be made to such patent authorities a reasonable amount of time in advance of submitting such filings or responses. In particular, each Party agrees to provide the other Party with all information necessary or desirable to enable the other Party to comply with any duty of candor and/or duty of disclosure requirements of any Patent authority. Except to the extent a Party is restricted by the licenses granted by such Party to the other Party under the terms of this Agreement, and/or the other covenants contained in this Agreement, each Party shall be entitled to practice, and grant licenses to Third Parties and Affiliates of such Third Parties to practice, the Joint Patents and all Joint Inventions without restriction or an obligation to account to the other Party, and the other Party shall consent and hereby consents, without additional consideration, to any and all such licenses.

10.4.4. Cooperation in Prosecution. Each Party shall provide the other Party all reasonable assistance and cooperation in the Patent prosecution efforts described above in this Section 10.4, including providing any necessary power of attorney and executing any other required documents or instruments for such prosecution.

10.5. Infringement of Patents by Third Parties.

10.5.1. Notification. Each Party shall promptly notify the other Party in writing of any existing or threatened infringement of the Onconova Patents (including Joint Patents) of which it becomes aware in the Licensed Territory, and shall provide to the other Party any and all evidence and information available to such Party regarding such alleged infringement.

10.5.2. Product Infringement of Onconova Patents (Including Joint Patents) in the Licensed Territory.

(a) If a Party becomes aware of any actual or alleged existing or threatened infringement by a Third Party of any Onconova Patent, including any Joint Patent, by making, using, importing, offering for sale, or selling the Compound and/or the Licensed Product (such activities, "Product Infringement") in the Licensed Territory, such Party shall notify the other Party as provided in Section 10.6.1. Baxter shall have the first right, but not the obligation, to bring an appropriate suit or other action against any person or entity engaged in such Product Infringement in the Licensed Territory, subject to Section 10.5.2(b). Baxter shall have a period of ** after such notification to or by Baxter, to elect to so enforce such Onconova Patent in the Licensed Territory. If Baxter does not so elect, Baxter shall so notify Onconova in writing during such **, or ** prior to any deadline relating to loss of any rights with respect to the Product Infringement, whichever is earlier, and Onconova shall have the right, but not the obligation, to commence a suit or take action to enforce such Onconova Patent against such Third Party allegedly perpetrating such Product Infringement. Each Party shall provide to the Party enforcing any such rights under this Section 10.5.2(a) reasonable assistance in such enforcement, including joining an action as a party plaintiff if so required by Laws to pursue such action, at the enforcing Party's sole expense. The enforcing Party shall keep the other Party regularly informed of the status and progress of such enforcement efforts, and shall reasonably consider the other Party's comments on any such efforts. Except as set forth above, the enforcing Party shall bear and be responsible for all costs incurred in connection with each Party's activities under this Section 10.5.2(a).

(b) The Party not bringing an action with respect to Product Infringement under this Section 10.5.2 shall be entitled to separate representation in such matter by counsel of its own choice and at its own expense, but such Party shall at all times cooperate fully with the Party bringing such action. Additionally, the Party not bringing an action under this Section 10.5.2 may have an opportunity to participate in such action to the extent that the Parties may mutually agree at the time the other Party elects to bring an action hereunder.

10.5.3. Product Infringement of Onconova Patents (including Joint Patents) Outside the Licensed Territory; Non-Product Infringement of Onconova Patents.

(a) For any and all infringement of Onconova Patents other than Joint Patents anywhere outside the Licensed Territory, and for any and all infringement other than Product Infringement of the Onconova Patents (other than Joint Patents) in the Licensed Territory, Onconova shall have the sole and exclusive right to bring an appropriate suit or other action against any person or entity engaged in such infringement of such Patents, in its sole discretion, and as between the Parties Onconova shall bear all related expenses and retain all related recoveries.

(b) If a Third Party infringes a Joint Patent by Product Infringement activities outside the Licensed Territory, Onconova shall have the sole and

exclusive right to bring an appropriate suit or other action against any person or entity engaged in such infringement of such Joint Patent, in its sole discretion, and as between the Parties Onconova shall bear all related expenses and retain all related recoveries. Baxter shall provide to Onconova reasonable assistance in such enforcement, at Onconova' request and expense, including without limitation joining such action as a party plaintiff if so required by Laws to pursue such action.

10.5.4. Non-Product Infringement of Joint Patents Anywhere in the World. For infringement of the Joint Patents that is not Product Infringement, the Parties shall confer to determine which Party shall have the first right to bring an appropriate suit or other action against any person or entity engaged in such infringement, and the manner in which they shall bear costs and share related recoveries of such suit or action. The Party that brings such suit or actions (the "Enforcing Party") shall keep the other Party regularly informed of the status and progress of such enforcement efforts, and shall reasonably consider the other Party's comments on any such efforts. The other Party shall cooperate with the enforcing Party in enforcing Joint Patents against such infringement, without limitation joining an action as a party plaintiff if so required by Laws to pursue such action. If the Parties are unable to reach agreement upon which Party shall bring an appropriate suit or other action against any person or entity engaged in such infringement of such Joint Patent within **, or ** prior to any deadline relating to loss of any rights with respect to such infringement, whichever is earlier, then Baxter shall have the first right, but not the obligation, to bring such suit or other actions against such infringement in the Licensed Territory at its sole expense, and Onconova shall have the first right, but not the obligation, to bring such suit or other actions against such infringement outside of the Licensed Territory. The other Party shall have the right to participate in such actions at its expense upon written notice to the other Party.

10.5.5. Settlement. Baxter shall not settle any claim, suit, or action that it brings under this Section 10.5 involving Onconova Patents (excluding Joint Patents) in any manner that would negatively impact Onconova, including settlements involving the ownership, validity or enforceability of any of the Onconova Patents, or that do not include a full and unconditional release from all liability of Onconova, without the prior written consent of Onconova, which shall not be unreasonably withheld, conditioned or delayed. Onconova shall not settle any claim, suit, or action that it brings under this Section 10.5 involving Onconova Patents (excluding Joint Patents) in the Licensed Territory in any manner that would negatively impact Baxter, without the prior written consent of Baxter, which shall not be unreasonably withheld, conditioned or delayed. Moreover, any settlement by Baxter involving Onconova Patents (excluding Joint Patents), or by Onconova involving Onconova Patents (excluding Joint Patents) in the Licensed Territory, that (i) results in cross-licensing or (ii) results in sublicenses to Third Parties shall require the other Party's prior written consent. Neither Party shall settle any claim, suit, or action that it brings under this Section 10.5 involving Joint Patents in any manner that would negatively impact the other Party, including the ownership, validity or enforceability of any of the Joint Patents, or if the settlement does not include a full and unconditional release from all liability of the other Party, without the prior written consent of such other Party.

10.5.6. Allocation of Proceeds. Except as otherwise provided in this Section 10.5, if either Party recovers monetary damages from any Third Party in a suit or action brought under this Section 10.5, whether such damages result from the infringement of Baxter Patents or Onconova Patents, such recovery shall be allocated **.

10.6. Infringement of Third Party Rights in the Licensed Territory.

10.6.1. Notice. If the development, manufacture, use, sale, offer for sale, import or export of the Licensed Product in the Licensed Field and in the Licensed Territory results in a claim for Patent infringement by a Third Party, the Party first having notice of such claim shall promptly notify the other Party in writing of such a claim. Following such notice, the Parties agree to enter into either a joint defense or common interest agreement, under which agreement the Parties can share the known facts of such infringement in reasonable detail, if they are advised to do so by counsel.

10.6.2. Third Party Claims. Baxter shall assume control of the defense of any claims brought by Third Parties alleging infringement of Third Party intellectual property rights in connection with the development, manufacture, use, sale, offer for sale, import or export of the Licensed Product in the Licensed Field in the Licensed Territory, represented by its own counsel. If requested by Baxter, Onconova agrees to join in any litigation, and in any event shall reasonably cooperate with Baxter, at Baxter's expense. Baxter shall have the exclusive right to settle any such claim without the consent of Onconova, unless such settlement shall negatively impact on Onconova, including without limitation on the ownership, validity or enforceability of any Onconova Patents. Any expenses incurred in defending any such claims shall be solely the responsibility of Baxter.

10.7. Patent Oppositions and Other Proceedings.

10.7.1. By the Parties. If either Party desires to bring an opposition, action for declaratory judgment, nullity action, interference, declaration for non-infringement, reexamination, or other attack upon the validity, title, or enforceability of a Patent owned or controlled by a Third Party that covers, in the Licensed Territory, the Compound or the Licensed Product, or the manufacture, use, sale, offer for sale, or importation of the Compound or the Licensed Product (except insofar as such action is a counterclaim to or defense of, or accompanies a defense of, a Third Party's claim or assertion of infringement under Section 10.6, in which case the provisions of Section 10.6 shall govern), such Party shall so notify the other Party, and the Parties shall promptly confer to determine whether to bring such action or the manner in which to settle such action. Baxter shall have the first right, but not the obligation, to bring in its sole control and at its sole expense such action in the Licensed Territory. If Baxter does not bring such action within ** of notification thereof pursuant to this Section 10.7 (or earlier, if required by the nature of the proceeding), then Onconova shall have the right, but not the obligation, to bring, in Onconova's sole control and at its sole expense, such action. The Party not bringing an action under this Section 10.7 shall join the action as a joint party plaintiff if required to enable the other Party to bring such action, at the other Party's

expense. Additionally, if appropriate, the Party not bringing an action under this Section 10.7 shall be entitled to separate representation, at its sole expense, in such proceeding by counsel of its own choice, and shall cooperate fully with the Party bringing such action. Any awards or amounts received in bringing any such action shall be first allocated to reimburse the Parties' expenses in such action, and any remaining amounts shall be retained by the Party bringing such action.

10.7.2. By Third Parties. If an Onconova Patent (including a Joint Patent) becomes the subject of any proceeding commenced by a Third Party in the Licensed Territory in connection with an opposition, reexamination request, action for declaratory judgment, nullity action, interference, or other attack upon the validity, title or enforceability thereof (except insofar as such action is a counterclaim to or defense of, or accompanies a defense of,

an action for infringement against a Third Party under Section 10.5, in which case the provisions of Section 10.5 shall govern), then Onconova shall have the first right, but not the obligation, to control such defense at its sole cost. Onconova shall permit Baxter to participate in the proceeding to the extent permissible under Laws, and to be represented by its own counsel in such proceeding, as Baxter's sole expense. If Onconova decides that it does not wish to defend against such action, then Baxter shall have a backup right to assume defense of such Third-Party action. Except as set forth above, all expenses incurred by the Parties in such an action shall be borne by the Party controlling the defense of the Third-Party action. Any awards or amounts received in defending any such Third-Party action, if any, shall be allocated between the Parties as provided in Section 10.5.6 as if the Party controlling the defense of the Third-Party Action were the Party that brought an action against an alleged infringer.

10.8. Patent Term Extensions in the Licensed Territory. The patent counsel of each Party shall discuss and recommend for which, if any, of the Onconova Patents in the Licensed Territory the Parties should seek any term extensions, supplementary protection certificates, and equivalents thereof offering Patent protection beyond the initial term with respect to any issued Patents ("Patent Term Extensions") in the Licensed Territory. Baxter shall have the final decision-making authority with respect to applying for any such Patent Term Extensions in the Licensed Territory; provided that Baxter shall not unreasonably fail or refuse to do so, and shall have the sole right to apply for any such Patent Term Extensions Baxter decides to seek, at its expense. Onconova shall cooperate fully with Baxter, at Baxter's expense, in making such filings or taking any related actions, for example and without limitation, making available all required regulatory data and information and executing any required authorizations to apply for such Patent Term Extension.

10.9. Registration of License. Onconova agrees that Baxter may, if applicable, register its license under the Onconova Patents with the patent authorities in the Licensed Territory. Baxter shall, at its expense, prepare and deliver to Onconova such instruments and other documents reasonably necessary and in proper form for such registration. The Parties shall mutually agree on the form of documents to be used for such purpose, and shall cooperate to preserve confidentiality of this Agreement to the extent permitted under applicable Laws in the relevant country. Onconova shall execute and return to Baxter such instruments and documents within ** from the receipt thereof.

10.10. Patent Marking. Baxter agrees to mark or have marked with the Onconova Patents to the extent consistent with applicable Laws any Licensed Product sold by Baxter or by its Sublicensees in accordance with the statutes of any country within the Licensed Territory relating to the marketing of patented articles, including without limitation to the extent required under Section 12.1 of the Temple Agreement.

ARTICLE XI.
TRADEMARKS

11.1. Baxter Trademarks. Baxter shall be responsible for the selection, registration and maintenance of all trademarks which it employs in connection with the commercialization of any Licensed Product in the Licensed Territory under this Agreement, other than the Onconova Trademarks (the "Baxter Trademarks"). Baxter shall solely own the Baxter Trademarks and pay all relevant costs thereof. Baxter shall not select, register or otherwise use any trademark that is the same as or confusingly similar to, misleading or deceptive with respect to or that dilutes any of the Onconova Trademarks. Onconova shall

not use any trademark that is the same as or confusingly similar to, misleading or deceptive with respect to or that dilutes any of the Baxter Trademarks. Baxter shall have the sole right to initiate at its own discretion legal proceedings against any infringement or threatened infringement of any Baxter Trademark.

11.2. Election to Use Onconova Trademarks. Within a reasonable time after the Effective Date, but in no event later than the first anniversary thereof, Baxter shall inform Onconova in writing if Baxter elects to use the Onconova Trademarks in connection with the commercialization of the Licensed Product in the Licensed Territory. If Baxter so notifies Onconova, the following shall apply:

11.2.1. Onconova shall and hereby does grant to Baxter an exclusive, royalty-free license, with the right to grant sublicenses through multiple tiers of Sublicensees (subject to Section 2.4.1), to use the Onconova Trademarks on or in connection with the commercialization of the Licensed Product in the Licensed Territory in the Licensed Field.

11.2.2. Baxter shall not use any trademark that is confusingly similar to, misleading or deceptive with respect to or that dilutes any of the Onconova Trademarks.

11.2.3. Baxter shall properly designate the Onconova Trademarks on the packaging of the final Licensed Product, to the extent required or permissible by the applicable Marketing Approvals and Baxter agrees that all Licensed Products with which the Onconova Trademarks are used shall conform to all requirements of any Applicable Laws and any Regulatory Authorities in the Licensed Territory and shall be of a level of quality commensurate to Onconova's Licensed Products outside of the Licensed Territory, but in no event less than a reasonable level of quality.

11.2.4. Except as otherwise provided in this Section 11.2, Onconova shall have the first right and authority, but not an obligation, to register and maintain the Onconova Trademarks in the Licensed Territory (subject to this Section 11.2). The Parties shall ** all costs of such registration and maintenance. Baxter shall provide Onconova reasonable opportunity to review and comment on such registration efforts regarding the Onconova Trademarks. Baxter shall provide Onconova with a copy of material communications from any Governmental Authority in the Licensed Territory regarding the Onconova Trademark, and shall provide drafts of any material filings or responses to be made to such authorities in a timely manner. Notwithstanding the foregoing, if Onconova determines in its sole discretion to abandon or not maintain any Onconova Trademark in the Licensed Territory, Onconova shall provide Baxter with ** prior written notice of such determination and, if Baxter so requests, shall provide Baxter with the opportunity to register and maintain such Onconova Trademark in the Licensed Territory in the name of Onconova. Thereafter, the Parties shall share equally all costs of filing, prosecuting and maintaining such Onconova Trademark in the Licensed Territory.

11.2.5. If a Party becomes aware of any actual or alleged existing or threatened infringement by a Third Party of any Onconova Trademark in the Licensed Territory (such activities, "Trademark Infringement"), such Party shall notify the other Party, and shall provide to the other Party any and all evidence and

information available to such Party regarding such alleged infringement. Baxter shall have the first right, but not the obligation, to bring an appropriate suit or other action against any person or entity engaged in such Trademark Infringement, at its sole expense, subject to this Section 11.2.5). Baxter shall have a period of ** after such notification to or by Baxter, to elect to so enforce such

Onconova Trademark. If Baxter does not so elect, Baxter shall so notify Onconova in writing during such **, or ** prior to any deadline relating to loss of any rights with respect to the Trademark Infringement, whichever is earlier, and Onconova shall have the right, but not the obligation, to commence a suit or take action to enforce such Onconova Trademark against such Third Party, at its sole expense. Each Party shall provide to the Party enforcing any such rights under this Section 11.2.5 reasonable assistance in such enforcement, at such enforcing Party's request and expense, including without limitation joining an action as a party plaintiff if so required by Laws to pursue such action. The enforcing Party shall keep the other Party regularly informed of the status and progress of such enforcement efforts, and shall reasonably consider the other Party's comments on any such efforts.

11.2.6. The Party not bringing an action with respect to Trademark Infringement under Section 11.2.5 shall be entitled to separate representation in such matter by counsel of its own choice and at its expense, but such Party shall at all times cooperate fully with the Party bringing such action. Additionally, the Party not bringing an action under Section 11.2.5 may have an opportunity to participate in such action to the extent that the Parties may mutually agree at the time the other Party elects to bring an action hereunder.

11.3. Infringement of Baxter Trademarks by Third Parties. With respect to any Baxter Trademarks associated with Licensed Products in the Licensed Territory, each Party shall notify the other Party promptly upon learning of any actual or alleged threatened or existing infringement of any trademark or of any unfair trade practices, trade dress imitation, passing off of counterfeit goods, or like offenses, against such trademark. Baxter shall have the sole right, in its own discretion and at its own expense, to bring an action to address such infringement.

ARTICLE XII.
REPRESENTATIONS AND WARRANTIES

12.1. The Parties' Representations and Warranties. Each Party hereby represents and warrants to the other Party, as of the Effective Date, as set forth below.

12.1.1. Such Party (a) is a corporation duly organized and subsisting under the applicable Laws of its jurisdiction of organization, and (b) has full power and authority and the legal right to own and operate its property and assets and to carry on its business as it is now being conducted and as it is contemplated to be conducted by this Agreement.

12.1.2. Such Party has the power, authority and legal right, and is free to enter into this Agreement and, in so doing, will not violate any other agreement to which such Party is a party as of the Effective Date.

12.1.3. This Agreement has been duly executed and delivered on behalf of such Party and constitutes a legal, valid, and binding obligation of such Party and is enforceable against it in accordance with its terms, subject to the effects of bankruptcy, insolvency, or other applicable Laws of general application affecting the enforcement of creditor rights and judicial principles affecting the availability of specific performance and general principles of equity.

12.1.4. Such Party has taken all corporate action necessary to authorize the execution and delivery of this Agreement.

12.1.5. Except with respect to Marketing Approvals for the Licensed Product or as otherwise described in this Agreement, such Party has obtained all necessary consents, approvals, and authorizations of all Regulatory Authorities and other Third Parties required to be obtained by such Party in connection with the execution and delivery of this Agreement and the performance of its obligations hereunder.

12.1.6. The execution and delivery of this Agreement and the performance of such Party's obligations hereunder (a) do not conflict with or violate any requirement of applicable Laws or any provision of the articles of incorporation, bylaws, limited partnership agreement, or any similar instrument of such Party, as applicable, in any material way, and (b) do not conflict with, violate, or breach or constitute a default or require any consent under, any applicable Laws or any contractual obligation or court or administrative order by which such Party is bound.

12.1.7. All of such Party's employees, officers, independent contractors, consultants, and agents have executed agreements requiring assignment to such Party of all Inventions made during the course of and as a result of their association with such Party and obligating the individual to maintain as confidential the confidential information of such Party.

12.1.8. Neither such Party, nor any of such Party's employees, independent contractors, consultants, agents or officers: (a) has ever been debarred or is subject to debarment or, to such Party's knowledge, convicted of a crime for which a Person could be debarred before a Regulatory Authority under applicable Laws, or (b) to such Party's knowledge, has ever been under indictment for a crime for which a Person could be debarred under such Laws.

12.1.9. All documents, information and know-how furnished or transferred by such Party to the other Party under this Agreement shall be, to its knowledge, free of errors in any material respect.

12.2. Onconova's Representations and Warranties. Onconova hereby represents and warrants to Baxter, as of the Effective Date, as set forth below:

12.2.1. A complete listing of all of the Upstream Agreement s is attached hereto as Exhibit 1.101 and a true and complete copy of each of the Upstream Agreements together with all exhibits, schedules, appendices, attachments and amendments thereto has been provided to Baxter prior to the Effective Date. The Upstream Agreements have not been modified, supplemented or amended since such copy was provided to Baxter. The Upstream Agreements are, to Onconova's knowledge, in full force and effect, all payments to date required to be made thereunder by Onconova have been made, and Onconova is in compliance in all material respects with its obligations thereunder.

12.2.2. Onconova has not received or provided any notice of termination of any of the Upstream Agreements, or any notices of breach of any of the Upstream Agreements.

12.2.3. Onconova has sufficient legal and/or beneficial title under its intellectual property rights necessary to grant the licenses contained in this Agreement.

12.2.4. There is no pending or, to Onconova's knowledge, threatened claim, litigation or any other proceeding brought by a Third Party against Onconova challenging the validity of the Onconova Patent Rights in the Licensed Territory, or claiming that the development, manufacture or commercialization of the Licensed Product in the Licensed Field in any portion of the Licensed Territory constitutes or would constitute infringement of such Third Party's intellectual property right(s), and Onconova has no present knowledge of any Third Party intellectual property right that would reasonably be expected to give rise to any such claim, litigation or proceeding.

12.2.5. There is no pending or, to Onconova's knowledge, threatened claim, litigation or any other proceeding brought by a Third Party against Onconova claiming that the development or manufacture of the Licensed Product at the location where Onconova currently manufactures such Licensed Product constitutes or would constitute infringement of such Third Party's intellectual property right(s), and Onconova has no present knowledge of any Third Party intellectual property right that would reasonably be expected to give rise to any such claim, litigation or proceeding.

12.2.6. Onconova has not received any written communications alleging that it has violated or that it would violate, through the manufacture, use, import, export, sale, and/or offer for sale of the Licensed Product in the Licensed Field and in the Licensed Territory or any portion thereof, any intellectual property rights of any Third Party.

12.2.7. To Onconova's knowledge, no invention claimed by the Onconova Patents was made or reduced to practice using any funding of the United States Government; provided that Onconova does not make any representation or warranty with respect to inventions licensed under the Upstream Agreements.

12.2.8. Onconova is not in possession of any in-licensed Third Party know-how, technology, trade secrets or patent rights that are necessary to manufacture a Licensed Product but are not Controlled by Onconova.

12.3. The Parties' Covenants. Each Party hereby covenants throughout the term of this Agreement as set forth below:

12.3.1. Such Party shall not enter into any agreement with a Third Party that will conflict with the rights granted to the other Party under this Agreement.

12.3.2. If during the term of this Agreement, a Party has reason to believe that it or any of its employees, officers, independent contractors, consultants, or agents rendering services relating to the Licensed Product: (x) is or will be debarred or convicted of a crime for which such Person could be debarred before a Regulatory Authority under applicable Laws, or (y) is or will be under indictment under such Laws, then such Party promptly shall notify the other Party of same in writing.

12.3.3. Onconova's Covenants. Onconova hereby covenants throughout the term of this Agreement as set forth below:

12.3.3.1. Onconova shall not agree to amend any terms or conditions of the Upstream Agreements in any manner that would adversely affect the rights granted to Baxter under this Agreement in any respect without the prior written consent of Baxter. Onconova further agrees that it shall not terminate the Upstream Agreements, shall

not cease to exercise its rights under the Upstream Agreements, and shall not amend the Upstream Agreements in any manner that would adversely affect Baxter, in each case without the prior written consent of Baxter. Onconova shall comply with the terms of the Upstream Agreements in all material respects; provided that Onconova shall not be in breach of the foregoing obligations to the extent that Onconova's failure to comply results from Baxter's non-compliance with the terms of this Agreement, and further provided that if Section 15.4 applies, then Onconova shall not be deemed in breach of this Section 12.3.3.1 and the Parties shall have the rights and obligations set forth in Section 15.4. Onconova shall notify Baxter of any anticipated termination of the Upstream Agreements by Onconova prior to such termination. Onconova shall further notify Baxter when it has received any notice from any Third Party that is a party to an Upstream Agreement stating that such Third Party intends to terminate or is terminating such Upstream Agreement.

12.3.3.2. Onconova shall use Commercially Reasonable Efforts to assist Baxter in obtaining from the licensor of any Upstream Agreement written assurance that in the event of termination of Onconova's rights under such Upstream Agreement, all rights granted to Baxter by Onconova pursuant to this Agreement that constitute a sublicense under rights granted to Onconova pursuant to such Upstream Agreement shall survive such termination of Onconova's rights, such that Baxter would have a direct license or other grant of rights from such licensor as necessary to allow Baxter to continue to practice such rights within the scope of Baxter's license as set forth in Section 2.1 (a "Direct License"). Baxter shall be responsible for any payments in consideration of such Direct License that solely relate to the Licensed Product in the Licensed Territory and that are approved in advance by Baxter in writing.

ARTICLE XIII.
CONFIDENTIALITY

13.1. Confidentiality Obligation of Baxter.

13.1.1. During the term of this Agreement and for a period of ** thereafter, or ** from the Effective Date, whichever is longer, Baxter:

(a) shall hold in strict confidence any and all information disclosed to it by Onconova, including Onconova Information (together "Onconova Confidential Information"), and shall not use, nor disclose or supply to any Third Party, nor permit any Third Party, to have access to the Onconova Confidential Information, without first obtaining the written consent of Onconova, except as expressly permitted in this Agreement;

(b) shall take all reasonable precautions necessary or prudent to prevent material in its possession or control that contains or refers to Onconova Confidential Information from being destroyed or lost, or discovered, received, used, intercepted or copied by any Third Party; and

(c) may disclose the Onconova Confidential Information only to its employees, consultants, independent contractors, agents, Affiliates, actual and potential Sublicensees and actual and potential acquirers; provided that such employees, consultants, independent contractors, agents, Affiliates,

actual and potential Sublicensees and actual and potential acquirers are bound by terms and conditions of confidentiality no less protective than the terms and conditions that bind Baxter hereunder.

For the avoidance of doubt, it is understood that Baxter shall be liable for any breach of the confidentiality obligation under this Section 13.1 by any person or corporation to whom the Onconova Confidential Information is disclosed by Baxter.

13.1.2. Baxter's obligations of confidentiality and non-use under this Section 13.1 shall not apply and Baxter shall have no further obligations with respect to any of the Onconova Confidential Information, to the extent Baxter can establish by competent proof that such Onconova Confidential Information:

(a) is or becomes part of the public domain without breach by Baxter of this Agreement;

(b) was in Baxter's possession before disclosure by Onconova and was not acquired directly or indirectly from Onconova; or

(c) is obtained from a Third Party with no obligation of confidentiality to Onconova, who has a right to disclose it to Baxter;

(d) is developed independently by Baxter without use of the Onconova Confidential Information, as evidenced by Baxter's written records; or

(e) is required to be revealed in response to a court decision or administrative order, or to comply with Laws of a Governmental Authority or rules of a securities exchange, in which case Baxter shall inform Onconova immediately by written notice and cooperate with Onconova using its Commercially Reasonable Efforts either to seek protective measures for such Onconova Confidential Information, or to seek confidential treatment of such Onconova Confidential Information, and in any case Baxter shall disclose only such portion of the Onconova Confidential Information which is so required to be disclosed.

13.1.3. Nothing herein shall prevent Baxter from disclosing any Onconova Confidential Information to the extent that such Onconova Confidential Information is required to be used or disclosed for the purposes of seeking or obtaining Marketing Approvals of Licensed Products in the Licensed Territory or seeking patent protection for Inventions it owns or has responsibility for prosecuting under Article X. Baxter shall further have the right to present Onconova Confidential Information at conferences or to publish Onconova Confidential Information in journals (collectively "Publications"); provided that if the Onconova Confidential Information concerned has not been previously published such Publication is subject to Onconova's prior written consent, not to be unreasonably withheld, conditioned or delayed.

13.1.4. Baxter acknowledges that certain Onconova Confidential Information was provided to Onconova by Temple University pursuant to the Temple Agreement and is subject to the confidentiality provisions of Article 2 of the Temple Agreement. To the extent the provisions of Article 2 of the Temple Agreement are more stringent than those in this ARTICLE XIII, Baxter agrees to comply with such more stringent terms with respect to any such Confidential Information of Temple University that is disclosed by Onconova to Baxter and labeled as "Confidential Information of Temple University."

13.1.5. Baxter acknowledges Temple University's right to publish its research as provided in Section 2.5 of the Temple Agreement; provided that Baxter reserves absolutely

the right to prevent any disclosure of Baxter Confidential Information without its prior written consent, which consent may be withheld at Baxter's sole discretion.

13.2. Confidentiality obligation of Onconova

13.2.1. During the term of this Agreement and for a period of ** thereafter, or ** from the Effective Date, whichever is longer, Onconova:

(a) shall hold in strict confidence any and all information disclosed to it by Baxter, including Baxter Information (together "Baxter Confidential Information") and shall not use, nor disclose or supply to any Third Party nor permit any Third Party to have access to the Baxter Confidential Information, without first obtaining the written consent of Baxter, except as expressly permitted in this Agreement;

(b) shall take all reasonable precautions necessary or prudent to prevent material in its possession or control that contains or refers to Baxter Confidential Information from being destroyed or lost, or discovered, received, used, intercepted or copied by any Third Party; and

(c) may disclose the Baxter Confidential Information to its employees, consultants, independent contractors, agents, Affiliates, actual and potential Licensees and Sublicensees and actual and potential acquirers; provided that such employees, consultants, independent contractors, agents, Affiliates, actual and potential Licensees and actual and potential acquirers are bound by terms and conditions of confidentiality no less protective than the terms and conditions that bind Onconova hereunder.

For the avoidance of doubt, it is understood that Onconova shall be liable for any breach of the confidentiality obligation under this Section 13.2 by any person or corporation to whom the Baxter Confidential Information is disclosed by Onconova.

13.2.2. Onconova's obligations of confidentiality and non-use under this Section 13.2 shall not apply and Onconova shall have no further obligations with respect to any of the Baxter Confidential Information to the extent that Onconova can establish by competent proof that such Baxter Confidential Information:

(a) is or becomes part of the public domain without breach by Onconova of this Agreement;

(b) was in Onconova's possession before disclosure by Baxter to Onconova and was not acquired directly or indirectly from Baxter;

(c) is obtained from a Third Party with no obligation of confidentiality to Baxter, who has a right to disclose it to Onconova;

(d) is developed independently by Onconova without use of the Baxter Confidential Information, as evidenced by Onconova's written records; or

(e) is required to be revealed in response to a court decision or administrative order, or to comply with Laws of a Governmental Authority or rules of a securities exchange, in which case Onconova shall inform Baxter immediately by written notice and cooperate with Baxter using its Commercially Reasonable Efforts either to seek protective measures for such Baxter Confidential Information, or to seek confidential

treatment of such Baxter Confidential Information, and in any case Onconova shall disclose only such portion of the Baxter Confidential Information which is so required to be disclosed.

13.2.3. Nothing herein shall prevent Onconova from disclosing any Baxter Confidential Information to the extent that such Baxter Confidential Information is required to be used or disclosed for the purposes of seeking or obtaining Marketing Approvals of Licensed Products inside or outside the Licensed Territory or seeking patent protection for Inventions it owns or has responsibility for prosecuting under ARTICLE X. Onconova and its Licensees shall further have the right to disclose any Baxter Confidential Information in a Publication; provided that if the Baxter Confidential Information concerned has not been previously published, such Publication is subject to Baxter's prior written consent, not to be unreasonably withheld, delayed or conditioned.

13.3. Press Releases; Publicity. Except with respect to the press release attached hereto as Schedule 13.3 which may be issued by either or both of the Parties upon execution of this Agreement, no press release or public announcement shall be made by either Party concerning the execution of this Agreement or the terms and conditions hereof without the prior written consent of the other Party, which shall not be unreasonably withheld, conditioned or delayed. Notwithstanding the foregoing, either Party may disclose the existence of this Agreement and the terms and conditions hereof without the prior written consent of the other pursuant to Section 13.1.2(d) or Section 13.2.2(d), as applicable, or in connection with a due diligence process associated with any future financing by either Party or the negotiation or exploration of a possible strategic transaction involving such Party; provided that such disclosure is made in the course of such diligence, negotiation or exploration pursuant to confidentiality obligations consistent with those set forth in this Agreement. Each Party may issue a press release or public announcement concerning the development of the Compound or the Licensed Products, provided that such Party shall provide the other Party with a copy of such press release or public announcement at least ** in advance of its intended publication or release thereof and shall consider in good faith the comments of the other Party which comments shall be provided as promptly as reasonably practicable following receipt of the press release or public announcement from the Party desiring to make the disclosure. Further, each Party agrees that it shall cooperate fully and in a timely manner with the other Party with respect to all disclosures required by the Securities and Exchange Commission and any other Governmental Authority or Regulatory Authority, including requests for confidential treatment of Confidential Information of either Party included in any such disclosure. Notwithstanding the foregoing, either Party may issue any public announcement that it is advised by legal counsel is required under applicable Laws, provided that such Party provides to the other Party a copy of such press release or public announcement not less than ** in advance of its release if legally permissible.

ARTICLE XIV.
INDEMNIFICATION

14.1. Onconova Indemnity. Onconova shall defend, indemnify and hold harmless Baxter and its Affiliates and their respective directors, officers, agents, successors, assignees and employees (the "Baxter Indemnitees") from and against any and all claims, liabilities, losses, costs, actions, suits, damages and expenses, including reasonable attorneys' fees (collectively "Damages") to the extent arising from any claim, action or proceeding made or brought against Baxter Indemnitees by a Third Party in connection with (a) the gross negligence, recklessness, or intentional wrongful acts or omissions of Onconova or its Affiliates or their respective employees, officers, independent contractors, consultants, or

agents, in connection with the performance by or on behalf of Onconova of Onconova's obligations or exercise of its rights under this Agreement; (b) any breach by Onconova, or its Affiliates or their respective independent contractors of any representation, warranty, covenant, or obligation of Onconova set forth in this Agreement; and (c) the development, manufacture, use, handling, storage, commercialization, transfer, importation, exportation or labeling, of the Compounds and/or Licensed Products by or for Onconova or its Affiliates either prior to the Effective Date anywhere in the world, or on or after the Effective Date outside the Licensed Territory; except in any such case to the extent such Damages are attributable to any gross negligence, recklessness, willful misconduct, or breach of this Agreement by Baxter or a Baxter Indemnitee.

14.2. Baxter Indemnity. Baxter shall defend, indemnify and hold harmless Onconova, Temple University and their respective Affiliates, directors, officers, agents, successors, assignees and employees (the "Onconova Indemnitees") from and against any and all Damages to the extent arising from any claim, action or proceeding made or brought against Onconova Indemnitees by a Third Party in connection with (a) the gross negligence, recklessness, or intentional wrongful acts or omissions of Baxter or its Affiliates or their respective employees, officers, independent contractors, consultants, or agents, in connection with the performance by or on behalf of Baxter of Baxter's obligations or exercise of its rights under this Agreement; (b) any breach by Baxter or its Affiliates or their respective independent contractors of any representation, warranty, covenant, or obligation of Baxter set forth in this Agreement; and (c) the development, manufacture (other than by Onconova, its agents, contract manufacturers or any other Third Parties engaged by Onconova), use, handling, storage, commercialization, transfer, importation, exportation or labeling of the Compounds and/or Licensed Products by or for Baxter or any of its Affiliates or their agents and independent contractors on or after the Effective Date; except in any such case to the extent such Damages are reasonably attributable to any gross negligence, recklessness, willful misconduct, or breach of this Agreement by Onconova or an Onconova Indemnitee; provided that Baxter's obligation to defend, indemnify and hold harmless Temple University shall be to the extent Onconova would be required to indemnify Temple University pursuant to the Temple Agreement for the relevant claims.

14.3. Indemnification Procedure.

14.3.1. Each Party shall notify the other in the event it becomes aware of a claim for which indemnification may be sought pursuant to this Article XIV. In case any proceeding (including any governmental investigation) shall be instituted involving any Party in respect of which indemnity may be sought pursuant to this Article XIV, such Party (the "Indemnified Party") shall promptly notify the other Party (the "Indemnifying Party") in writing (an "Indemnification Claim Notice"). The Indemnifying Party and Indemnified Party shall promptly meet to discuss how to respond to any claims that are the subject matter of such proceeding. At its option, the Indemnifying Party may assume the defense of any Third Party claim subject to indemnification as provided for in this Section 14.3 by giving written notice to the Indemnified Party within ** (or until such time provided in any applicable extension to appropriately answer any complaint, if any, but no longer than ** (the "Election Time Period"); with the Indemnified Party being obligated to make all reasonable efforts to obtain any such extension) after the Indemnifying Party's receipt of an Indemnification Claim Notice, solely for claims (a) that solely seek monetary damages and (b) as to which the Indemnifying Party expressly agrees in writing that, as between the Indemnifying Party and the Indemnified Party, the Indemnifying Party shall be solely obligated to satisfy and

discharge the claim in full (the matters described in (a) and (b), the "Litigation Conditions"). The Indemnified Party may assume responsibility for such defense if the Litigation Conditions are not satisfied, by written notice to the Indemnifying Party within the Election Time Period. If the Indemnified Party fails to promptly provide an Indemnification Claim Notice, and such failure materially prejudices the defense of such claim, then the Indemnifying Party shall be relieved of its responsibility to indemnify the Indemnified Party.

14.3.2. Upon assuming the defense of a Third Party claim in accordance with this Section 14.3, the Indemnifying Party shall be entitled to appoint lead and any local counsel in the defense of the Third Party claim. Should the Indemnifying Party assume and continue the defense of a Third Party claim, except as otherwise set forth in this Section 14.3, the Indemnifying Party will not be liable to the Indemnified Party for any legal expenses subsequently incurred by such Indemnified Party after the date of assumption of defense in connection with the analysis, defense, countersuit or settlement of the Third Party claim. Without limiting this Section 14.3, any Indemnified Party will be entitled to participate in, but not control, the defense of a Third Party claim for which it has sought indemnification hereunder and to engage counsel of its choice for such purpose; provided, however, that such engagement will be at the Indemnified Party's own expense unless (a) the engagement thereof has been specifically requested by the Indemnifying Party in writing, or (b) the Indemnifying Party has failed to assume and actively further the defense and engage counsel in accordance with this Section 14.3 (in which case the Indemnified Party will control the defense), or (c) the Indemnifying Party no longer satisfies the Litigation Conditions.

14.3.3. Subject to the Litigation Conditions being satisfied, the Indemnifying Party will have the sole right to consent to the entry of any judgment, enter into any settlement or otherwise dispose of such Damages, on such terms as the Indemnifying Party, in its reasonable discretion, will deem appropriate (provided, however that such terms shall include a complete and unconditional release of the Indemnified Party from all liability with respect thereto), and will transfer to the Indemnified Party all amounts which said Indemnified Party will be liable to pay pursuant to such settlement or disposal of such claim prior to the time such payments become due by the Indemnified Party. With respect to all other Damages in connection with Third Party claims, where the Indemnifying Party has assumed the defense of the Third Party claim in accordance with this Section 14.3, the Indemnifying Party will have authority to consent to the entry of any judgment, enter into any settlement or otherwise dispose of such Damages; provided it obtains the prior written consent of the Indemnified Party, not to be unreasonably withheld, conditioned or delayed.

14.3.4. The Indemnifying Party that has assumed the defense of the Third Party claim in accordance with this Section 14.3 will not be liable for any settlement or other disposition of any Damages by an Indemnified Party that is reached without the written consent of such Indemnifying Party. The Indemnified Party will not admit any liability with respect to, or settle, compromise or discharge, any Third Party claim without first offering to the Indemnifying Party the opportunity to assume the defense of the Third Party claim in accordance with this Section 14.3. If the Indemnifying Party chooses to defend or prosecute any Third Party claim, the Indemnified Party will cooperate in the defense or prosecution thereof and will furnish such records, information and testimony, provide such witnesses including to the extent possible, former employees and attend such conferences, discovery proceedings, hearings, trials and appeals as may be reasonably requested in connection with such Third Party claim. Such cooperation will include access during normal business hours afforded to the Indemnifying Party to, and reasonable retention by the Indemnified Party of,

records and information that are reasonably relevant to such Third Party claim, and making employees and agents available on a mutually convenient basis to provide additional information and explanation of any material provided hereunder. The Indemnifying Party will reimburse the Indemnified Party for all its reasonable out-of-pocket expenses incurred in connection with such cooperation.

14.3.5. Each Party shall maintain, at its cost, a program of insurance and/or self insurance against liability and other risks associated with its activities and obligations under this Agreement, including its clinical trials, the commercialization of any Licensed Products and its indemnification obligations hereunder, in such amounts, subject to such deductibles and on such terms as are customary for the activities to be conducted by it under this Agreement. All insurance required by this Section 14.3.5 shall be maintained during the Term and each Party shall, from time to time, provide copies of certificates of such insurance to the other party upon request. Further, each Party shall list the other Party as an additional insured on all insurance policies. All insurance required by this Section 14.3.5 shall be maintained in (a) at least ** following expiration or termination of this Agreement or, (b) for at least ** after the termination or expiration of this Agreement if insurance is written on a claims-made basis.

14.4. Limitation of Liability; Exclusion of Damages; Disclaimer.

14.4.1. EXCEPT WITH RESPECT TO DAMAGES AWARDED TO A THIRD PARTY BY A COURT OF COMPETENT JURISDICTION THAT ARE REQUIRED TO BE INDEMNIFIED UNDER SECTION 14.1 OR SECTION 14.2, AND EXCEPT IN THE CASE OF A BREACH OF ARTICLE XIII, AND WITHOUT LIMITING THE LIABILITY OF A PARTY FOR INFRINGEMENT OR MISAPPROPRIATION OF THE INTELLECTUAL PROPERTY RIGHTS OF THE OTHER PARTY OR FOR FRAUD OR WILLFUL MISCONDUCT, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR SPECIAL, INDIRECT, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION DAMAGES RESULTING FROM LOSS OF USE, LOSS OF PROFITS, INTERRUPTION OR LOSS OF BUSINESS, OR OTHER ECONOMIC LOSS) ARISING OUT OF THIS AGREEMENT OR WITH RESPECT TO A PARTY'S PERFORMANCE OR NON-PERFORMANCE HEREUNDER.

14.4.2. EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT, NEITHER PARTY PROVIDES ANY WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS OR IMPLIED, REGARDING THE LICENSED PRODUCT AND EACH PARTY HEREBY DISCLAIMS ALL OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND FREEDOM FROM INFRINGEMENT OF THIRD PARTY RIGHTS.

ARTICLE XV.
TERM; TERMINATION

15.1. Term. This Agreement shall expire in its entirety upon the expiration of all applicable Royalty Terms in the Licensed Territory and satisfaction of the applicable payment obligations (including milestone payments) under this Agreement with respect to all Licensed Products in all countries in the Licensed Territory (the "Term").

15.1.1. Effect of Expiration. Upon expiration of this Agreement in accordance with Section 15.1:

(a) the Licensed Rights shall continue in full force and effect and be considered to be fully paid-up; and

(b) Subject to the Confidentiality obligations contained in ARTICLE XIII, Baxter and Onconova shall each have the right to freely use all Information disclosed to it by the other Party hereunder solely in connection with the development, manufacture and commercialization of Licensed Product.

15.2. Early Termination.

15.2.1. By Either Party for Breach. Without prejudice and in addition to any other contractual remedy the non-defaulting Party may have under this Agreement, either Party may terminate this Agreement in writing forthwith, if the other Party commits a material breach of any provision of this Agreement and such breach is not cured within ** after written notice of the breach is received by the other Party, which notice shall specify the nature of the breach and demand its cure. Notwithstanding the foregoing, if a material breach is not susceptible to cure within the cure period specified above, the non-breaching Party's right of termination shall be suspended only if, and for so long as, (a) the breaching Party has provided to the non-breaching Party a written plan that is reasonably calculated to effect a cure, (b) such plan is reasonably acceptable to the non-breaching Party and (c) the breaching Party commits to and does carry out such plan; provided, however, that, unless otherwise mutually agreed by the Parties in such plan, in no event shall such suspension of the non-breaching Party's right to terminate extend beyond ** after the original cure period.

15.2.2. By Either Party for Force Majeure. The Agreement may be terminated by either Party in the event of a Force Majeure (as hereinafter defined) pursuant to Section 15.4.

15.2.3. By Either Party for Insolvency. Either Party may terminate this Agreement upon written notice if the other Party is dissolved or liquidated, files or has filed against it a petition under any bankruptcy or insolvency law that is not dismissed within **, makes an assignment for the benefit of its creditors or has a receiver or trustee appointed for all or substantially all of its property.

15.2.4. By Onconova for Baxter Patent Challenge. In the event that Baxter or any of its Affiliates commences or otherwise, directly or indirectly, pursues (or, other than as required by Law or legal process, voluntarily assists any Third Party to pursue in any material respect where Baxter has knowledge that its assistance will be used by the Third Party to pursue) any proceeding seeking to have any of the Onconova Patents revoked or declared invalid, unpatentable, or unenforceable, Onconova may declare a material breach hereunder, terminate this Agreement on written notice to Baxter and shall then have the right to exercise the remedies available under Section 15.3 with immediate effect.

15.2.5. By Either Party for Commercial Failure. In the event of a Commercial Failure, either Party shall have the right to terminate this Agreement upon ** prior written notice to the other Party; provided, however, that Onconova shall not have a right to terminate this Agreement pursuant to this Section 15.2.5 if such Commercial Failure results,

directly or indirectly, from the failure of Onconova or its Affiliates or agents to supply Product under the Supply Agreement if executed pursuant to Section 8.1.

15.2.6. By Baxter for Convenience. Commencing ** after the Effective Date, Baxter shall have the right to terminate this Agreement upon ** prior written notice to Onconova.

15.3. Obligations upon Early Termination.

15.3.1. In the event of termination of this Agreement by either Party in accordance with Section 15.2:

(a) all Licensed Rights shall revert to Onconova without any compensation to be paid by Onconova;

(b) Baxter shall promptly return to Onconova any and all Onconova Information;

(c) Baxter shall promptly transfer to Onconova or its nominee any and all Marketing Approvals and all other filings and submissions with and to Regulatory Authorities owned by Baxter or its Affiliates with respect to the Licensed Product; provided that the Parties shall agree upon commercially reasonable compensation to Baxter to reflect the value of such assets. To this end Baxter shall make Commercially Reasonable Efforts to file for transfer with the relevant Regulatory Authorities and to give all other notifications and approvals necessary under law for the transfer of Marketing Approvals and such other filings and submissions;

(d) Baxter shall grant to Onconova a worldwide license, with the right to sublicense, to use any Baxter Trademarks (including, without limitation, the goodwill symbolized by such Baxter Trademarks) used to brand the Licensed Product, and a license to reproduce, distribute, perform, display and prepare derivative works of Baxter's copyrights used to brand or promote the Licensed Product, in each case solely to the extent necessary or useful for commercializing the Licensed Product; provided that such license shall bear a commercially reasonable royalty to be agreed by the Parties in good faith;

(e) The licenses granted by Baxter to Onconova pursuant to Section 2.2 and other provisions of this Agreement shall continue in effect solely to the extent necessary or useful for developing or commercializing the Licensed Product, in addition to those sections that also survive pursuant to Section 15.4.3;

(f) Baxter shall furnish Onconova with reasonable cooperation, at Baxter's expense, to assure a smooth transition of any clinical or other studies in progress then being conducted by Baxter or its Affiliates related to the Compound or Licensed Products which Onconova determines to continue in compliance with applicable Laws and ethical guidelines applicable to the transfer or termination of any such studies. In the event that Onconova informs Baxter that it does not intend to continue specific development activities then in progress, each Party shall bear its own costs incurred in closing out such activities; and

(g) Baxter shall not withdraw or cancel any Marketing Approval or Drug Approval Application, unless expressly instructed so by Onconova in writing; provided

that Onconova shall be responsible for all costs and expenses for the maintenance of all Marketing Approvals and Drug Approval Applications following the effective date of termination.

15.4. Force Majeure

15.4.1. No failure or delay by either Party in the performance of any obligation hereunder shall be deemed a breach of this Agreement nor create any liability for any damages, increased cost or losses which the other Party may sustain by reason of such failure or delay of performance, if the same shall arise from any cause or causes beyond the control of that Party, such as earthquake, storm, flood, fire, other acts of nature, epidemic, war, riot, hostility, public disturbance, cessation of transport, act of public enemies, prohibition or act by a Government Authority or public agency, strike or other labor dispute or work stoppage (collectively "Force Majeure"); provided, however, that the Party so prevented shall continue to take all commercially reasonable actions within its power to comply with its obligations hereunder as fully as possible and to mitigate possible damages.

15.4.2. The Party so prevented shall without undue delay notify the other Party in writing thereof.

15.4.3. Should the event of Force Majeure continue for more than **, the Parties shall promptly discuss their further performance under this Agreement and whether to modify or terminate this Agreement in view of the effect of the event of Force Majeure. If no agreement can be reached within ** after expiration of such **, either Party may terminate this Agreement effective immediately upon written notice to the other Party.

15.5. Survival. For the avoidance of doubt, it is understood that provisions under Articles 1 and 14 and Sections 6.3.1, 9.2.3, 9.3, 9.5, 9.6, 9.7, 10.2, 13.1 (for the term set forth therein), 13.2 (for the term set forth therein), 15.1.1, 15.3, 15.5, 15.6, 16.2, 16.3, 16.5, 16.13, 16.14 and 16.15 shall survive the expiration of this Agreement.

15.6. Other Remedies. Termination or expiration of this Agreement for any reason shall not release any party from any liability or obligation that has accrued prior to such expiration or termination, nor affect the survival of any provision hereof to the extent it is expressly stated to survive termination. Termination or expiration of this Agreement for any reason shall not constitute a waiver or release of, or otherwise be deemed to prejudice or adversely affect, any rights, remedies, or claims, whether for damages or otherwise, that a Party may have hereunder or that may arise out of or in connection with such termination or expiration.

ARTICLE XVI.
GENERAL PROVISIONS

16.1. Assignment. This Agreement is binding upon and will inure to the benefit of the Parties and their respective permitted assignees or successors in interest, including without limitation those that may succeed by assignment, transfer or otherwise to the ownership of either of the Parties or of the assets necessary to the conduct of the business to which this Agreement relates. This Agreement may not be assigned or otherwise transferred by either Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld, conditioned or delayed; provided, however, that either Party may, without such consent, assign this Agreement together with all of its rights and obligations

hereunder to its Affiliates, or to a successor in interest in connection with the transfer or sale of all or substantially all of its business to which this Agreement relates, or in the event of its merger or consolidation or similar transaction, subject to the assignee agreeing to be bound by the terms of this Agreement. Any purported assignment in violation of the preceding sentences shall be void. Any permitted successor shall assume and be bound by all obligations of its assignor or predecessor under this Agreement.

16.2. Headings. Headings are inserted for convenience and shall not affect the meaning or interpretation of this Agreement.

16.3. Waiver. No waiver of any default hereunder by either Party or any failure to enforce any rights hereunder shall be deemed to constitute a waiver of any subsequent default with respect to the same or any other provision hereof.

16.4. Notices. Any and all notices given by one Party to the other Party under this Agreement must be in writing and shall be delivered by hand, sent by registered or certified air mail (postage prepaid), international courier service or fax to the other Party's address as set forth below or to the latest address of such Party as shall have been communicated to the other Party.

If to Baxter:

Baxter Healthcare SA
Thurgauerstrasse 130
8152 Glattpark (Opfikon)
Switzerland
Attention: President
Telephone: +41 44 878 6000
Facsimile: +41 44 878 6350

With copies to:

Baxter Healthcare Corporation
One Baxter Parkway
Deerfield, Illinois 60015
Attention: President BioScience
Telephone: +1 847.940.6255
Facsimile: +1 847.940.6271

Baxter Healthcare SA
Thurgauerstrasse 130
8152 Glattpark (Opfikon)
Switzerland
Attention: Legal Counsel
Telephone: +41 1 878 6199
Facsimile: +41 1 878 6352

If to Onconova:

Onconova Therapeutics, Inc.
375 Pheasant Run

Newtown, PA 18490
Attention: Commercial Department
Telephone: +1 267.759.3680
Facsimile: +1 267.759.3681

With copies to:

Onconova Therapeutics, Inc.
375 Pheasant Run
Newtown, PA 18490
Attention: Chief Executive Officer
Telephone: +1 267.759.3680
Facsimile: +1 267.759.3681

Dechert LLP
902 Carnegie Center, Suite 500
Princeton, NJ 08540
Attention: James J. Marino
Telephone: +1 609.955.3230
Facsimile: +1 609 955.3259

16.5. Severability. Should any part of this Agreement be held unenforceable or in conflict with the applicable Laws of any jurisdiction, the invalid or unenforceable part or provision shall be replaced with a provision which accomplishes, to the extent possible, the original business purpose of such part or provision in a valid and enforceable manner, and the remainder of this Agreement shall remain binding upon the Parties hereto.

16.6. Entire Agreement. This Agreement constitutes the whole agreement between the Parties and shall cancel and supersede any and all prior and contemporaneous negotiations, correspondence, understandings and agreements, whether oral or written, between the Parties respecting the subject matter hereof, including without limitation the Confidentiality Agreement (with any information disclosed thereunder being deemed to be disclosed pursuant to this Agreement and subject to the terms of Articles 11 or 12 respectively).

16.7. Amendment. Any amendment or modification to this Agreement shall only be made in writing and shall only be valid when signed by the due representatives of the Parties.

16.8. Counterparts. This Agreement may be executed in more than one counterpart, each of which shall be deemed an original, but all of such counterparts taken together shall constitute one and the same agreement.

16.9. Agency. Neither Party is, nor shall be deemed to be, an employee, agent, co-venturer, or legal representative of the other Party for any purpose. Neither Party shall be entitled to enter into any contracts in the name of, or on behalf of the other Party, nor shall either Party be entitled to pledge the credit of the other Party in any way or hold itself out as having the authority to do so.

16.10. Further Actions. Each Party agrees to execute, acknowledge, and deliver such further instruments, and to do all such other acts, as may be necessary or appropriate in order to carry out the purposes and intent of this Agreement.

16.11. Compliance with Laws. Each Party will comply with all Laws in performing its obligations and exercising its rights hereunder, including without limitation all Laws relating to the export, re-export or other transfer of any Information transferred pursuant to this Agreement or the Licensed Product.

16.12. Third Party Beneficiary. Each Party acknowledges and agrees that Temple University is a third party beneficiary of this Agreement to the extent required for Temple University to enforce this Agreement against Baxter in its capacity as a sublicensee under the Temple Agreement, and to enforce Temple's rights under Section 16.2.

16.13. Governing Law. The construction, validity and performance of this Agreement shall be governed in all respects by the laws of the state of Delaware, excluding its provisions regarding conflicts of law. The UNCITRAL Convention on the International Sale of Goods shall not apply.

16.14. Dispute Resolution; Jurisdiction. Any disputes under this Agreement shall be submitted initially by either Party for resolution by the Executive Officers. The Executive Officers shall meet and discuss such matter within ** after a Party proposes that such Executive Officers meet to discuss the dispute. In the event the Executive Officers of each Party are unable to resolve the dispute within ** after receiving notice of the dispute (or such longer period as the Parties may mutually agree upon), then such dispute shall be submitted upon the initiative of either Party after expiration of the ** period for resolution as set forth in Exhibit 16.14.

16.15. Bankruptcy Code. All rights and licenses granted under or pursuant to this Agreement by Onconova or Baxter are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code and of any similar provisions of applicable Laws under any other jurisdiction (collectively, the "Bankruptcy Laws"), licenses of right to "intellectual property" as defined under the Bankruptcy Laws. Onconova agrees that Baxter, as a licensee of rights under this Agreement, shall retain and may fully exercise all of its rights and elections under the Bankruptcy Laws.

[Signature Page Follows]

[Signature Page to License Agreement]

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed in duplicate by their respective duly authorized officers or representatives.

ONCONOVA THERAPEUTICS, INC.		**BAXTER HEALTHCARE SA**	
Signature:	/s/ Ramesh Kumar	Signature:	/s/ Benedikt Kubik
Name:	Ramesh Kumar	Name:	Benedikt Kubik
Title:	President and CEO	Title:	Finance Director
		Signature:	/s/ Sarah Byrne-Quinn
		Name:	Sarah Byrne-Quinn
		Title:	VP Business Development & Strategy

Schedule 1.13(a)

**

Schedule 1.13(e)

**(1)

**

(1) **

Schedule 1.23

**

Schedule 1.66

**

Schedule 1.67

**

Schedule 1.101

Upstream Agreements

The January 1, 1999 License Agreement between Temple University and Onconova, as amended from time to time.

Schedule 13.3

Exhibit 16.14

**

(a) **

(b) **

(c) **

(d) **

(e) **

(f) **

(g) **

Exhibit 10.2

CONFIDENTIAL

EXECUTION VERSION

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

LICENSE AGREEMENT

by and between

Licensor:
Onconova Therapeutics, Inc.
375 Pheasant Run,
Newtown, PA 18940
U.S.A.

(hereinafter referred to as "Onconova")

and

Licensee:
SymBio Pharmaceuticals Limited
San-Ei Building 8Fl
5-23-7 Shimbashi, Minato-ku
Tokyo 105-0004
Japan

(hereinafter referred to as "SymBio")

Onconova and SymBio are also referred to individually as a "Party" and together as the "Parties".

I. WITNESSETH THAT:

WHEREAS, Onconova is developing a pharmaceutical product in the United States under the trademark Estybon™ for use in oncology, and owns or controls certain proprietary technology, know-how and information relating to such product;

WHEREAS, Onconova holds an exclusive license to the intellectual property rights listed in Annex 6 and certain other Patent Rights (as defined in the Temple Agreement) from Temple University — Of The Commonwealth System of Higher Education ("Temple University"), pursuant to which Temple University has granted Onconova the right to enter into sublicense agreements;

WHEREAS, SymBio has expressed to Onconova its interest in obtaining from Onconova a license to develop and commercialize such product in Japan and Korea;

WHEREAS, the Parties have established plans and time lines for development of such product in the United States and within Japan and Korea, which will serve as the guiding principle for the Parties' development efforts pursuant to this Agreement;

NOW, THEREFORE, it is agreed between the Parties as follows:

1. Definitions

The following terms as used in this Agreement (as hereinafter defined) shall have the meanings set forth in this Section (which meanings shall be applicable both to the singular and the plural forms of such terms):

1.1 "Actual Unit Cost" means **.

1.2 "Additional Indication" means any indication for Licensed Products other than r/r MDS, Frontline MDS, Frontline Pancreatic or Ovarian Cancer.

1.3 "Affiliate" means with respect to each Party, any Person that directly or indirectly is controlled by, controls or is under common control with a Party. For the purposes of this definition only, the term "control" (including, with correlative meanings, the terms "controlled by" and "under common control with") as used with respect to a Person means (a) in the case of a corporate entity, direct or indirect ownership of voting securities entitled to cast at least fifty percent (50%) of the votes in the election of directors or (b) in the case of a non-corporate entity, direct or indirect ownership of at least fifty percent (50%) of the equity interests with the power to direct the management and policies of such entity; provided that, if local Laws restrict foreign ownership, control shall be established by direct or indirect ownership of the maximum ownership percentage that may, under such local Laws, be owned by foreign interests, but in no event less than forty-five percent (45%) and only if such forty-five percent (45%) ownership percentage provides such Person with the power to direct the management and policies of such entity.

1.4 "Agreement" means this License Agreement, including all of its Annexes.

1.5 "Business Day" means a day other than Saturday, Sunday or any day on which commercial banks located in the State of Pennsylvania, U.S., or in Tokyo, Japan are authorized or obligated by Laws to close.

1.6 "Clinical Sample" means any investigational drug products containing the Compound as well as placebos for use in developing the Licensed Product and/or Commercial Product.

1.7 "Combination Product" means the Licensed Product that includes the Compound and at least one (1) additional therapeutically active pharmaceutical ingredient other than the Compound. Except for those drug delivery vehicles, adjuvants or excipients that are recognized by the applicable Regulatory Authority as active ingredients, drug delivery vehicles, adjuvants, and excipients are hereby deemed not to be "therapeutically active pharmaceutical ingredients," and their presence shall not be deemed to create a Combination Product for purposes of this Section 1.7.

1.8 "Commercial Product" means the Licensed Product in finished package form fit for sale in the Licensed Territory.

1.9 "Commercial Supply Agreement" has the meaning set forth in Section 5.2.

1.10 "Commercially Reasonable Efforts" means, with respect to a Party's obligation under this Agreement to develop, manufacture, commercialize or seek intellectual property protection for the Licensed Product, the level of efforts required to carry out such obligation in a sustained manner consistent with the efforts that a similarly situated company devotes to a product of similar market potential, profit potential, or strategic value at a similar stage in its development or product life within its portfolio. For

purposes of illustration, Commercially Reasonable Efforts requires, with respect to such an obligation, that a Party reasonably and in good faith: (a) promptly assign responsibility for such obligation to specific employee(s) who are held accountable for progress and monitor such progress on an on-going basis, (b) set and seek to achieve reasonable objectives for carrying out such obligation, and (c) reasonably make and implement decisions and allocate resources designed to advance progress with respect to such objectives, all taking into account issues of available intellectual property coverage, safety and efficacy information, targeted product profile, the competitiveness of the marketplace, other technical, legal, scientific and/or medical factors and the pricing and reimbursement status for the relevant product. In evaluating whether a Party has used Commercially Reasonable Efforts, due consideration will be given to any delays by the other Party in performing its obligations under this Agreement that adversely impact the first Party's ability to perform its obligations under this Agreement.

1.11 "Compound" means the substance that is a sodium salt of (E)-2,4,6-trimethoxystyryl-3-carboxymethylamino-4-methoxybenzyl sulfone, or any Derivative/Improvement thereof.

1.12 "Confidentiality Agreement" means that certain confidentiality agreement between SymBio and Onconova dated January 11, 2011.

1.13 "Control" means possession of the ability to grant a license, sublicense or access as provided for under this Agreement without (a) violating the terms of any agreement or other arrangement with any Third Party or (b) increasing at any time the amount of any payments required under any such agreement or arrangement that is entered into after the Effective Date, provided that this subsection (b) shall not apply if the other Party elects in writing to be responsible for all such increased payments as provided in Section 2.5. For clarity, subsection (b) shall not apply to the Upstream Agreement because it was entered into by Onconova prior to the Effective Date.

1.14 "Damages" has the meaning set forth in Section 16.1.

1.15 "Derivative/Improvement" means **.

1.16 "Development Plan" means the development plan and the time schedule attached hereto as Annex 2, which the Parties shall abide by in the development of the Licensed Product in the United States under Section 3.1 hereof.

1.17 "Development Supply Agreement" has the meaning set forth in Section 5.1.

1.18 "Direct License" has the meaning set forth in Section 10.4(ii).

1.19 "Drug Approval Application" means an application for Marketing Approval required before commercial sale or use of the Licensed Product as a drug in a regulatory jurisdiction or country.

1.20 "Effective Date" means July 5, 2011.

1.21 "Enforcing Party" has the meaning set forth in Section 7.5(iv).

1.22 "Frontline MDS" means the treatment, amelioriation and/or prevention of MDS using the Licensed Product as the frontline drug therapy in patients having MDS with excess blasts.

1.23 "Frontline Pancreatic" means the treatment, amelioration and/or prevention of pancreatic cancer using the Licensed Product in treatment naïve patients having pancreatic cancer.

1.24 "Goods" means the Compound, Clinical Samples and/or the Licensed Product and/or Commercial Product.

1.25 "Improvement" means any improvement or modification of the Licensed Product or Compound, including any Derivative/Improvement, that is developed by (a) Onconova or, if rights thereto are obtained by Onconova pursuant to Section 7.1(ii), its Licensees or (b) SymBio or, if rights thereto are obtained by SymBio pursuant to Section 7.1(iii), its Sublicensees, for use in the Licensed Field.

1.26 "Information" means (i) techniques and data necessary for the development or commercialization of the Licensed Product within the Licensed Field, including without limitation inventions, practices, methods, knowledge, know-how, skill, experience, test data including without limitation pharmacological, toxicological and clinical test data, analytical and quality control data or descriptions and (ii) compounds, compositions of matter, assays and biological materials necessary for the development or commercialization of the Licensed Product within the Licensed Field.

1.27 “Indemnified Party” has the meaning set forth in Section 16.3.

1.28 “Indemnifying Party” has the meaning set forth in Section 16.3.

1.29 “Invention” means any and all discoveries, developments, improvements, modifications, formulations, analogs, homologs, materials, compositions of matter, cell lines, processes, machines, manufactures and other inventions (whether patentable or not patentable) made in the course of activities performed under this Agreement by or on behalf of either Party or both Parties.

1.30 “Japan Net Selling Price” means **.

1.31 “Joint Committee” or “JC” has the meaning set forth in Section 2.3(i).

1.32 “Joint Inventions” has the meaning set forth in Section 7.2.

1.33 “Joint Patent” has the meaning set forth in Section 7.4(ii).

1.34 “Law” means all applicable laws, statutes, rules, regulations, ordinances and other pronouncements having the effect of law of any federal, national, multinational, state, provincial, county, city or other political subdivision, domestic or foreign.

1.35 “Licensee” means any Third Party to which Onconova has granted rights under the Onconova Patents or Onconova Know-how for the Licensed Product in the Field outside of the Licensed Territory.

1.36 “Licensee Improvements” has the meaning set forth in Section 7.1(iv).

1.37 “Licensed Field” means the treatment, amelioration or prevention of any disease or condition.

1.38 “Licensed Product” means formulations of pharmaceutical preparations for human use, including without limitation oral and injectible formulations, which contain the Compound, including any Derivative/Improvement thereof.

1.39 “Licensed Rights” means the rights granted by Onconova to SymBio pursuant to Section 2.1.

1.40 “Licensed Territory” means Japan and Korea.

1.41 “Litigation Conditions” has the meaning set forth in Section 16.3.

1.42 “Mark Up” has the meaning set forth in Section 5.2(ii).

1.43 “Marketing Approval” means, with respect to a particular country or regulatory jurisdiction, all necessary authorizations and approvals by the Regulatory Authorities required to manufacture, use, import, market, distribute and promote the Licensed Product in such country or regulatory jurisdiction, including, but not limited to, any importation or manufacturing licenses, marketing authorization (health registration) and NHI Price and reimbursement approval, if applicable.

1.44 “Marketing Exclusivity” means, with respect to each country of the Licensed Territory, the period of data exclusivity as provided under local Laws during which Third Parties do not have the right, in connection with seeking or obtaining Marketing Approval of a pharmaceutical product that contains the same or substantially similar active ingredient(s) or the same active moiety(ies) as a Licensed Product, (i) to reference the Licensed Product’s clinical dossier without an express right of reference from the dossier holder, or (ii) to rely on previous Regulatory Authority determinations of safety and effectiveness with respect to the Licensed Product to support the submission, review or approval of a Drug Approval Application or similar regulatory submission filed with the applicable Regulatory Authority for such pharmaceutical product, as well as any other exclusivity periods available under local Laws (e.g. with respect to orphan drugs, new chemical entity exclusivity and pediatric exclusivity) during which Third Parties are prevented from filing or having accepted by Regulatory Authorities a Drug Approval Application for, or obtaining Marketing Approval of, a pharmaceutical product that contains the same or substantially similar active ingredient(s) or the same active moiety(ies) as a Licensed Product in the relevant country.

1.45 “MDS” means myelodysplastic syndrome.

1.46 “Net Sales” means the gross amounts invoiced or otherwise billed by SymBio or Sublicensees on account of sales or any other commercial disposition of the Licensed Product and/or Commercial Product to Third Parties, including without limitation wholesalers, hospitals and/or other intermediate Third Parties, in the Licensed Territory (hereinafter the “Gross Sales”), less the following to the extent specifically related to the Licensed Product and actually allowed, incurred or paid during such period:

i) customs duties and excise, value added and other taxes directly related to the sale to the extent applicable and not reimbursable, but excluding income tax;

ii) amounts repaid or credited by reason of discounts (including without limitation cash and quantity discounts), rejections, return of goods or retroactive price reductions with respect to the Licensed Product;

iii) freight, shipping, postage, insurance or packing and handling charges invoiced to the purchaser;

iv) charges incurred in connection with the exportation or importation of the Licensed Product, to the extent not deducted pursuant to subsection (i) or subsection (iii) above;

v) bad debts actually written off in connection with the Licensed Product (it being understood that “Net Sales” will include all amounts received for any bad debts at a subsequent date), and

vi) customer rebates and allowances on account of the sale of the Licensed Product to the extent actually allowed and common within the pharmaceutical industry in the Licensed Territory;

provided that all of the foregoing deductions are incurred in the ordinary course and calculated in accordance with then-current generally accepted accounting principles in Japan, consistently applied, during the applicable calculation period throughout the selling party's organization.

All such discounts, allowances, credits, rebates, and other deductions granted for a range of products shall be fairly and equitably allocated to the Licensed Product and other products of SymBio and its Affiliates and Sublicensees such that the Licensed Product does not bear a disproportionate portion of such deductions. Any Third Party to which SymBio or its Affiliates and Sublicensees sells Compounds in bulk form shall be deemed a Sublicensee such as to cause sales of Licensed Product by such Third Party to be taken into account when calculating Net Sales; provided that for clarity, in such case, the sale of such Compounds in bulk form shall not itself be deemed a Net Sale of a Licensed Product.

Notwithstanding the foregoing, in the event the Licensed Product is sold in a country in the Licensed Territory as part of a Combination Product, Net Sales of the Combination Product will be calculated as follows:

(1) If the Licensed Product and other therapeutically active pharmaceutical ingredient(s) included in the Combination Product each are sold separately in such country, Net Sales will be calculated by multiplying the total Net Sales (as described above) of the Combination Product by the fraction A/(A+B), where A is the average gross selling price in such country of the Licensed Product sold separately in the same formulation and dosage, and B is the sum of the average gross selling prices in such country of such other therapeutically active pharmaceutical ingredient(s) sold separately in the same formulation and dosage, during the applicable calendar year.

(2) If the Licensed Product is sold independently of the other therapeutically active pharmaceutical ingredient(s) included in the Combination Product in such country, but the average gross selling price of such other therapeutically active pharmaceutical ingredient(s) cannot be determined, Net Sales will be calculated by multiplying the total Net Sales (as described above) of the Combination Product by the fraction A/C where A is the average gross selling price in such country of such Licensed Product sold independently and C is the average gross selling price in such country of the entire Combination Product.

(3) If the other therapeutically active pharmaceutical ingredient(s) included in the Combination Product are sold independently of the Licensed Product therein in such country, but the average gross selling price of such Licensed Product cannot be

determined, Net Sales will be calculated by multiplying the total Net Sales (as described above) of the Combination Product by the fraction [1-B/C], where B is the average gross selling price in the Licensed Territory of such other therapeutically active pharmaceutical ingredient(s) and C is the average gross selling price in the Licensed Territory of the entire Combination Product.

(4) If the Licensed Product and other therapeutically active pharmaceutical ingredient(s) included in the Combination Product are not sold separately, or if they are sold separately but the average gross selling price of neither such Licensed Product nor the other therapeutically active pharmaceutical ingredient(s) can be determined, in such country, Net Sales of the Combination Product shall be equal to Net Sales of the Combination Product multiplied by a mutually agreed percentage or, pending agreement on such a percentage, fifty percent (50%).

The average gross selling price for the product(s) contained in the Combination Product other than the Licensed Product shall be calculated for each applicable time period by dividing the gross aggregate sales revenues for such other product by the units of such other product(s) sold during such time period, as published by IMS or another mutually agreed independent source; provided that in the absence of appropriate IMS or other mutually agreed independent source of such data, such average gross selling price shall be calculated as follows: In the calendar year during which a Combination Product is first sold in a country, a forecasted average gross selling price shall be used for the Licensed Product and the other therapeutically active pharmaceutical ingredient(s), to be determined in good faith by SymBio. Any over- or under-payment due to a difference between forecasted and actual average gross selling prices in such country shall be paid or credited, as applicable, in the first royalty payment of the following calendar year. In the following calendar year the average gross selling price of both the Licensed Product and the other therapeutically active pharmaceutical ingredient(s) included in the Combination Product in the previous calendar year shall apply.

1.47 "NHI Price" means the official public price for medicinal products marketed and sold in the Licensed Territory as approved by relevant Regulatory Authorities.

1.48 "Onconova Confidential Information" has the meaning set forth in Section 11.1(i).

1.49 "Onconova Information" means such Scientific Information generated and/or compiled by or on behalf of Onconova as of the Effective Date and listed in Annex 1 as well as Scientific Information generated and/or compiled by or on behalf of Onconova or its Licensees, if any, during the term of this Agreement.

1.50 "Onconova Know-How" means Information which (i) is necessary for the development, manufacture, use, sale, offer for sale and/or importation of Goods in the Licensed Field, and (ii) is within the Control of Onconova. Notwithstanding anything herein to the contrary, Onconova Know-how shall exclude Onconova Patents, but shall include the Onconova Information.

1.51 "Onconova Improvements" has the meaning set forth in Section 7.1(v).

1.52 "Onconova Indemnitees" has the meaning set forth in Section 16.2.

1.53 "Onconova Patent" means a Patent which claims inventions necessary for the development, manufacture, use, sale, offer for sale and/or importation of Goods within the Licensed Field, and that is Controlled by Onconova, including without

limitation Onconova's interest in any Joint Patents. Onconova Patents include without limitation the patents listed in Annex 3.

1.54 "Onconova Trademarks" means the trademarks set forth on Annex 5.

1.55 “Ovarian Cancer” means the treatment and/or amelioration using the Licensed Product in patients having ovarian cancer who have become resistant to at least one cycle of chemotherapy and/or the prevention of such ovarian cancer in such patients using the Licensed Products.

1.56 “Patent” means (a) letters patent (or other equivalent legal instrument), including without limitation utility and design patents, and including without limitation any extension, substitution, registration, confirmation, reissue, re-examination or renewal thereof, (b) applications for letters patent, including without limitation a provisional application, non-provisional application, reissue application, a re-examination application, a continuation application, a continued prosecution application, a continuation-in-part application, a divisional application or any equivalent of the foregoing applications that is pending at any time during the term of this Agreement before a government patent authority and (c) all foreign or international equivalents of any of the foregoing in any country.

1.57 “Patent Term Extensions” has the meaning set forth in Section 7.8.

1.58 “Paying Party” has the meaning set forth in Section 15.8.

1.59 “Person” means any individual, firm, corporation, partnership, limited liability company, trust, business trust, joint venture, governmental authority, association or other entity.

1.60 “Product Infringement” has the meaning set forth in Section 7.5(ii)(a).

1.61 “Prosecuting Party” has the meaning set forth in Section 7.4(ii).

1.62 “r/r MDS” means treatment and/or amelioration using the Licensed Product in patients having MDS with excess blasts who relapse after, are refractory to, or are intolerant to, hypomethylating agents such as, but not limited to, azacitidine or decitabine, or any other drug therapies used frontline to treat MDS, and/or the prevention of such MDS in such patients using the Licensed Product.

1.63 “Recipient Party” has the meaning set forth in Section 15.8.

1.64 “Regulatory Authority” means any national or supranational governmental authority, including without limitation the MHLW (i.e., the Japanese Ministry of Health, Labour and Welfare, or any successor agency thereto), or other governmental body that has responsibility in a given country or jurisdiction over the development, manufacture and/or commercialization of the Compound and/or the Licensed Product.

1.65 “Sales Report” means with respect to each calendar quarter a report detailing:

i) the relevant Gross Sales in each local currency invoiced by SymBio or Sublicensees to Third Parties, including wholesalers, hospitals or other intermediate Third Parties, indicating the breakdown of sales by each type of the Licensed Product and/or Commercial Product;

ii) the deductions from Gross Sales used to calculate Net Sales;

iii) the Net Sales in each local currency;

iv) the currency exchange rates used; and

v) the sum of royalties due pursuant to Section 15.1.

1.66 “Scientific Information” means any and all medical, toxicological, pharmacological, pre clinical, clinical and chemical data, specifications, medical uses, adverse reactions, formulation and quality control methods of or for the Compound and/or the Licensed Product, and further including without limitation all proprietary information submitted to relevant Regulatory Authorities to support a Drug Approval Application for and Marketing Approval of the Licensed Product in any country of the world.

1.67 “Sole Inventions” has the meaning set forth in Section 7.2.

1.68 “Specifications” means the specifications for the Licensed Product set forth in Annex 4.

1.69 “Sublicensee” means any Third Party to which SymBio sublicenses the Licensed Rights.

1.70 “Sublicensee Improvements” has the meaning set forth in Section 7.1(v).

1.71 “SymBio Confidential Information” has the meaning set forth in Section 12.1(i).

1.72 “SymBio Improvements” has the meaning set forth in Section 7.1(iv).

1.73 “SymBio Indemnitees” has the meaning set forth in Section 16.1.

1.74 “SymBio Information” means the Scientific Information generated and/or compiled by or on behalf of SymBio, and/or its Sublicensees, if any, during the term of this Agreement.

1.75 “SymBio Know-How” means Information that (i) is necessary for the development, manufacture, use, sale, offer for sale and/or importation of Goods in the Licensed Field, and (ii) is within the Control of SymBio. Notwithstanding anything herein to the contrary, SymBio Know-how shall exclude SymBio Patents, but shall include SymBio Information.

1.76 “SymBio Patent” means a Patent that claims inventions necessary for the development, manufacture, use, sale, offer for sale and/or importation of Goods within the Licensed Field, and that is Controlled by SymBio, including without limitation SymBio’s interest in any Joint Patents.

1.77 “SymBio Trademarks” has the meaning set forth in Section 8.1.

1.78 "Third Party" means any person or corporation or unincorporated body other than Onconova and SymBio and their respective Affiliates, including, without being limited to, governmental bodies and authorities.

1.79 "Trademark Infringement" has the meaning set forth in Section 8.2(v).

1.80 "Temple Agreement" means the January 1, 1999 License Agreement between Temple University and Onconova, as amended from time to time.

1.81 "Temple University" has the meaning set forth in the recitals.

1.82 "Upstream Agreement" means any agreement existing as of the Effective Date under which Onconova obtains a license or other right from a Third Party to develop, make, use, sell, offer for sale or import the Compound and/or the Licensed Product in the Licensed Territory.

1.83 "USD" means a United States Dollar.

1.84 "U.S." means the United States of America, its territories and possessions.

1.85 "U.S. Net Selling Price" means **.

1.86 "Valid Claim" means, for a country, a claim of an issued and unexpired Patent, or a Patent application filed in good faith that has not been pending for more than ** after its priority date, in each case, that is within the Onconova Patents (including the Joint Patents), and that has not been held unpatentable, invalid, or unenforceable by a final unappealable decision of a court or other government agency of competent jurisdiction, in an unappealed or unappealable decision, admitted to be invalid or unenforceable through reissue, re-examination, disclaimer, or otherwise.

1.87 "Withholding Taxes" has the meaning set forth in Section 15.8.

2. Grant of License; Right of First Negotiation

2.1 Subject to the terms and conditions of this Agreement, Onconova hereby grants to SymBio, and SymBio accepts, an exclusive, royalty-bearing, non-transferable (except pursuant to Section 22.1) right and license under Onconova Know-How and Onconova Patents, with the right to, subject to Section 2.1(i), grant sublicenses through multiple tiers of Sublicensees, subject to Section 7.1(v), to develop, manufacture (solely to the extent SymBio obtains such right pursuant to Article 5, the Development Supply Agreement or the Commercial Supply Agreement), use, sell, offer for sale, import, market, distribute and promote the Licensed Product in the Licensed Field and in the Licensed Territory.

i) Each agreement between SymBio and a Sublicensee (i) shall be in writing and subject and subordinate to, and consistent with, the terms and conditions of this Agreement; (ii) shall not diminish, reduce or eliminate any of SymBio's obligations under this Agreement; (iii) shall require the Sublicensee(s) to comply with all applicable terms of this Agreement (except for the payment obligations, for which SymBio shall remain financially responsible); and (iv) shall prohibit further sublicensing except on terms consistent with this Section 2.1(i). SymBio shall be responsible for the performance of each Sublicensee and shall ensure that each Sublicensee complies with all relevant provisions of this Agreement.

ii) The licenses granted by Onconova pursuant to Section 2.1 are, with respect to any Onconova Know-How and Onconova Patents licensed to Onconova under the Temple Agreement, subject to Temple's reserved rights for non-commercial educational and research purposes under Section 3.1 of the Temple Agreement.

iii) The Parties acknowledge that inventions among the Onconova Patents Controlled, but not owned, by Onconova that are licensed to Onconova pursuant to the Temple Agreement may have resulted from United States Government funding, and any such Onconova Patents shall be subject to any applicable Laws of the United States related to federally funded inventions.

2.2 Subject to the terms of this Agreement, SymBio hereby grants to Onconova, and Onconova accepts, an exclusive, fully paid-up, non-transferable (except pursuant to Section 22.1) right and license under SymBio Know-How and SymBio Patents, with the right to, subject to Section 2.2(i), grant sublicenses through multiple tiers of sublicensees, subject to Section 7.1(iv), to develop, manufacture, use, sell, offer for sale, import, market, distribute and promote the Licensed Product in the Licensed Field outside the Licensed Territory; provided that such license shall be exclusive except as to SymBio, its Affiliates and Sublicensees with respect to the right to manufacture Licensed Product outside the Licensed Territory for sale, offer for sale, import, marketing, distribution and promotion in the Licensed Territory.

i) Each agreement between Onconova and a sublicensee granted a sublicense of the rights and licenses granted under Section 2.2 shall be in writing and subject and subordinate to, and consistent with, the terms and conditions of this Agreement; (ii) shall not diminish, reduce or eliminate any of Onconova's obligations under this Agreement; (iii) shall require the sublicensee(s) to comply with all applicable terms of this Agreement; and (iv) shall prohibit further sublicensing except on terms consistent with this Section 2.2(i). Onconova shall be responsible for the performance of each such sublicensee and shall ensure that each sublicensee complies with all relevant provisions of this Agreement.

2.3 Joint Committee

i) Within ** after the Effective Date, each Party shall appoint three (3) of its senior employees to serve on the Joint Committee ("JC"). Each Party may replace its JC representatives by written notice to the other Party. For ** following the Effective Date, a JC member appointed by Onconova shall serve as chairperson of the JC. In each subsequent year commencing upon an anniversary of the Effective Date, the chairperson shall be appointed by the Party that did not appoint the chairperson for the immediately preceding year.

ii) The JC shall coordinate the Parties' communications and exchange of Scientific Information and data regarding development and marketing activities pursuant to the Agreement as further specified in Articles 3, 4, 6 and 9.

iii) The JC shall meet at least once every ** at times mutually agreed upon by the Parties. At least one (1) of such meetings per ** shall be held in person, and all other such meetings may be held by teleconference or videoconference. The location of the meetings of the JC to be held in person

shall agreed by the Parties. Each Party shall bear all the expenses of its representatives on the JC. The JC shall have no power to amend or waive compliance with this Agreement.

2.4 No Other Licenses. Neither Party grants to the other Party any rights, licenses or covenants in or to any intellectual property, whether by implication, estoppel, or otherwise, other than the license rights that are expressly granted under this Agreement, the Development Supply Agreement or the Commercial Supply Agreement. Notwithstanding anything to the contrary herein, neither Party grants to the other Party any license or other right to manufacture, develop or commercialize any active ingredients other than the Compound (or any Derivative/Improvement thereof), including without limitation any method of making any active ingredients other than the Compound or any Derivative/Improvement, any composition or

formulations of any active ingredients other than the Compound or any Derivative/Improvement, or any method of using or administering any active ingredients other than the Compound or any Derivative/Improvement.

2.5 If, after the Effective Date, either Party enters into an agreement or other arrangement to obtain a license or other rights to or under Information, Scientific Information or Patents that are owned or controlled by a Third Party and that would, solely but for the operation of Section 1.13(b), in the case of Onconova be included in the Onconova Information, Onconova Know-How or Onconova Patents or, in the case of SymBio, be SymBio Information, SymBio Know-How or SymBio Patents, then the Party obtaining such license or rights shall promptly notify the other Party and shall specify in such notice the type and amount of payments that would be due to such Third Party by reason of the practice or use of, or access to, such Information, Scientific Information or Patents by the other Party pursuant to the license set forth in Section 2.1 or 2.2, as applicable (but not by reason of the practice or use of, or access to, such Information, Scientific Information or Patents outside the scope of such license). The Party receiving such notice may elect in writing to bear the responsibility for such additional payments, and upon such receiving Party's written election to bear such responsibility, the Information, Scientific Information, or Patents as applicable, shall thereafter be deemed "Controlled" by the Party originally obtaining such license or rights (notwithstanding Section 1.13(b)), and shall be subject to the license under Section 2.1 or 2.2, as applicable.

2.6 Right of First Negotiation. If during the term of this Agreement, Onconova desires to develop and/or commercialize in the Licensed Territory any product containing a Related Compound (as defined below), either itself or with or through an Affiliate or a Third Party, Onconova shall, prior to the commencement of any such activities in or with respect to the Licensed Territory, notify SymBio in writing of Onconova's intent to conduct such activities (directly or with or through an Affiliate or a Third Party). Together with such notice, Onconova shall provide to SymBio all material information in Onconova's Control regarding such Related Compound and the basis for Onconova's interest in conducting such activities with respect thereto. Within ** after receiving such notice and information, SymBio shall notify Onconova in writing whether or not SymBio is interested in negotiating the terms pursuant to which SymBio would obtain a license or right to conduct such activities with respect to such Related Compound in the Licensed Territory. If SymBio notifies Onconova that SymBio is interested in negotiating such terms, the Parties shall negotiate in good faith for up to ** after Onconova receives such notice from SymBio the terms pursuant to which SymBio would obtain such rights. If the Parties do not enter into such an agreement within such negotiation period, or if SymBio does not provide written notice of its interest within the aforementioned ** period, then Onconova would have the right to conduct such activities either itself or with or through an Affiliate or Third Party in the Licensed Territory, provided that Onconova shall not grant to a Third Party a license or right to conduct such activities on terms that are materially more favorable, taken as a whole, to such Third Party than the terms last offered by SymBio to Onconova therefor unless it first offers SymBio the opportunity to obtain such license or right on such terms, and SymBio notifies Onconova within ** after receiving such notice that SymBio has decided it is not interested in obtaining such license or right on such terms. "Related Compound" means any **.

3. Obligation to Develop & Use

3.1 Onconova shall use Commercially Reasonable Efforts to develop or have developed the Licensed Product at its own cost and responsibility outside the Licensed Territory.

Onconova's obligations to develop Licensed Products outside the Licensed Territory shall include, but not be limited to, the following:

i) using Commercially Reasonable Efforts to develop or have developed the Licensed Product in accordance with the Development Plan in Annex 2;

ii) using Commercially Reasonable Efforts to file or have filed a Drug Approval Application for the Licensed Product outside the Licensed Territory as soon as is reasonably practicable; and

iii) using Commercially Reasonable Efforts to obtain, and once obtained, to maintain, Marketing Approval outside the Licensed Territory.

3.2 SymBio shall (a) use Commercially Reasonable Efforts to develop the Licensed Product in each country in the Licensed Territory, and (b) shall develop the Licensed Product in the Licensed Territory at its own cost and responsibility in accordance with the requirements of this Agreement and in conformity with all applicable Laws. SymBio's obligations under this Section 3.2 shall include, but not be limited to, the following:

i) using Commercially Reasonable Efforts to develop the Licensed Product in accordance with the Development Plan;

ii) using Commercially Reasonable Efforts to file a Drug Approval Application for the Licensed Product in each country of the Licensed Territory as soon as is reasonably practicable; and

iii) using Commercially Reasonable Efforts to obtain, and once obtained, to maintain, Marketing Approval in each country of the Licensed Territory.

3.3 Updating Development Plans

i) Onconova recognizes that any material change to the timelines for and scope of Onconova's activities under the Development Plan outside the Licensed Territory may adversely affect the timelines for SymBio's development of Licensed Products in the Licensed Territory.

ii) From time to time, Onconova may update the Development Plan as it relates to activities to be conducted by or on behalf of Onconova, provided that Onconova shall use Commercially Reasonable Efforts to avoid any material change to the timelines for, and scope of, Onconova's activities under the Development Plan outside the Licensed Territory that reasonably could be expected to materially and adversely affect the timelines for SymBio's development of Licensed Products in the Licensed Territory. Onconova shall provide all proposed updates to its activities under the

Development Plan to SymBio for review, comment and if applicable, consent, prior to the implementation of such update. SymBio shall have ** after receipt of such proposed Development Plan to provide written comments on any proposed update to Onconova's activities under the Development Plan. Onconova shall reasonably consider SymBio's comments thereto. After consideration of SymBio's comments, Onconova shall provide to SymBio a final updated Development Plan. Notwithstanding the foregoing, SymBio's rights under this Section 3.3(ii) shall not apply with respect to any jurisdiction outside of the Licensed Territory for which Onconova has granted the right to a Licensee to develop the Licensed Product, unless and until such Licensee agrees to

provide to or for the benefit of SymBio the rights set forth in this Section 3.3(ii) and to assume the obligations of Onconova set forth in this Section 3.3(ii) with respect to such jurisdiction. Onconova shall use Commercially Reasonable Efforts to secure from each such Licensee all of the rights of SymBio, and to require such Licensee to perform all such obligations of Onconova, under this Section 3.3(ii).

iii) From time to time, SymBio may update the Development Plan as it relates to activities to be conducted by or on behalf of SymBio if such updates: (a) are not likely to cause a material change to the timing of development; (b) are likely to cause a material change to the timing or scope of SymBio's activities under such Development Plan and are in response to any updates to the Development Plan made by Onconova or a Licensee pursuant to Section 3.3(ii), or (c) are likely to cause a material change to the timing or scope of SymBio's activities under such Development Plan and are in response to unanticipated circumstances outside of SymBio's reasonable control (other than as described in the subsection (b)). SymBio shall provide to Onconova all proposed updates to its activities under the Development Plan for review and comment. Onconova shall have ** after receipt of such proposed Development Plan to provide written comments on any proposed update to SymBio's activities under the Development Plan. SymBio shall reasonably consider Onconova's comments thereto. After consideration of Onconova's comments, SymBio shall provide to Onconova a final updated Development Plan.

4. Launch & Commercialization of Licensed Product

4.1 SymBio shall have full responsibility for all commercialization activities for the Commercial Product, at SymBio's expense and risk and in accordance with the terms of this Agreement and in conformity with all applicable Laws. SymBio shall use Commercially Reasonable Efforts to obtain Marketing Approval for the Commercial Product in each country of the Licensed Territory. SymBio shall commence the marketing of the Commercial Product under either the Onconova Trademark or another trademark selected and owned or Controlled by SymBio, as SymBio in its sole discretion shall decide and as set forth in Article 8, in the Licensed Territory within ** after obtaining the first Marketing Approval of the Licensed Product. SymBio shall notify Onconova promptly of the date of first commercial sale of the Licensed Product in the Licensed Territory.

4.2 After receiving Marketing Approval of the Licensed Product in a country in the Licensed Territory, SymBio shall use Commercially Reasonable Efforts to market, sell and promote the Commercial Product in such country.

Specifically, SymBio shall (i) launch commercially a Commercial Product in a given country in the Licensed Territory no later than ** after receipt of Marketing Approval for such Licensed Product in such country, and (ii) not withdraw a Commercial Product from sale or abandon for more than ** the sale of a Commercial Product, provided that SymBio shall not be in breach of the foregoing obligations to the extent that SymBio's failure to launch or abandonment of the Commercial Product as described above results from a failure of Onconova to supply Commercial Product to SymBio pursuant to the terms of the Development Supply Agreement and/or Commercial Supply Agreement, as applicable, and further provided that if Section 21.1 applies, then SymBio shall not be deemed in breach of this Section 4.2 and the Parties shall have the rights and obligations set forth in Section 21.1.

4.3 The Joint Committee will coordinate communications regarding certain aspects of the Parties' marketing efforts for Licensed Product as follows:

i) Through the Joint Committee:

a) Onconova shall share with SymBio free of charge any and all of marketing information in the Control of Onconova with respect to the Commercial Product, including without limitation, complete promotion plans and strategies, as well as all promotional and sales materials used for the launch and marketing of the Licensed Product outside the Licensed Territory. Onconova shall use its Commercially Reasonable Efforts to obtain from its Licensees the right to provide such marketing information generated by such Licensees.

b) SymBio shall share with Onconova free of charge any and all of marketing information in the Control of SymBio with respect to Commercial Product, including without limitation, complete promotion plans and strategies, as well as all promotional and sales activities and materials used for the launch and marketing of the Licensed Product in the Licensed Territory, whether generated by SymBio or its Sublicensees.

4.4 SymBio shall (i) use Commercially Reasonable Efforts not to abandon or allow to lapse any Drug Approval Application for a Licensed Product in the Licensed Territory, and (ii) not abandon or allow to lapse any Marketing Approval for the Licensed Product in the Licensed Territory.

5. Manufacturing & Supply

5.1 Development Supply. Pursuant to the Development Supply Agreement, Onconova shall, by itself or through its Third Party contract manufacturer, supply to SymBio, and SymBio shall purchase from Onconova, all quantities of Clinical Samples required by SymBio to develop the Licensed Product in the Licensed Territory, at the Actual Unit Cost plus ** of such Actual Unit Cost as a manufacturing mark up. Within ** after the Effective Date, the Parties shall commence good faith negotiations of a development supply agreement which shall govern the supply by Onconova of Clinical Samples (the "Development Supply Agreement"), with a goal of entering into the Development Supply Agreement within ** after the Effective Date. Such Development Supply Agreement shall be consistent with the terms set forth in this Article 5, and shall include customary and reasonable terms and conditions commonly accepted in the pharmaceutical industry for supply of similar products at similar scale. Without limiting the foregoing, the Development Supply Agreement shall contain rights for SymBio to audit the Actual Unit Cost periodically, an obligation for the Parties to enter into a quality agreement, and backup rights for SymBio to manufacture the Licensed Product.

5.2 Commercial Supply.

i) Not later than ** before the anticipated first commercial sale of the Licensed Product in the Licensed Territory, the Parties shall commence good faith negotiations of a commercial supply agreement that shall govern the supply of Commercial Product to SymBio (the "Commercial Supply Agreement"), with a goal of entering into the Commercial Supply Agreement no later than ** prior to the anticipated first commercial sale of the Licensed Product in the Licensed Territory. Pursuant to the Commercial Supply Agreement,

Onconova shall be obligated, by itself or through its Third Party contract manufacturer, to supply to SymBio, and SymBio shall be required to purchase, all quantities of the Commercial Product required by SymBio to commercialize the Licensed Product in the Licensed Territory. Such Commercial Supply Agreement shall be consistent with the terms set forth in this Article 5, and shall include customary and reasonable terms and conditions commonly accepted in the pharmaceutical industry for supply of similar products at similar scale. Without limiting the foregoing, the Commercial Supply Agreement shall contain rights for SymBio to audit the Actual Unit Cost periodically, an obligation for the Parties to enter into a quality agreement, backup rights for SymBio to manufacture Licensed Products and rights for SymBio to inspect facilities used to manufacture Commercial Product.

ii) Pursuant to the Commercial Supply Agreement, Onconova shall supply SymBio with the Commercial Product meeting the relevant Specifications, at a price equal to the "Mark Up," which shall be defined as Onconova's Actual Unit Cost for the Commercial Product plus **, provided that (i) in no event shall the Mark Up exceed **, and further provided that in no event shall the sum of the price for supply of the Commercial Product to SymBio and the royalty payable pursuant to Section 15 with respect to the Commercial Product exceed **. The foregoing calculations shall be based on the average Japan Net Selling Price and U.S. Net Selling Price calculated for all units of Commercial Product sold in the calendar quarter preceding the calendar quarter in which Onconova invoices SymBio for Commercial Product. With respect to any supply of Commercial Product prior to the period during which the U.S. Net Selling Price and/or Japan Net Selling Price can be calculated, the Parties shall use an estimated U.S. Net Selling Price and/or Japan Net Selling Price, as applicable, for purposes of calculating the Mark Up.

5.3 Onconova shall notify SymBio of the identity of any Third Party contract manufacturers that will manufacture Goods to be supplied to SymBio, or that are as of the Effective Date, manufacturing Goods to be supplied to SymBio pursuant to this the Development Supply Agreement or Commercial Supply Agreement, promptly after entering into an agreement with any such Third Party or the Effective Date, as applicable.

5.4 Each Party shall not, and shall use Commercially Reasonable Efforts (consistent with any applicable Law) to obligate its Licensees, Sublicensees, distributors or wholesalers to not, deliver or cause to be delivered, including via the Internet or mail order, Licensed Product outside each Party's territory and to not sell any Licensed Product to a purchaser if in either case such Party or its Licensees, Sublicensees, distributors or wholesalers knows, or has reason to believe, that such purchaser intends to remove such Licensed Product from such Party's territory for the purpose of sales or use by patients of the Licensed Product in the other Party's territory.

6. Exchange of Scientific Information

6.1 Within ** after the Effective Date, Onconova shall deliver to SymBio a copy of all Onconova Information listed in Annex 1 that is available in tangible form as of the Effective Date.

6.2 For the purpose of this Agreement, any and all Onconova Information disclosed by Onconova to SymBio before execution of this Agreement shall be deemed to have been disclosed hereunder.

6.3 Whenever any material event occurs in the course of the development of the Licensed Product by Onconova or its Licensees of which Onconova becomes aware, but in no event less than once every ** until such time as SymBio or a Sublicensee receives Marketing Approval for the Licensed Product in each country of the Licensed Territory, Onconova shall disclose to SymBio information regarding, and Scientific Information resulting from, all development activities with respect to the Compound and/or the Licensed Product conducted by Onconova or its Licensees, as may be necessary or useful for development of the Licensed Product in the Licensed Territory, and a description of the status of such development efforts.

6.4 Whenever any material event occurs in the course of the development of the Licensed Product by SymBio or its Sublicensees of which SymBio becomes aware, but in no event less than once every ** during the term of this Agreement, SymBio shall disclose to Onconova information regarding, and Scientific Information resulting from, all development activities with respect to the Compound and/or the Licensed Product conducted by SymBio or its Sublicensees as may be necessary or useful for development of the Licensed Product outside the Licensed Territory, and a description of the status of such development efforts.

6.5 Each Party shall have the right, at no additional expense, to use all Scientific Information disclosed to it pursuant to Section 6.3 or Section 6.4, as applicable, for the development and commercialization of the Licensed Product, and to grant to its Licensees (as to Onconova) or Sublicensees (as to SymBio) the right to use such Scientific Information for the development and commercialization of the Licensed Product, without any obligation to the other Party except as otherwise set forth in this Agreement.

6.6 Onconova and its Licensees shall have the right to cross-reference, for purposes of developing Licensed Products outside of the Licensed Territory, all Drug Approval Applications and other filings with Regulatory Authorities made by SymBio or Sublicensees for Licensed Products. SymBio and its Sublicensees shall have the right to cross-reference, for purposes of developing Licensed Products in the Licensed Territory, all Drug Approval Applications and other filings with Regulatory Authorities made by Onconova or its Licensees.

6.7 Onconova shall facilitate SymBio's interaction with Onconova's Licensees, by using Commercially Reasonable Efforts to coordinate, and if appropriate participate in, written and oral communications between SymBio and such Licensees, for purposes of developing Licensed Products in the Licensed Territory and enabling SymBio and such Licensees to comply with their respective obligations under Law. SymBio shall facilitate Onconova's interaction with SymBio's Sublicensees, by using Commercially Reasonable Efforts to coordinate, and if appropriate participate in, written and oral communications between SymBio and such Licensees, for purposes of developing Licensed Products outside of the Licensed Territory and enabling Onconova and such Sublicensees to comply with their respective obligations under Law.

6.8 The Joint Committee shall coordinate the Parties' sharing of Scientific Information and other Information as required under this Agreement:

i) Through the Joint Committee:

a) Onconova shall share with SymBio, free of charge (except for amounts becoming due and payable to Onconova pursuant to Articles 14 and 15), any and all Onconova Information generated or compiled

during the term of this Agreement for use in development and commercialization of the Licensed Product in the Licensed Territory.

b) SymBio shall share with Onconova, free of charge, any and all SymBio Information generated or compiled during the term of this Agreement for use in development and commercialization of the Licensed Product outside of the Licensed Territory.

6.9 SymBio agrees that all Onconova Information delivered by Onconova or any of its Affiliates or Licensees hereunder shall, as between the Parties, at all times be and remain sole and exclusive property of Onconova, or its Affiliates or Licensees, respectively.

6.10 Onconova agrees that all SymBio Information delivered by SymBio or any of its Affiliates or Sublicensees hereunder shall, as between the Parties, at all times be and remain sole and exclusive property of SymBio or its Affiliates or Sublicensees, respectively.

7. Inventions; Access to Improvements; Patents

7.1 Improvements and Inventions.

i) The Parties acknowledge that SymBio and its Sublicensees may change, improve or modify the Goods or otherwise make Inventions in the course of exercising SymBio's rights and performing its obligations under this Agreement, and that Onconova and its Licensees may change, improve or modify the Goods and otherwise make Inventions as Onconova and its Licensees continue to develop the Licensed Product outside the Licensed Territory and to manufacture Licensed Product for supply to SymBio for the Licensed Territory.

ii) Onconova will use Commercially Reasonable Efforts to obtain from its Licensees Control of Improvements made or developed by or on behalf of such Licensees, as well as Control of all intellectual property rights therein that are owned or controlled by such Licensees, in each case as necessary to provide SymBio access to rights to such Improvements as part of the Onconova Information, Onconova Know-how or Onconova Patents, as applicable, in the Licensed Territory pursuant to this Agreement. Any such Improvements made by or on behalf of Onconova's Licensees of which Onconova obtains Control shall be included in the Onconova Know-How, and all Patents claiming such Improvements of which Onconova obtains Control shall be included in the Onconova Patents, provided that if any royalties or other fees are required to be paid to a Licensee in respect of such rights, SymBio shall be responsible for such payments to the extent reasonably allocable to the Licensed Product in the Licensed Territory.

iii) SymBio will use Commercially Reasonable Efforts to obtain from its Sublicensees Control of Improvements made or developed by or on behalf of such Sublicensees, as well as Control of all intellectual property rights therein that are owned or controlled by such Sublicensees, in each case as necessary to provide Onconova access to rights to such Improvements as part of the SymBio Information, SymBio Know-how or SymBio Patents, as applicable, pursuant to this Agreement. Any such Improvements made by or on behalf of SymBio's Sublicensees of which SymBio obtains Control shall be included in the SymBio Know-How, and all Patents claiming such

Improvements of which SymBio obtains Control shall be included in the SymBio Patents, provided that if any royalties or other fees are required to be paid to a Sublicensee in respect of such rights, Onconova shall be responsible for such payments to the extent reasonably allocable to the Licensed Product outside the Licensed Territory.

iv) Onconova shall have the right to grant sublicenses under Section 2.2 with respect to SymBio Know-How and SymBio Patents that constitute Improvements ("SymBio Improvements") to any Licensees who agree to provide to Onconova Control of Improvements made by or on behalf of such Licensee ("Licensee Improvements") on a royalty-free, fully-paid basis, enabling Onconova to provide to SymBio a sublicense pursuant to Section 2.1 under such Licensee Improvements at no additional cost to SymBio. If Onconova desires to grant sublicenses to SymBio Improvements under Section 2.2 to any Licensees who do not agree to provide to Onconova Control of Licensee Improvements made by or on behalf of such Licensee on such a royalty-free, fully-paid basis, the Parties will negotiate commercially reasonable terms under which Onconova may grant such a sublicense under SymBio Improvements to such Licensee for up to ** after Onconova requests that it have the right to grant such a sublicense to such Licensee. In such case, Onconova may only grant a sublicense under such SymBio Improvements to such Licensee after the Parties agree in writing on the applicable commercial terms.

v) SymBio shall have the right to grant sublicenses under Section 2.1 with respect to Onconova Know-How and Onconova Patents that constitute Improvements ("Onconova Improvements") to any Sublicensees who agree to provide to SymBio Control of Improvements made by or on behalf of such Sublicensee ("Sublicensee Improvements") on a royalty-free, fully-paid basis, enabling SymBio to provide to Onconova a sublicense pursuant to Section 2.2 under such Sublicensee Improvements at no additional cost to Onconova. If SymBio desires to grant sublicenses to Onconova Improvements under Section 2.1 to any Sublicensees who do not agree to provide to SymBio Control of Sublicensee Improvements made by or on behalf of such Sublicensee on such a royalty-free, fully-paid basis, the Parties will negotiate commercially reasonable terms under which SymBio may grant such a sublicense under Onconova Improvements to such Sublicensee for up to ** after SymBio requests that it have the right to grant such a sublicense to such Sublicensee. In such case, SymBio may only grant a sublicense under such Onconova Improvements to such Sublicensee after the Parties agree in writing on the applicable commercial terms.

7.2 Ownership of Inventions. Inventorship shall be determined in accordance with U.S. patent laws. Any Invention made solely by employees, agents, or independent contractors of a Party in the course of performing activities under this Agreement, together with all intellectual property rights therein ("Sole Inventions") shall be owned by such Party. Any Invention made jointly by employees, agents, or independent contractors of each Party, together with all intellectual property rights therein ("Joint Inventions") shall be owned jointly by the Parties in accordance with joint ownership interests of co-inventors under U.S. patent laws, with each joint Party having, unless otherwise set forth in this Agreement, the unrestricted right to license and grant rights to sublicense any such Joint Invention. To the extent necessary to effect the foregoing, each Party hereby grants to the other party a nonexclusive, royalty-free, worldwide license, with the right to grant sublicenses, under such Party's interest in Joint Inventions, for any and all purposes; provided that the foregoing shall not apply

to any uses of such Joint Inventions for which and the receiving Party otherwise retains an exclusive license pursuant to this Agreement, with such proviso to apply only for so long as such receiving Party retains such exclusive license.

7.3 Disclosure of Inventions. Each Party shall promptly disclose to the other Party in writing any Invention disclosures, or other similar documents, submitted to it by its employees, agents, or independent contractors describing each and every Invention that may be either a Sole Invention or a Joint Invention, and all Information relating to such Invention.

7.4 Prosecution of Patents.

i) Onconova Patents Other than Joint Patents. Onconova shall have the first right and authority to file, prosecute, and maintain Onconova Patents other than Joint Patents on a worldwide basis at its sole discretion (subject to this Section 7.4(i)). The Parties shall ** all costs of such filing, prosecution and maintenance in the Licensed Territory; otherwise, ** shall bear all expenses of such activities. Onconova shall provide SymBio opportunity to review and comment on any and all prosecution efforts, but in no case less than **, if reasonably practicable, prior to any filing deadlines, regarding the Onconova Patents within the Licensed Territory, provided that Onconova shall have final control over such prosecution efforts after reasonably considering SymBio's comments, if any. Onconova shall provide SymBio with a copy of material communications from patent authorities in the Licensed Territory regarding the Onconova Patents, and shall provide drafts of any material filings or responses to be made to such Patent authorities in a timely manner. Notwithstanding the foregoing, if Onconova determines in its sole discretion to abandon or not maintain in the Licensed Territory any Onconova Patent other than a Joint Patent, Onconova shall provide SymBio with ** prior written notice of such determination and, if SymBio so requests, shall provide SymBio with the opportunity to prosecute and maintain such Onconova Patent in the Licensed Territory in the name of Onconova. Thereafter, the Parties shall ** all expenses of filing, prosecuting and maintaining such Onconova Patent in the Licensed Territory.

SymBio acknowledges that certain of the Onconova Patents are subject to the rights of Onconova's licensors pursuant to the Upstream Agreements. Notwithstanding the provisions of this Section 7.4(i), SymBio agrees that the rights of such licensors are precedent to Onconova's obligations, and SymBio's rights under this Section 7.4(i), and Onconova compliance with the terms of the Upstream Agreements, shall not if contrary to the terms of this Section 7.4(i) constitute a breach hereof, including without limitation with respect to the ** review period described above; provided, however, that Onconova shall notify Onconova's licensors pursuant to the Upstream Agreements of its desire to abandon or not maintain any Onconova Patent in the Licensed Territory only after (a) Onconova first provides to SymBio ** prior written notice of such intent as provided in the preceding paragraph and (b) SymBio elects not to prosecute and maintain such Onconova Patents within such ** period.

ii) Joint Patents. With respect to any potentially patentable Joint Invention, the Parties shall meet and agree upon which Party shall prosecute and maintain Patent applications covering such Joint Invention (any such Patent application and any Patents issuing therefrom, a "Joint Patent") in particular countries and jurisdictions throughout the world. Unless otherwise agreed by the

Parties, SymBio will prosecute and maintain any Joint Patents in the Licensed Territory, and Onconova will prosecute and maintain the Joint Patents outside the Licensed Territory, subject to the Parties coordinating their efforts as appropriate to make such prosecution activities as efficient, convenient, and harmonious as possible. The Parties ** all expenses of filing, prosecuting and maintaining such Joint Patents. The Party that prosecutes a Joint Patent (the "Prosecuting Party") shall provide the other Party the opportunity to review and comment on any and all such prosecution efforts regarding the applicable Joint Patent in the particular jurisdictions, and such other Party shall provide the Prosecuting Party reasonable assistance in such efforts, provided that the Prosecuting Party shall have final control over such prosecution efforts after reasonably considering the other Party's comments, if any. The Prosecuting Party shall provide the other Party with a copy of all material communications from any Patent authority in the applicable jurisdictions regarding the Joint Patent being prosecuted by such Party, and shall provide drafts of any material filings or responses to be made to such patent authorities a reasonable amount of time in advance of submitting such filings or responses. In particular, each Party agrees to provide the other Party with all information necessary or desirable to enable the other Party to comply with any duty of candor and/or duty of disclosure requirements of any Patent authority. Except to the extent a Party is restricted by the licenses granted by such Party to the other Party under the terms of this Agreement, and/or the other covenants contained in this Agreement, each Party shall be entitled to practice, and grant licenses to Third Parties and Affiliates of such Third Parties to practice, the Joint Patents and all Joint Inventions without restriction or an obligation to account to the other Party, and the other Party shall consent and hereby consents, without additional consideration, to any and all such licenses.

iii) Cooperation in Prosecution. Each Party shall provide the other Party all reasonable assistance and cooperation in the Patent prosecution efforts described above in this Section 7.4, including without limitation providing any necessary power of attorney and executing any other required documents or instruments for such prosecution.

7.5 Infringement of Patents by Third Parties.

i) Notification. Each Party shall promptly notify the other Party in writing of any existing or threatened infringement of the Onconova Patents (including Joint Patents) of which it becomes aware in the Licensed Territory, and shall provide to the other Party any and all evidence and information available to such Party regarding such alleged infringement.

ii) Product Infringement of Onconova Patents (Including Joint Patents) in the Licensed Territory.

a) If a Party becomes aware of any actual or alleged existing or threatened infringement by a Third Party of any Onconova Patent, including any Joint Patent, by making, using, importing, offering for sale, or selling the Compound and/or the Licensed Product (such activities, "Product Infringement") in the Licensed Territory, such Party shall notify the other Party as provided in Section 7.5(i). SymBio shall have the first right, but not the obligation, to bring an appropriate suit or other action against any person or entity engaged in such Product Infringement in the Licensed Territory, subject to Section 7.5(ii)(b).

SymBio shall have a period of ** after such notification to or by SymBio, to elect to so enforce such Onconova Patent in the Licensed Territory. If SymBio does not so elect, SymBio shall so notify Onconova in writing during such ** period, or ** prior to any deadline

relating to loss of any rights with respect to the Product Infringement, whichever is earlier, and Onconova shall have the right, but not the obligation, to commence a suit or take action to enforce such Onconova Patent against such Third Party allegedly perpetrating such Product Infringement. Each Party shall provide to the Party enforcing any such rights under this Section 7.5(ii) reasonable assistance in such enforcement, including without limitation joining an action as a party plaintiff if so required by Laws to pursue such action, at the enforcing Party's sole expense. The enforcing Party shall keep the other Party regularly informed of the status and progress of such enforcement efforts, and shall reasonably consider the other Party's comments on any such efforts. Except as set forth above, the enforcing Party shall bear and be responsible for all costs incurred in connection with each Party's activities under this Section 7.5(ii).

b) The Party not bringing an action with respect to Product Infringement under this Section 7.5 shall be entitled to separate representation in such matter by counsel of its own choice and at its own expense, but such Party shall at all times cooperate fully with the Party bringing such action. Additionally, the Party not bringing an action under this Section 7.5 may have an opportunity to participate in such action to the extent that the Parties may mutually agree at the time the other Party elects to bring an action hereunder.

iii) Product Infringement of Onconova Patents (including Joint Patents) Outside the Licensed Territory.

a) For any and all infringement of Onconova Patents other than Joint Patents anywhere outside the Licensed Territory, and for any and all infringement other than Product Infringement of the Onconova Patents (other than Joint Patents) in the Licensed Territory, Onconova shall have the sole and exclusive right to bring an appropriate suit or other action against any person or entity engaged in such infringement of such Patents, in its sole discretion, and as between the Parties Onconova shall bear all related expenses and retain all related recoveries.

b) If a Third Party infringes a Joint Patent by Product Infringement activities outside the Licensed Territory, Onconova shall have the sole and exclusive right to bring an appropriate suit or other action against any person or entity engaged in such infringement of such Joint Patent, in its sole discretion, and as between the Parties Onconova shall bear all related expenses and retain all related recoveries. SymBio shall provide to Onconova reasonable assistance in such enforcement, at Onconova' request and expense, including without limitation joining such action as a party plaintiff if so required by Laws to pursue such action.

iv) Non-Product Infringement of Joint Patents Anywhere in the World. For infringement of the Joint Patents that is not Product Infringement, the Parties shall confer to determine which Party shall have the first right to bring an

appropriate suit or other action against any person or entity engaged in such infringement, and the manner in which they shall bear costs and share related recoveries of such suit or action. The Party that brings such suit or actions (the "Enforcing Party") shall keep the other Party regularly informed of the status and progress of such enforcement efforts, and shall reasonably consider the other Party's comments on any such efforts. The other Party shall cooperate with the enforcing Party in enforcing Joint Patents against such infringement, without limitation joining an action as a party plaintiff if so required by Laws to pursue such action. If the Parties are unable to reach agreement upon which Party shall bring an appropriate suit or other action against any person or entity engaged in such infringement of such Joint Patent within **, or ** prior to any deadline relating to loss of any rights with respect to such infringement, whichever is earlier, then SymBio shall have the first right, but not the obligation, to bring such suit or other actions against such infringement in the Licensed Territory at its sole expense, and Onconova shall have the first right, but not the obligation, to bring such suit or other actions against such infringement outside of the Licensed Territory. The other Party shall have the right to participate in such actions at its expense upon written notice to the other Party.

v) Settlement. SymBio shall not settle any claim, suit, or action that it brings under this Section 7.5 involving Onconova Patents (excluding Joint Patents) in any manner that would negatively impact Onconova, including settlements involving the ownership, validity or enforceability of any of the Onconova Patents, or that do not include a full and unconditional release from all liability of Onconova, without the prior written consent of Onconova, which shall not be unreasonably withheld or delayed. Onconova shall not settle any claim, suit, or action that it brings under this Section 7.5 involving Onconova Patents (excluding Joint Patents) in the Licensed Territory in any manner that would negatively impact SymBio, without the prior written consent of SymBio, which shall not be unreasonably withheld or delayed. Moreover, any settlement by SymBio involving Onconova Patents (excluding Joint Patents), or by Onconova involving Onconova Patents (excluding Joint Patents) in the Licensed Territory, that (i) results in cross-licensing or (ii) results in sublicenses to Third Parties shall require the other Party's prior written consent. Neither Party shall settle any claim, suit, or action that it brings under this Section 7.5 involving Joint Patents in any manner that would negatively impact the other Party, including the ownership, validity or enforceability of any of the Joint Patents, or if the settlement does not include a full and unconditional release from all liability of the other Party, without the prior written consent of such other Party.

vi) Allocation of Proceeds. Except as otherwise provided herein, if either Party recovers monetary damages from any Third Party in a suit or action brought under this Section 7.5, whether such damages result from the infringement of SymBio Patents or Onconova Patents, such recovery shall be allocated **.

7.6 Infringement of Third Party Rights in the Licensed Territory.

i) Notice. If the development, manufacture, use, sale, offer for sale, import or export of the Licensed Product in the Licensed Field and in the Licensed Territory results in a claim for Patent infringement by a Third Party, the Party first having notice of such claim shall promptly notify the other Party in writing of such a claim. Following such notice, the Parties agree to enter into either a joint defense or common interest agreement, under which agreement the

Parties can share the known facts of such infringement in reasonable detail, if they are advised to do so by counsel.

ii) Third Party Claims. SymBio shall assume control of the defense of any claims brought by Third Parties alleging infringement of Third Party intellectual property rights in connection with the development, manufacture, use, sale, offer for sale, import or export of the Licensed Product in the Licensed Field in the Licensed Territory, represented by its own counsel. If requested by SymBio, Onconova agrees to join in any litigation, and in any event shall reasonably cooperate with SymBio, at SymBio's expense. SymBio shall have the exclusive right to settle any such claim without the consent of Onconova, unless such settlement shall negatively impact on Onconova, including without limitation on the ownership, validity or enforceability of any Onconova Patents. Any expenses incurred in defending any such claims shall be solely the responsibility of SymBio.

7.7 Patent Oppositions and Other Proceedings.

i) By the Parties. If either Party desires to bring an opposition, action for declaratory judgment, nullity action, interference, declaration for non-infringement, reexamination, or other attack upon the validity, title, or enforceability of a Patent owned or controlled by a Third Party that covers, in the Licensed Territory, the Compound or the Licensed Product, or the manufacture, use, sale, offer for sale, or importation of the Compound or the Licensed Product (except insofar as such action is a counterclaim to or defense of, or accompanies a defense of, a Third Party's claim or assertion of infringement under Section 7.6, in which case the provisions of Section 7.6 shall govern), such Party shall so notify the other Party, and the Parties shall promptly confer to determine whether to bring such action or the manner in which to settle such action. SymBio shall have the first right, but not the obligation, to bring in its sole control and at its sole expense such action in the Licensed Territory. If SymBio does not bring such action within ** of notification thereof pursuant to this Section 7.7 (or earlier, if required by the nature of the proceeding), then Onconova shall have the right, but not the obligation, to bring, in Onconova's sole control and at its sole expense, such action. The Party not bringing an action under this Section 7.7 shall join the action as a joint party plaintiff if required to enable the other Party to bring such action, at the other Party's expense. Additionally, if appropriate, the Party not bringing an action under this Section 7.7 shall be entitled to separate representation, at its sole expense, in such proceeding by counsel of its own choice, and shall cooperate fully with the Party bringing such action. Any awards or amounts received in bringing any such action shall be first allocated to reimburse the Parties' expenses in such action, and any remaining amounts shall be retained by the Party bringing such action.

ii) By Third Parties. If an Onconova Patent (including a Joint Patent) becomes the subject of any proceeding commenced by a Third Party in the Licensed Territory in connection with an opposition, reexamination request, action for declaratory judgment, nullity action, interference, or other attack upon the validity, title or enforceability thereof (except insofar as such action is a counterclaim to or defense of, or accompanies a defense of, an action for infringement against a Third Party under Section 7.5, in which case the provisions of Section 7.5 shall govern), then Onconova shall have the first right, but not the obligation, to control such defense at its sole cost. Onconova shall permit SymBio to participate in the proceeding to the extent

permissible under Laws, and to be represented by its own counsel in such proceeding, as SymBio's sole expense. If Onconova decides that it does not wish to defend against such action, then SymBio shall have a backup right to assume defense of such Third-Party action. Except as set forth above, all expenses incurred by the Parties in such an action shall be borne by the Party controlling the defense of the Third-Party action. Any awards or amounts received in defending any such Third-Party action, if any, shall be allocated between the Parties as provided in Section 7.5(vi) as if the Party controlling the defense of the Third-Party Action were the Party that brought an action against an alleged infringer.

7.8 Patent Term Extensions in the Territory. The patent counsel of each Party shall discuss and recommend for which, if any, of the Onconova Patents in the Licensed Territory the Parties should seek any term extensions, supplementary protection certificates, and equivalents thereof offering Patent protection beyond the initial term with respect to any issued Patents ("Patent Term Extensions") in the Licensed Territory. SymBio shall have the final decision-making authority with respect to applying for any such Patent Term Extensions in the Licensed Territory, provided that SymBio shall not unreasonably fail or refuse to do so, and shall have the sole right to apply for any such Patent Term Extensions SymBio decides to seek, at its expense. Onconova shall cooperate fully with SymBio, at SymBio's expense, in making such filings or taking any related actions, for example and without limitation, making available all required regulatory data and information and executing any required authorizations to apply for such Patent Term Extension.

7.9 Orange Book Equivalent. Upon request of SymBio, to the extent that SymBio shall not have the right to itself do so, Onconova shall file appropriate information with Regulatory Authorities in the Licensed Territory listing any Onconova Patents with such Regulatory Authorities in the equivalent of the U.S. Orange Book, if any, as a Patent related to the Licensed Product. Onconova shall use Commercially Reasonable Efforts to maintain such listing, at SymBio's expense.

7.10 Registration of License. Onconova agrees that SymBio may, if applicable, register its license under the Onconova Patents with the patent authorities in the Licensed Territory. SymBio shall, at its expense, prepare and deliver to Onconova such instruments and other documents reasonably necessary and in proper form for such registration. The Parties shall mutually agree on the form of documents to be used for such purpose, and shall cooperate to preserve confidentiality of this Agreement to the extent permitted under applicable Laws in the relevant country. Onconova shall execute and return to SymBio such instruments and documents within ** from the receipt thereof.

7.11 Patent Marking. SymBio agrees to mark or have marked with the Onconova Patents to the extent consistent with applicable Laws any Licensed Product sold by SymBio or by its Sublicensees in accordance with the statutes of any country within the Licensed Territory relating to the marketing of patented articles, including without limitation to the extent required under Section 12.1 of the Temple Agreement.

8. Trademarks

8.1 SymBio shall be responsible for the selection, registration and maintenance of all trademarks which it employs in connection with the commercialization of any Licensed Product in the Licensed Territory under this Agreement, other than the Onconova Trademarks (the "SymBio Trademarks"). SymBio shall solely own the SymBio Trademarks and pay all relevant costs thereof. SymBio shall not select,

register or otherwise use any trademark that is the same as or confusingly similar to, misleading or deceptive with respect to or that dilutes any of the Onconova Trademarks. Onconova shall not use any trademark that is the same as or confusingly similar to, misleading or deceptive with respect to or that dilutes any of the SymBio Trademarks. SymBio shall have the sole right to initiate at its own discretion legal proceedings against any infringement or threatened infringement of any SymBio Trademark.

8.2 Election to Use Onconova Trademarks. Within a reasonable time after the Effective Date, but in no event later than **, SymBio shall inform Onconova in writing if SymBio elects to use the Onconova Trademarks in connection with the commercialization of the Licensed Product in the Licensed Territory. If SymBio so notifies Onconova, the following shall apply:

i) Onconova shall and hereby does grant to SymBio an exclusive, royalty-free license, with the right to grant sublicenses through multiple tiers of Sublicensees (subject to Section 2.1(i)), to use the Onconova Trademarks on or in connection with the commercialization of the Licensed Product in the Licensed Territory in the Licensed Field.

ii) SymBio shall not use any trademark that is confusingly similar to, misleading or deceptive with respect to or that dilutes any of the Onconova Trademarks.

iii) SymBio shall properly designate the Onconova Trademarks on the packaging of the final Licensed Product, to the extent required or permissible by the applicable Marketing Approvals and SymBio agrees that all Licensed Products with which the Onconova Trademarks are used shall conform to all requirements of any Applicable Laws and any Regulatory Authorities in the Licensed Territory and shall be of a level of quality commensurate to Onconova's Licensed Products outside of the Territory, but in no event less than a reasonable level of quality.

iv) Except as otherwise provided in this Section 8.2, Onconova shall have the first right and authority, but not an obligation, to register and maintain the Onconova Trademarks in the Licensed Territory (subject to this Section 8.2(iv)). The Parties shall share equally all costs of such registration and maintenance. SymBio shall provide Onconova reasonable opportunity to review and comment on such registration efforts regarding the Onconova Trademarks. SymBio shall provide Onconova with a copy of material communications from any governmental authority in the Licensed Territory regarding the Onconova Trademark, and shall provide drafts of any material filings or responses to be made to such authorities in a timely manner. Notwithstanding the foregoing, if Onconova determines in its sole discretion to abandon or not maintain any Onconova Trademark in the Licensed Territory, Onconova shall provide SymBio with ** prior written notice of such determination and, if SymBio so requests, shall provide SymBio with the opportunity to register and maintain such Onconova Trademark in the Licensed Territory in the name of Onconova. Thereafter, the Parties shall share equally all costs of filing, prosecuting and maintaining such Onconova Trademark in the Licensed Territory.

v) If a Party becomes aware of any actual or alleged existing or threatened infringement by a Third Party of any Onconova Trademark in the Licensed Territory (such activities, "Trademark Infringement"), such Party shall notify the other Party, and shall provide to the other Party any and all evidence and

information available to such Party regarding such alleged infringement. SymBio shall have the first right, but not the obligation, to bring an appropriate suit or other action against any person or entity engaged in such Trademark Infringement, at its sole expense, subject to this Section 8.2(v). SymBio shall have a period of ** after such notification to or by SymBio, to elect to so enforce such Onconova Trademark. If SymBio does not so elect, SymBio shall so notify Onconova in writing during such ** period, or ** prior to any deadline relating to loss of any rights with respect to the Trademark Infringement, whichever is earlier, and Onconova shall have the right, but not the obligation, to commence a suit or take action to enforce such Onconova Trademark against such Third Party, at its sole expense. Each Party shall provide to the Party enforcing any such rights under this Section 8.2(v) reasonable assistance in such enforcement, at such enforcing Party's request and expense, including without limitation joining an action as a party plaintiff if so required by Laws to pursue such action. The enforcing Party shall keep the other Party regularly informed of the status and progress of such enforcement efforts, and shall reasonably consider the other Party's comments on any such efforts.

vi) The Party not bringing an action with respect to Trademark Infringement under this Section 8.2 shall be entitled to separate representation in such matter by counsel of its own choice and at its expense, but such Party shall at all times cooperate fully with the Party bringing such action. Additionally, the Party not bringing an action under this Section 8.2 may have an opportunity to participate in such action to the extent that the Parties may mutually agree at the time the other Party elects to bring an action hereunder.

8.3 Infringement of SymBio Trademarks by Third Parties. With respect to any SymBio Trademarks associated with Licensed Products in the Licensed Territory, each Party shall notify the other Party promptly upon learning of any actual or alleged threatened or existing infringement of any trademark or of any unfair trade practices, trade dress imitation, passing off of counterfeit goods, or like offenses, against such trademark. SymBio shall have the sole right, in its own discretion and at its own expense, to bring an action to address such infringement.

9. Adverse Event Reporting

9.1 Each Party shall provide to the other Party all information of which it becomes aware (including without limitation, as to SymBio, information provided by its Sublicensees, and in the case of Onconova, information provided by its Licensees) relating to the occurrence of any serious adverse event or any adverse event in connection with the Goods, and shall forward to the other Party information concerning any and all charges, complaints or claims reportable to any Regulatory Authority relating to the Goods that may come to the attention of a Party or its Sublicensees or Licensees (as applicable).

9.2 Details regarding the adverse event reporting and recall procedures shall be set out in a pharmacovigilance agreement or a separate agreement which shall be negotiated and entered into by and between Onconova and SymBio separately within ** after the Effective Date.

9.3 In the event that: (i) SymBio determines that an event, incident, or circumstance has occurred which may result in the need for a recall, market withdrawal or other removal of the Licensed Product or any lot or lots thereof from the market in the Licensed Territory, or Onconova determines that an event, incident, or circumstance

that could reasonably adversely affect the Licensed Product in the Licensed Territory has occurred which is reasonably likely to result in the need for a recall, market withdrawal or other removal of the Licensed Product, or any lot or lots thereof from the market; (ii) either Party becomes aware that a Regulatory Authority is threatening or has initiated an action to remove the Licensed Product from the market in the Licensed Territory or, if such event could reasonably adversely affect the Licensed Product in the Licensed Territory, any Regulatory Authority is threatening or has initiated an action to remove the Licensed Product from the market; or (iii) either Party is required by any Regulatory Authority to distribute a "Dear Doctor" letter or its equivalent regarding use of the Licensed Product in the Licensed Territory or, if such event could reasonably adversely affect Licensed Product in the Licensed Territory, any Regulatory Authority has required distribution of a "Dear Doctor" letter or its equivalent regarding use of the Licensed Product, it shall promptly advise the other Party in writing with respect thereto, and shall provide to the other Party copies of all relevant correspondence, notices, and the like in the possession or Control of such Party. In such event, SymBio shall have the sole authority to determine if a recall or other removal of the Licensed Product is required in the Licensed Territory, and shall be responsible for conducting any such recall or other removal of the Licensed Product in the Licensed Territory, whether voluntary or involuntary, or taking such other remedial action required by applicable Laws in the Licensed Territory. At SymBio's request, Onconova shall assist SymBio, at SymBio's expense, with respect to any such recall or remedial action, and shall provide SymBio with all information that SymBio may request in connection with its dealings with a Regulatory Authority in connection with such recall or remedial action. For avoidance of doubt, Onconova shall have the sole authority to determine if a recall or other removal of the Licensed Product is required outside of the Licensed Territory.

9.4 The Joint Committee will coordinate the maintenance of safety databases and the preparation of global safety reports.

10. Representations and Warranties

10.1 The Parties' Representations and Warranties. Each Party hereby represents and warrants to the other Party, as of the Effective Date, as set forth below.

i) Such Party (a) is a corporation duly organized and subsisting under the applicable Laws of its jurisdiction of organization, and (b) has full power and authority and the legal right to own and operate its property and assets and to carry on its business as it is now being conducted and as it is contemplated to be conducted by this Agreement.

ii) Such Party has the power, authority and legal right, and is free to enter into this Agreement and, in so doing, will not violate any other agreement to which such Party is a party as of the Effective Date.

iii) This Agreement has been duly executed and delivered on behalf of such Party and constitutes a legal, valid, and binding obligation of such Party and is enforceable against it in accordance with its terms, subject to the effects of bankruptcy, insolvency, or other applicable Laws of general application affecting the enforcement of creditor rights and judicial principles affecting the availability of specific performance and general principles of equity.

iv) Such Party has taken all corporate action necessary to authorize the execution and delivery of this Agreement.

v) Except with respect to Marketing Approvals for the Licensed Product or as otherwise described in this Agreement, such Party has obtained all necessary consents, approvals, and authorizations of all Regulatory Authorities and other Third Parties required to be obtained by such Party in connection with the execution and delivery of this Agreement and the performance of its obligations hereunder.

vi) The execution and delivery of this Agreement and the performance of such Party's obligations hereunder (i) do not conflict with or violate any requirement of applicable Laws or any provision of the articles of incorporation, bylaws, limited partnership agreement, or any similar instrument of such Party, as applicable, in any material way, and (ii) do not conflict with, violate, or breach or constitute a default or require any consent under, any applicable Laws or any contractual obligation or court or administrative order by which such Party is bound.

vii) All of such Party's employees, officers, independent contractors, consultants, and agents have executed agreements requiring assignment to such Party of all Inventions made during the course of and as a result of their association with such Party and obligating the individual to maintain as confidential the confidential information of such Party.

viii) Neither such Party, nor any of such Party's employees, independent contractors, consultants, agents or officers: (i) has ever been debarred or is subject to debarment or, to such Party's knowledge, convicted of a crime for which a Person could be debarred before a Regulatory Authority under applicable Laws, or (ii) to such Party's knowledge, has ever been under indictment for a crime for which a Person could be debarred under such Laws.

ix) All documents, information and know-how furnished or transferred by such Party to the other Party under this Agreement shall be, to its knowledge, free of errors in any material respect.

10.2 **Onconova's Representations and Warranties**. Onconova hereby represents and warrants to SymBio, as of the Effective Date, as set forth below:

i) A true and complete copy of each of the Upstream Agreements has been provided to SymBio prior to the Effective Date. The Upstream Agreements have not been modified, supplemented or amended since such copy was provided to SymBio. The Upstream Agreements are, to Onconova's knowledge, in full force and effect, all payments to date required to be made thereunder by Onconova have been made, and Onconova is in compliance in all material respects with its material obligations thereunder.

ii) Onconova has not received or provided any notice of termination of the Upstream Agreements, or any notices of material breach of the Upstream Agreements.

iii) Onconova has sufficient legal and/or beneficial title under its intellectual property rights necessary to grant the licenses contained in this Agreement.

iv) Onconova has the right to transfer to SymBio a copy of the Onconova Know-How set forth in Annex 1 in accordance with this Agreement.

v) There is no pending or, to Onconova's knowledge, threatened claim, litigation or any other proceeding brought by a Third Party against Onconova challenging the validity of the Onconova Patent Rights in the Licensed Territory, or claiming that the development, manufacture or commercialization of the Licensed Product in the Licensed Field in the Licensed Territory constitutes or would constitute infringement of such Third Party's intellectual property right(s).

vi) Onconova has not received any written communications alleging that it has violated or that it would violate, in any material manner, through the manufacture, use, import, export, sale, and/or offer for sale of the Licensed Product in the Licensed Field and in the Licensed Territory, any intellectual property rights of any Third Party.

vii) To Onconova's knowledge, no invention claimed by the Onconova Patents was made or reduced to practice using any funding of the United States Government.

10.3 **The Parties' Covenants**. Each Party hereby covenants throughout the term of this Agreement as set forth below:

i) Such Party shall not enter into any agreement with a Third Party that will conflict with the rights granted to the other Party under this Agreement.

ii) If during the term of this Agreement, a Party has reason to believe that it or any of its employees, officers, independent contractors, consultants, or agents rendering services relating to the Licensed Product: (x) is or will be debarred or convicted of a crime for which such Person could be

debarred before a Regulatory Authority under applicable Laws, or (y) is or will be under indictment under such Laws, then such Party promptly shall notify the other Party of same in writing.

10.4 **Onconova's Covenants**. Onconova hereby covenants throughout the term of this Agreement as set forth below:

i) Onconova shall not agree to amend any terms or conditions of the Upstream Agreements in any manner that would adversely affect the rights granted to SymBio under this Agreement in any respect without the prior written consent of SymBio. Onconova shall further agree that it shall not terminate the Upstream Agreements, shall not cease to exercise its rights under the Upstream Agreements, and shall not amend the Upstream Agreements in any manner that would adversely affect SymBio, in each case without the prior written consent of SymBio. Onconova shall comply with all material terms of the Upstream Agreements in all material respects, provided that Onconova shall not be in breach of the foregoing obligations to the extent that Onconova's failure to comply results from SymBio's non-compliance with the terms of this Agreement, and further provided that if Section 21.1 applies, then Onconova shall not be deemed in breach of this Section 10.4(i) and the Parties shall have the rights and obligations set forth in Section 21.1. Onconova shall notify SymBio of any anticipated termination of the Upstream Agreements by Onconova prior to such termination. Onconova shall further notify SymBio when it has received any notice from any Third Party that is a party to an Upstream Agreement stating that such Third Party intends to terminate or is terminating such Upstream Agreement.

ii) Onconova shall use Commercially Reasonable Efforts to assist SymBio in obtaining from the licensor of any Upstream Agreement written assurance that in the event of termination of Onconova's rights under such Upstream Agreement, all rights granted to SymBio by Onconova pursuant to this Agreement that constitute a sublicense under rights granted to Onconova pursuant to such Upstream Agreement shall survive such termination of Onconova's rights, such that SymBio would have a direct license or other grant of rights from such licensor as necessary to allow SymBio to continue to practice such rights within the scope of SymBio's license as set forth in Section 2.1 (a "Direct License"). SymBio shall be responsible for any payments in consideration of such Direct License that solely relate to the Licensed Product in the Licensed Territory and that are approved in advance by SymBio in writing.

11. Confidentiality Obligation of SymBio

11.1 During the term of this Agreement and for a period of ** thereafter, or ** from the Effective Date, whichever is longer, SymBio:

i) shall hold in strict confidence any and all information disclosed to it by the Onconova, including without limitation Scientific Information and other Onconova Information (together "Onconova Confidential Information") and shall not use, nor disclose or supply to any Third Party, nor permit any Third Party, to have access to the Onconova Confidential Information, without first obtaining the written consent of Onconova, except as expressly permitted in this Agreement;

ii) shall take all reasonable precautions necessary or prudent to prevent material in its possession or control that contains or refers to Onconova Confidential Information from being destroyed or lost, or discovered, received, used, intercepted or copied by any Third Party; and

iii) may disclose the Onconova Confidential Information only to its employees, consultants, independent contractors, agents, Affiliates, actual or potential Sublicensees and actual or potential acquirers, provided that such employees, consultants, independent contractors, agents, Affiliates, actual or potential Sublicensees and actual or potential acquirers are bound by terms and conditions of confidentiality no less protective than the terms and conditions that bind SymBio hereunder.

For the avoidance of doubt, it is understood that SymBio shall be liable for any breach of the confidentiality obligation under this Section 11.1 by any person or corporation to whom the Onconova Confidential Information is disclosed by SymBio.

11.2 SymBio's obligations of confidentiality and non-use under Section 11.1 shall not apply and SymBio shall have no further obligations with respect to any of the Onconova Confidential Information, to the extent SymBio can establish by competent proof that such Onconova Confidential Information:

i) is or becomes part of the public domain without breach by SymBio of this Agreement;

ii) was in SymBio's possession before disclosure by Onconova and was not acquired directly or indirectly from Onconova;

iii) is obtained from a Third Party with no obligation of confidentiality to Onconova, who has a right to disclose it to SymBio;

iv) is required to be revealed in response to a court decision or administrative order, or to comply with Laws of a governmental authority or rules of a securities exchange, in which case SymBio shall inform Onconova immediately by written notice and cooperate with Onconova using its Commercially Reasonable Efforts either to enable Onconova to seek protective measures for such Onconova Information, or to seek confidential treatment of such Onconova Information, and in such case SymBio shall disclose only such portion of the Onconova Information which is so required to be disclosed.

11.3 Nothing herein shall prevent SymBio from disclosing any Onconova Confidential Information to the extent that such Onconova Confidential Information is required to be used or disclosed for the purposes of seeking or obtaining Marketing Approvals of Licensed Products in the Licensed Territory or seeking patent protection for Inventions it owns or has responsibility for prosecuting under Article 7. SymBio shall further have the right to present Onconova Information at conferences or to publish Onconova Information in journals (collectively "Publications"), provided such Publication is subject to Onconova's prior written consent, not to be unreasonably withheld or delayed.

11.4 SymBio acknowledges that certain Onconova Confidential Information was provided to Onconova by Temple University pursuant to the Temple Agreement and is subject to the confidentiality provisions of Article 2 of the Temple Agreement. To the extent the provisions of Article 2 of the Temple Agreement are more stringent than those in this Article 11, SymBio agrees to comply with such more stringent terms with respect to any such Confidential Information of Temple University that is disclosed by Onconova to SymBio and labeled as "Confidential Information of Temple University."

11.5 SymBio acknowledges Temple University's right to publish its research as provided in Section 2.5 of the Temple Agreement.

12. Confidentiality obligation of Onconova

12.1 During the term of this Agreement and for a period of ** thereafter, or ** from the Effective Date, whichever is longer, Onconova:

i) shall hold in strict confidence any and all information disclosed to it by SymBio, including without limitation the Scientific Information and other SymBio Information (together "SymBio Confidential Information") and shall not use, nor disclose or supply to any Third Party nor permit any Third Party to have access to the SymBio Confidential Information, without first obtaining the written consent of SymBio, except as expressly permitted in this Agreement;

ii) shall take all reasonable precautions necessary or prudent to prevent material in its possession or control that contains or refers to SymBio Confidential Information from being destroyed or lost, or discovered, received, used, intercepted or copied by any Third Party; and

iii) may disclose the SymBio Confidential Information to its employees, consultants, independent contractors, agents, Affiliates, actual and potential Licensees and actual and potential acquirers, provided that such employees,

consultants, independent contractors, agents, Affiliates, actual and potential Licensees and actual and potential acquirers are bound by terms and conditions of confidentiality no less protective than the terms and conditions that bind Onconova hereunder.

For the avoidance of doubt, it is understood that Onconova shall be liable for any breach of the confidentiality obligation under this Section 12.1 by any person or corporation to whom the SymBio Confidential Information is disclosed by Onconova.

12.2 Onconova's obligations of confidentiality and non-use under Section 12.1 shall not apply and Onconova shall have no further obligations with respect to any of the SymBio Confidential Information as far as Onconova can establish by competent proof that such SymBio Confidential Information:

i) is or becomes part of the public domain without breach by Onconova of this Agreement;

ii) was in Onconova's possession before disclosure by SymBio to Onconova and was not acquired directly or indirectly from SymBio;

iii) is obtained from a Third Party with no obligation of confidentiality to SymBio, who has a right to disclose it to Onconova;

iv) is required to be revealed in response to a court decision or administrative order, or to comply with Laws of a governmental authority or rules of a securities exchange, in which case Onconova shall inform SymBio immediately by written notice and cooperate with SymBio using its Commercially Reasonable Efforts either to enable SymBio to seek protective measures for such SymBio Confidential Information, or to seek confidential treatment of such SymBio Confidential Information, and in such case Onconova shall disclose only such portion of the SymBio Confidential Information which is so required to be disclosed.

12.3 Nothing herein shall prevent Onconova from disclosing any SymBio Confidential Information to the extent that such SymBio Information is required to be used or disclosed for the purposes of seeking or obtaining Marketing Approvals of Licensed Products outside the Licensed Territory or seeking patent protection for Inventions it owns or has responsibility for prosecuting under Article 7. Onconova and its Licensees shall further have the right to disclose any SymBio Information in a Publication, provided that if the SymBio Information concerned has not been previously published, such Publication is subject to SymBio's prior written consent, not to be unreasonably withheld or delayed.

13. Press Releases

13.1 Subject to Section 11.3 or 12.3 as applicable, either Party may issue a press release or public announcement concerning any aspect of the development or commercialisation of the Compound, the Licensed Product and Commercial Product, provided that it provides to the other Party a copy of such press release or public announcement at least ** in advance of its intended publication or release thereof and obtains the written consent, not to be unreasonably withheld or delayed, of such other Party to such publication or release. Notwithstanding the foregoing, either Party may issue any public announcement that it is advised by legal counsel are required under applicable Laws, provided that such Party provides to the other Party

a copy of such press release or public announcement promptly after its release thereof.

13.2 No press release or public announcement shall be made by either Party concerning the execution of this Agreement or the terms and conditions hereof, without the prior written consent of the other Party which shall not be unreasonably withheld, delayed or conditioned. Notwithstanding the foregoing, either Party may disclose the existence of this Agreement and the terms and conditions hereof without the prior written consent of the other pursuant to Section 11.2(iv) or Section 12.2(iv), as applicable, or in connection with a due diligence process associated with any future financing by either Party or the negotiation or exploration of a possible strategic transaction involving such Party, provided that such disclosure is made in the course of such diligence, negotiation or exploration pursuant to confidentiality obligations consistent with those set forth in this Agreement.

14. Lump Sum Payment

14.1 In consideration of Onconova's efforts in generating and compiling the Onconova Information and in developing the Compound, and in consideration of the licenses and other rights granted to SymBio herein, SymBio shall pay to Onconova the following one-time (except as provided in Section 14.1(e)), lump sum payments on occurrence of the corresponding events.

UPFRONT

Upon delivery to SymBio of a Form 6166 - Certification of U.S. Tax Residency issued to Onconova or 45 days after the Effective Date, whichever is earlier	USD 7.5M

MILESTONES

**

a. **
b. **
c. **
d. **
e. **
**

SALES MILESTONES

**

**
**
**

For avoidance of doubt, if two or more of the foregoing milestones shall be achieved in the same calendar year, the payments corresponding to each such milestone shall be payable to Onconova.

14.2 All payments under Section 14.1 shall be made in USD.

14.3 SymBio shall notify Onconova of the achievement of each of the development milestones set forth in Section 14.1 within ** of its achievement, and each of the sales milestones set forth in Section 14.1 within ** after SymBio or its Sublicensee

closes its books for the relevant annual period in which such sales milestone payment becomes due. All payments under Section 14.1 shall be made within ** after receipt of Onconova's invoice, except that the upfront payment of USD 7.5 Million shall be made within ** after SymBio's receipt of an invoice for such amount. All payments under Section 14.1 shall be made without setoff or deduction of any kind, other than pursuant to Section 15.8.

14.4 All payments to be made to Onconova under this Agreement shall be made by wire transfer to the following account:

**

or such other account as may be specified by Onconova in writing to SymBio.

15. Royalty Payment; Audits

15.1 In consideration of the Onconova Information, Onconova Patents and Onconova Know-How licensed to SymBio, and in consideration of the other rights granted to SymBio herein, SymBio shall pay to Onconova the following incremental royalties on annual Net Sales in the Licensed Territory:

. **
. **
· 20% on annual Net Sales above **

If, in a given calendar quarter, on a country by country and product by product basis during the term during which royalties are due (as set forth in Section 15.2), (i) no Valid Claim exists in such country covering the composition of matter of such Licensed Product or the use of, or treatment with, the Licensed Product, and (ii) Competing Products are sold in such country constituting, on a unit basis, more than ** of the aggregate number of units of Competing Products and Licensed Products sold in such country during the relevant calendar quarter, based on data provided by IMS, or, if such data is not available from IMS, such other reliable data source as is reasonably determined by the Parties, then the royalty rate set forth in this Section 15.1 shall be reduced by ** of that otherwise due pursuant to this Section 15.1 for such calendar quarter. For purposes of the foregoing, "Competing Product" means in a country in the Licensed Territory, any product, other than the Licensed Product, that contains a Compound or the same active ingredient as is contained in a Licensed Product and which is approved for use in such country pursuant to a regulatory approval process governing approval of generic products based on the then-current standards for regulatory approval in such country.

15.2 Royalty Term. Royalties shall be payable, on a country by country and product by product basis, for the longer of (i) the time period prior to expiration of Marketing Exclusivity for the Licensed Product in a country in the Licensed Territory following the first commercial sale of the Licensed Product in such country, (ii) ** from first commercial sale of the Licensed Product if such country is Japan, or ** from first commercial sale of the Licensed Product if such country is Korea, or (iii) the term during which the Licensed Product, or the manufacture or use of the Licensed Product, falls under a Valid Claim of the Onconova Patents in such country.

15.3 Offsets. If SymBio reasonably determines in good faith that it is reasonably necessary to obtain a license under any Third Party intellectual property rights that would be infringed by the development, use, manufacturing or commercialization in the Licensed Field in the Licensed Territory by SymBio or its Sublicensees of the

Licensed Product, to the extent such infringement arises with respect to either the development, use, manufacturing or commercialization of the Licensed Product as it exists as of the Effective Date, or the development, use, manufacturing or commercialization activities encompassed within the Onconova Patents ("Necessary Third Party IP"), SymBio will be responsible for the negotiation and execution of the corresponding license agreement. All amounts due under such Third Party license agreement with respect to Necessary Third Party IP in connection with the development, manufacture, use or commercialization of the Licensed Product in the Licensed Field in the Licensed Territory, shall be borne by SymBio; provided, however, that SymBio shall be entitled to deduct up to ** of all payments associated with any lump sum payments or royalties actually paid to such Third Party with respect to Necessary Third Party IP in connection with the development, manufacture, use or commercialization of the Licensed Product in the Licensed Field in the Licensed Territory from the royalty payments thereafter made by SymBio to Onconova pursuant to Section 15.1, provided that in no event shall the royalties due to

Onconova for a given calendar quarter be reduced under this Section 15.3 by more than **. Any unused offset earned in a calendar year may be carried forward from such calendar year to the subsequent calendar year and may be used in such subsequent calendar year, subject to ** limitation set forth in the immediately preceding sentence.

15.4 For clarity, Onconova shall be solely responsible for paying all amounts due pursuant to the Upstream Agreements.

15.5 Payment of royalties under Section 15.1 shall be due ** after the end of each calendar quarter and shall be made in USD. All payments under Section 15.1 shall be made without setoff or deduction of any kind, other than pursuant to Section 15.3 or Section 15.8.

15.6 The conversion rate of Net Sales into USD, if applicable, shall be the official exchange rate between the United States Dollar (USD) and Japanese Yen (JPY) at Tokyo's foreign exchange (TTM: telegraphic transfer middle rate) on the last business day of each month for the calendar quarter in which the royalties were earned.

15.7 SymBio shall keep true, correct and complete records of all royalties and other amounts payable to Onconova under Section 15.1 hereof, including without limitation all financial information needed to calculate Net Sales, and upon payment of royalties shall deliver to Onconova the respective Sales Report. All financial terms and standards (including any calculation of Net Sales and financial payments due under this Agreement) shall be governed by and determined in accordance with normally accepted accounting principles and shall be consistent with SymBio's audited consolidated financial statements.

15.8 All payments under this Agreement shall be made without any deduction or withholding for or on account of any tax, except as set forth in this Section 15.8. The Parties agree to cooperate with one another and use reasonable efforts to minimize obligations for any and all income or other taxes required by Law to be withheld or deducted from any of the royalty and other payments made by or on behalf of a Party hereunder ("Withholding Taxes"). The applicable paying Party under this Agreement (the "Paying Party") shall, if required by Law, deduct from any amounts that it is required to pay to the recipient Party hereunder (the "Recipient Party") an amount equal to such Withholding Taxes, provided that the Paying Party shall give the Recipient Party reasonable notice prior to paying any such Withholding Taxes. Such Withholding Taxes shall be paid to the proper taxing authority for the Recipient

Party's account and, if available, evidence of such payment shall be secured and sent to recipient within ** of such payment. The Paying Party shall, at the Recipient Party's cost and expense, do all such lawful acts and things and sign all such lawful deeds and documents as the Recipient Party may reasonably request to enable the Paying Party to avail itself of any applicable legal provision or any double taxation treaties with the goal of paying the sums due to the Recipient Party hereunder without deducting any Withholding Taxes.

15.9 Onconova and Temple University each shall have the right, no more than once during each calendar quarter during the term of this Agreement and for ** after its termination, to have an independent certified public accountant ("Accountant") of its own selection (subject to SymBio's acceptance of such Accountant, not to be unreasonably withheld or delayed) and at its own expense audit the relevant books and records of account of SymBio in connection with the payment of royalties and any other amounts under this Agreement during normal business hours, and upon reasonable prior notice, to determine whether appropriate accounting has been performed and payments have been made to Onconova hereunder; provided that such Accountant shall be bound to treat all information reviewed during such audit as confidential, and does not disclose to Onconova any information other than information which shall have previously been given to Onconova pursuant to any provision of this Agreement or information regarding the payments due to or by Onconova as a result of such audit.

If the Accountant determines that the Sales Report has not been true or accurate, then SymBio shall refund Onconova for the costs of the Accountant if SymBio has underpaid such royalties by more than **, and the royalties shall be re-calculated on the basis of the Accountant's findings. Such Accountant's findings shall be binding for both Parties absent manifest error.

15.10 SymBio agrees to maintain complete and accurate books and records regarding its sales of the Licensed Product for purposes of determining royalties due and other amounts owing to Onconova pursuant to this Agreement for such periods of time as are required under applicable Law, provided that in no event shall SymBio retain such books and records for less than ** after the date of relevant payment made to Onconova.

15.11 Royalties payable under Section 15.1 shall be payable only once with respect to a particular unit of Licensed Product and shall be paid only once regardless of the number of Patents applicable to such Licensed Product.

15.12 If Onconova does not receive payment of any sum due to it under Section 14.1 or Section 15.1 on or before the due date, simple interest shall thereafter accrue on the sum due to Onconova from the due date until the date of payment at ** per annum or the maximum rate allowable by applicable Law, whichever is less.

16. Indemnification

16.1 Onconova shall defend, indemnify and hold harmless SymBio and its Affiliates and their respective directors, officers, agents, successors, assignees and employees (the "SymBio Indemnitees") from and against any and all claims, liabilities, losses, costs, actions, suits, damages and expenses, including reasonable attorneys' fees (collectively "Damages") to the extent arising from any claim, action or proceeding made or brought against SymBio Indemnitees by a Third Party in connection with (i) the gross negligence, recklessness, or intentional wrongful acts or omissions of Onconova, its Affiliates, and/or its Licensees and its or their respective employees,

officers, independent contractors, consultants, or agents, in connection with the performance by or on behalf of Onconova of Onconova's obligations or exercise of its rights under this Agreement; (ii) any breach by Onconova, or its Affiliates, Licensees or independent contractors of any representation, warranty, covenant, or obligation of Onconova set forth in this Agreement, and (iii) the development, manufacture, use, handling, storage, commercialization, transfer, importation, exportation or labeling, of the Licensed Product by or for Onconova, its Affiliates or Licensees either prior to the Effective Date anywhere in the world, or on or after the Effective Date outside the Licensed Territory; except in any such case to the extent such Damages are reasonably attributable to any gross negligence, recklessness, willful misconduct, or breach of this Agreement by SymBio or a SymBio Indemnitee.

16.2 SymBio shall defend, indemnify and hold harmless Onconova, Temple University and their respective Affiliates, directors, officers, agents, successors, assignees and employees (the "Onconova Indemnitees") from and against any and all Damages to the extent arising from any claim, action or proceeding made or brought against Onconova Indemnitees by a Third Party in connection with (i) the gross negligence, recklessness, or intentional wrongful acts or

omissions of SymBio, its Affiliates, and/or its Sublicensees and its or their respective employees, officers, independent contractors, consultants, or agents, in connection with the performance by or on behalf of SymBio of SymBio's obligations or exercise of its rights under this Agreement; (ii) any breach by SymBio, or its Affiliates, Sublicensees or independent contractors of any representation, warranty, covenant, or obligation of SymBio set forth in this Agreement; and (iii) the development, manufacture (other than by Onconova or its contract manufacturers), use, handling, storage, commercialization, transfer, importation, exportation or labeling of the Licensed Product by or for SymBio or any of its Affiliates, Sublicensees, agents, and independent contractors; except in any such case to the extent such Damages are reasonably attributable to any gross negligence, recklessness, willful misconduct, or breach of this Agreement by Onconova or an Onconova Indemnitee, provided that SymBio's obligation to defend, indemnify and hold harmless Temple University shall be to the extent Onconova would be required to indemnify Temple University pursuant to the Temple Agreement for the relevant claims.

16.3 Indemnification Procedure**.**

i) Each Party shall notify the other in the event it becomes aware of a claim for which indemnification may be sought pursuant to this Article 16. In case any proceeding (including any governmental investigation) shall be instituted involving any Party in respect of which indemnity may be sought pursuant to this Article 16, such Party (the "Indemnified Party") shall promptly notify the other Party (the "Indemnifying Party") in writing (an "Indemnification Claim Notice"). The Indemnifying Party and Indemnified Party shall promptly meet to discuss how to respond to any claims that are the subject matter of such proceeding. At its option, the Indemnifying Party may assume the defense of any Third Party claim subject to indemnification as provided for in this Section 16.3 by giving written notice to the Indemnified Party within ** (or until such time provided in any applicable extension to appropriately answer any complaint, if any, but no longer than ** (the "Election Time Period"); with the Indemnified Party being obligated to make all reasonable efforts to obtain any such extension) after the Indemnifying Party's receipt of an Indemnification Claim Notice, solely for claims, (i) that solely seek monetary damages and (ii) as to which the Indemnifying Party expressly agrees in writing that, as between the Indemnifying Party and the Indemnified Party, the Indemnifying Party shall be solely obligated to satisfy and discharge the claim in full (the

matters described in (i) and (ii), the "Litigation Conditions"). The Indemnified Party may assume responsibility for such defense if the Litigation Conditions are not satisfied, by written notice to the Indemnifying Party within the Election Time Period. If the Indemnified Party fails to promptly provide an Indemnification Claim Notice, and such failure materially prejudices the defense of such claim, then the Indemnifying Party shall be relieved of its responsibility to indemnify the Indemnified Party.

ii) Upon assuming the defense of a Third Party claim in accordance with this Section 16.3, the Indemnifying Party shall be entitled to appoint lead and any local counsel in the defense of the Third Party claim. Should the Indemnifying Party assume and continue the defense of a Third Party claim, except as otherwise set forth in this Section 16.3, the Indemnifying Party will not be liable to the Indemnified Party for any legal expenses subsequently incurred by such Indemnified Party after the date of assumption of defense in connection with the analysis, defense, countersuit or settlement of the Third Party claim. Without limiting this Section 16.3, any Indemnified Party will be entitled to participate in, but not control, the defense of a Third Party claim for which it has sought indemnification hereunder and to engage counsel of its choice for such purpose; provided, however, that such engagement will be at the Indemnified Party's own expense unless (a) the engagement thereof has been specifically requested by the Indemnifying Party in writing, or (b) the Indemnifying Party has failed to assume and actively further the defense and engage counsel in accordance with this Section 16.3 (in which case the Indemnified Party will control the defense), or (c) the Indemnifying Party no longer satisfies the Litigation Conditions.

iii) Subject to the Litigation Conditions being satisfied, the Indemnifying Party will have the sole right to consent to the entry of any judgment, enter into any settlement or otherwise dispose of such Damages, on such terms as the Indemnifying Party, in its reasonable discretion, will deem appropriate (provided, however that such terms shall include a complete and unconditional release of the Indemnified Party from all liability with respect thereto), and will transfer to the Indemnified Party all amounts which said Indemnified Party will be liable to pay pursuant to such settlement or disposal of such claim prior to the time such payments become due by the Indemnified Party. With respect to all other Damages in connection with Third Party claims, where the Indemnifying Party has assumed the defense of the Third Party claim in accordance with this Section 16.3, the Indemnifying Party will have authority to consent to the entry of any judgment, enter into any settlement or otherwise dispose of such Damages, provided it obtains the prior written consent of the Indemnified Party, not to be unreasonably withheld or delayed.

iv) The Indemnifying Party that has assumed the defense of the Third Party claim in accordance with this Section 16.3 will not be liable for any settlement or other disposition of any Damages by an Indemnified Party that is reached without the written consent of such Indemnifying Party. The Indemnified Party will not admit any liability with respect to, or settle, compromise or discharge, any Third Party claim without first offering to the Indemnifying Party the opportunity to assume the defense of the Third Party claim in accordance with this Section 16.3. If the Indemnifying Party chooses to defend or prosecute any Third Party claim, the Indemnified Party will cooperate in the defense or prosecution thereof and will furnish such records, information and testimony, provide such witnesses including to the extent

possible, former employees and attend such conferences, discovery proceedings, hearings, trials and appeals as may be reasonably requested in connection with such Third Party claim. Such cooperation will include access during normal business hours afforded to the Indemnifying Party to, and reasonable retention by the Indemnified Party of, records and information that are reasonably relevant to such Third Party claim, and making employees and agents available on a mutually convenient basis to provide additional information and explanation of any material provided hereunder. The Indemnifying Party will reimburse the Indemnified Party for all its reasonable out-of-pocket expenses incurred in connection with such cooperation.

16.4 SymBio agrees that during the term of this Agreement and for ** thereafter it shall keep and maintain the following insurance with ** or another reputable carrier with at least as strong a rating as ** : comprehensive public liability, including products liability coverage and clinical trial coverage, with limits of (a) ** and (b) ** or any such greater amount determined by the board of directors of SymBio, naming Onconova as an additional insured from the Effective Date forward with respect to SymBio's performance hereof. SymBio agrees to provide Onconova certificates evidencing such coverage within ** after the Effective Date and at least annually thereafter. If such insurance is canceled or materially altered, SymBio shall provide prompt written notice to Onconova.

16.5 Except as expressly provided in this Section 16, neither Party shall have any liability to indemnify the other Party against any Third Party claims.

17. Limitation of Liability; Exclusion of Damages; Disclaimer

17.1 EXCEPT IN THE CASE OF A BREACH OF ARTICLES 11 OR 12, AND WITHOUT LIMITING THE PARTIES' OBLIGATIONS UNDER ARTICLE 16 OR LIABILITY OF A PARTY FOR INFRINGEMENT OR MISAPPROPRIATION OF THE INTELLECTUAL PROPERTY RIGHTS OF THE OTHER PARTY OR FOR FRAUD OR WILLFUL MISCONDUCT, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR SPECIAL, INDIRECT, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION DAMAGES RESULTING FROM LOSS OF USE, LOSS OF PROFITS, INTERRUPTION OR LOSS OF BUSINESS, OR OTHER ECONOMIC LOSS) ARISING OUT OF THIS AGREEMENT OR WITH RESPECT TO A PARTY'S PERFORMANCE OR NON-PERFORMANCE HEREUNDER.

17.2 EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT, NEITHER PARTY PROVIDES ANY WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS OR IMPLIED, REGARDING THE LICENSED PRODUCT AND EACH PARTY HEREBY DISCLAIMS ALL OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND FREEDOM FROM INFRINGEMENT OF THIRD PARTY RIGHTS.

18. Term

18.1 SymBio's rights under this Agreement, shall, unless terminated earlier, be in full force and effect on a country by country and product by product basis for the longer of: (i) expiration of Marketing Exclusivity for the Licensed Product in a country in the Licensed Territory following the first commercial sale of such Licensed Product in such country, (ii) ** after first commercial sale of such Licensed Product if such country is Japan, or ** after first commercial sale of such Licensed Product if such

country is Korea, or (iii) the term during which Licensed Product, or the manufacture or use of the Licensed Product, falls under a Valid Claim of the Onconova Patents in such country.

18.2 Effect of Expiration. Upon expiration of this Agreement in accordance with Section 18.1:

i) the Licensed Rights shall continue in full force and effect and be considered to be fully paid-up;

ii) subject to Section 18.2(i) hereof, SymBio's confidentiality obligation under Section 11 shall continue to be in full force and effect for a period of ** following expiration of this Agreement;

iii) Onconova shall have the right to freely use and license all Onconova Information and all SymBio Information disclosed by SymBio to Onconova hereunder;

iv) subject to Section 18.2(iii) hereof, Onconova's confidentiality obligation under Section 12 shall continue to be in full force and effect for a period of ** following expiration of this Agreement; and

v) if Onconova and SymBio mutually agree in writing before the expiration of this Agreement, Onconova shall continue the supply of the Commercial Product to SymBio, provided that Onconova's supply price and supply conditions shall be commercially competitive.

18.3 Survival. For the avoidance of doubt, it is understood that provisions under Sections 6.9 (Ownership of Onconova Information), 6.10 (Ownership of SymBio Information), 7.2 (Ownership of Inventions), 8.1 (Trademarks), 9 (Adverse Event Reporting), 11 (Confidentiality Obligation of SymBio), 12 (Confidentiality obligation of Onconova), 15.9 (Audits), 15.10 (Maintenance of Records), 16 (Indemnification), 17 (Limitation of Liability; Exclusion of Damages; Disclaimer), 18.2 (Effect of Expiration) 18.3 (Survival), 20 (Obligations on Early Termination), 22 (General Provisions), 23 (Governing Law) and 24 (Dispute Resolution; Jurisdiction) shall survive the expiration of this Agreement.

18.4 Other Remedies. Termination or expiration of this Agreement for any reason shall not release any party from any liability or obligation that has accrued prior to such expiration or termination, nor affect the survival of any provision hereof to the extent it is expressly stated to survive termination. Termination or expiration of this Agreement for any reason shall not constitute a waiver or release of, or otherwise be deemed to prejudice or adversely affect, any rights, remedies, or claims, whether for damages or otherwise, that a Party may have hereunder or that may arise out of or in connection with such termination or expiration.

19. Early Termination

19.1 SymBio may terminate this Agreement at-will on ** written notice to Onconova.

19.2 Without prejudice and in addition to any other contractual remedy the non-defaulting Party may have under this Agreement, either Party may terminate this Agreement in writing forthwith, if the other Party commits a material breach of any provision of this Agreement and such breach is not cured within ** after written notice of the breach is received by the other Party.

19.3 The Agreement may be terminated by either Party in the event of a Force Majeure (as hereinafter defined) pursuant to Section 21.1.

19.4 Either Party may terminate this Agreement upon written notice if the other Party is dissolved or liquidated, files or has filed against it a petition under any bankruptcy or insolvency law that is not dismissed within **, makes an assignment for the benefit of its creditors or has a receiver or trustee appointed for all or substantially all of its property.

19.5 In the event that SymBio or any of its Affiliates commences or otherwise, directly or indirectly, pursues (or, other than as required by law or legal process, voluntarily assists any Third Party to pursue in any material respect where SymBio has knowledge that its assistance will be used by the Third Party to pursue) any proceeding seeking to have any of the Onconova Patents revoked or declared invalid, unpatentable, or unenforceable, Onconova may declare a material breach hereunder, terminate this Agreement on written notice to SymBio and shall then have the right to exercise the remedies available under Section 20.1 with immediate effect.

20. Obligations upon Early Termination

20.1 In the event of termination of this Agreement by Onconova in accordance with Section 19.2, 19.3, 19.4 or 19.5 or by SymBio under Section 19.1,

i) all Licensed Rights shall revert to Onconova without any compensation to be paid by Onconova;

ii) SymBio shall return to Onconova any and all Onconova Information;

iii) SymBio shall transfer to Onconova or its nominee any and all Marketing Approvals and all other filings and submissions with and to Regulatory Authorities with respect to the Licensed Product. To this end SymBio shall make Commercially Reasonable Efforts to file for transfer with the relevant Regulatory Authorities and to give all other notifications and approvals necessary under law for the transfer of Marketing Approvals and such other filings and submissions;

iv) SymBio shall grant to Onconova a worldwide, fully-paid, royalty-free license, with the right to sublicense, to use the SymBio Trademarks (including, without limitation, the goodwill symbolized by such SymBio Trademarks) used to brand the Licensed Product, and a license to reproduce, distribute, perform, display and prepare derivative works of SymBio's copyrights used to brand or promote the Licensed Product, in each case solely to the extent necessary or useful for commercializing the Licensed Product;

v) The licenses granted by SymBio to Onconova pursuant to Section 2.2 and other provisions of this Agreement shall continue in effect in addition to those sections that also survive pursuant to Section 18.3;

vi) SymBio shall furnish Onconova with reasonable cooperation, at SymBio's expense, to assure a smooth transition of any clinical or other studies in progress related to the Compound or Licensed Products which Onconova determines to continue in compliance with applicable Laws and ethical guidelines applicable to the transfer or termination of any such studies. In the event that Onconova informs SymBio that it does not intend to continue

specific development activities then in progress, costs incurred in closing out such activities shall be borne by SymBio; and

vii) SymBio shall not withdraw or cancel any Marketing Approval or Drug Approval Application, unless expressly instructed so by Onconova in writing.

20.2 In the event of termination of this Agreement by SymBio in accordance with Sections 19.2, 19.3 or 19.4:

i) The Licensed Rights under Section 2.1 shall survive subject to all payment obligation under Articles 14 and 15, provided, however that SymBio may defer the payment of any milestones or royalties payable hereunder pursuant to Articles 14 or 15, as applicable, until after a determination of the damages, if any, that may be owed by Onconova, with SymBio having the right to offset any such damages that are so determined against the milestones or royalties becoming payable to Onconova thereafter;

ii) SymBio shall retain ownership of any and all Marketing Approvals and other permits or approvals held by SymBio in the Licensed Territory with respect to the Licensed Product; and

iii) Onconova's obligations and SymBio's rights under Articles 5, 6, 7 and 8 shall continue in addition to those sections that also survive pursuant to Section 18.3, including without limitation SymBio's obligation to indemnify Onconova pursuant to Section 16.2.

20.3 All rights and licenses granted under or pursuant to this Agreement by Onconova or SymBio are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code and of any similar provisions of applicable Laws under any other jurisdiction (collectively, the "Bankruptcy Laws"), licenses of right to "intellectual property" as defined under the Bankruptcy Laws. Onconova agrees that SymBio, as a licensee of rights under this Agreement, shall retain and may fully exercise all of its rights and elections under the Bankruptcy Laws.

21. Force Majeure

21.1 No failure or delay by either Party in the performance of any obligation hereunder shall be deemed a breach of this Agreement nor create any liability for any damages, increased cost or losses which the other Party may sustain by reason of such failure or delay of performance, if the same shall arise from any cause or causes beyond the control of that Party, such as earthquake, storm, flood, fire, other acts of nature, epidemic, war, riot, hostility, public disturbance, cessation of transport, act of public enemies, prohibition or act by a government or public agency, strike or other labor dispute or work stoppage (collectively "Force Majeure"); provided, however, that the Party so prevented shall continue to take all commercially reasonable actions within its power to comply with its obligations hereunder as fully as possible and to mitigate possible damages.

The Party so prevented shall without undue delay notify the other Party in writing thereof.

21.2 Should the event of Force Majeure continue for more than **, the Parties shall promptly discuss their further performance under this Agreement and whether to modify or terminate this Agreement in view of the effect of the event of Force Majeure. If no agreement can be reached within ** after expiration of such **, either

Party may terminate this Agreement effective immediately upon written notice to the other Party.

22. General Provisions

22.1 Assignment. This Agreement is binding upon and will inure to the benefit of the Parties and their respective permitted assignees or successors in interest, including without limitation those that may succeed by assignment, transfer or otherwise to the ownership of either of the Parties or of the assets necessary to the conduct of the business to which this Agreement relates. This Agreement may not be assigned or otherwise transferred by either Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld or delayed; provided, however, that either Party may, without such consent, assign this Agreement together with all of its rights and obligations hereunder to its Affiliates, or to a successor in interest in connection with the transfer or sale of all or substantially all of its business to which this Agreement relates, or in the event of its merger or consolidation or similar transaction,

subject to the assignee agreeing to be bound by the terms of this Agreement. Any purported assignment in violation of the preceding sentences shall be void. Any permitted successor shall assume and be bound by all obligations of its assignor or predecessor under this Agreement.

22.2 Headings. Headings are inserted for convenience and shall not affect the meaning or interpretation of this Agreement.

22.3 Waiver. No waiver of any default hereunder by either Party or any failure to enforce any rights hereunder shall be deemed to constitute a waiver of any subsequent default with respect to the same or any other provision hereof.

22.4 Notices. Any and all notices given by one Party to the other Party under this Agreement must be in writing and shall be delivered by hand, sent by registered or certified air mail (postage prepaid), international courier service or fax to the other Party's address as set out at the beginning of this Agreement or to the latest address of such Party as shall have been communicated to the other Party.

Notices sent to Onconova shall be directed to the attention of Commercial Department, with a copy to the Chief Executive Officer.

Notices sent to SymBio shall be directed to the attention of Director Business Development, with a copy to the Chief Financial Officer.

22.5 Severability. Should any part of this Agreement be held unenforceable or in conflict with the applicable Laws of any jurisdiction, the invalid or unenforceable part or provision shall be replaced with a provision which accomplishes, to the extent possible, the original business purpose of such part or provision in a valid and enforceable manner, and the remainder of this Agreement shall remain binding upon the Parties hereto.

22.6 Entire agreement. This Agreement constitutes the whole agreement between the Parties and shall cancel and supersede any and all prior and contemporaneous negotiations, correspondence, understandings and agreements, whether oral or written, between the Parties respecting the subject matter hereof, including without limitation the Confidentiality Agreement (with any information disclosed thereunder being deemed to be disclosed pursuant to this Agreement and subject to the terms of Articles 11 or 12 respectively).

22.7 Amendment. Any amendment or modification to this Agreement shall only be made in writing and shall only be valid when signed by the due representatives of the Parties.

22.8 Counterparts. This Agreement may be executed in more than one counterpart, each of which shall be deemed an original, but all of such counterparts taken together shall constitute one and the same agreement.

22.9 Agency. Neither Party is, nor shall be deemed to be, an employee, agent, co-venturer, or legal representative of the other Party for any purpose. Neither Party shall be entitled to enter into any contracts in the name of, or on behalf of the other Party, nor shall either Party be entitled to pledge the credit of the other Party in any way or hold itself out as having the authority to do so.

22.10 Further Actions. Each Party agrees to execute, acknowledge, and deliver such further instruments, and to do all such other acts, as may be necessary or appropriate in order to carry out the purposes and intent of this Agreement.

22.11 Compliance with Laws. Each Party will comply with all Laws in performing its obligations and exercising its rights hereunder, including without limitation all Laws relating to the export, re-export or other transfer of any Information transferred pursuant to this Agreement or the Licensed Product.

22.12 Third Party Beneficiary. Each Party acknowledges and agrees that Temple University is a third party beneficiary of this Agreement to the extent required for Temple University to enforce this Agreement against SymBio in its capacity as a sublicensee under the Temple Agreement, and to enforce Temple's rights under Section 16.2.

23. Governing Law

23.1 The construction, validity and performance of this Agreement shall be governed in all respects by the laws of the state of Delaware, excluding its provisions regarding conflicts of law. The UNCITRAL Convention on the International Sale of Goods shall not apply.

24. Dispute Resolution; Jurisdiction

24.1 Any disputes under this Agreement shall be submitted initially by either Party for resolution by senior executive officers of each Party having authority to make decisions in such matters ("Executives"). The Executives shall meet and discuss such matter within ** after a Party proposes that such Executives meet to discuss the dispute. In the event the Executives of each Party are unable to resolve the dispute within ** after receiving notice of the dispute (or such longer period as the Parties may mutually agree upon), then such dispute shall be submitted upon the initiative of either Party after expiration of the ** Executive discussion period for resolution as set forth in Section 24.2.

24.2 Except as expressly provided in Section 24.4, if the Parties are unable resolve a given dispute pursuant to Section 24.1, either Party may submit the dispute for binding arbitration. The arbitration shall be held in San Francisco, CA under the rules of the American Arbitration Association ("AAA"). The arbitration shall be conducted by three (3) arbitrators who are knowledgeable in the subject matter at issue in the dispute. One (1) arbitrator will be selected by SymBio, one (1) arbitrator will be selected by Onconova, and the third arbitrator will be selected by mutual agreement

of the two (2) arbitrators selected by the Parties. The arbitrators will establish rules regarding discovery and the submission of evidence in such matter which shall be reasonably designed to allow discovery and submission of all salient facts. The arbitrators shall, within ** after the conclusion of the arbitration hearing, issue a written award and statement of decision describing the essential findings and conclusions on which the award is based, including the calculation of any damages awarded. The arbitrators shall be authorized to grant any temporary, preliminary or permanent equitable remedy or relief the arbitrators deem just and equitable and within the scope of this Agreement, including, without limitation, an injunction or order for specific performance. The award of the arbitrators shall be the sole and exclusive remedy of the Parties (except for those remedies set forth in this Agreement). Judgment on the award rendered by the arbitrators may be enforced in any court having competent jurisdiction thereof, subject only to revocation on grounds of fraud or clear bias on the part of the arbitrators.

24.3 Each Party will bear its own costs and expenses (including its attorney's fees) associated with any arbitration initiated under this section.

24.4 The language of the arbitration proceeding will be English. Notwithstanding the provisions of this Section 24, each Party shall have the right to seek preliminary or permanent injunctive or other equitable relief in any court of competent jurisdiction as such Party deems necessary to preserve its rights and to protect its interests and disputes relating to the inventorship, enforceability, validity or scope of patent rights shall be submitted for resolution to a court of competent jurisdiction.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed in duplicate by their respective duly authorized officers or representatives.

Onconova Therapeutics, Inc.	**SymBio Pharmaceuticals Limited**
/s/ Ramesh Kumar	/s/ Fuminor Yoshida
By: Ramesh Kumar President and CEO	By: Fuminor Yoshida President and CEO

Overview of Annexes (to be attached):

Annex 1: Onconova Information
Annex 2: Development Plan
Annex 3: Patent List
Annex 4: Specifications
Annex 5: Onconova Trademarks
Annex 6: Temple Patent Rights

Annex 1: Onconova Information (CTD)

Module 3: Quality

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Module 4: Nonclinical Study Reports

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Module 5: Clinical Study Reports

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Regulatory Affairs

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Annex 2: Development Plan

ON 01910.Na

CLINICAL DEVELOPMENT PLAN
And Current Status

June 14th 2011

MDS, Pancreatic and Ovarian Cancer

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Annex 3: Patent List

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Annex 4: Specifications

Current Specifications of ON 01910.Na
Injectable Drug Product
and
Oral Soft Gelatin Capsules

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Annex 5: Onconova Trademarks

Estybon® Trademark Registration

TRADEMARK ESTABLISHMENT in the UNITED STATES
TRADEMARK PLAN WITHIN ASIA

June 15, 2011

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Annex 6: Temple Patent Rights

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Exhibit 10.3

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

FIRST AMENDMENT TO LICENSE AGREEMENT

THIS FIRST AMENDMENT TO LICENSE AGREEMENT (this "Amendment") is entered into effective as of September 2, 2011, by and between Onconova Therapeutics, Inc, ("Onconova"), and SymBio Pharmaceuticals Limited ("SymBio") (each, a "Party" and together, "the "Parties"), with respect to the following facts:

A. Onconova and SymBio have entered into a certain License Agreement dated July 7, 2011 (the "Agreement").

B. Onconova and SymBio desire to amend the Agreement as set forth in this Amendment.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Onconova and SymBio agree as follows:

1. All capitalized terms used in this Amendment and not otherwise defined herein shall have the meaning given such terms in the Agreement.
2. The Amendment will remain in full force and effect for the duration of the Agreement unless agreed upon by the Parties in a separate writing.
3. The Parties agree to amend the second sentence of Section 5.1 of the Agreement in its entirety with the following sentence: "On or before **, the Parties shall commence good faith negotiations of a development supply agreement, which shall govern the supply by Onconova of Clinical Samples (the "Development Supply Agreement") with a goal of entering into the Development Supply Agreement within ** after they commence such negotiations."
4. The Parties agree to amend Section 9.2 of the Agreement in its entirety with the following sentence: "On or before **, the Parties shall commence good faith negotiations of a pharmacovigilance agreement, which shall govern the adverse event reporting and recall procedures (the "Pharmacovigilance Agreement") with a goal of entering into the Pharmacovigilance Agreement within ** after they commence such negotiations."
5. In the event of a dispute between the Parties which arises out of or relates in any way to this Amendment, or if either Party alleges that the other Party is in default of this Amendment, then the dispute or allegation shall be settled in accordance with the Dispute Resolution process agreed upon by the Parties in Article 24 of the Agreement.
6. In the event of any conflict between the provisions of the Agreement and the provisions of this Amendment, the provisions of this Amendment shall control. Except as set forth above, the Agreement shall continue in full force and effect in accordance with its terms and conditions as amended hereby.
7. The construction, validity and performance of this Amendment shall be governed in all respects by the laws of the state of Delaware, excluding its provisions regarding conflicts of law. The UNCITRAL Convention on the International Sale of Goods shall not apply.
8. This Amendment may be executed in more than one counterpart, each of which shall be deemed an original, but all of such counterparts taken together shall constitute one and the same agreement.

IN WITNESS WHEREOF, the Parties hereto have caused this Amendment to be executed by their respective duly authorized officers or representatives as of the date first set forth above.

ONCONOVA THERAPEUTICS, INC	SYMBIO PHARMACEUTICALS LIMITED
/s/ Ramesh Kumar	/s/ Fuminor Yoshida
By: Ramesh Kumar	By: Fuminor Yoshida
Its: President and CEO	Its: President and CEO

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

LICENSE AGREEMENT

This agreement (the "License Agreement") is made effective this first day of January, 1999 by and between Temple University - Of The Commonwealth System of Higher Education, a corporation organized and existing under the laws of the Commonwealth of Pennsylvania ("TEMPLE"), having a principal place of business at Broad Street and Montgomery Avenue, Philadelphia, Pennsylvania and Onconova Therapeutics Inc. ("ONCONOVA"), a corporation organized and existing under the laws of the State of Delaware, having a principal place of business at P.O. Box 7693, Princeton, New Jersey.

WHEREAS, TEMPLE is the solo owner of (i) the United States patent applications pertaining to "Aryl Sulfone Compounds," which patents are listed in Exhibit A, which Exhibit A is attached hereto and is incorporated herein by reference, (ii) "Additional Compounds" listed in Exhibit B, which Exhibit B is attached hereto and is incorporated herein by reference, and (iii) technical information pertaining to such patent applications, Aryl Sulfone Compounds and Additional Compounds;

WHEREAS, on even date herewith, TEMPLE and ONCONOVA have entered that certain Research Agreement ("Research Agreement") pursuant to which TEMPLE shall undertake for the benefit of ONCONOVA research activities relating to aryl sulfone compounds and other compounds; and

WHEREAS, ONCONOVA desires to obtain an exclusive worldwide license under the aforementioned patent applications and technical information related thereto;

NOW THEREFORE, in consideration of the premises and of the covenants and obligations hereinafter set forth, and intending to be legally bound, the parties hereby agree as follows:

1. DEFINITIONS

The following definitions shall apply throughout this License Agreement:

1.1. "ADDITIONAL COMPOUND" shall mean a compound identified in Exhibit B, and any methods of making or using such compound.

1.2. "AFFILIATE" shall mean each and every business entity controlling, controlled by or under common control with ONCONOVA. For purposes of this definition "control" shall mean ownership, directly or indirectly, of at least fifty percent (50%) of the voting stock.

1.3. "COMPANY" shall mean ONCONOVA and its AFFILIATES.

1.4. "CONFIDENTIAL INFORMATION" shall mean all information disclosed or samples supplied by one party to the other pursuant to this License Agreement. However, CONFIDENTIAL INFORMATION shall not include information which: (i) was known

to the receiving party prior to the date of disclosure by the disclosing party or is developed independently of information received from the disclosing party by those who have not had access to this information; or (ii) is lawfully received in good faith at any time by the receiving party from others lawfully in possession of the same and having the right to disclose the same; or (iii) is as of the date of receipt, in the public domain or subsequently enters the public domain other than by reason of acts or omissions of the receiving party; or (iv) is required to be disclosed by law, rule of court or regulation.

1.5. "EFFECTIVE DATE" shall mean the date first above written as the effective date of this License Agreement.

1.6. "INVENTOR" shall mean Dr. E. Premkumar Reddy and/or Dr. M.V. Ramana Reddy of the TEMPLE faculty.

1.7. "LICENSED PRODUCT" shall mean any product the manufacture, use or sale of which would infringe, induce infringement of, or contribute to the infringement of at least one VALID CLAIM contained in a patent application or issued patent included in PATENT RIGHTS if that VALID CLAIM were contained, instead, in an issued patent not included in PATENT RIGHTS.

1.8. "NET SALES" shall mean the gross receipts from the SALE of LICENSED PRODUCT by COMPANY or by its sublicensees less deductions for: (i) transportation and insurance charges; (ii) sales and excise taxes, and any other governmental charges or duties paid; (ii) normal and customary trade, quantity and cash discounts allowed; (iii) sales commissions; and (iv) allowances on account of rejection or return by customers.

1.9. "NEW COMPOUND" shall mean any compound that is developed under the PROJECT, and any method of making or using such compound.

1.10. "PATENT RIGHTS" shall mean (i) the United States patent applications listed in Exhibit A, and (ii) patent applications disclosing or claiming ADDITIONAL COMPOUNDS, NEW COMPOUNDS or PROJECT RESULTS, and any foreign counterparts thereof, or any continuations, continuations-in-part, divisions, re-issues, additions, renewals or extensions thereof, and any patents issuing therefrom.

1.11. "PROJECT" shall have the meaning defined in the RESEARCH AGREEMENT.

1.12. "PROJECT RESULTS" shall have the meaning defined in the RESEARCH AGREEMENT.

1.13. "RESEARCH AGREEMENT" shall mean that certain research agreement executed by the parties hereto on even date herewith, which research agreement is attached hereto and incorporated by reference.

1.14. "SALE" shall mean any transaction for which consideration is received for the sale, lease, license, transfer or other disposition of LICENSED PRODUCT by COMPANY or by its sublicensees.

1.15. "TECHNICAL INFORMATION" shall mean any CONFIDENTIAL INFORMATION of a technical nature relating to (i) LICENSED PRODUCT, (ii) ADDITIONAL COMPOUNDS, or (iii) an NEW COMPOUNDS, which CONFIDENTIAL INFORMATION is in the possession of TEMPLE as of the EFFECTIVE DATE or that is developed under the PROJECT, and which is necessary or useful to COMPANY in furtherance of the development, manufacture or marketing of LICENSED PRODUCT.

1.16. "VALID CLAIM" shall mean a claim of a patent application or patent, which claim has not expired and has not been held unenforceable, unpatentable or invalid by unappealable decision of a court or other governmental agency of competent jurisdiction.

2. CONFIDENTIALITY

2.1. CONFIDENTIAL INFORMATION disclosed in documentary form shall be marked "Confidential." Oral discussions of CONFIDENTIAL INFORMATION shall be reduced to writing by the disclosing party and a copy marked "Confidential" provided to the receiving party within ** of the disclosure date.

2.2. The receiving party shall hold all CONFIDENTIAL INFORMATION in strict confidence for a period of ** from the disclosure date; not use said CONFIDENTIAL INFORMATION except a provided in this License Agreement; and not disclose, directly or indirectly, said CONFIDENTIAL INFORMATION to others except with the prior written consent of the disclosing party. The receiving party shall use at least the same. degree of care to maintain CONFIDENTIAL INFORMATION secret as the receiving party uses in maintaining secret its own confidential information, but always at least a reasonable degree of care. The receiving party shall restrict disclosure of CONFIDENTIAL INFORMATION solely to those of its employees and consultants having a need to know such CONFIDENTIAL INFORMATION in order to accomplish the purposes of this License Agreement. The receiving Parity shall also advise its employees and consultants, before they have access to CONFIDENTIAL INFORMATION, of the obligations of the receiving party under this License Agreement, and require such employees and consultants to maintain those obligations.

2.3. Notwithstanding the provisions of Paragraph 2.2, COMPANY shall be entitled, without TEMPLE's prior written approval, to disclose; any CONFIDENTIAL INFORMATION of TEMPLE to the FDA or any other health authority in the world, but only to the extent required by law or regulation to obtain approval to test or market LICENSED PRODUCT.

2.4. The receiving party shall, upon request, by the disclosing party, promptly return all written materials or samples of tangible property received hereunder, as well as all summaries thereof and notes pertaining thereto, with the exception that one copy of said written materials may be retained by the receiving party solely for archival purposes.

2.5. Notwithstanding any other provision of this License Agreement, it is recognized by COMPANY that TEMPLE, through the INVENTOR, shall have the right to publish or present publicly the results of any research concerning LICENSED PRODUCT.

However, TEMPLE and the INVENTOR agree to notify COMPANY in writing of any such proposed publication or presentation ** before submission. Should COMPANY, within ** of such notification, advise TEMPLE and the INVENTOR in writing that it wishes TEMPLE to file one or more patent applications pertaining to information contained in the proposed publication or presentation, TEMPLE shall delay submission until after TEMPLE has made such filing. COMPANY may also request deletion of sensitive information from the proposed publication, and TEMPLE agrees to give good faith consideration in such a request.

3. GRANT OF LICENSE

3.1. TEMPLE grants to COMPANY a world-wide exclusive license under PATENT RIGHTS and TECHNICAL INFORMATION, with the right to grant sublicenses, to make, have made, use, sell, offer for sale and import LICENSED PRODUCT.

3.2. Notwithstanding the preceding license grant, TEMPLE shall retain rights to make, have made, use and import LICENSED PRODUCT royalty free for non-commercial educational and research purposes only, and shall be free to grant these rights to other non-profit educational and research institutions.

3.3. The parties acknowledge that inventions in PATENT RIGHTS may have resulted from United States Government funding, and agree that their rights and obligations under this License Agreement shall be subject to TEMPLE's obligations to the United States Government, if any, which would arise out of the receipt by TEMPLE of research funding from the United States Government. In particular, should the PATENT RIGHTS be subject to rifts of the United States Government, then COMPANY agrees that LICENSED PRODUCT sold in the United States under this License Agreement shall be manufactured substantially in the United States.

4. PAYMENTS

4.1. In consideration of the license granted to COMPANY under the terms of this License Agreement, COMPANY shall pay to TEMPLE, for each calendar quarter during the term of this License Agreement, with respect to NET SALES of LICENSED PRODUCT by COMPANY, a royalty of: (i) ** and (ii) **.

4.2. In further consideration of the license granted to COMPANY under the terms of this License Agreement, COMPANY shall pay to TEMPLE, for each calendar quarter during the term of this License Agreement, with respect to NET SALES of LICENSED PRODUCT by any sublicensee, a royalty of ** of such NET SALES.

4.3. In further consideration of the license granted to COMPANY under the terms of this License Agreement, COMPANY shall pay to TEMPLE: (i) upon the execution of this License Agreement, the non-refundable sum of ** and (ii) on or before **, the non-refundable sum of **. These payments shall not be creditable against any other payments due to TEMPLE under this License Agreement.

4.4. In further consideration of the license granted to COMPANY under the terms of this License Agreement, COMPANY shall pay to TEMPLE, beginning ** and annually thereafter, a non-refundable license maintenance fee of ** regardless of or irrespective of actual NET SALES, which license maintenance fee payment may be credited against payments due to TEMPLE under Paragraph 4.1 during the same calendar year, with no carry-over of unused credit to subsequent calendar years.

4.5. In further consideration of the license granted to COMPANY under the terms of this License Agreement, COMPANY shall pay to TEMPLE twenty five percent (25%) of any consideration, whether in the form of cash or equity, mid royalties on account of NET SALES of LICENSED PRODUCT (together, the "Sublicense Payments") which COMPANY receives from any sublicensee to secure or maintain the sublicense, including but not limited to sublicense fees, sublicense maintenance fees, milestone payments and minimum royalties, provided, however, that the Sublicense Payments shall not include (i) earned royalties on NET SALES, (ii) any payments to the COMPANY for research and development activities, or (iii) proceeds, whether as part of a sublicensing agreement or otherwise, from an equity or debt investment in the COMPANY made by a third party, which is negotiated in good faith as an arms-length transaction that reflects only the fair market value of such investment COMPANY may credit cash payments made to TEMPLE during any calendar year pursuant to this Paragraph 4.5 against any payments due to TEMPLE pursuant to Paragraph 4.4 in the same calendar year.

4.6. Royalty payments for sales in each country shall commence with the first unit of each LICENSED PRODUCT sold by COMPANY or by its sublicenses in such country and will end coincident with the expiration date of the last-to-expire issued patent within PATENT RIGHTS in such country covering such LICENSED PRODUCT.

5. STATEMENTS AND REMITTANCES

5.1. COMPANY shall keep and shall require its sublicensees to keep complete and adequate records relating to the SALE of LICENSED PRODUCT.

5.2. Within ** after the Close of each calendar quarter, COMPANY shall remit to TEMPLE a statement of NET SALES by COMPANY and by its sublicensees on account for such quarter, which statement shall be accompanied by the payment due to TEMPLE pursuant to Paragraph 4.1 on account of NET SALES by COMPANY for such quarter. Payments due to TEMPLE pursuant to Paragraphs 4.2 and 4.5 on account of consideration received by COMPANY from sublicensees during any calendar quarter shall be paid by COMPANY to TEMPLE within ** of the close of such calendar quarter.

5.3. The financial statements of COMPANY and of its sublicensees will be audited annually by an independent certified public accountant. TEMPLE shall have the right to employ, at its own expense, a qualified accountant of its own selection to whom COMPANY shall make no unreasonable objection, to examine the books and records of COMPANY and its sublicensees relating to the SALE of LICENSED PRODUCT for the purpose of verifying the amount of royalty payments due. Such examination of books and records of COMPANY and its sublicensees shall take place during regular business hours during the

term of this License Agreement and for ** after its termination, provided however, that such an examination shall not take place more than once a year and shall not cover records for more than the preceding **, and provided that such accountant shall report to TEMPLE only as to the accuracy of the royalty statements and payments. If such accountant shall find an underpayment to TEMPLE, presentation of a written statement substantiating the underpayment will be provided to COMPANY. If COMPANY is not in agreement with the findings of the qualified accountant selected by TEMPLE, then COMPANY shall so notify TEMPLE in writing within ** of receipt by COMPANY of said findings, in which case the parties will jointly appoint, within a further period of **, an independent qualified accountant to validate, at **, TEMPLE's accountant's findings, and the decision of said independent accountant shall be final. If said independent accountant verifies that an underpayment has occurred, the amount due and interest (accruing at the prevailing Prime Rate from the date payment was due through the date of actual payment to TEMPLE) shall be paid to TEMPLE within **. Should such underpayment represent more than ** of the royalties due TEMPLE, COMPANY shall reimburse TEMPLE for the cost of the examination by TEMPLE's accountant that disclosed such underpayment.

5.4. All payments due to TEMPLE under this License Agreement shall be made in United States dollars and shall be sent by COMPANY to TEMPLE to the attention of "Business Manager" at the address shown in Paragraph 13.5. However, TEMPLE shall have the right, upon giving written notice to COMPANY, to receive royalty payments on account of NET SALES within a particular country in the local currency if permitted by law.

5.5. If COMPANY fails to make any payment due to TEMPLE within the time prescribed by the terms of this License Agreement, a penalty equal to ** of the amount due and unpaid on the first day of each calendar month shall be added to the amount due. However, the provisions of this Paragraph 5.5 shall not apply to any underpayment of royalties which is uncovered by audit of the books of COMPANY or of its sublicensees pursuant to Paragraph 5.3.

6. REPRESENTATIONS

6.1. TEMPLE represents that it has the right to enter into this License Agreement and to make the herein grant of license under PATENT RIGHTS and TECHNICAL INFORMATION. TEMPLE further represents that it is the sole and exclusive owner of PATENT RIGHTS and TECHNICAL INFORMATION, all of which are free and clear of any liens, charges and encumbrances.

6.2. TEMPLE further represents that to the best of TEMPLE's knowledge, as of the EFFECTIVE DATE, the inventions in the PATENT RIGHTS have not resulted from United States Government funding.

6.3. Each party represents that it is authorized to enter into the License Agreement and that in the due performance thereof it would not be acting in violation of any outstanding obligation, contractual or otherwise, which may be owed by that party to any third party.

6.4. To the best of TEMPLE's knowledge, no third party has expressed to TEMPLE, in writing, that any patent or patent application included in the PATENT RIGHTS is invalid or unenforceable. However, TEMPLE makes no warranty that exercise by COMPANY or its sublicensees of the rights granted herein will not infringe any patents owned by a third party, or that any patent application within PATENT RIGHTS will issue as a patent.

6.5. COMPANY warrants that, prior to the execution of this License Agreement, it has not negotiated or in any manner discussed, whether formally or 'informally, with any third party any agreement or other arrangement, including but not limited to research or consulting agreements, which provides for consideration to be paid in any form, including but not limited to amounts of money or shares of stock, to any INVENTOR, any INVENTOR's spouse or other relative, or any entity in which any of them has a financial interest.

7. PATENT PROSECUTION AND LITIGATION

7.1. TEMPLE, in consultation with COMPANY but in TEMPLE's sole discretion, shall diligently prosecute all patent applications and maintain all patents within PATENT RIGHTS, to the extent permitted by law, in all countries designated in writing by COMPANY during the term of this License Agreement. Except as provided in Paragraph 7.5, ** shall be responsible for ** costs and expenses incurred by TEMPLE during the term of this License Agreement, in the

preparation, filing and prosecution of all patent applications, and in the maintenance of all patents within PATENT RIGHTS. Such costs and expenses shall not be creditable against any other payments due to TEMPLE under this License Agreement.

7.2. In consulting with COMPANY on patent prosecution pursuant to paragraph 7.1, TEMPLE shall timely provide COMPANY with copies of all Office Actions and provide copies of all Office Action responses, where reasonably practicable sufficiently in advance of the filing of such responses to reasonably allow COMPANY to comment. TEMPLE shall incorporate all reasonable comments by COMPANY in such responses or shall supplement responses to incorporate such reasonable comments.

7.3. If TEMPLE declines to file or maintain a patent application or an issued patent included within PATENT RIGHTS, COMPANY shall have the option, at its expense, of continuing to prosecute any such patent application, filing such patent application or keeping such issued patent in force, as applicable. However, should COMPANY exercise such option, such exercise shall not be interpreted as an assignment to COMPANY, and TEMPLE shall have the option to take control of such prosecution, filing or keeping in force. Such reassertion of control by TEMPLE shall be complied with by COMPANY as soon as is reasonably practicable and without prejudice to such patent application or issued patent.

7.4. COMPANY shall make all payments due to TEMPLE pursuant to Paragraph 7.1 within ** of receipt of a detailed invoice therefor. TEMPLE, in its sole discretion, may elect to have its patent counsel submit such invoices directly to COMPANY, in which case COMPANY shall pay TEMPLE's patent counsel directly.

7.5. In the event that COMPANY notifies TEMPLE in writing that it will stop paying the costs and expenses with respect any patent application or patent in any country, TEMPLE, at its option, may assume the obligation of supporting such patent application or patent in such country, and COMPANY's rights and obligations thereto under this License Agreement shall terminate in such country. Termination of COMPANY's rights and obligations with respect to any patent application or patent in any country shall in no way affect the rights and obligations of COMPANY to the same patent application or patent in any other country or to any other patent application or patent in any country.

7.6. TEMPLE may file patent applications in countries other than those designated by COMPANY provided, however that TEMPLE shall notify COMPANY in writing of any such filing within ** of the filing date. If within ** of its receipt of such notification COMPANY fails to inform TEMPLE in writing that it wishes to support such applications in such countries, TEMPLE shall bear all the costs associated with such additional patent application filings, and such applications in such countries and any patents granting therefrom shall not be included within PATENT RIGHTS. TEMPLE shall then be free to license such patents and patent applications in such countries to others.

7.7. COMPANY, at its option, may defend any claim, made by others, of patent infringement resulting from the manufacture, use, sale or other disposition of LICENSED PRODUCT, whether such claim shall be made against TEMPLE or COMPANY, and if COMPANY defends such claim, COMPANY shall bear all costs and expenses, including reasonable attorneys' fees, incurred in connection with any such claim. These costs and expenses will be a credit against ** of royalty payments due to TEMPLE on account of NET SALES of said LICENSED PRODUCT, pursuant to Paragraphs 4.1 and 4.2, in each year during the term of this License Agreement until fully offset. Each party to this License Agreement agrees that it shall notify the other party in writing in the event any claim of infringement is made against that party.

7.8. In the event either party becomes aware of any actual or threatened infringement of PATENT RIGHTS in any country, that party shall promptly notify the other party in writing. COMPANY shall have the first right to bring an infringement action against the infringer and to use TEMPLE's name if legally required in connection therewith. If COMPANY does not proceed with a particular patent infringement action or attempt to sublicense the infringer within ** of notification, TEMPLE, after notifying COMPANY in writing, shall be entitled to proceed against such infringement at its own expense, through counsel of its choice. The party conducting such suit shall have full control over its conduct. In any event, TEMPLE and COMPANY shall assist one another and cooperate in any such litigation. TEMPLE and COMPANY may also jointly participate in any infringement action if both parties agree to do so in writing in advance, and set forth the basis for sharing of expenses.

7.9. The amount of any recovery resulting from any litigation or settlement thereof ("Recovery") shall **. Any Recovery, in excess **. Each party shall always have the right to be represented by counsel of its choice and at its own expense in any suit instituted by another for infringement. If the parties have agreed to participate jointly in an infringement action,

any recovery in excess of satisfying the parties' attorney fees, costs of the litigation and payment of the royally due to TEMPLE on account of the infringement, shall be allocated to the parties in the same proportion as the sharing of the litigation expenses.

8. INDEMNIFICATION

8.1. COMPANY agrees to indemnify, hold harmless, and defend TEMPLE, its trustees, officers, employees and agents against any and all claims, excluding claims stemming from TEMPLE's use of LICENSED PRODUCT as outlined in Paragraph 3.2, including legal fees and costs arising out of the exercise of any rights granted under this License Agreement, without limiting the generality of the foregoing, against any damages, losses or liabilities whatsoever including but not limited to death or injury to person or damage to property arising from the commercial sale and clinical research of LICENSED PRODUCT by COMPANY, its sublicensees or any customers of any of them in any manner whatsoever. TEMPLE shall give COMPANY written notice of any claim(s) related to LICENSED PRODUCT within **, and TEMPLE shall reasonably cooperate with COMPANY and its insurance carrier in the defense of any such claim(s).

8.2. In addition to the foregoing, COMPANY shall maintain, during the period that any LICENSED PRODUCT is sold or otherwise made available to others pursuant to this License Agreement, Comprehensive Liability Insurance, including Product liability Insurance, with a reputable and financially secure insurance carrier(s) to cover the activities of COMPANY and its sublicensees, if any, contemplated by this License Agreement for minimum limits of ** per occurrence. Such insurance shall name TEMPLE, its trustees, officers, employees, and agents as additional insureds. COMPANY shall furnish a Certificate of Insurance, upon request, evidencing coverage of ** with ** of written notice of cancellation or material change to TEMPLE. COMPANY's insurance shall be written to cover claims incurred, discovered, manifested, or made during the term, or after the expiration, of this License Agreement. COMPANY shall at all times comply, through insurance or self-insurance, with all statutory workers' compensation and employers' liability requirements covering any and all employees with respect to activities performed under this License Agreement.

9. SUBLICENSES

9.1. COMPANY shall have the right to enter into sublicense agreements, provided that all applicable material terms of this License Agreement are incorporated into such sublicense agreements to provide for the protection of TEMPLE and its trustees, officers, employees and agents, and provided further that COMPANY remains primarily liable for its obligations under this License Agreement. A copy of any sublicense agreement shall be provided to TEMPLE for its review and approval prior to execution.

10. ASSIGNMENT

10.1. This License Agreement and any and all of the rights and obligations of either party hereunder shall not be assigned, delegated, sold, transferred or otherwise disposed of, by operation of law or otherwise, without the prior written consent of the other party,

provided, however, that a party may assign this License Agreement without consent of the other party (i) to a third party who acquires substantially all of the assets or control of such party or (ii) in connection with an assignment to an AFFILIATE.

11. TERMINATION

11.1. This License Agreement may be terminated with respect to any patent application or patent in any country at any time by mutual written consent of the parties.

11.2. COMPANY may, in COMPANY's sole discretion and for any reason whatsoever, terminate this License Agreement in its entirety or only with respect to any patent application or patent within PATENT RIGHTS in any country by giving TEMPLE ** prior written notification thereof. In addition, COMPANY may terminate, this License Agreement by giving TEMPLE ** prior written notice upon material breach by TEMPLE of any material provision of this License Agreement, unless such breach is cured within the period of such notice.

11.3. TEMPLE may terminate this License Agreement by giving COMPANY ** prior written notification in the event that COMPANY fails to meet either one of the following two milestones: (i) to raise, in the form of debt or equity, at least ** on or before **; and (ii) to raise, in the form of debt or equity, at least ** on or before **. However, TEMPLE agrees to give good faith consideration to a written request by COMPANY to delay by up to ** the date either one of the aforementioned milestones, provided that COMPANY has made substantial progress towards meeting such milestone and includes with the request documentary evidence of such progress.

11.4. TEMPLE may terminate this License Agreement by giving COMPANY ** prior written notice upon material breach of any material provision of this License Agreement by COMPANY, unless such breach is cared within the period of such notice. However, the notice period shall be only ** for any breach by COMPANY for non-payment of monies due to TEMPLE under this License Agreement.

11.5. This License Agreement shall immediately terminate, without notice, if COMPANY breaches the same material provision of this License Agreement ** times in the same calendar year, without regard to whether a cure was effected.

11.6. This License Agreement shall immediately terminate if either party is adjudicated bankrupt, files a voluntary petition in bankruptcy, makes or executes an assignment for the benefit of creditors, is liquidated or dissolved, or a receiver, trustee, liquidator, sequestrator or other judicial representative is appointed for either party or its property. In such event, that party shall execute any documents that are necessary to reassign or transfer the interest granted hereunder.

11.7. Upon termination of this License Agreement, TEMPLE shall have the right to retain any amounts already paid by COMPANY under this License Agreement, and COMPANY shall pay to TEMPLE all amounts accrued which are then due or which become due based on the SALE of LICENSED PRODUCT, manufactured or produced prior to the effective date of termination.

11.8. The provisions of Article 2 (entitled CONFIDENTIALITY) and Article 8 (entitled INDEMNIFICATION) and Paragraphs 11.7 and 13.1 shall survive the termination of this License Agreement.

12. PATENT MARKING

12.1. COMPANY agrees to mark or have marked all LICENSED PRODUCT sold by COMPANY or by its sublicensees under this License Agreement in accordance with the statutes of the United States and countries and territories relating to the marketing of patented articles in which any LICENSED PRODUCT covered by a granted patent is marketed.

13. MISCELLANEOUS

13.1. This License Agreement shall be construed and the respective rights of the parties hereto determined according to the substantive laws of the Commonwealth of Pennsylvania, notwithstanding the provisions governing conflict of laws under such Pennsylvania law to the contrary. The parties agree that any dispute arising out of this License Agreement may be resolved by recourse to the courts of the Commonwealth of Pennsylvania or the United States District Court for the Eastern District of Pennsylvania.

13.2. If any provision of this License Agreement is held to be invalid or unenforceable under the laws of any jurisdiction of the parties, all other provisions shall, nevertheless continue in full force and effect.

13.3. This License Agreement constitutes the entire agreement among the parties pertaining to PATENT RIGHTS and TECHNICAL INFORMATION and supersedes all previous arrangements, whether written or oral. Any amendment or modification to this License Agreement shall be made in writing signed by both parties.

13.4. Time is of the essence, under this License Agreement.

13.5. Notices and payments to the parties shall be addressed as follows:

To TEMPLE: Office of Technology Transfer
Temple University (083-45)
1601 N. Broad Street, Room 406
Philadelphia, PA 19122-6099

To COMPANY: Onconova Therapeutics Inc.
P.O. Box 7693
Princeton, NJ 08543-7693

Either party may change its address for notice by giving notice to the other in the manner herein provided. Any notice required or provided for by the terms of this License Agreement shall be in writing and sent by registered or certified mail, return receipt requested, postage prepaid and properly addressed in accordance with the paragraph above. The effective date of notice shall be the actual date of receipt.

[REST OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties have caused this License Agreement to be executed by their duly authorized representatives as of the date first above written.

For Temple University — Of The Commonwealth System of Higher Education:

By: /s/ Martin S. Dorph Date:
Martin S. Dorph
Vice President, Chief Financial Officer and Treasurer

For Onconova Therapeutics, Inc.:

By: /s/ Ramesh Kumar Date: 2/19/1999
Ramesh Kumar
President

IN ACKNOWLEDGMENT OF HAVING READ AND UNDERSTOOD THE FOREGOING:

By: /s/ E. Premkumar Reddy Date: 2/19/1999
E. Premkumar Reddy

By: /s/ M.V. Ramana Reddy Date: 2/19/1999
M.V. Ramana Reddy

EXHIBIT A

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EXHIBIT B

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Exhibit 10.5

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

AMENDMENT TO LICENSE AGREEMENT

This Amendment Agreement is made and entered into as of September 1, 2000, by and between Temple University — Of The Commonwealth System of Higher Education ("TEMPLE") and Onconova Therapeutics Inc. ("ONCONOVA").

WHEREAS, TEMPLE and ONCONOVA are parties to that certain License Agreement dated and effective January 1, 1999 pertaining to aryl sulfone compounds (the "LICENSE");

WHEREAS, the parties desire to amend the LICENSE in accordance with Paragraph 13.3 thereof;

NOW, THEREFORE, in consideration of the premises and of the covenants and obligations hereinafter set forth, and intending to be legally bound, the parties hereby agree to amend the LICENSE, as follows:

1. The following sentence shall be added at the end of Paragraph 1.8:

> "However, except where the sublicensee is the end-user of LICENSED PRODUCT, any SALE by COMPANY to a sublicensee shall be excluded from the computation of NET SALES, but any subsequent SALE by the sublicensee shall be included in the computation of NET SALES."

2. In Paragraph 4.1, "**" shall be replaced with "**".

3. Paragraph 4.5 shall be replaced in its entirety with:

> "4.5 In further consideration of the license granted to COMPANY under the terms of this License Agreement, COMPANY shall pay to TEMPLE ** of any consideration in any form, including but not limited to cash and equity, which COMPANY receives from any sublicensee to secure or maintain the sublicense, including but not limited to sublicense fees, sublicense maintenance fees, milestone payments and minimum royalties, provided, however, that such consideration shall not include (i) earned royalties on NET SALES of LICENSED PRODUCT by sublicensee, (ii) any payments to COMPANY for research and development activities, or (iii) proceeds, whether as part of a sublicensing arrangement or otherwise, from an equity or debt investment in COMPANY made by a third party, which is negotiated in good faith as an arms-length transaction that reflects only the fair market value of such investment. COMPANY may credit cash payments made to TEMPLE during any calendar year pursuant to this Paragraph 4.5 against any payments due to TEMPLE pursuant to Paragraph 4.4 in the same calendar year."

4. Except as expressly set forth above, all terms and conditions of the LICENSE shall remain unchanged and in full force and effect.

IN WITNESS WHEREOF the parties have caused this License Agreement to be executed by their duly authorized representatives as of the date first above written.

For Temple University — Of The Commonwealth System of Higher Education:

By: /s/ Martin S. Dorph Date: 11/13/2000
Martin S. Dorph
Vice President, Chief Financial Officer and Treasurer

For Onconova Therapeutics, Inc.:

By: /s/ Ramesh Kumar Date: 11/29/2000
Ramesh Kumar
President

Exhibit 10.6

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

AMENDMENT # 1 TO EXCLUSIVE LICENSE AGREEMENT

This Amendment No. 1 (“Amendment No. 1”) to the License Agreement by and between Temple University — Of The Commonwealth System of Higher Education (“TEMPLE”) and Onconova Therapeutics (“ONCONOVA”), dated January 1, 1999, as amended (“Agreement”), is entered into effective as of March 21, 2013 (“Amendment No. 1 Date”).

WHEREAS, ONCONOVA and TEMPLE wish to update the PATENT RIGHTS listed in Exhibit A.

NOW, THEREFORE, in consideration of the premises and of the covenants and obligations hereinafter set forth, the parties, intending to be legally bound, hereby agree to amend Agreement as follows:

1. Exhibit A and Exhibit B of Agreement shall be deleted and replaced in its entirety with Exhibit A of this Amendment No. 1.

2. PATENT RIGHTS jointly owned by TEMPLE and another party that are included in Exhibit A of this Amendment No. I represent TEMPLE’s ownership interest in such PATENT RIGHTS.

3. All other terms and conditions of Agreement shall remain unchanged and in full force and effect, as amended to date.

In consideration for expenses incurred by TEMPLE to enter into this Amendment No. 1, ONCONOVA shall pay TEMPLE ** within ** days of Amendment No. 1 Date.

IN WITNESS WHEREOF, the parties have caused this Amendment No. 1 to the Agreement to be executed by their duly authorized representative the day and year written below:

Temple University - Of The Commonwealth System of Higher Education:

By: /s/ Kenneth H. Kaiser Date: 3/21/2013
Kenneth H. Kaiser
Senior Associate Vice President, Finance and Human Resources

Onconova Therapeutics, Inc.:

By: /s/ Ramesh Kumar, Ph.D. Date: 3/21/2013
Ramesh Kumar, Ph.D.
President and CEO

Exhibit A

DBR Ref.	Temple Ref.	Title	U.S. Application Serial Nos.
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CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

1311 Mamaroneck Avenue, Suite 310
White Plains, NY 10605 USA
www.lls.org

Onconova
Therapeutics, Inc.

375 Pheasant Run
Newtown, PA 18940
www.onconova.com

DEFINITIVE AGREEMENT

This Definitive Agreement (the "**Agreement**") is made as of the 12th day of May, 2010 (the "**Effective Date**") by and between The Leukemia and Lymphoma Society, a New York nonprofit corporation with its principal place of business at 1311 Mamaroneck Avenue, White Plains, New York 10605, United States of America ("**LLS**") and Onconova Therapeutics, Inc., a Delaware corporation with its principal place of business at 375 Pheasant Run, Newtown, PA 18940 ("**Company**"). LLS and Company are sometimes hereinafter referred to individually as the "**Party**" and together as the "**Parties**".

WHEREAS, LLS is a national voluntary health agency which, among other activities encourages and sponsors research relating to leukemia, lymphoma, Hodgkin's disease and myeloma and to increase understanding and public awareness of the disease by, among other means, making grants and business alliances to support research and education efforts to the public about blood cancers. To further this mission, LLS provides research funding to entities that can demonstrate through LLS's review process that their proposed research project holds scientific promise to advance LLS's effort to find treatments and cures for blood cancers and its complications.

WHEREAS, Company is in the business of developing and commercializing pharmaceutical products and/or biotechnology products and has submitted a project proposal and funding request to LLS dated February 5, 2010 to conduct a human clinical trial, which proposal is entitled "Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents, an Unmet Medical Need" attached hereto as Exhibit A (the "**Company Proposal**"), and the Company Proposal has been conditionally approved by LLS through its Therapy Acceleration Program Committee as described in the Letter of Intent dated March 15, 2010 included as Exhibit B.

WHEREAS, nothing in this Agreement shall restrict LLS from funding other research and development efforts, including without limitation efforts by other researchers, companies or entities that fall within the scope of the Research Program.

NOW, THEREFORE, in consideration of the mutual premises herein contained and for other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged by the Parties, the Parties agree as follows.

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1. Certain Definitions.

1.1. "**Agreement**" has the meaning set forth in the introductory paragraph hereof.

1.2. "**Claims**" has the meaning set forth in Section 16.1.

1.3. "**Company**" has the meaning set forth in the introductory paragraph hereof.

1.4. "**Company Proposal**" has the meaning set forth in the recitals hereof.

1.5. "**Company Sale**" has the meaning set forth in Section 10.1(c).

1.6. "**Confidential Information**" means any scientific, technical, trade or business information possessed, obtained by, developed for or given to the other Party which is treated by the disclosing Party as confidential or proprietary including, without limitation, Proprietary Material, Research Results, research materials and developments, formulations, techniques, methodology, assay systems, formulae, procedures, tests, equipment, data, reports, know-how, sources of supply, patent positioning, relationships with consultants and employees, business plans and business developments, information concerning the existence, scope or activities of any research, development, manufacturing, marketing or other projects of either Party, and any other confidential information about or belonging to either Party's suppliers, licensors, licensees, partners, affiliates, customers, potential customers or others. All information of a confidential or proprietary nature supplied in written, electronic, oral or visual form pursuant to this Agreement shall be considered as being Confidential Information.

1.7. "**Deliverables**" means any and all items prepared or required to be delivered in accordance with Exhibit C.

1.8. "**Development Exceptions**" has the meaning set forth in Section 5.2.

1.9. "**Effective Date**" has the meaning set forth in the introductory paragraph hereof.

1.10. "**FDA**" means the United States Food and Drug Administration or its successor.

1.11. "**Field**" means Myelodysplastic Syndromes ("MDS"), a collection of disorders in which bone marrow function is disrupted, commonly resulting in decreased numbers of red blood cells, white blood cells and/or platelets. In more advanced cases of MDS, malignant blast cells dominate the marrow and further inhibit normal marrow function, often giving rise to Acute Myelogenous Leukemia ("AML").

1.12. "**First Commercial Sale**" means the first sale to a third party for end use of the Product in the Field after receipt of the requisite regulatory approvals. Sales for test marketing, sampling and promotional uses, clinical trial purposes or compassionate or similar use shall not be considered to constitute a First

Commercial Sale.

1.13. "**Force Majeure**" means in relation to either Party, conditions beyond the reasonable control of the Parties, including without limitation, an act of God or terrorism, compliance with any regulation, law or order of any government, war, civil commotion,

epidemic, failure or default of public utilities or common carriers, or destruction of production facilities or materials by fire, earthquake, storm or like catastrophe.

1.14. "**Funding**" has the meaning set forth in Section 2.1.

1.15. "**Indemnitee**" has the meaning set forth in Section 16.1.

1.16. "**Intellectual Property Rights**" means any and all intellectual and proprietary rights throughout the world, whether or not registered, including without limitation rights in and to discoveries, concepts, ideas, Proprietary Material, developments, specifications, methods, drawings, designs, flow charts, diagrams, models, formulae, procedures, processes, schematics, specifications, algorithms, apparatus, inventions, ideas, know-how, materials, techniques, methodologies, modifications, improvements, works of authorship and data (whether or not protectable under patent, copyright, trade secrecy or similar laws), including Patents, utility models, and registered and unregistered designs, including mask works, copyrights, trade secrets, design history, manufacturing documentation, and any other form of protection afforded by law to inventions, models, designs, works of authorship, databases or technical information and applications and registrations with respect thereto.

1.17. "**LLS**" has the meaning set forth in the introductory paragraph hereof.

1.18. "**Major European Country**" means **.

1.19. "**Major Market**" means each of the **.

1.20. "**Milestones**" means achievement of an agreed upon technical, business or regulatory milestone pertaining to the Deliverables and Milestones as outlined in Exhibit C and herein referred collectively as the achievement of Milestones.

1.21. "**MTA**" has the meaning set forth in Section 8.2.

1.22. "**NDA**" means a new drug application filed with the FDA or an equivalent application to the equivalent agency in any other country or group of countries wherein approval of such new drug application by the regulatory authority shall permit marketing of Product in such country.

1.23. "**Net Sales**" means the gross amount invoiced on sales or other dispositions of the Product in the Field (to the extent such Field can be determined) by Company (or its successor) and its affiliates and licensees to non-affiliate third party customers, less customary deductions as determined in accordance with Generally Accepted Accounting Principles ("GAAP") and as generally and consistently applied throughout Company's (or its successor's) organization, limited to the following (collectively, "**Net Sales Deductions**"): (i) customary trade, quantity, or cash discounts and commissions to non-affiliated brokers or agents, price reduction or incentive programs, retroactive price adjustments with respect to sales of such Product, charge-back payments, and rebates granted to managed health care organizations or to federal, state and local governments (or their respective agencies, purchasers and reimbursers) or to trade customers, including wholesalers and chain and pharmacy buying groups, to the extent actually allowed and taken; (ii) amounts repaid or credited by reason of rejection or return; (iii) to the extent

separately stated on purchase orders, invoices, or other documents of sale, (or its successor) or it affiliates; any taxes or other governmental charges levied on the production, sale, transportation, delivery, or use of a Product which is paid by or on behalf of Company (or its successor) or its affiliates or licensees, including value-added taxes, or other governmental charges otherwise measured by the billing amount, but specifically excluding taxes based on net income of the selling party; and (iv) outbound transportation costs prepaid or allowed and costs of insurance in transit.

Should Product be in a combination package containing other therapeutically active materials than Product, "Net Sales", for the purpose of determining payments due to LLS on the Product within that combination package (a "**Combination Product**"), shall be calculated by **, during the payment period in question, of the other therapeutically active materials sold separately, less the Net Sales Deductions.

If, on a country-by-country basis, either the Product or the other therapeutically active materials of the Combination Product are not sold separately in finished form in such country, Net Sales of the Combination Product shall be determined by the Parties in good faith based on the relative fair market value for the Product and each therapeutically active material in finished form, as applicable.

For sake of clarity and avoidance of doubt, the transfer of Product by Company or one of its affiliates or licensees to another affiliate or licensee of such selling party for resale shall not be considered a sale; in such cases, Net Sales shall be determined based on the amount invoiced or otherwise billed by such affiliate or licensee to an independent third party, less the Net Sales Deductions allowed under this Section. Notwithstanding the foregoing, sales of Product by Company or an affiliate or licensee to a bona fide third party distributor in an arms length transaction shall be considered a sale to a third party customer and Net Sales shall be determined based on all amounts invoiced or otherwise billed to, or other consideration paid by, the distributor, less the Net Sales Deductions allowed under this Section. Any Products used (but not sold for more than nominal consideration) for test marketing, sampling and promotional uses or compassionate or similar use or used (but not sold for more than nominal consideration) for clinical or other research purposes shall not be considered in determining Net Sales hereunder.

1.24. "**Party**" and "**Parties**" have the meaning set forth in the introductory paragraph hereof.

1.25. "**Potential Partner**" has the meaning set forth in Section 7.2(b).

1.26. "**Product**" means Company's proprietary compound identified as ON 01910.Na, including any metabolites, prodrugs, free forms, salts, solvates, hydrates, anhydrous forms, optical isomers and polymorphs thereof, in any and all dosage formulations and combinations in which the active pharmaceutical ingredient is present.

1.27. "**Product Outlicense**" has the meaning set forth in Section 10.1(a).

1.28. "**Progress Report**" has the meaning set forth in Section 4.1(a).

1.29. "**Project Inventions**" means any and all new discoveries, concepts, ideas, Proprietary Material, developments, specifications, methods, drawings, designs, flow charts, diagrams, models, formulae, procedures, processes, schematics, specifications, algorithms, apparatus, inventions, ideas, know-how, materials, techniques, methodologies, modifications, improvements, works of authorship and data (whether or not protectable under patent, copyright, trade secrecy or similar laws and whether or not patentable or reduced to practice), know-how, materials, methods, models, procedures, processes, schematics, specifications, techniques, tools, and any other forms of technology that are conceived, created, discovered, developed, generated, made or reduced to practice or tangible medium of expression during the performance of this Agreement, whether solely by one or more employees or consultants of Company, solely by one or more employees or consultants of LLS, or jointly by one or more employees or consultants of Company and one or more employees or consultants of LLS, in each case relating to the Research Program and/or the Product, together with all related Intellectual Property Rights.

1.30. "**Proprietary Material**" means any and all (i) molecules and/or reagents owned by, licensed to or otherwise proprietary to Company, and (ii) derivatives, modifications, improvements, fragments, metabolites, analogs or homologs thereof, which could not have been discovered or made but for the use of Proprietary Materials.

1.31. "**Research Program**" means (a) the clinical development activities based on the Company Proposal, as may be modified by Company from time to time due to clinical trial requirements, FDA requirements, other regulatory requirements or as otherwise set forth in this Agreement, unless directed by the FDA or other regulatory body, modifications to the clinical trial must be reviewed and approved by LLS due the potential requirement for an Amendment to a Deliverable, Milestone, or Payment, such approval will not be unreasonably withheld and (b) certain other activities requested by LLS, including presentations to donors and other interested parties, which have been mutually agreed to by the Parties, and which shall be conducted by Company and funded in part by LLS pursuant to this Agreement and which includes the Milestones and Deliverables attached hereto and made a part hereof as Exhibit C.

1.32. "**Research Results**" means all data sets, data analyses, reports detailing all optimized conditions and procedures, test results, laboratory notes, techniques, know-how, and any other results that are obtained in the performance of the Research Program. Company retains sole ownership of all Research Results.

1.33. "**Research Advisory Committee**" means an advisory group consisting of equal representation from LLS and Company as further described in Section 3.

1.34. "** **Report**" has the meaning set forth in Section 4.1.

1.35. "**Term**" shall have the meaning set forth in Section 15.1.

1.36. "**Transferee**" has the meaning set forth in Section 8.2.

2. Research Program and Funding.

2.1. The Funding and its Distribution. LLS agrees to provide funds (the "**Funding**") to Company to partially fund the Research Program in the amounts and according to the timeline

with specific Deliverables and Milestones as described in Exhibit C. The sum total of the Funding shall not exceed US$10,000,000, and shall be paid in accordance with the amounts and achievement of Milestones set forth in Exhibit C. The Deliverables and the Milestone payments set forth in Exhibit C may be revised only by written agreement of the Parties from time to time, as determined in the reasonable discretion of LLS provided that the total amount of the Funding requested by Company to conduct the Research Program shall not be increased and the timely payment of each of these amounts is subject to the availability of funds from LLS. If any delay in payment interferes with Company's ability to continue the Research Program or meet a Milestone in a timely manner, Company may terminate this Agreement pursuant to Section 15.4.

2.2. Use of Funding. Funding shall be used exclusively for the payment or reimbursement of the costs and expenses for clinical development activities as outlined in the Company Proposal budget, of the Research Program by Company as specified in and in accordance with and subject to the terms and conditions contained in this Agreement or otherwise mutually agreed to by both Parties. Should Funding exceed the costs and expenses incurred or committed by Company for the Research Program, upon completion of the Research Program the Parties agree to discuss the use of excess Funding for other Company programs in the Field or which may fall within the mandate of LLS during the meeting referenced in Section 7.1, provided, that in the event the Parties do not come to mutually agreeable terms for a new agreement during such meeting, and if such agreement is not documented through a written agreement signed and delivered on behalf of the Parties within ** days thereafter, then excess Funding (after taking into account all committed but not paid or accrued expenditures) shall be returned to LLS within ** days of the expiration or termination of this Agreement.

2.3. Costs - Permissible and Impermissible. Company hereby agrees to limit the expenditure of Funding as set forth in this Section 2.3.

2.3.1. Permissible Costs. Company and LLS have agreed that Funding shall be used as per the budget described in Exhibit A and made part of this Agreement. Should additional expenditures not contemplated by the budget and directly related to the performance of the Research Program be required, the Parties agree to collaborate to determine in good faith if these expenditures shall be considered permissible costs.

2.3.2. Impermissible Costs. Company and LLS will collaborate to identify in good faith impermissible costs. Without limitation of the foregoing, the following costs will be impermissible costs, except as the Parties otherwise agree in writing, (a) capital costs, including but not limited to, purchase of land, buildings, construction and equipment; and (b) other costs mutually agreed in writing by the Parties as impermissible.

2.4. Donor Designated Funds. Where Funding is, in part or whole, provided by a donor to LLS who requests that the donated funds be restricted for support of Company, Company agrees as a condition to receiving Funding under this Agreement to participate in promotional/publicity activities (including but not limited to meeting the Board of Trustees of the donor's affiliated organization, being interviewed for their newsletter, etc.) upon reasonable advance notice and such participation shall not be unreasonably withheld or delayed, provided, however, Company shall have no obligation to publish or disseminate information that contains Company Confidential Information or proprietary know-how or trade secrets or will compromise

securing patent protection of Project Inventions or any other Intellectual Property. Company shall acknowledge the support of LLS in all such activities. Notwithstanding the foregoing, Company shall be obligated to participate in no more than ** such promotional/publicity activities per **. Additional meeting requests shall be discussed and mutually agreed upon by both Parties.

2.5. Presentations. As a condition to receiving Funding under this Agreement, Company agrees to work with LLS staff on a Communications Plan for internal and external presentations or meetings by LLS regarding the Research Program, provided, however, Company shall have no obligation to, and LLS shall have no right to, publish or disseminate information that contains Company Confidential Information or proprietary know-how or trade secrets or will compromise securing patent protection of Project Inventions or other Intellectual Property or which impacts patients' confidential information. Company representative(s) shall inform LLS of public presentations or meetings planned to be made by Company at least ** days prior to the presentation or meeting. Company shall acknowledge the support of LLS in all such presentations and those carried on without LLS representation. Notwithstanding the foregoing, per the Communications Plan, Company shall be obligated to participate in no more ** presentations or meetings by LLS regarding the Research Program per **. For purposes of this Section 2.5, presentations and meetings as part of the Communications Plan are distinct from meetings described in Section 3.2 and scheduled for the Research Advisory Committee as outlined in Exhibit C. Additional presentation requests of LLS shall be discussed and mutually agreed upon by both Parties.

2.6. Funding Audit. LLS will have the right, during normal business hours and upon at least ** days' prior written notice, to have a mutually acceptable independent audit firm inspect Company's records, at LLS' cost, as they relate to the Funding to verify that Company has complied with Sections 2.2. and 2.3. LLS may exercise such right every **. The independent audit firm will be required to agree in writing with Company to comply with confidentiality restrictions at least as stringent as those set forth in this Agreement and to provide a non-confidential summary of the results of the audit to both of the Parties. In the event that any such examination shows a misuse of funds in excess of (i) ** for any ** month period, then Company shall pay LLS' reasonable, out-of-pockets cost of the examination as well as reimburse the full amount equal to the expenditures of Funding spent but not used by Company in accordance with Sections 2.2 and 2.3 plus **. For a misuse of funds of less than **, Company shall pay the difference within ** days without interest charge. In the event that either Party disputes the independent audit firm's determination, the dispute shall be resolved pursuant to the provisions of Section 14 of this Agreement.

Company agrees to maintain books and records documenting the expenditure of the Funding in accordance with Generally Accepted Accounting Principles ("**GAAP**") as generally and consistently applied throughout Company's organization and will make these books and records relating to the Funding available to LLS and its representatives for review upon ** days' prior written notice at the place where such books and records are maintained by Company, upon reasonable request for a period of ** years following expiration or termination of this Agreement. LLS shall have the right, at its cost, to have any financial report or document related to the expenditure of the Funding reviewed by external consultants and may include external consultants in any meeting or teleconference, subject to execution by such external consultants of

appropriate confidentiality agreements with Company and mutual agreement by the Parties that there is no conflict of interest by the external consultants.

3. Research Advisory Committee

3.1. Research Advisory Committee. It is agreed that the Parties shall form a Research Advisory Committee for the Research Program. The Research Advisory Committee shall consist of ** members, ** members to be appointed by each Party. Each Party may appoint or substitute any of its members serving on the Research Advisory Committee by written notice to the other Party. ** representative from each Party shall be designated as Team Leader. LLS shall have the right to appoint ** of its members to be the chairperson of the Research Advisory Committee to oversee the administration of the Research Advisory Committee. A listing of the initial members of the Research Advisory Committee is included as Exhibit D.

3.2. Meetings. The Research Advisory Committee shall hold meetings (in person or by teleconference) at such times and places as the Team Leaders may mutually agree, provided, meetings shall be held at least every ** months during the Term, and more frequently if mutually agreed by Team Leader. The ** meeting of the Research Advisory Committee shall be held within ** days of the Effective Date. The content of the meetings will be based on the information provided in the Quarterly Reports described below. The quorum for Research Advisory Committee meetings shall be ** members, provided there is at least ** member from each Party. The Research Advisory Committee shall keep minutes of its meetings which shall reflect in reasonable detail all actions recommended or taken. Such minutes shall not be deemed to amend or waive any provisions of this Agreement. From time to time, between scheduled meetings the Research Advisory Committee shall consult with Company to confirm that commercially reasonable efforts are ongoing to achieve the Milestones. LLS shall have the right to invite external parties/consultants to any meeting or teleconference, *provided* that such external consultants are under confidentiality terms no less stringent than this Agreement, subject to execution by such external parties/consultants of appropriate confidentiality agreement with Company and mutual agreement that there is no conflict of interest by external parties/consultants.

3.3. Recommendations. The Research Advisory Committee shall be an information sharing and advisory body, with recommendations rendered by unanimous vote. Implementation of any recommendations of the Research Advisory Committee is subject to the prior approval of an authorized officer of LLS and the Chief Executive Officer or Board of Directors of Company.

3.4. Responsibilities. Company and LLS shall be kept informed by the Team Leaders of the Research Advisory Committee of material matters relating to the Research Program, including, but not limited to: (a) the progress of the Research Program, including Research Results, or summaries thereof, deemed relevant by either Team Leader; (b) recommendations regarding modifications or amendments to the Research Program (Exhibit C) from time to time in such manner as may be appropriate based on any interim Research Results, and (c) substantiation regarding the accomplishment of Milestones set forth in Exhibit C. This reporting responsibility will be a communication that will take place no less than ** times per year in the form of a ** Report as described in Section 4 or as is necessary to inform LLS of a potential material delay in a Deliverable or Milestone listed in Exhibit C. While Company maintains all control

over the Research Program, the Research Advisory Committee may make recommendations, subject to Section 3.3, about forward progress and changes in direction of the Research Program.

4. Reports.

4.1. ** Reports. As the basis for the **Research Advisory Committee Meetings the Company shall submit, ** prior to the scheduled Research Advisory Committee Meeting, a report that contains information related to the achievement of any Milestones and Deliverables described in Exhibit C of this Agreement, which

are required for purposes of receiving payments tied to such Deliverables and Milestones. The ** Report is used for purposes of guiding, the Research Advisory Committee. The information that should be reported includes and is together herein defined as the ** Report ("** Report"):

(a) a confidential written summary of the status and progress of the Research Program conducted during such period, including a description of Milestones and Deliverables achieved, and a summary of Research Results together with copies of relevant data supporting significant findings; a detailed summary of expenditures for the Research Program, a chart that identifies the number of patients accrued and the number of trial sites contracted and accruing for the Research Program. Such status reporting should indicate the actual accrual numbers compared to projected numbers as outlined in the Research Program to be used for comparison purposes.

The ** Report will provide an opportunity for the Parties to review the progress of the Research Program towards the Milestones and Deliverables and discuss any need for revision of the timeline for Deliverables and Milestones or directions of the Research Program that may be appropriate. LLS shall have the right to have any ** Report or other data submitted by Company reviewed and validated by external consultants, provided that such external consultants are under confidentiality terms no less stringent than this Agreement, and may include external consultants in any meeting or teleconference, subject to execution by such external consultants of appropriate confidentiality agreements with Company and mutual agreement that there is no conflict of interest by external parties/consultants. If following the ** review LLS requests a meeting (either in person or via telephone) to discuss the progress and results of the Research Program with Company, Company shall use commercially reasonable efforts to make appropriate representative(s) available for such reasonably requested meetings at mutually convenient times and locations within ** business days of the request.

Financial Reports. Company shall submit its company Financial Reports to LLS every ** months during the Term, which Company Financial Reports shall be substantially the same reports provided by Company to its investors and can be incorporated in ** of the annual ** Reports. Furthermore, if, in an effort to raise investment capital, Company issues any document to prospective investors, including but not limited to an offering prospectus or private placement memorandum, during the Term, it shall promptly submit a copy of such document to LLS. Company shall make its financial representatives available, in person or by phone, to explain and discuss such financial reports or documents, as reasonably requested by LLS. LLS shall have the right to have any financial report or document submitted by Company reviewed by external consultants and may include external consultants in any meeting or teleconference, subject to execution by such external consultants of appropriate confidentiality agreements with

Company and mutual agreement that there is no conflict of interest by external parties/consultants. For avoidance of doubt, Company shall not be required to provide LLS with any documents or information that are the subject of confidential discussions between Company and any prospective acquirer, licensee or partner of Company. Notwithstanding the Financial Reports, within ** days of becoming aware of any event that Company believes will materially impair or enhance Company's ability to conduct the Research Program, the Company shall report such information to LLS.

4.2. Upon Expiration or Termination of this Agreement. Company shall submit, to LLS the following reports which together herein defined as the Final Report:

(a) within ** days of the expiration or termination of this Agreement, a written report summarizing the status and progress of the Research Program conducted since the Effective Date of the Agreement, including a description of Milestones and Deliverables achieved, and a summary of significant Research Results together with copies of relevant data (not previously submitted) supporting significant findings, and

(b) within ** days of the expiration or termination of this Agreement, a general description of any Project Inventions since the Effective Date of the Agreement, and

(c) within ** days after all invoices for Research Program expenses have been submitted to Company, a detailed report of expenditures of the Funding for the Research Program since the Effective Date of the Agreement.

5. Conduct of Research Program.

5.1. Responsibility. Subject to the terms and provisions of this Agreement, Company shall be solely responsible for the Research Program. Company shall have the right, in its reasonable discretion, to make changes to the Research Program due to clinical trial results (including without limitation, to address any safety or efficacy issues), FDA requirements or other regulatory requirements, or to comply with applicable laws, rules or regulations, *provided* that changes not mandated by the FDA or a regulatory body are reviewed and approved by LLS, which approval will not be unreasonably withheld. If Company proposes to make any material change in the Research Program, it shall discuss in good faith such change with LLS through the Research Advisory Committee. Without limiting the foregoing, Company shall be solely responsible for management and conduct of the Research Program and shall in particular: (a) maintain complete and accurate records of all material Research Results, (b) consider, review and propose to LLS amendments or modifications to the Research Program (Exhibit C) from time to time in such manner as may be deemed appropriate by Company based on any interim Research Results; and (c) review, substantiate and demonstrate to the reasonable satisfaction of the Research Advisory Committee and the senior management of LLS the accomplishment of Milestones and Deliverables as set forth in Exhibit C.

5.2. Standard of Conduct. Company shall use commercially reasonable efforts, including but not limited to committing the necessary staff, laboratories, offices, equipment and other facilities, to conduct the Research Program, subject to Section 5.1, substantially in accordance with Exhibit A. In the event that LLS has a reasonable basis to believe that

Company is not using commercially reasonable efforts to achieve the Milestones and Deliverables set forth on Exhibit C hereto, LLS shall give written notice thereof to Company specifying the basis for such belief Company shall make commercially reasonable good faith efforts to address the concerns of LLS within ** days after Company's receipt of the notice. If LLS reasonably believes that Company has not done so during such ** day period, LLS shall notify Company within ** days after the expiration of such ** day period, whereupon, LLS and Company shall negotiate in good faith within ** days to attempt to mutually resolve the issue. If the Parties cannot then resolve the issue informally, it shall be deemed a Dispute (as hereinafter defined) and resolved pursuant to the provisions of Section 14 hereof Notwithstanding anything to the contrary in this Agreement, Company shall not be deemed to have failed to use commercially reasonable efforts to achieve the Milestones and Deliverables set forth on Exhibit C hereto or to perform the Research Program, in the event one or more of the following events or circumstances (the "**Development Exceptions**") is attributable to a failure or delay in performance by Company that is outside of Company's reasonable control: (i) the occurrence of adverse events or health, safety or efficacy issues such that the Company determines to hold or delay a study, (ii) any regulatory hold, constraint or restriction is imposed or raised by the FDA or any other regulatory authority; (iii) any Force Majeure event, or (iv) sale of the Product is enjoined or likely to be enjoined based on a reasonable opinion of Company's outside counsel as a result of allegations of infringement of its intellectual property. For the avoidance of doubt, Company's

failure to meet one of the Milestones or Deliverables set forth in Exhibit C shall not automatically establish Company's failure to use commercially reasonable efforts to develop the Product.

5.3. Interruption or Delay of Research Program. If any portion of the Research Program including a human subject research clinical trial is to be interrupted or delayed for a period of ** days or more, Company, within ** days of becoming aware of the need to interrupt or delay the Research Program, shall provide the Research Advisory Committee and senior management of LLS with notice indicating (a) the work will be interrupted or delayed, (b) the reason for the interruption or delay, and (c) the anticipated date upon which the work will resume. Interruptions or delays of the Research Program may lead to Company not being able to achieve Milestones set forth in Exhibit C, and if not adequately resolved in a timeframe satisfactory to the Parties, could lead to the termination of this Agreement pursuant to Section 15.2.

5.4. Site Visit(s). LLS shall have the right, up to ** times each calendar year, during normal business hours and upon reasonable notice of at least ** days, to inspect records in order to review and assess progress and results of the Research Program.

5.5. Human Subject Research.

5.5.1. IRB Approval. Company agrees to obtain prior written approval from each clinical site's Institutional Review Board ("**IRB**") before undertaking any clinical trial with human subject research as required by applicable law. A true copy of the executed copy of this approval must be made available within ** days upon written request by LLS.

5.5.2. Informed Consent. Except as provided in Section 5.5.3, upon approval of human subject research clinical trial by each clinical site's IRB, no clinical trial may be

conducted by Company pursuant thereto until: (i) each clinical site has secured a valid consent and/or authorization in accordance with applicable law from the research participant (or their legal guardians); and (ii) Company maintains a true copy of the consent and/or authorization to be made available within ** days upon written request by LLS. Such consent will conform ethically with the guidelines prescribed by the National Institutes of Health ("**NIH**") or equivalent foreign guidelines and shall contain sufficient information so that the human subject (or their legal guardian) will be in a position to provide appropriate informed consent prior to participating, including suitable explanations to human subjects (or their legal guardians) concerning the experimental nature of the research and all significant potential hazards.

5.5.3. Waiver of Consent. In the event that Company has requested a waiver of the consent and/or authorization requirement, as set forth in applicable law, from each clinical site's IRB, no clinical trial may be conducted by Company pursuant thereto until each clinical site's IRB has issued appropriate documentation of such waiver in accordance with applicable law. Company shall maintain a true copy of the documentation of such waiver to be made available within ** days upon written request by LLS.

5.5.4. No Responsibility of LLS. Human subjects studied in the course of the Research Program, including a clinical trial conducted by Company pursuant to this Agreement, are under no circumstances a responsibility of LLS.

5.5.5. Termination of a Clinical Trial. Company reserves the right to terminate any clinical trial at any time after notice to and consultation with LLS, except that in cases involving patient safety issues or if authorization to conduct such clinical trial is withdrawn by the FDA or other applicable regulatory body, prior consultation requirements to LLS shall not apply. Upon termination of a clinical trial, Company and the applicable staff shall cease the performance of the applicable clinical trial but will continue to collect such data and prepare such reports as stipulated in the applicable clinical trial protocol and approved by the applicable IRB.

6. Representations; Warranties; Covenants.

6.1. Mutual Representations. Each Party represents and warrants to the other Party as of the Effective Date that it has the power and authority to execute and deliver this Agreement and to perform its obligations hereunder and that the execution, delivery and performance of this Agreement have been duly and validly authorized and approved. Each of the Parties hereby represents and warrants that this Agreement is a legal and valid obligation binding upon such Party and enforceable in accordance with its terms; the execution, delivery and performance of the Agreement by such Party does not conflict with any agreement, instrument or understanding, oral or written, to which it is a party or by which it is bound, nor, to its knowledge, violate any law or regulation of any court, governmental body or administrative or other agency having jurisdiction over it.

6.2. Company Representations. Company represents, warrants and covenants to LLS that Company (a) shall use commercially reasonable efforts to obtain and maintain during the Term all licenses, permits and other approvals and authorizations required to conduct the Research Program and shall do so in conformity with all applicable laws and regulations, it being

understood that loss of a license, permit or other approval or authorization due to a Development Exception shall not be deemed a breach of this clause (a), and (b) with respect to any third party to whom it subcontracts the performance of any aspect of the Research Program, it will monitor such subcontractor(s) and use commercially reasonable efforts to ensure that they have and shall maintain during the Term all licenses, permits and other approvals and authorizations required to conduct the Research Program and shall do so in conformity with all applicable laws and regulations. Company shall provide documentation of its and its subcontractor's licenses, permits, approvals or authorizations promptly at LLS's request.

6.3. DISCLAIMER. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS AGREEMENT, EACH OF THE PARTIES MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE RESEARCH PROGRAM, RESEARCH RESULTS, OR ANY PRODUCT RESULTING FROM THE RESEARCH PROGRAM, OR ANY WARRANTY OF NON-INFRINGEMENT. The Parties understand and agree that development and commercialization of any Product in the Field will involve approval by regulatory authorities and that no Party is guaranteeing the safety or efficacy of any Product in the Field or obtaining regulatory approval to market or sell the Product. The Parties acknowledge that no intellectual property rights warranties are being made hereunder nor are any warranties being made with respect to the Research Results or Project Inventions.

7. Additional Research and Commercially Reasonable Efforts.

7.1. Additional Research. The Parties acknowledge a common purpose of developing product(s) useful for the diagnosis, cure or treatment of certain blood cancers and their complications. Achieving this goal may require additional research and development efforts beyond those encompassed within the Research Program. The Parties agree to meet no less than ** days prior to the expiration or termination of this Agreement in order to (a) evaluate the progress of the Research Program, (b) discuss additional research and development opportunities resulting from the Research Program, (c) determine any mutual interest in either amending this Agreement and its associated Research Program or entering into a new agreement to further such additional research and (d) if mutually agreed upon, the Parties agree to negotiate in good faith any reasonable agreements as may be proposed by either Party.

7.2. Commercially Reasonable Efforts to Further the Research Program.

(a) Even in the absence of a further agreement between the Parties, and with a successful outcome of the Research Program, Company agrees that for a period of five (5) years following the expiration or termination of this Agreement, Company shall take such steps as are commercially reasonable to further the clinical development of the Product and to bring the Product to practical application in the Field in a Major Market, including by outlicensing or partnering with a third party, provided that Company reasonably believes that the Product is safe and effective as determined by successfully meeting its pre-determined endpoints in its clinical trials, and provided that Company receives necessary regulatory approvals to continue development and commercialization of the Product in a Major Market in the Field. Company shall keep LLS informed in writing during such five (5) year period on at least a recurring ** basis of Company's efforts and results with regard to continuing development of such

Product. Company agrees that if and/or when it licenses the Product to a third party for commercialization, Company shall include provisions in the license agreement to obligate the licensee to continue the clinical development of the Product in the Field in a commercially reasonable manner, provided that Company or licensee reasonably believes that the Product is safe and effective as determined by successfully meeting its pre-determined endpoints in its clinical trials, and provided that Company and/or licensee receives necessary regulatory approvals to continue development and reach the market for the Product in the Field in a Major Market.

(b) If during such five (5) year period, Company no longer uses commercially reasonable efforts to advance the clinical development of the Product in the Field in a Major Market or terminates all of its clinical development efforts directly related to the Product and/or no longer uses commercially reasonable efforts in its partnering efforts for the Product, despite successfully demonstrating clinical efficacy and safety as determined by meeting its clinical pre-determined endpoints, Company agrees to permit LLS, subject to execution by such third parties of appropriate confidentiality agreements with Company to disclose the Research Results and Project Inventions to third parties that LLS reasonably believes would have a potential interest, and the necessary financial capacity, to further develop and commercialize the Product in a Major Market (a "**Potential Partner**"). Company agrees to enter into good faith discussions with each Potential Partner, within ** days of written notification from LLS, to evaluate the feasibility of a potential licensing relationship. Should Company and a Potential Partner mutually agree in writing to proceed with such relationship, Company shall work in good faith to negotiate a license of the results of the Research Program and any necessary Project Inventions or to develop or to commercialize the Product in a Major Market within a commercially reasonable timeframe. In consideration for LLS's efforts in facilitating a transaction between Company and a Potential Partner, in lieu of any payments under Section 10, Company shall pay to LLS ** of any consideration received by Company from a Potential Partner pursuant to such transaction (including, but not limited to: (i) **; and (ii) **.

(c) Notwithstanding anything to the contrary set forth in this Agreement, if the Research Program is deemed unsuccessful due to its not meeting its clinical endpoints for safety and efficacy during the Term of this Agreement, as determined by clinical experts retained by Company or by the FDA, all Funding provided to Company by LLS will be considered a non-repayable grant.

(d) Notwithstanding the above, if the Research Program is deemed unsuccessful (in accordance with the criteria set forth above), *and*, within a five (5) year period thereafter, Company advances its knowledge base relating to the Research Program and the Product, and decides to move forward in development of the Product, Company shall so notify LLS in writing, whereupon LLS shall have the right of first offer to support a research program provided that LLS gives Company written notice of its determination to do so within ** days after the date of Company's written notice.

(e) If Company during the Term of this Agreement or the five (5) year period thereafter fails to use commercially reasonable efforts to advance the clinical development of the Research Program despite successfully meeting its pre-determined clinical endpoints for safety and efficacy, unless a Development Exception is applicable, Company will be required to pay

back to LLS the total amount of the Funding that LLS provided to Company during the Term, net of any amounts previously paid by Company to LLS, within ** days after the termination or expiration of this Agreement.

(f) Notwithstanding anything to the contrary herein, this Section 7 shall apply in the event that (i) Company licenses the Product, and the responsibility for developing and commercializing the Product in the Field in the Major Markets, is transferred to one or more third parties, or (2) a third party acquires control of Company (whether by merger, equity purchase or otherwise) or all or substantially all of Company's assets relating to the Product.

(g) This Section 7, sets forth LLS' sole and exclusive remedy for the matters addressed by this Section 7. For avoidance of doubt, Company shall not be required to further research or develop the Product if it is reasonably determined by Company and reasonably demonstrated to LLS that the Product fails to meet clinical endpoints for safety or efficacy.

8. Publication of Results.

8.1. Publication of Results. If either Party determines that scientific findings and results developed in the conduct of the Research Program have scientific significance that would be of interest to the broader research community, Company shall use reasonable efforts to publish or otherwise cause to be publicly disseminated within the research community such scientific findings and results, together with the underlying data, provided that such results have been produced and verified, provided, however, Company shall have no obligation to publish or disseminate information that contains Company's Confidential Information or proprietary know-how or trade secrets or will compromise securing patent protection of Project Inventions or other Intellectual Property. Company shall acknowledge the support of LLS in all such publications.

8.2. Availability of Materials. In the event that Company no longer uses commercially reasonable efforts to advance the clinical development of the Product which results in expiration or termination of this Agreement, and an LLS funded academic researcher thereafter requests the opportunity to study the physical materials, research tools and resources developed during or emanating from the Research Program that are reasonably available to Company, Company agrees during the ** year period following expiration or termination of this Agreement to make them available to such academic researcher for non-commercial research, following public disclosure of such materials by Company, which disclosure may include, without limitation, scientific publications, seminar presentations, and publication of

patent applications. These materials shall be shared on an "at cost" basis only under a Materials Transfer Agreement ("**MTA**") executed between the requesting party ("**Transferee**") and Company, provided that such transfer shall occur within ** business days of execution of the MTA. Such MTA shall contain terms customary in the pharmaceutical industry and shall be negotiated in good faith by Company within ** business days following Transferee's request.

9. Intellectual Property.

9.1. Ownership Rights in Pre-Existing Works. Each Party will retain ownership and control of their respective works of authorship, inventions, know-how, information, and data, proprietary material, and all Intellectual Property Rights therein, that were in existence as of the

Effective Date or are later generated outside of scope of the performance by each Party of its obligations under this Agreement.

9.2. Ownership Rights in Project Inventions. Company shall own any and all proprietary rights, including but not limited to all other Intellectual Property Rights, in all Project Inventions and all Research Results. LLS hereby assigns to Company all right, title and interest it has or may acquire in or to the Project Inventions or Research Results or any proprietary rights therein, without the requirement of any additional consideration or further action of LLS.

9.3. Protection and Perfection of Rights. LLS will assist Company in any reasonable manner in the procurement and maintenance of all Intellectual Property Rights in the Project Inventions and Research Results, provided, however Company shall cover all expense at its sole cost. Without limiting the foregoing, LLS will execute, and cause its employees and representatives to execute, upon Company's request, any assignments, applications and other documents that Company believes may be necessary or appropriate to protect or perfect the Intellectual Property Rights in the Project Inventions. LLS will ensure that its employees and consultants who participate in activities under this Agreement are obligated to assign or otherwise transfer all right, title and interest in and to all Intellectual Property Rights in the Project Inventions to Company or its designee and will, as requested by Company, obtain for Company the execution of all necessary applications or other documents therefore from any employee or consultant.

9.4. Reservation of Rights. Except for the rights expressly provided in this Agreement, no other rights are granted by either Party to the other Party. Notwithstanding anything to the contrary, no rights or licenses are granted under this Agreement by either Party to the other for the use of any trade names, trademarks, and service marks.

9.5. Patent Prosecution Reporting. The filing of all patent applications generated to protect Project Inventions filed by Company shall be reported in writing by Company in a timely fashion to LLS, but no later than ** days prior to the submission date of any such patent applications. After receipt of any such report, LLS may request in writing the disclosure of all actions, papers or agreements related thereto, and Company shall promptly provide LLS a copy of each such action, paper or agreement within ** days after LLS's written request. The obligation set forth in this Section 9.5 shall terminate for each patent application upon the issuance of the resulting patent.

10. Payments to LLS.

10.1. Payments. In consideration of LLS's Funding and transfer to Company of any rights LLS may have to any Project Inventions and Research Results developed during the Term, Company shall pay LLS the amounts set forth in this Section 10, subject in all respects to the provisions of Sections 7.2 and 15.5 of this Agreement:

(a) if, Company partners or outlicenses the rights to the Product to a third party or transfers the rights to the Product to a partnership with a third party for further development and/or commercialization of the Product (a "**Product Outlicense**"), then Company shall pay to LLS payments under the following tiered payment schedule: (i) an amount equal to ** of any

upfront and milestone payments received by Company from such third party or partnership created with a third party for further development and/or commercialization of the Product should such event take place after LLS has provided at least ** of the proposed funding for the Research Program, provided however that (A) funding paid to Company for sponsored research performed or to be performed by Company at standard industry FTE rates or for other goods or services in connection therewith, at arms' length (B) payments for the purchase of equity investments in Company or any affiliate at arms' length, or (C) loan proceeds paid to Company or any affiliate in an arms' length debt financing, shall not be deemed either an upfront or milestone payment'; (ii) an amount equal to ** of any upfront and milestone payments received by Company from such third party or partnership created with a third party for further development and/or commercialization of the Product should such event take place before LLS has provided at least ** of the proposed funding for the Research Program, provided however that (A) funding paid to Company for sponsored research performed or to be performed by Company at standard industry FTE rates or for other goods or services in connection therewith, at arms' length (B) payments for the purchase of equity investments in Company or any affiliate at arms' length, or (C) loan proceeds paid to Company or any affiliate in an arms' length debt financing, shall not be deemed either an upfront or milestone payment, and (iii) a royalty equal to ** of Net Sales of the Product.

(b) if Company does not enter into a Product Outlicense and enters the market place for the Product in the Field through its own mechanisms (or through an affiliate): (i) an initial payment of ** upon First Commercial Sale; (ii) a payment of ** at the ** of the First Commercial Sale; and (iii) a royalty equal to ** of Net Sales of the Product in the Field provided, however, that the aggregate total payments under clause (b) shall be limited to three (3) times the total Funding received by Company from LLS.

(c) if Company does enter into a Product Outlicense after Company has entered the market place through its own mechanisms (or though an affiliate), then Company shall pay (or require the counterparty to the Product Outlicense to pay, if applicable) to LLS a royalty equal to ** of Net Sales of the Product.

(d) In the event the Company combines through merger or otherwise with another company, is sold or transferred to another company or all or substantially all of its assets relating to the Product are sold or transferred to another company (each, a "**Company Sale**"), and only if the counterparty to the Company Sale does not assume all of Company's obligations under Sections 10.1(a) and (b), Company shall pay to LLS or cause such other company to pay to LLS, in lieu of any other payments under this Section 10.1: (i) an amount equal to ** the Funding paid up to the time of the closing of the Company Sale by LLS to the Company, which amount shall be paid ** days following the later of (x) first NDA approval for the Product in the Field or (y) the closing of such Company Sale and; (ii) a amount equal to ** royalty on Net Sales of the Product. LLS agrees to consider in good faith any proposal from Company or its successor for a lump sum payment in lieu of such royalty.

The payments specified in each of clauses (a), (b), (c) and (d) above are mutually exclusive and in no event shall Company be required to make, and LLS shall not be entitled to receive, payments under more than any one of such clauses at any given time.

10.2. Timing of Payment. Royalty payments to LLS pursuant to this provision shall be paid on a ** basis within ** days following the end of each calendar **. Company shall provide to LLS financial information reasonably adequate to establish and document the amounts payable to LLS pursuant to this Section 10, and shall permit an independent auditor, if LLS deems necessary and at LLS' cost to examine its financial records to verify the accuracy of the amount payable to LLS upon ** business days' prior written notice. Audits of such financial information shall be conducted no more frequently than annually and shall take place at the location where such records are maintained by Company. The independent audit firm will be required to agree in writing with Company to comply with confidentiality restrictions at least as stringent as those set forth in this Agreement, and to provide a non-confidential summary of the results of the audit to both of the Parties. In the event that any such examination shows an underreporting and underpayment in excess of the greater of **, then Company shall pay the cost of the examination as well as any additional sum that would have been payable to LLS had Company reported correctly, plus an interest charge at a rate of ** per year, calculated from the date the correct payment was due to LLS. For underpayment of less than ** for any ** month period, Company shall pay the difference within ** days of receipt of the auditor's summary without interest charge or examination costs. For any overpayment by the Company to LLS identified in the auditor's summary, such amount shall be deducted by Company from the following quarter's royalty payment owed to LLS.

10.3. Taxes. LLS shall be responsible for all taxes and other governmental charges and assessments incurred or payable as a result of any payments made by Company to LLS hereunder.

11. Confidentiality.

11.1. Definition. Confidential Information shall have the meaning set forth in Section 1.

11.2. Exceptions to Confidential Information. The following information shall not be treated as Confidential Information: information (a) that is in the public domain or is known by others in the field at the time of disclosure; (b) that is in the possession of the receiving Party free of any obligation of confidentiality prior to the time of disclosure; (c) that subsequently becomes part of the public domain or becomes publicly known through no fault of the receiving Party; (d) that subsequently is received by the receiving Party without any obligation of confidentiality from a third party who is free to disclose the information; (e) that is independently developed by the receiving Party without the use of any Confidential Information; or (f) that is required to be disclosed to comply with applicable laws or regulations, or with a court or administrative order.

11.3. Confidentiality Obligations. For a period of ** years following the last disclosure by a Party of Confidential Information pursuant to this Agreement, the receiving Party agrees that it will maintain the confidentiality of and will not disclose to any third party, or use for any purpose other than as contemplated by this Agreement, any Confidential Information furnished to it by the disclosing Party, except as permitted herein. The receiving Party agrees that any dissemination of Confidential Information to its employees shall be limited to the extent reasonably possible and that the receiving Party shall instruct all persons to whom any Confidential Information is disclosed of the confidential nature of such information, the

proprietary right of the disclosing Party therein, and the obligation of such person to maintain the confidentiality of such information during and after employment with the receiving Party. The receiving Party shall also require that any consultants, agents or independent contractors of the receiving Party who are hired or engaged by the receiving Party shall be bound to written confidentiality agreements no less stringent than the confidentiality obligations set forth in this Agreement and to hold in confidence any Confidential Information which they acquire during the course of their duties.

11.4. Exceptions to Non-Disclosure Obligation. In the event that the receiving Party is required or requested by law or government order to disclose any Confidential Information, the receiving Party will, to the extent permitted by law, (a) promptly notify the disclosing Party of any such request or requirement, and of the circumstances relating to such disclosure and the proposed scope thereof, so that the disclosing Party may seek an appropriate protective order or other appropriate protections, and (b) provide reasonable assistance at the disclosing Party's request so the disclosing Party may seek to obtain a protective order or other reliable assurance that confidential treatment will be accorded the Confidential Information. In addition, Company may disclose Confidential Information of LLS to the extent Company determines such disclosure is reasonably necessary to any bona fide potential or actual investor, investment banker, acquirer, merger partner, or other potential or actual financial partner of Company; provided that each disclosee must be bound by obligations of confidentiality and non-use no less stringent than those set forth in this Section 11 prior to any such disclosure

12. Healthcare Compliance.

The Parties specifically intend to comply with all applicable laws, rules and regulations to the extent relevant to this Agreement, including (i) the federal anti-kickback statute (42 U.S.C. 1320a-7(b) and the related safe harbor regulations; and (ii) the Limitation on Certain Physician Referrals, also referred to as the "Stark Law" (42 U.S.C. 1395 (n)). Accordingly, no part of any consideration paid hereunder is a prohibited payment for the recommending or arranging for the referral of business or the ordering of items or services; nor are any payments or contributions of free materials intended to induce illegal referrals of business. In the event that any part of this Agreement is determined to violate federal, state, or local laws, rules, or regulations, the Parties agree to negotiate in good faith revisions to the provision or provisions that are in violation. In the event the Parties are unable to agree to new or modified terms as required to bring the entire Agreement into compliance, either Party may terminate this Agreement immediately upon written notice to the other Party. The Parties shall comply with the Health Insurance Portability and Accountability Act of 1996 and the regulations promulgated thereunder, and all applicable state, local and foreign privacy and other laws, rules and regulations, to the extent relevant to the Research Program.

13. Debarment & Exclusion.

13.1 Debarment. Company represents that Company is not debarred and that it does not knowingly use in any capacity, directly or indirectly, the services of any individual or entity which is debarred by the FDA pursuant to 21 USC Section 335a(a) or (b) for the Research Program. Company will promptly disclose in writing to LLS if any individual or entity providing services for the Research Program is debarred or if any claim, investigation or legal or

administrative proceeding, is pending, threatened ("debarment action") relating to the debarment of Company or, any individual/entity performing services upon notice of such debarment action. In the event Company is debarred by the FDA pursuant to 21 USC Section 335a (a) or (b)1 LLS shall have the right to terminate this agreement immediately upon written notice to the Company.

13.2 Exclusion. Company represents that it is not excluded and does not knowingly use in any capacity, directly or indirectly, the Services of any individual or entity the Research Program which is excluded by the Office of the Inspector General (OIG) pursuant to Social Security Act Section 1128(a) (b) and (c) and or 42 USC Section 1320a-7 for any of the services or research hereunder. Company will promptly disclose in writing to LLC if any individual or entity providing services for the Research Program is excluded or upon notice of an ("exclusion action") or if any action, claim, investigation or legal or administrative proceeding is pending and or threatened, and Company shall promptly cease use of the services of such individual or entity.

14. Dispute Resolution.

14.1. Procedures Mandatory. The Parties agree that any claim or dispute arising out of or relating to this Agreement, including any alleged failure to perform, or breach, of this Agreement, or any issue relating to the interpretation or application of this Agreement, other than breaches of confidentiality obligations, shall be resolved solely by means of the procedures set forth in this Section 14.

14.2. Negotiation. Any Party who wishes to make a claim arising out of or relating to this Agreement must notify the other Party in writing setting forth the claim. The Parties have fourteen (14) days after receipt of the claim notice by the other Parry to resolve the dispute informally.

14.3. Meeting of Senior Management. If the aforesaid ** day period expires without resolution of the claim, either Party may request a meeting between senior management of the Parties to resolve the dispute and shall propose at least three different non-holiday (US) weekdays (and times) within the ** days after the request when such a meeting may take place, none to be sooner than ** days after the request is received. If none of the times and dates proposed are acceptable to the other Party, that Party shall, not later than ** days after receiving the request, counter-propose in writing at least ** different non-holiday weekdays (and times) within the same period, none to be sooner than ** days after the counter-proposal is received. The Party who made the initial request shall respond to any counter-proposed dates in writing not later than ** days after receiving the counter-proposal. Such a meeting may be either by telephone or in person. If a meeting is agreed upon, the Parties must participate unless it is rescheduled by agreement.

14.4. Further Proceedings.

14.4.1. The Party requesting the meeting may proceed to arbitration if the other Party has not agreed to a meeting or counter-proposed a meeting within ** days after receiving the claiming Party's request, or has failed to participate in an agreed meeting.

14.4.2. The Party receiving a request for a meeting may proceed to arbitration if the other Party has not agreed to a meeting within ** days after receiving a counter-proposal, or has failed to participate in an agreed meeting.

14.4.3. Either Party may proceed to arbitration if a meeting takes place and the claim is not resolved.

14.5. Arbitration. Any Party entitled under Section 14.4 to proceed with arbitration may submit the claim or dispute to arbitration conducted by JAMS or any corporate successor of JAMS or, if unavailable, by the American Arbitration Association or any corporate successor of the American Arbitration Association, under the rules of such organization generally applicable to commercial disputes. Such arbitration shall be the exclusive means of proceeding further in the dispute resolution process. The arbitration shall be held in the County of New York in the State of New York. The arbitrator is authorized to award such injunctive and monetary relief as he, she or they believe(s) appropriate. The arbitration will be heard and determined by one (1) arbitrator, who will be jointly selected by LLS and Company. If, within thirty (30) days following the date upon which a claim is received by the respondent, the Parties cannot agree on a single arbitrator, the arbitration will be heard and determined by three (3) arbitrators, with one arbitrator being appointed by each Party and the third arbitrator being selected by the two Party-appointed arbitrators. If either Party fails to select an arbitrator, or if the Party-appointed arbitrators cannot agree on a third arbitrator within ** days of the respondent receiving the claim, such arbitrator will be appointed by JAMS. The arbitration award shall be accompanied by a reasoned opinion in writing (in English), shall state the reasons for the award, and shall be final and binding on the Parties and enforceable in any court of competent jurisdiction, and the Parties expressly exclude any right to appeal from such decision. The arbitration shall otherwise be governed by the United States Arbitration Act, 9 U.S.C. Section 1 et seq. For purposes of enforcement of any such award, the Parties agree to submit to the jurisdiction of the state and federal courts located in the County of New York in the State of New York.

14.6. Preservation of Rights Pending Resolution.

14.6.1. Performance to Continue. Each Party shall continue to perform its obligations under this Agreement pending final resolution of any claim or dispute arising out of or relating to this Agreement unless the Agreement is rightfully terminated or rescinded.

14.6.2. Provisional Remedies. Although the procedures specified in this Section are the sole and exclusive procedures for the resolution of disputes arising out of or relating to this Agreement, either Party may seek a preliminary injunction or other preliminary relief to avoid irreparable harm or to preserve its rights pending resolution of these dispute resolution procedures.

14.7. Statute of Limitations. All applicable statutes of limitation and time-based defenses (such as estoppels and !aches) concerning a claim subject to this dispute resolution process shall be tolled upon the sending of a notice of such claim as specified in Section 2, above, and such toll shall continue until the time ** days after the date that the claimant becomes entitled to commence arbitration hereunder.

14.8. Failure to Comply With Dispute Resolution Process. Any Party may restart the dispute resolution process as to the same claim, but only after either ** days have elapsed after the negotiation period set forth in Section 14.2 above and no Party has requested a meeting under Section 14.3 above, or at least one Party becomes entitled to proceed to arbitration under Section 14.5, above. Upon rightful commencement of an arbitration concerning a claim, any newer dispute resolution process concerning that claim terminates.

14.9. Costs. Each Party will bear its own costs and expenses (including its attorney's fees) associated with any arbitration initiated under this section; provided that the arbitrator shall assess against the Party losing the arbitration all of the arbitrator(s)' and administrative fees associated with the arbitration and the costs and expenses (including reasonable attorney's fees) of both Parties, unless the arbitrator(s) believes that neither Party is the clear loser, in which case the arbitrator(s) shall, in its/their sole discretion, divide arbitrator(s)' and administrative fees and the Parties' costs and expenses between the Parties.

15. Term and Termination.

15.1. Term. This Agreement shall commence on the Effective Date and shall remain in effect until the completion of the Milestones as detailed in Exhibit C (the "**Term**"), unless earlier terminated in accordance with the provisions of this Agreement.

15.2. Termination Rights. Other than the Termination Rights specified in previous sections of this Agreement, Company may terminate this Agreement at any time during the Term upon at least ** days written notice to LLS or immediately upon the termination of the Research Program. LLS may terminate this Agreement upon at least ** days written notice to Company as provided in Sections 5.3 and 13.1 hereof Either Party may terminate this Agreement pursuant to Section 12 hereof.

15.3. Termination for Bankruptcy. LLS may terminate this Agreement immediately, with no further payment obligations, if Company (a) becomes insolvent or is unable to pay its debts when due, (b) files a petition in bankruptcy, reorganization or similar proceedings (and if filed against, such petition is not removed within ** days), (c) discontinues its business, or (d) a receiver is appointed or there is an assignment for the benefit of Company's creditors.

15.4. Termination for Breach. In the event that (a) Company commits a material breach of its obligations under this Agreement, or (b) LLS commits a material breach of its obligations under this Agreement, including if LLS fails to pay any amount to Company hereunder when such amount is due and payable and, in either case, LLS fails to cure its breach within ** days after receiving written notice thereof from Company or if Company fails to cure its breach within ** days after receiving written notice thereof from LLS, the non-breaching Party may terminate this Agreement immediately upon written notice to the breaching Party.

15.5. Effect of Termination. In the event that LLS terminates this Agreement for any reason other than pursuant to Section 15.4 upon a material breach by Company of its obligations under this Agreement or in the event Company terminates this Agreement pursuant to Section 15.4 upon a material breach by LLS of any of its obligations under this Agreement, or under Sections 12 or 15.3, LLS shall compensate Company for the work it has completed up to the date

of termination by paying Company (a) the balance of any Funding owed for each completed Milestone, and (b) the amount of any reasonable accrued costs and non-cancelable obligations directly related to the Research Program incurred by Company prior to the receipt of notice of termination, such payment to be made within ** days following the verification of such amount; provided, however, such payment, together with all other Funding payments made pursuant to this Agreement, shall not exceed the total amount of Funding to be provided by LLS pursuant to Section 2 of this Agreement. Furthermore, in such event, all Funding provided by LLS shall be considered a non-repayable grant to Company, and the provisions of Sections 7.2 and 10 shall not survive the termination or expiration of this Agreement, notwithstanding anything to the contrary set forth in this Agreement. Company shall provide such documentation of completed Milestones, accrued costs and non-cancelable commitments as LLS may reasonably request.

In the event that LLS terminates this Agreement pursuant to Section 15.4 upon a material breach by Company of its obligations under this Agreement, Company shall within ** days of termination repay to LLS an amount equal to that portion of the Funding that LLS had paid to Company pursuant to this Agreement, provided, if Company challenges the justification for such termination, the matter shall be treated as a Dispute pursuant to Section 14 hereof.

In the event Company terminates this Agreement pursuant to the first sentence of Section 15.2, Company must perform in accordance with the applicable provisions of Section 7.2, and Section 10 shall survive termination under these specific circumstances.

15.6. Force Majeure. Neither Party will be responsible for delay resulting from causes beyond the reasonable control of such Party, including without limitation fire, explosion, flood, war, acts of terrorism, strike or riot, provided that the non-performing Party uses commercially reasonable efforts to avoid or remove such causes of nonperformance and continues performance under this Agreement with reasonable dispatch when such causes are removed.

15.7. Survival. The following provisions shall survive the expiration or termination of this Agreement: Sections 4.4, 7.2 (except as otherwise specified in Section 15.5), 8, 9, 10, 11, 14, 15.5, 15.6, 15.7, 16.1, 16.2, 16.4, 16.5, 16.7, 16.10, 16.12, 16.13, 16.14 and 16.15 and all definitions applicable to those sections.

16. Miscellaneous Provisions.

16.1. Indemnification. Company agrees to indemnify, hold harmless and defend, LLS and LLS directors, officers, representatives, employees and agents and their respective successors, heirs and assigns (each an "**Indemnitee**") from and against any and all claims, losses, expenses, demands, suits, liability or damage for personal injury, property damage or otherwise, including reasonable attorneys' fees, (collectively "**Claims**"), arising directly or indirectly from, relating to, or resulting from a third party claim against an Indemnitee in respect of (a) any research performed under this Agreement, including research undertaken by one or more investigators or subcontractors pursuant to one or more agreements between Company and its subcontractors and investigators, (b) any product developed in whole or in part from such research, (c) any claim of infringement or misappropriation of intellectual property, (d) any material breach of its representations, warranties, covenants or obligations under this Agreement and (e) the conduct of Company's business or operations outside of the Research Program.

Notwithstanding the foregoing, Company shall have no obligations pursuant to this Agreement to defend, hold harmless or indemnify LLS from any liability, loss, damage or expense to the extent it arises from (a) LLS's negligence or willful misconduct, (b) any breach by LLS of its representations, warranties, covenants or obligations under this Agreement and (c) the conduct by LLS of its business or operations outside of the Research Program.

16.2. Indemnification Procedures.

16.2.1. In the case of any Claim asserted against an Indemnitee, such Indemnitee shall (i) notify Company in writing as soon as it becomes aware of any Claim and shall permit Company (at the expense of Company) to assume the defense of any Claim and (ii) cooperate fully with the legal representative chosen by Company, provided that the failure of any Indemnitee to give notice as provided herein shall not relieve Company of its indemnification obligation hereunder except to the extent that such failure results in a lack of actual notice to Company and Company is materially prejudiced as a result of such failure to give notice.

16.2.2. Except with the prior written consent of the Indemnitee, Company shall not consent to entry of any judgment or enter into any settlement that provides for injunctive or other non-monetary relief affecting the Indemnitee or that does not include as an unconditional term thereof the giving by each claimant or plaintiff to such Indemnitee of a release from all liability with respect to such Claim.

16.2.3. If the Indemnitee in good faith determines that the conduct of the defense of any Claim subject to indemnification under this Agreement or any proposed settlement of any such Claim by Company might be expected to affect adversely the Indemnitee's tax status, reputation, the ability of the Indemnitee to conduct its business or fulfill its mission, the Indemnitee will have the right at all times to take over and assume control over the defense, settlement, negotiations or litigation relating to that portion of the Claim at its sole cost and expense, provided that if the Indemnitee does so take over and assume control, the Indemnitee may not settle such Claim with the written consent of Company, such consent not to be unreasonably withheld.

16.3. Insurance.

16.3.1. Company represents and warrants that it has and will maintain during the Term liability insurance in an amount as is customarily carried by entities engaged in activities similar to those contemplated by this Agreement, but in no event less than ** for a single occurrence and ** in the aggregate, *provided* Company supplies to LLS written assurance from its insurance carrier that such coverage is adequate for a Company engaged in activities similar to those contemplated in this Agreement. Insufficient self-insurance coverage shall not relieve Company of its indemnification obligations under Section 16.1.

16.3.2. In addition to the liability insurance referred to in Section 16.3.1 above, Company has and will maintain during the Term workmen's compensation and other insurance coverage in amounts appropriate to the conduct of Company' business activities and the services and research contemplated by this Agreement and in conformance with applicable legal and regulatory requirements.

16.3.3. Company shall add LLS as an additional insured to its insurance policies with respect to the Research Program and shall cause its insurance policies to provide for ** days' prior written notice to LLS by the insurance carrier of cancellation, expiration or modification of the insurance policy and will furnish to LLS certificates of insurance evidencing the foregoing within ** days after the Effective Date.

16.4. Limitation on Liability. It is agreed by the Parties that neither Party shall have a right to or shall claim special, indirect, punitive or consequential damages, including lost profits, for breach of this Agreement, regardless of any notice of the possibility of such damages. Notwithstanding the foregoing, nothing in this Section 16.4 is intended to or shall limit or restrict damages available for a Party's breach of Section 11.

16.5. Publicity; Use of Party's Name. Neither Party shall use the name of the other Party, its trademarks, service marks, logos, or the name of any principal investigator, or any employee or agent, for any press release, marketing, advertising, public relations or other purposes without the prior written consent of the other Party, except that either Party may use the name of each other, disclose the existence of this Agreement, and include a general description of the nature of the Research Program (for example, as set forth in Exhibit A and C) in any descriptions on its website, in its research portfolio, fundraising activities and its reporting requirements. If Company successfully develops a treatment for a blood cancer or their complications in the Field utilizing information developed in whole or in part from the Research Program, then Company shall acknowledge LLS's financial contribution in any announcement or publication made by Company directly related to such event.

16.6. Relationship of Parties. The Parties do not intend this Agreement to create a legal partnership, joint venture, or agency relationship. There are no third party beneficiaries to this Agreement. The activities and resources of each Party shall be managed by such Party, acting independently and in its individual capacity and the Parties shall have a relationship of independent contractors with respect to each other. Neither Party shall have any express or implied right or authority to assume or create any obligations on behalf or in the name of the other Party or to bind the other Party to any contract, agreement or undertaking with any third party.

16.7. Governing Law. This Agreement shall be governed by and construed in accordance with the law of the State of New York, without giving effect to its principles or rules of conflict of laws to the extent such principles or rules are not mandatorily applicable by statute or would require or permit the application of the laws of another jurisdiction.

16.8. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, and all of which together shall be deemed to be one and the same instrument. This Agreement may be executed and delivered by facsimile or electronic transmission, which shall be binding on the Party delivering a copy via facsimile or electronic transmission.

16.9. Binding Effect. This Agreement shall be binding upon and inure to the benefit of the Parties and their respective permitted successors and assigns.

16.10. Assignment and Subcontracting. This Agreement may not be assigned by either Party without the prior written consent of the other Party, except that Company may assign this Agreement to an affiliate or to a successor in connection with the merger, consolidation or sale of all or substantially all of Company's assets or that portion of its assets or business to which this Agreement relates, so long as the affiliate or successor assumes in writing the obligations of this Agreement. Any assignment or attempted assignment in violation of this provision shall be null and void unless agreed upon in writing by both Parties.

16.11. Entire Agreement; Amendment and Waiver. This Agreement and all Exhibits attached hereto, constitute the entire agreement and understanding of the Parties with respect to the subject matter of the Agreement and supersedes any prior and contemporaneous understandings, proposals and agreements, whether written or oral, between the Parties relating to its subject matter. Any amendment, alteration or modification must be in writing and signed by the Parties. Any waiver of any rights or failure to act in a specific instance shall relate only to such instance and shall not be construed as an agreement to waive any rights or fail to act in any other instance, whether or not similar.

16.12. Notice. Any notice required or permitted to be given hereunder shall be deemed given: when personally delivered; upon confirmed receipt of electronic delivery by email or facsimile; upon receipt by delivery by recognized overnight delivery service; or ** days after being deposited in the mail, with postage prepaid for certified mail, return receipt requested, addressed as follows:

COMPANY

Address:	375 Pheasant Run, Newtown, PA 18940 USA	
Senior Management:	**Ramesh Kumar, Ph.D**., *Founder, Chief Executive Office*	267-759-3680
		rkumar@onconova.us

For Legal Issues:	**Ramesh Kumar, Ph.D**., *Founder, Chief Executive Office*	267-759-3680 rkumar@onconova.us
For Legal Issues, with a copy to:	Dechert LLP Attention: James Marino	902 Carnegie Center Suite 500 Princeton, NJ 08540-6531

THE LEUKEMIA & LYMPHOMA SOCIETY

Address:	1311 Mamaroneck Ave, Suite 310, White Plains, New York 10605	
Senior Management:	Louis J. DeGennaro, PhD; Chief Scientific Officer	914-821-8922, louis.degennaro@lls.org
For Legal Issues:	James Nangle; Chief Financial Officer	914-821-8824, jimmy.nangle@lls.org
For Legal Issues, with copy to:	Holland & Knight LLP Attention: Neal N. Beaton	31 West 52nd Street New York, New York 10019

or, in each case, to such other address or facsimile number or to the attention of such other person as may be specified in writing by such Party to the other Party.

16.13. Severability. If any provision of this Agreement is inoperative or unenforceable for any reason in any jurisdiction, such circumstances shall not have the effect of rendering the provision in question inoperative or unenforceable in any other case, circumstance or jurisdiction, or of rendering any other provision or provisions herein contained invalid, inoperative, or unenforceable to any extent whatsoever.

16.14. Headings. The headings contained in this Agreement are for purposes of convenience only and shall not affect the meaning or interpretation of this Agreement.

16.15. Construction of this Agreement. In any construction of this Agreement, the Agreement shall not be construed against any Party based upon the identity of the drafter of the Agreement or any provision of it.

16.16. Further Assurances. Each Party agrees to execute all such further instruments and documents and take all such further actions as the other Party may reasonably require in order to effectuate the terms hereof.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the Effective Date.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar, Ph.D.

Print Name: Ramesh Kumar, Ph.D.

Title: Chief Executive Officer

Date: May 12, 2010

THE LEUKEMIA & LYMPHOMA SOCIETY

By: /s/ James T. Nangle

Print Name: James T. Nangle

Title: Chief Financial Officer

Date: May 12, 2010

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar, Ph.D.

Print Name: Ramesh Kumar, Ph.D.

Title: Chief Executive Officer

Date: May 12, 2010

THE LEUKEMIA & LYMPHOMA SOCIETY

By: /s/ James T. Nangle

Print Name: James T. Nangle

Title: Chief Financial Officer

Date: May 12, 2010

EXHIBIT A

Company Proposal

[See attached.]

FUNDING PROPOSAL TO
THE LEUKEMIA AND LYMPHOMA SOCIETY

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375 PHEASANT RUN, NEWTOWN, PA 18940
WWW.ONCONOVA.COM RKUMAR@ONCONOVA.US
267 759-3680 (PH) 267 759-3681 (FAX)

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PRIMARY CONTACT INFORMATION

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PROJECT OVERVIEW

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PROJECT PLAN AND BUDGET

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Budget Justification

The project budget submitted is based on our estimate of clinical trial-related costs for the pivotal trial proposed in this application. We have used the following considerations:

1. Aggressive enrollment timelines necessitate a large number of trial sites and their associated management costs
2. Monitoring, data management and other vital functions will be entrusted, for most part, to contract research organization
3. Key opinion leaders will be engaged in the trial, drug safety committees and as advisors
4. Electronic capture of data and real time assessment tools will be employed to curtail the time lag between trial enrollment and close out of the study.
5. A project management technology provider will be engaged to increase the probability of successful execution and quality control.
6. Completion of all chemistry, manufacturing and controls (CMC) and related activities to permit rapid NDA filing and approval of the application.

The proposed Clinical Study costs of ** were projected based on treating ** patients at ** sites across the United States and Europe. Since per patient costs vary from site to site, we have used our experience in conducting more than a dozen trials in more than ** sites to generate a median cost for our model. Onconova has developed a budget with costs for CRO services, Data Management and Statistical Consultants. Onconova also has prepared a detailed budget for direct per patient costs. We also have budgeted start up costs of ** and additional variable costs of **. These Clinical Study costs are spread over the Project period, and allocated based on achieving key milestones.

In this budget we have not provided for a variance related to increase in the sample size. This issue will be finalized when the SPA is approved (this is the first milestone in our proposal).

Clinical Supply, i.e., drug product and related CMC activities, is projected at **. Onconova plans to complete drug registration activities and to produce enough ON 01910.Na drug product to treat over ** patients over this ** month project period, in support of multiple on-going studies. We have portioned ** of these budgeted CMC costs for the MDS project. We have allocated active pharmaceutical ingredient (API) and drug product stability and storage costs evenly over the entire study period, while API manufacturing, and drug product filling and finishing costs were spread evenly only over the patient treatment period. Onconova is committing to cover ** of the CMC-related costs.

Personnel costs for both Clinical and CMC/Development were calculated by preparing a manning chart and assigning a percentage of time devoted to MDS Clinical and CMC Development activities. We project that our Clinical personnel will devote ** of their time to the MDS trial, with ** part-time employee scheduled at ** of their time. For CMC Development personnel, we are estimate ** of their time devoted to MDS-related activities.

These costs were then spread evenly over the entire project time period. Onconova is committing to cover ** of the personnel costs.

A summary of project budget cost categories and requested funding from LLS is provided below.

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Summary: The proposed budget is based on “real-life” scenarios and aimed at successful execution of the study in a timely manner. Onconova is proposing to undertake significant part of the proposed cost of the study. A success-based, milestone-linked payment plan has been proposed.

COMPANY INFORMATION

Senior Management (http://www.onconova.com/management.shtml for biographical information).

Senior management includes Ramesh Kumar (President & CEO) and E.P. Reddy (scientific founder and lead scientific advisor, Director of the Fels Institute for Cancer Research & Molecular Biology at Temple University), who have worked together since founding the company in 1998, and Michael Hoffman, who has been an investor and is now Board Chairman. All three are successful businessmen and bring an entrepreneurial spirit to the Company.

Ramesh Kumar, Ph.D. (President & CEO) received his Ph.D. in Molecular Biology from the University of Illinois, Chicago, and trained at the National Cancer Institute. He has held positions in R&D or management at Princeton University, Bristol-Myers Squibb, DNX (later Nextran, a subsidiary of Baxter) and Kimeragen (later Valigen), where he was President of the Genomics and Transgenics Division. Dr. Kumar has over 50 publications spanning the areas of molecular oncology, transgenic animals, gene therapy and recombination and is an inventor in 8 U.S. patents and many patent applications. He co-edited the 1993 book “Molecular Basis of Human Cancer.”

Francois Wilhelm, M.D., Ph.D. (Chief Medical Officer) has 23 years of global clinical development experience covering all phases of drug development and post-marketing in Europe (Hoffmann-La Roche) and in the US (Fujisawa, Pfizer, Procter & Gamble, Akros Pharma, Johnson and Johnson). He has led clinical development programs in Oncology-Hematology, Immunology, Inflammation, Virology, Bone metabolism, Endocrinology, Woman’s health, Coagulation and Lipid metabolism. He has more than 30 publications. Dr. Wilhelm is responsible for the clinical development of the Onconova’s drug candidates.

Manoj Maniar, Ph.D. (Sr. Vice President, Product Development) has developed and commercialized several pharmaceutical products and medical devices during his career. Previously, Dr. Maniar was with SRI International, where he held the position of Senior Director, Formulation and Drug Development. He has authored more than 75 patents, publications, and presentations in the field of pharmaceutical sciences.

Jim Altland (Sr. Vice President, Finance & Corporate Development) is a CPA in Ohio and is a graduate of the University of Akron. He was a Senior Partner of Tatum LLC, where in the Philadelphia office he was Practice Leader for the life science segment. Mr. Altland was CFO at LifeTime Pharmaceuticals and NorthStar Research & Development, Ltd. He is the former President and CEO of JRA Consulting, providing consulting services to early stage life science companies.

Company Description (see www.onconova.us for additional company information)

Onconova is a private clinical development stage biopharmaceutical company targeting therapeutic areas of significant unmet medical need, with a sharpened focus upon rapid approval and first-to-market positioning. Three clinical-stage products are being studied in Phase I & Phase II trials in 15 medical institutions in the U.S. and abroad. More than 250 patients and volunteers have been enrolled in these trials, establishing the safety, tolerability and efficacy of a first-in-class oncology

product and the safety of a novel radiation protectant. Onconova is poised to initiate a pivotal NDA-seeking clinical trial for its lead anti-cancer compound and to obtain a government procurement contract for its radiation protection drug within the next twelve months.

Onconova's most advanced anti-cancer drug is ON 01910.Na, currently undergoing Phase I & clinical trials. ON 01910.Na has shown remarkable evidence of clinical activity in myelodysplastic syndromes (MDS) in multi-center proof-of-concept studies. The U.S. Food & Drug Administration (FDA) has designated ON 01910.Na as an Orphan Drug for treatment of MDS. Plans for a Special Protocol Assessment (SPA) of a Phase II/III pivotal clinical trial in MDS patients are underway.

Ex-RAD is a radiation mitigation drug being developed in collaboration with the U.S. Department of Defense. Two Phase 1 clinical safety trials with healthy volunteers have been completed.

A second anti-cancer agent, ON 013105, has entered Phase I dose escalation safety trials, with an initial focus on lymphoma patients.

The Onconova product pipeline is supported by several pre-clinical candidates, a proprietary medicinal chemistry library, more than 100 issued patents, and a highly focused internal R&D engine.

Onconova has secured more than $85 Million from institutional and individual investors, with a significant contribution from non-dilutive grants and Government contracts.

Scientific Advisory Board (see http://www.onconova.com/aboutus.shtml for biosketches)

Clinical Advisory Board

Jerome E. Groopman, M.D., Chairman	Beth Israel Deaconess Medical Center
Ross C. Donehower, M.D.	Johns Hopkins Hospital
James F. Holland, M.D.	Mount Sinai Medical Center
Stephen C. Nimer, M.D.	Memorial Sloan Kettering Cancer Center
Gail Eckhardt, M.D.	University of Colorado
Mark Ratain, M.D.	University of Chicago
David Parkinson, M.D.	Nodality, Inc.

Scientific Advisory Board

Hilary Koprowski, M.D.	Thomas Jefferson University
Peter Nowell, M.D.	University of Pennsylvania
Anna Marie Skalka, Ph.D.	Fox Chase Cancer Center
George Vande Woude, Ph.D.	Van Andel Research Institute
Peter Vogt, Ph.D.	Scripps Institute

Financial Information

Onconova Therapeutics, Inc. has raised over ** million of equity capital and over ** million of non-dilutive funding since being founded in December 1998. As of **, Onconova has approximately ** million of fully diluted Convertible Preferred and Common Stock shares outstanding. With over ** investors, Onconova is currently in the process of completing a ** Series G Convertible Preferred Stock Offering.

Company Intellectual Property

ON 01910.Na Barriers to Entry: Patents and Orphan Drug Designation

Onconova scientists have pioneered the synthesis and screening of styryl benzylsulfones, a new chemotype and the basis for ON 01910.Na. Many aspects of ON 01910.Na are covered by patents and patent applications broadly covering composition of matter, intermediates, processes of synthesis, formulation, and methods of treatment for cancer and proliferative disorders. Applications are filed world-wide. **.

The barrier to entry for our products spans well beyond the protection of the chemical composition. We have sought coverage of novel formulations, method of treatment and combination therapy with various drugs. We employ a layered multi-claim strategy in our patent applications, permitting divisional applications and expansion of coverage.

We have also provided for market exclusivity (for seven years after approval) by seeking Orphan Drug designation for ON 01910.Na in specific indications. In October 2009, the U.S. FDA granted Orphan Drug designation of ON 01910.Na for treatment of MDS.

A summary of patents and patent applications concerning ON 01910.Na is provided below. Patents and applications are available upon request.

Patents and patent applications relevant to ON 01910.Na

Application No.	Filed	Specifications/Claims	Comment/Status
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Competitive Intellectual Property Landscape
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ADDITIONAL INFORMATION

Citations:

Appendix 1: 2006 International Working Group (IWG) criteria
Appendix 2: World Health Organization (WHO) criteria
Appendix 3: French-American-British (FAB) classification
LITERATURE CITATIONS

Appendix 1: 2006 IWG Response Criteria for MDS

Category	Hematologic Response Response Criteria (responses must last at least 4 weeks)(a)
Complete remission (CR)	Bone marrow: ≤5% myeloblasts with normal maturation of all cell lines. Persistent dysplasia will be noted (dysplastic changes should consider the normal range of dysplastic changes.) Peripheral blood: · Hemoglobin (Hgb) ≥110 g/L (untransfused, patient not on erythropoietin) · Neutrophils >1.0 x 10^9/L (not on myeloid growth factor) · Platelets >100 x 10^9/L (not on a thrombopoietic agent) · Blasts 0%;
Partial remission (PR)	All CR criteria (if abnormal prior to treatment), except: Bone Marrow blasts decreased by ≥50% compared with pretreatment but still >5%. Cellularity and morphology not relevant.
Marrow CR	Bone marrow: ≤ 5% myeloblasts and decrease by ≥50% over pretreatment Peripheral blood: if hematologic improvement (HI) responses, they will be noted in addition to the marrow CR
Stable disease (SD)	Failure to achieve at least PR, but no evidence of progression for >8 weeks.
Failure	Death during treatment or disease progression characterized by worsening of cytopenias, increase in percentage of bone marrow blasts, or progression to an MDS FAB subtype more advanced than pretreatment.
Relapse after CR or PR	At least one of the following: · Return to pretreatment bone marrow blast percentage · Decrement of ≥50% from maximum remission/response levels in granulocytes or platelets · Reduction in hemoglobin concentration by >1.5 g/L or transfusion dependence.(b)

Cytogenetic response	Complete: Disappearance of the chromosomal abnormality without appearance of new ones Partial: At least 50% reduction of the chromosomal abnormality
Disease progression	For patients with: Less than 5% blasts: ≥50% increase in blasts to >5% blasts 5%-10% blasts: ≥50% increase in blasts to >10% blasts 10%-20% blasts: ≥50% increase in blasts to >20% blasts 20%-30% blasts: ≥50% increase in blasts to >30% blasts Any of the following: At least ≥50% decrement from maximum remission/response levels in granulocytes or platelets Reduction in hemoglobin concentration by ≥2 g/dL Transfusion dependence(b)

(a) For a designated response (CR, PR), relevant response criteria must be noted on at least 2 successive determinations at least 1 week apart after an appropriate period following therapy (e.g., 1 month or longer).
(b) In the absence of another explanation, such as acute infection, gastrointestinal bleeding, hemolysis, etc.

Hematologic Improvement*	Response Criteria (responses must last at least 8 weeks)(a)

Erythroid response (pretreatment, < 11 g/dL)	Hgb increase by ≥1.5 g/dL Relevant reduction of units of red blood cell (RBC) transfusions by an absolute number of at least 4 RBC transfusions/8 wk compared with the pretreatment transfusion number in the previous 8 wk. Only RBC transfusions given for a Hgb of ≤ 9.0 g/dL pretreatment will count in the RBC transfusion response evaluation.
Platelet response (pretreatment, < 100 x 109/L)	Absolute increase of > 30 x 10^9/L for patients starting with >20 x 10^9/L Increase from < 20 x 10^9/L to >20 x 10^9/L and by at least 100%
Neutrophil response (pretreatment, < 1.0 x 10^9/L)	At least 100% increase and an absolute increase >0.5 x 10^9/L.
Progression or relapse after HI	At least 1 of the following: At least 50% decrement from maximum response levels in granulocytes or platelets Reduction in Hgb by ≥1.5 g/dL Transfusion dependence

* Pretreatment counts averages of at least 2 measurements (not influenced by transfusions) ≥1 week apart (modification)
(a) For a designated response (CR, PR), relevant response criteria must be noted on at least 2 successive determinations at least 1 week apart after an appropriate period following therapy (e.g., 1 month or longer).
(b) In the absence of another explanation, such as acute infection, gastrointestinal bleeding, hemolysis, etc.

Reference: Cheson et al. 2006

Appendix 2: WHO Diagnostic Criteria for MDS

Once a diagnosis of MDS is established, 8 subtypes of MDS are recognized in the WHO classification that are distinguished by the percentage of myeloblasts, the presence of ringed sideroblasts, number of dysplastic lineages, and karyotype as summarized in the following table (Brunning et al, 2008).

WHO Classification and Criteria for MDS

MDS Subtype	Blood Findings	Bone Marrow Findings
Refractory anemia (RA)	Anemia No or rare blasts	Erythroid dysplasia only <5% blasts <15% ringed sideroblasts
Refractory anemia with ringed sideroblasts (RARS)	Anemia No blasts	Erythroid dysplasia only >15% ringed sideroblasts <5% blasts
Refractory cytopenia with multilineage dysplasia (RCMD)	Cytopenias (bi- or pancytopenia) No or rare blasts No Auer rods <1 x 10^9/L monocytes	Dysplasia in >10% of cells in 2 or more myeloid cell lines <5% blasts in marrow No Auer rods <15% ringed sideroblasts
Refractory cytopenia with multilineage dysplasia and ringed sideroblasts (RCMD-RS)	Cytopenias (bi- or pancytopenia) No or rare blasts No Auer rods <1 x 10^9/L monocytes	Dysplasia in >10% of cells in 2 or more myeloid cell lines >15% ringed sideroblasts <5% blasts No Auer rods
Refractory anemia with excess blasts-1 (RAEB-1)	Cytopenias <5% blasts No Auer rods <1 x 10^9/L monocytes	Unilineage or multilineage dysplasia 5% to 9% blasts No Auer rods
Refractory anemia with excess blasts-2 (RAEB-2)	Cytopenias <5% to 19% blasts Auer rods ± <1 x 10^9/L monocytes	Unilineage or multilineage dysplasia 10% to 19% blasts Auer rods ±
Myelodysplastic syndrome, unclassified (MDS-U)	Cytopenias No or rare blasts No Auer rods	Unilineage dysplasia in granulocytes or megakaryocytes <5% blasts No Auer rods
MDS associated with isolated del(5q)	Anemia <5% blasts Platelets normal or increased	Normal to increased megakaryocytes with hypolobated nuclei <5% blasts No Auer rods Isolated del(5q)

Appendix 3: FAB Classification

Once a diagnosis of MDS is established, 5 subtypes of MDS are recognized in the FAB classification that are distinguished by the percentage of myeloblasts, presence or absence ringed sideroblasts (i.e., erythroid precursors with iron deposits surrounding the nucleus), or a monocytosis, as summarized in the following table (Bennett et al. 1976, Bennett et al. 1982).

FAB Classification of MDS

FAB Category	% Myeloblasts		% Ringed Sideroblasts	Monocytes >1 x 10^9/L
	Bone Marrow	Blood		
Refractory anemia (RA)	<5	<1	<15	-
RA with ringed sideroblasts (RARS)	<5	<I	>15	-
RA with excess blasts (RAEB)	5 - 20	<5	Variable	-
Chronic myelomonocytic leukemia (CMML)	<20	<5	Variable	+
RAEB in transformation (RAEB-t)	21 - 30	≥Auer rods	Variable	+/-

LITERATURE CITATIONS:

Bello CM, Yu D, Zhu W, Wetzstein GA, Lancet JE (2009) Outcomes following induction chemotherapy in patients with AML arising from MDS: Analysis of prognostic factors. *J Clin Oncol* 27, Abstract #7088.

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Bennett JM, Catovsky D, Daniel MT, Flandrin G, Galton DA, Gralnick HR, Sultan C (1982) Proposals for the classification of the myelodysplastic syndromes. *Br J Haematol* 51, 189-199.

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EXHIBIT B

Letter Of Intent

Therapy Acceleration Program
Biotechnology Accelerator
Project Proposal
Version 1.4

The Leukemia & Lymphoma Society
Fighting Blood Cancers

Mar 18 2010

The Leukemia & Lymphoma Society

[ILLEGIBLE]

March 15, 2010

Ramesh Kumar, Ph.D
Chief Executive Officer
Onconova
375 Pheasant Run
Newtown, PA 18940

Re: Letter of Intent for Negotiating Definitive Agreement

Dear Dr. Kumar:

The governing committee of The Leukemia & Lymphoma Society's Therapy Acceleration Program has recommended that The Leukemia & Lymphoma Society move forward and begin with this letter of intent *("LOI")* to outline the general terms of a proposed collaboration between The Leukemia & Lymphoma Society with its principle place of business at 1311 Mamaroneck Avenue, White Plains, NY 10605 *("LLS")* and Onconova with its principle place of business at 375 Pheasant Run, Newtown, PA 18940 *("Onconova")* regarding the project titled "Approval Track (pivotal) Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS), Patients Refractory to Hypomethylating Agents," *("Research Project")*.

This LOI is to facilitate further discussions and to serve as the basis for a definitive agreement *("Definitive Agreement")* that will govern the parties' legal rights and obligations in connection with the Research Project. LLS's timeline for funding the Research Project will commence upon execution of the Definitive Agreement.

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2. Definitive Agreement. The principal business terms of the Research Project (including those set forth in paragraph 1 above) will be embodied in the Definitive Agreement and will include the elements put forth in Onconova's original proposal, outline the responsibilities of the parties and include customary legal and commercial terms for agreements of this type.

The following summarizes the key elements (but not all elements), to be drafted and agreed to in the Definitive Agreement:

- Go/No-Go Decision Points (DPs): These are critical time points, mutually agreed upon, where together with the Research Advisory Committee (RAC) we determine the viability of moving forward with success. Such DPs may include approval of the SPA, number of trial sites on board by specified time points, number of IRB approvals, patient accrual rates, and similar clinical requirements;
- Funding payments tied to the achievement of Milestones: These too are mutually agreed upon, and reviewed and monitored by the Research Advisory Committee (RAC). Examples of Milestones may include first patient enrolled, tenth site signed on, 15th IRB approval, a clinical trial report etc. The goal is to ensure that Onconova is funded properly in a manner that enables them to spread resources to achieve their Milestones;
- Specific Deliverables: These are reports such as quarterly reports, financial reports and clinical updates that are also tied into the release of funding in a tranche manner. Our accountants use these Deliverables to ensure LLS meets its audit requirements as it disperses funding.
- A schedule of quarterly RAC meetings in which together we review progress, assess challenges and discuss ways to overcome obstacles to success;
- Diligence requirements to move forward with commercialization efforts provided positive clinical endpoints are achieved;
- A negotiated Return on Investment for LLS that does not hinder Onconova's ability to partner yet provides the possibility of a revenue stream that enables LLS to continue to fund companies with compounds showing great promise for patients with blood cancer.

3. Negotiations. Upon execution of this LOI, Onconova agrees to provide LLS with a report on progress preparing for the Research Project. The parties further agree to use their good faith efforts to negotiate the Definitive Agreement embodying the principal terms within forty-five days, of the execution of this Letter of Intent but in no event later than May 5, 2010

4. Confidentiality. The parties have executed a Mutual Nondisclosure Agreement dated April 6, 2009 (the "NDA"). The parties agree to treat this LOI (including, without limitation, the principal business terms) as confidential information ("*Confidential Information*") of both parties pursuant to the terms of the NDA and further agree, subject to obligations under the law, not to make any public announcement concerning this LOI, discussions between the parties or the substance thereof. Information disclosed related to this LOI shall be governed by the NDA. For the avoidance of doubt, all information to which LLS has access to during its due diligence shall be the Confidential Information of Onconova and shall be subject to the terms of the NDA.

5. Relationship of the Parties. This LOI does not constitute a binding agreement between the parties, other than with respect to the terms set forth in paragraph 3 and 4 herein. The parties further acknowledge and agree that this LOI does not constitute an offer, acceptance, commitment, representation or contract to buy or sell any products and is not meant to describe all of the terms and conditions of the Research Project of which shall be set forth in the Definitive Agreement

6. Governing Law. This LOI will be governed and construed in accordance with the laws of the State of New York, without regard to or application of its conflicts of laws rules or principles.

7. Letter Of Intent. This LOI constitutes the basis on which a Definitive Agreement will be negotiated with respect to the subject matter of the LOI and supersedes any prior agreements between the parties with respect to such subject matter.

If the terms are acceptable, please sign and return one copy to LLS and keep a copy for your records. We look forward to finalizing the Definitive Agreement and enhancing the relationship between our respective companies.

Sincerely,

ACCEPTED BY: THE LEUKEMIA & LYMPHOMA SOCIETY, INC.

/s/ James T. Nangle
James T. Nangle, Chief Financial Officer (Authorized Signature)

James T. Nangle
Printed Name and Title

3/12/10
Date of Execution

ACCEPTED BY: ONCONOVA THERAPEUTICS, INC.

/s/ Ramesh Kumar
Authorized Signature

Ramesh Kumar, President & CEO
Printed Name and Title

March 19, 2010
Date of Execution

AMENDMENT TO LETTER OF INTENT BETWEEN
LEUKEMIA & LYMPHOMA SOCIETY AND ONCONOVA THERAPEUTICS

This Amendment to the Letter of Intent between LEUKEMIA & LYMPHOMA SOCIETY ("LLS") and ONCONOVA THERAPEUTICS ("Company") is entered into on this the 5th day of May, 2010 by and between LLS and Company.

WHEREAS the Parties have executed a Letter of Intent ("LOI") dated March 19, 2010 to negotiate in good faith for a Definitive Agreement for the Research Project titled "Approval Track (pivotal) Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS), Patients Refractory to Hypomethylating Agents;" and

WHEREAS the Parties desire to extend the term of the negotiating period agreed to in the LOI as described below.

NOW, THEREFORE, in consideration of the premises and other good and valuable consideration, the receipt and legal sufficiency of which are hereby acknowledged, the Parties do hereby amend the LOI as follows:

1. Section 3 of the LOI, ***Negotiations*** is revised and restated as follows: "Upon execution of this LOI, Onconova agrees to provide LLS with a report on progress preparing for the Research Project. The parties further agree to use their good faith efforts to negotiate the Definitive Agreement embodying the principal terms within ** days of the execution of this Letter of Intent but in no event later than May 12, 2010.

Except as otherwise provided in this Amendment, the terms of the LOI shall remain in full force and effect.

IN WITNESS WHEREOF, the Parties have caused this Amendment to be executed as of the day and year first above written.

LEUKEMIA & LYMPHOMA SOCIETY	ONCONOVA THERAPEUTICS
By: /s/ Louis J. DeGennaro	By: /s/ Ramesh Kumar, Ph.D.
Printed Name: Louis J. DeGennaro	Printed Name: Ramesh Kumar, Ph.D.
Title: Executive Vice President	Title: President and CEO
Date: May 5, 2010	Date: May 5, 2010

EXHIBIT C

Deliverables, Milestones and Payments

LLS and Company agree to the following provisions regarding timelines, Deliverables, Milestones and Payments in performance of the Research Program under the terms of the Agreement.

1. **Timelines.**

1.1 Definition. A timeline is a linear, chronological representation of key events or steps along the Term of this Agreement whereby the Parties measure progress toward the goals of the Research Program. The timeline is a pictorial representation of the anticipated Deliverables, Milestones and Payments to Company by LLS.

1.2 Overview of Research Program Timeline. The following timeline represents the Company's best estimate for achieving site initiation, follow-up and study reports. In order to maintain maximum flexibility of the Research Program, the timeline and associated Deliverables, Milestones and Payments may be revised by mutual agreement of the Parties.

Timeline for Site Initiation, Follow-up, and Study Report for Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents.

1.3 Timeline of Deliverables, Milestones and Payments. The Parties agree that the following is a representation of key events during the Term of this Agreement, whereby Deliverables, Milestones and Payments are represented by single letter designations ("D", "M", and "P", respectively). Numbers that follow the single letter designations represent the consecutive order of the Deliverables, Milestones or Payments.

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EXHIBIT D

Research Advisory Committee

Company:

Ramesh Kumar, PhD

Francoise Wilhelm, MD., PhD

LLS:

James Kasper, M.S.

Louis J. DeGennaro, PhD

Exhibit 10.8

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

FIRST AMENDMENT TO AGREEMENT

This First Amendment to Agreement, effective June 23, 2011, is by and between THE LEUKEMIA & LYMPHOMA SOCIETY ("LLS"), a Delaware corporation, business at 1311 Mamaroneck Ave, White Plains, NY and ONCONOVA THERAPEUTICS ("ONCONOVA"), a Delaware corporation having its principal place of business at 375 Pheasant Run, Newtown, PA.

WHEREAS, LLS and ONCONOVA have previously entered into a partnership to conduct a human clinical trial entitled "Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents, an Unmet Medical Need" effective May 12, 2010 (the "Agreement") under which LLS supports clinical research conducted by ONCONOVA with the goal of successfully completing a pivotal trial;

WHEREAS, an Amendment is sought to reflect changes in the Milestones, Deliverables and payment schedule, herein attached as Revisions to Exhibit C;

NOW, THEREFORE, in consideration of the foregoing and of the mutual covenants hereinafter set forth, it is agreed by LLS and ONCONOVA that the following applies:

1. Terms not otherwise defined herein shall have the meanings given them in the Agreement;

2. Exhibit C of the Agreement is hereby modified by the inclusion of a Revised Exhibit C.

Except as expressly amended or supplemental by this Amendment to the Agreement, all of the terms and conditions of the Agreement shall remain in full force and effect in accordance with their terms.

No agreement or understanding bearing on this Amendment to Agreement shall be binding on either party hereto unless it shall be in writing and signed by the duly authorized officer or representative or each of LLS and ONCONOVA and shall expressly refer to this Amendment to Agreement.

IN WITNESS WHEREOF, the parties have caused the Amendment to be executed by their duly authorized representatives.

THE LEUKEMIA & LYMPHOMA SOCIETY	ONCONOVA THERAPEUTICS
By: Richard Winneker, PhD	By: Ramesh Kumar, Ph.D.
/s/ Richard Winneker, Ph.D.	/s/ Ramesh Kumar, Ph.D.
(Signature)	(Signature) 6/23/11
Title: Senior VP, Research	Title: President and CEO

Revised Exhibit C

Deliverables, Milestones and Payments

LLS and Company agree to the following provisions regarding timelines, Deliverables, Milestones and Payments in performance of the Research Program under the terms of the Agreement.

1. **Timelines**.

1.1. Definition. A timeline is a linear, chronological representation of key events or steps along the Term of this Agreement whereby the Parties measure progress toward the goals of the Research Program. The timeline is a pictorial representation of the anticipated Deliverables, Milestones and Payments to Company by LLS.

1.2. Overview of Research Program Timeline. The following timeline represents the Company's best estimate for achieving site initiation, follow-up and study reports. In order to maintain maximum flexibility of the Research Program, the timeline and associated Deliverables, Milestones and Payments may be revised by mutual agreement of the Parties.

Timeline for Site Initiation, Follow-up, and Study Report for Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents.

1.3. Timeline of Deliverables, Milestones and Payments. The Parties agree that the following is a representation of key events during the Term of this Agreement, whereby Deliverables, Milestones and Payments are represented by single letter designations ("D", "M", and "P", respectively). Numbers that follow the single letter designations represent the consecutive order of the Deliverables, Milestones or Payments.

2. **Deliverables**.

2.1. Research Program Deliverables. The Parties have agreed upon the following defined Deliverables.

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3. **Milestones and Payments**.

3.1. Definition. A Milestone is a readily identifiable and quantifiable achievement reflecting progress in the Research Program. A Payment is the transfer of Funding from LLS to Company.

3.2. Research Program Payments and Milestones. The Parties have agreed upon a schedule of Payments which are subject to the achievement of Milestones.

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4. **Research Advisory Committee Meetings**.

4.1. Research Advisory Committee Meeting Schedule. The Parties have tentatively agreed upon a schedule of Research Advisory Committee Meetings. In accordance with Article 3.2 of the Agreement, additional meetings may be scheduled and the Team Leaders, upon mutual agreement, may change such meeting dates.

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Exhibit 10.9

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

SECOND AMENDMENT TO DEFINITIVE AGREEMENT

This Second Amendment to Definitive Agreement, effective May 29, 2012, is by and between THE LEUKEMIA & LYMPHOMA SOCIETY ("LLS"), a New York non-profit corporation, having its principal place of business at 1311 Mamaroneck Ave, White Plains, NY and ONCONOVA THERAPEUTICS, INC. ("ONCONOVA," or "Company"), a Delaware corporation having its principal place of business at 375 Pheasant Run, Newtown, PA.

WHEREAS, LLS and ONCONOVA have previously entered into an agreement to conduct a human clinical trial entitled "Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents, an Unmet Medical Need" effective May 12, 2010 as amended on June 23, 2011 (collectively the "Agreement") under which LLS supports clinical research conducted by ONCONOVA with the goal of successfully completing a pivotal trial; and

WHEREAS, an amendment is sought to reflect changes in the overall Research Program Funding, Milestones, Deliverables and payment schedule.

NOW THEREFORE in consideration of the foregoing -and -of the mutual covenants hereinafter set forth, it is agreed by LLS and ONCONOVA as follows:

1. Terms not otherwise defined herein shall have the meanings given them in the Agreement.

2. The second sentence of Section 2.1 of the Agreement is hereby modified to read in its entirety as follows:

"The sum total of the Funding shall not exceed $12,500,00 and shall be paid in accordance with the amounts and achievement of Milestones set forth in Revised Exhibit C."

3. Section 10.1(a) of the Agreement is hereby modified to read in its entirety as follows:

"if Company partners or outlicenses the rights to the Product to a third party or transfers the rights to the Product to a partnership with a third party for further development and/or commercialization of the Product (a "**Product Outlicense**"), then, subject to Section 10.1(e), Company shall pay to LLS payments under the following tiered payment schedule: (i) an amount equal to ** payable upon execution of the first Product Outlicense; (ii) an amount equal to ** within ** days after the first regulatory approval for marketing of the Product by a regulatory body; (iii) an amount equal to ** within ** days of the First Commercial Sale; (iv) an amount equal to ** within ** days of meeting the sales

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milestone of ** in annual Net Sales; and (v) a royalty equal to ** of Net Sales starting from the date of the First Commercial Sale. The Parties acknowledge that Company has entered into a License Agreement, dated July 5, 2011, with SymBio Pharmaceuticals Limited and that such License Agreement does not constitute a Product Outlicense for purposes of clause (i) of this Section 10.1."

4. Section 10.1(b) of the Agreement is hereby modified to read in its entirety as follows:

"if Company does not enter into a Product Outlicense and enters the market place (i.e., commences commercialization) for the Product in the Field through its own mechanisms (or through an affiliate), then, subject to Section 10.1(e), Company shall pay to LLS payments under the following tiered payment schedule: (i) an initial payment equal to ** within ** days of the First Commercial Sale; (ii) an amount equal to ** within ** days of meeting the sales milestone of ** in annual Net Sales; (iii) an amount equal to ** within ** of meeting the sales milestone of ** in annual Net Sales; and (iv) a royalty equal to ** of Net Sales in the Field starting from the date of the First Commercial Sale."

5. Section 10.1(c) of the Agreement is hereby modified to read in its entirety as follows:

"if Company enters into a Product Outlicense after Company has entered the market place (i.e., commences commercialization) through its own mechanisms (or through an affiliate), then, subject to Section 10.1(e), Company shall pay upon execution thereof (or require the counterparty to the Product Outlicense to pay, if applicable) to LLS an amount equal to the total amount of Funding actually received by Company from LLS (less any amounts previously paid to LLS) and a royalty equal to ** of Net Sales of the Product."

6. Section 10.1(d) of the Agreement is hereby modified to read in its entirety as follows:

"if Company combines through merger or otherwise with another company, is sold or transferred to another company or all or substantially all of its assets relating to the Product are sold or transferred to another company (each, a "**Company Sale**"), and only if the counterparty to the Company Sale does not assume all of Company's obligations under Sections 10.1(a) and (b), Company shall pay to LLS or cause such other company to pay to

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LLS, subject to Section 10.1(e), (i) an amount equal to ** within ** days after the first regulatory approval for marketing of the Product by a regulatory body; (ii) an amount equal to ** within ** days of the First Commercial Sale; (iii) an amount equal to ** within ** days of meeting the sales milestone of ** in annual Net Sales; and (iv) a royalty equal to ** of Net Sales. LLS agrees to consider in good faith any proposal from Company or its successor for a lump sum payment in lieu of such royalty."

7. Section 10.1(e) is hereby added to the Agreement as follows:

"The payments specified in each of clauses (a), (b), (c) and (d) above are mutually exclusive and in no event shall Company be required to make, and LLS shall not be entitled to receive, payments under more than any one of such clauses at any given time. The aggregate total payments to LLS under this Section 10.1, notwithstanding any other provision of this Agreement to the contrary, shall be limited to three (3) times the total Funding actually received by Company from LLS under this Agreement."

8. Exhibit C of the Agreement is hereby replaced in its entirety by Revised Exhibit C attached hereto.

9. Except as expressly amended or supplemented by this Amendment to the Agreement, all of the terms and conditions of the Agreement shall remain in full force and effect in accordance with their terms.

10. No agreement or understanding bearing on this Amendment to the Agreement shall be binding on either party hereto unless it shall be in writing and signed and delivered by a duly authorized officer or representative of each of LLS and ONCONOVA expressly referring to this Amendment to the Agreement.

IN WITNESS WHEREOF, the parties have caused the Amendment to be executed and delivered by their duly authorized representatives.

THE LEUKEMIA & LYPHOMA SOCIETY	ONCONOVA THERAPUETICS, INC.
By: James T. Nangle	By: Ramesh Kumar, Ph.D.
(Signature) /s/ James T. Nangle	(Signature) /s/ Ramesh Kumar, Ph.D
Title: Senior Vice President & CFO	Title: Vice President & CFO

REVISED EXHIBIT C

Deliverables, Milestones and Payments

LLS and Company agree to the following provisions regarding timelines, Deliverables, Milestones and Payments in performance of the Research Program under the terms of the Agreement.

1. Timelines.

1.1. Definition. A timeline is a linear, chronological representation of key events or steps along the Term of this Agreement whereby the Parties measure progress toward the goals of the Research Program. The timeline is a pictorial representation of the anticipated Deliverables, Milestones and Payments to Company by LLS.

1.2. Overview of Research Program Timeline. The following timeline represents the Company's best estimate for achieving site initiation, follow-up and study reports. In order to maintain maximum flexibility of the Research Program, the timeline and associated Deliverables, Milestones and Payments may be revised by mutual agreement of the Parties.

Timeline for Site Initiation; Follow-up, -and-Study Report for Approval Track-Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents.

1.3. Timeline of Deliverables, Milestones and Payments. The Parties agree that the following is a representation of key events during the Term of this Agreement, whereby Deliverables, Milestones and Payments are represented by single letter designations ("D", "M", and "P", respectively). Numbers that follow the single letter designations represent the consecutive order of the Deliverables, Milestones or Payments.

2. Deliverables.

2.1. Research Program Deliverables. The Parties have agreed upon the following defined Deliverables.

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3. Milestones and Payments.

3.1. Definition. A Milestone is a readily identifiable and quantifiable achievement reflecting progress in the Research Program. A Payment is the transfer of Funding from LLS to Company.

3.2. Research Program Payments and Milestones. The Parties have agreed upon a schedule of Payments which are subject to the achievement of Milestones.

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4. Research Advisory Committee Meetings.

4.1. Research Advisory Committee Meeting Schedule. The Parties have tentatively agreed upon a schedule of Research Advisory Committee Meetings. In accordance with Article 3.2 of the Agreement, additional meetings may be scheduled and the Team Leaders, upon mutual agreement, may change such meeting dates.

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CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

THIRD AMENDMENT TO DEFINITIVE AGREEMENT

This Third Amendment to Agreement, effective January 15, 2013, is by and between THE LEUKEMIA & LYMPHOMA SOCIETY ("LLS"), a Delaware corporation, business at 1311 Mamaroneck Ave, White Plains, NY and ONCONOVA THERAPEUTICS ("ONCONOVA"), a Delaware corporation having its principal place of business at 375 Pheasant Run, Newtown, PA.

WHEREAS, LLS and ONCONOVA have previously entered into an agreement to conduct a human clinical trial entitled "Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents, an Unmet Medical Need" effective May 12, 2010 as amended on June 23, 2011 and May 29, 2012 (collectively the "Agreement") under which LLS supports clinical research conducted by ONCONOVA with the goal of successfully completing a pivotal trial; and

WHEREAS, an Amendment is sought to reflect payment changes in Section 10.1 due to Onconova's pending termination of further Funding from LLS and to add a member from LLS to the Research Advisory Committee in order for LLS to have bi-annual updates on the success of the Research Program.

NOW, THEREFORE, in consideration of the foregoing and of the mutual covenants hereinafter set forth; it is agreed by LLS and ONCONOVA that the following applies:

1. Terms not otherwise defined herein shall have the meanings given them in the Agreement;

2. The second sentence of Section 2.1 of the Agreement is modified to read in its entirety as follows:

"The sum total of the Funding shall not exceed $8,000,000 and shall be paid in accordance with the amounts and achievement of Milestones set forth in Revised Exhibit C."

3. Section 10.1(a) of the Agreement is modified to read in its entirety as follows:

"if Company partners or outlicenses the rights to the Product to a third party or transfers the rights to the Product to a partnership with a third party for further development and/or commercialization of the Product (a "**Product Outlicense**"), then Company shall pay to LLS payments under the following tiered payment schedule: (i) an amount equal to ** payable upon execution of the Product Outlicense; (ii) an amount equal to ** within ** days after the first approval for market registration by a regulatory body; (iii) an amount equal to ** within ** days after the First Commercial Sale; (iv) an amount equal to ** within **

days after meeting the sales milestone of ** in Net Sales; and (v) a royalty equal to ** of Net Sales starting from the date of the First Commercial Sale. The Parties acknowledge that Company has entered into a License Agreement, dated July 5, 2011, with SymBio Pharmaceuticals Limited and that such License Agreement does not constitute a Product Outlicense for purposes of clause (i) of this Section 10.1."

4. Section 10.1(d) of the Agreement is modified in its entirety as follows:

"if Company combines through merger or otherwise with another company, is sold or transferred to another company or all or substantially all of its assets relating to the Product are sold or transferred to another company (each, a "Company Sale"), and only if the counterparty to the Company Sale does not assume all of the Company's obligations under Sections 10.1(a) and (b), Company shall pay to LLS or cause such other company to pay to LLS, subject to Section 10.1(e), (i) an amount equal to ** within ** days after the first regulatory approval for marketing of the Product by a regulatory body; (ii) an amount equal to ** within ** days of the First Commercial Sale; (iii) an amount equal to ** within ** days of meeting the sales milestone of ** in annual Net Sales; and (iv) a royalty equal to ** of Net Sales. LLS agrees to consider in good faith any proposal from Company or its successor for a lump sum payment in lieu of such royalty."

5. Section 10.1 (e) of the Agreement is modified as follows:

"The payments specified in each of clauses (a), (b), (c), and (d) of the agreement, are mutually exclusive and in no event shall Company be required to make, and LLS shall not be entitled to receive, payments under more than any one of such clauses at any given time. The aggregated total payments to LLS under this Section 10.1, notwithstanding any other provision of this Agreement to the contrary, shall be limited to up to ** times the total Funding actually received by Company from LLS under this Agreement and said aggregated total payments to LLS from Company may not exceed **."

6. Research Advisory Committee: At termination of the Definitive Agreement, the Parties agree to retain the Research Advisory Committee and the working relationship established. The Parties agree to meet in person or by phone on at least a bi-annual basis to provide updates on the Product development and commercialization efforts of the Product until all contract obligations are completed.

7. Except as expressly amended or supplemented by this Amendment to the Agreement, all of the terms and conditions of the Agreement shall remain in full force and effect in accordance with their terms.

8. Revised Exhibit C of the Second Amendment effective May 29, 2012 is hereby replaced in its entirety by Revised Exhibit C attached hereto.

9. No agreement or understanding bearing on this Amendment to the Agreement shall be binding on either party hereto unless it shall be in writing and signed and delivered by a duly authorized officer or representative of each of LLS and ONCONOVA expressly referring to this Amendment to the Agreement.

IN WITNESS WHEREOF, the parties have caused the Amendment to be executed and delivered by their duly authorized representatives.

THE LEUKEMIA & LYMPHOMA SOCIETY		**ONCONOVA THERAPEUTICS, INC.**	
By:	James T. Nangle	By:	Ramesh Kumar, Ph.D.
(Signature)	/s/ James T. Nangle	(Signature)	/s/ Ramesh Kumar, Ph.D.
Title:	Senior Vice President & CFO	Title:	President and CEO

REVISED EXHIBIT C

Deliverables, Milestones and Payments

LLS and Company agree to the following provisions regarding timelines, Deliverables, Milestones and Payments in performance of the Research Program under the terms of the Agreement.

1. Timelines.

1.1. Definition. A timeline is a linear, chronological representation of key events or steps along the Term of this Agreement whereby the Parties measure progress toward the goals of the Research Program. The timeline is a pictorial representation of the anticipated Deliverables, Milestones and Payments to Company by LLS.

1.2. Overview of Research Program Timeline. The following timeline represents the Company's best estimate for achieving site initiation, follow-up and study reports. In order to maintain maximum flexibility of the Research Program, the timeline and associated Deliverables, Milestones and Payments may be revised by mutual agreement of the Parties.

Timeline for Site Initiation, Follow-up, and Study Report for Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents.

1.3. Timeline of Deliverables, Milestones and Payments. The Parties agree that the following is a representation of key events during the Term of this Agreement, whereby Deliverables, Milestones and Payments are represented by single letter designations ("D", "M", and "P", respectively). Numbers that follow the single letter designations represent the consecutive order of the Deliverables, Milestones or Payments.

2. Deliverables.

2.1. Research Program Deliverables. The Parties have agreed upon the following defined Deliverables.

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3. Milestones and Payments.

3.1. Definition. A Milestone is a readily identifiable and quantifiable achievement reflecting progress in the Research Program. A Payment is the transfer of Funding from LLS to Company.

3.2. Research Program Payments and Milestones. The following schedule of Payments, which were subject to the achievement of Milestones, have been received for a total of $8 Million dollars.

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4. Research Advisory Committee Meetings.

4.1. Research Advisory Committee Meeting Schedule. The Parties have tentatively agreed upon a schedule of Research Advisory Committee Meetings. In accordance with Article 3.2 of the Agreement, additional meetings may be scheduled and the Team Leaders, upon mutual agreement, may change such meeting dates.

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Exhibit 10.11

TERMINATION OF AGREEMENT

This Termination of Agreement, effective February 5, 2013, is by and between THE LEUKEMIA & LYMPHOMA SOCIETY ("LLS"), a Delaware corporation, having its principal place of business at 1311 Mamaroneck Ave, White Plains, NY and ONCONOVA THERAPEUTICS ("ONCONOVA," together "the Parties"), a Delaware corporation having its principal place of business at 375 Pheasant Run, Newtown, PA.

WHEREAS, LLS and ONCONOVA have previously entered into an agreement to conduct a human clinical trial entitled "Approval Track Clinical Trial of ON 01910.Na in High Risk Myelodysplastic Syndromes (MDS) Patients Refractory to Hypomethylating Agents, an Unmet Medical Need" effective May 12, 2010 as amended on June 23, 2011, May 1, 2012 and January 15 , 2013 (collectively the "Agreement") under which LLS supports clinical research conducted by ONCONOVA with the goal of successfully completing a pivotal trial; and

WHEREAS, a Third Amendment to Agreement was executed on January 15, 2013, to reflect payment changes in Section 10.1 due to Onconova's pending termination of further Funding from LLS and to add a member from LLS to the Development Committee in order for LLS to have bi-annual updates on the success of the Research Program; and

WHEREAS, LLS and ONCONOVA wish to terminate the further funding and the Agreement,

NOW, THEREFORE, in consideration of the foregoing and of the mutual covenants hereinafter set forth, it is agreed by LLS and ONCONOVA that the following applies:

1. Terms not otherwise defined herein shall have the meanings given them in the Agreement;

2. The parties hereby agree to terminate the Agreement in accordance with Section 15.2 of the Agreement. The termination date of the Agreement shall be thirty (30) days from the effective date of this Termination of Agreement.

3. Except as expressly amended or supplemented by this Termination of Agreement, all of the terms and conditions of the Agreement shall remain in full force and effect in accordance with their terms.

4. No agreement or understanding bearing on this Termination of Agreement shall be binding on either party hereto unless it shall be in writing and signed and delivered by a duly authorized officer or representative of each of LLS and ONCONOVA expressly referring to this Termination of Agreement.

IN WITNESS WHEREOF, the parties have caused the Amendment to be executed and delivered by their duly authorized representatives.

THE LEUKEMIA & LYPHOMA SOCIETY		ONCONOVA THERAPUETICS, INC.	
By:	Richard Winneker, Ph.D.	By:	Ramesh Kumar, Ph.D.
(Signature)	/s/ Richard Winneker, Ph.D.	(Signature)	/s/ Ramesh Kumar, Ph.D.
Title:	Senior Vice President, Research	Title:	President and CEO

Exhibit 10.12

CONFIDENTIAL MATERIAL OMITTED AND FILED
SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION.
DOUBLE ASTERISKS DENOTE SUCH OMISSIONS.

LIMITED LIABILITY COMPANY AGREEMENT

OF

GBO, LLC

A Delaware limited liability company

UNITS IN GBO, LLC, A DELAWARE LIMITED LIABILITY COMPANY (THE "UNITS") HAVE NOT BEEN REGISTERED WITH OR QUALIFIED BY THE SECURITIES AND EXCHANGE COMMISSION OR ANY SECURITIES REGULATORY AUTHORITY OF ANY STATE. THE UNITS ARE BEING SOLD IN RELIANCE UPON EXEMPTIONS FROM SUCH REGISTRATION OR QUALIFICATION REQUIREMENTS. THE UNITS CANNOT BE SOLD, TRANSFERRED, ASSIGNED OR OTHERWISE DISPOSED OF EXCEPT IN COMPLIANCE WITH THE RESTRICTIONS ON TRANSFERABILITY CONTAINED IN THIS AGREEMENT, AND APPLICABLE FEDERAL, STATE AND OTHER SECURITIES LAWS.

TABLE OF CONTENTS

LIMITED LIABILITY COMPANY AGREEMENT
OF
GBO, LLC

THIS LIMITED LIABILITY COMPANY AGREEMENT OF GBO, LLC (this "**Agreement**") of GBO, LLC (the "**Company**") is entered into as of December 12, 2012, by and among Onconova Therapeutics® Inc., a Delaware corporation ("**Onconova**") and GVK Biosciences Private Limited, a private limited company incorporated under the Companies Act, 1956 in India ("**GVK BIO**" and together with Onconova, individually as either "**Member**" or "**Party**," and collectively, the "**Members**" or the "**Parties**").

RECITALS

WHEREAS, the Company shall be formed as a Delaware limited liability company pursuant to the filing of a Certificate of Formation (the "**Certificate**") with the Secretary of State of the State of Delaware in accordance with the Delaware Limited Liability Company Act, 6 Del. C. § 18-101, *et seq*., or any successor statutes, as amended from time to time (the "**Act**");

WHEREAS, the Company will be a joint venture company of Onconova and GVK BIO formed to collaborate on and develop two new programs (each a "**Program**" and together the "**Programs**"): (i) a program to develop the PLK2 Inhibitor through the filing of an IND and/or conducting a PoC Study ("**Program 1**") and (ii) a program to develop the CK2 Inhibitor through the filing of an IND and/or conducting a PoC Study ("**Program 2**");

WHEREAS, GVK BIO will make an initial Capital Contribution of $500,000 into the Company either through its Indian entity or through an entity incorporated outside India, in exchange for ten (10) Units (as defined below) accounting for a ten percent (10%) Percentage Interest in the Company on the terms set forth herein;

WHEREAS, Onconova will make Capital Contribution of the Contributed Assets (as defined below) to the Company in exchange for ninety (90) Units accounting for a ninety percent (90%) Percentage Interest in the Company on the terms set forth herein;

WHEREAS, the Members have determined that the Company should be managed by a Board of Managers (as defined below), and have elected Managers (as defined below);

WHEREAS, each Member's relative Percentage Interest in the Company may change upon the additional Capital Contributions of GVK BIO or the completion of certain deliverables; and

WHEREAS, the Members desire to enter into this Agreement to reflect their relative Interests (as defined below) in the Company, to reflect the election of Managers and to address various matters pertaining to the operation and management of the Company.

NOW, THEREFORE, in consideration of the mutual promises set forth herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto hereby agree as follows:

AGREEMENT

ARTICLE I

DEFINITIONS

Unless the context otherwise requires, the following terms shall have the following meanings for purposes of this Agreement:

"**Act**" has the meaning set forth in the Recitals.

"**Adjusted Capital Account Deficit**" shall mean, with respect to any Member, the deficit balance, if any, in such Member's Capital Account as of the end of the relevant Fiscal Year, after giving effect to the following adjustments:

(a) Credit to such Capital Account any amounts which such Member is deemed to be obligated to restore pursuant to the penultimate sentences of Treasury Regulations Section 1.704-2(g)(1) and 1.704-2(i)(5); and

(b) Debit to such Capital Account the items described in Sections 1.704- 1(b)(2)(ii)(d)(4), 1.704-1(b)(ii)(d)(5) and 1.704-1(b)(2)(ii)(d)(6) of the Treasury Regulations.

The foregoing definition of Adjusted Capital Account Deficit is intended to comply with the provisions of Section 1.704-1(b)(2)(ii)(d) of the Treasury Regulations and shall be interpreted consistently therewith.

"**Affiliate**" with respect to any Person means (i) any other Person who controls, is controlled by or is under common control with such Person, or (ii) any director, officer, partner or employee of such Person or any Person specified in clause (i) above. As used in this definition, "control" (including its correlative meanings, "controlled by" and "under common control with") shall mean possession, directly or indirectly, of power to direct or cause the direction of management or policies (whether through ownership of securities or partnership or other ownership interests, by contract or otherwise).

"**Agreement**" has the meaning set forth in the preamble to this Agreement.

"**Approval of the Board of Managers**" has the meaning set forth in Section 6.2(c).

"**Available Assets**" means, with respect to any Fiscal Year, all Company assets that are available for distribution, after deducting amounts determined in good faith by the Board of Managers to be necessary for: (i) the payment of expenses; (ii) payments required to be made in connection with any loan to the Company (including without limitation any loans made by the Members) or any other loan secured by a lien on any Company assets; (iii) capital expenditures for projects; (iv) any amounts to be distributed for Tax Liability Distributions; and (v) any other amounts set aside for the restoration, increase or creation of reasonable Reserves.

"**Bankruptcy**" means the occurrence of any one or more of those events set forth in Section 18-304 of the Act.

"**Board of Managers**" shall refer to the board of Managers designated pursuant to this Agreement having the powers and responsibilities as provided for herein.

"**Bona Fide Offer**" has the meaning set forth in Section 10.2(a).

"**Bona Fide Offeror**" has the meaning set forth in Section 10.2(a).

"**Capital Account**" means the Capital Account maintained for each Member on the Company's books and records in accordance with the following provisions:

(a) To each Member's Capital Account there shall be added (i) such Member's Capital Contributions, (ii) such Member's allocable share of Net Profits and any items in the nature of income or gain that are specially allocated to such Member pursuant to Article VI hereof or other provisions of this

Agreement, and (iii) the amount of any Company liabilities assumed by such Member or which are secured by any property distributed to such Member.

(b) From each Member's Capital Account there shall be subtracted (i) the amount of (A) Cash and (B) the Gross Asset Value of any Company assets (other than Cash) distributed to such Member pursuant to any provision of this Agreement, (ii) such Member's allocable share of Net Losses and any other items in the nature of expenses or losses that are specially allocated to such Member pursuant to Article VI or other provisions of this Agreement, and (iii) liabilities of such Member assumed by the Company or which are secured by any property contributed by such Member to the Company.

(c) In the event any Interest is transferred in accordance with the terms of this Agreement, the transferee shall succeed to the Capital Account of the transferor to the extent it relates to the transferred Interest.

(d) In determining the amount of any liability for purposes of subparagraphs (a) and (b) above, there shall be taken into account Code Section 752(c) and any other applicable provisions of the Code and Regulations.

(e) The foregoing provisions and the other provisions of this Agreement relating to the maintenance of Capital Accounts are intended to comply with Regulations Sections 1.704-1(b) and 1.704-2 and shall be interpreted and applied in a manner consistent with such Regulations. In the event that the Manager shall determine that it is prudent to modify the manner in which the Capital Accounts, or any additions or subtractions thereto, are computed in order to comply with such Regulations, the Manager may make such modification, provided that it is not likely to have a material effect on the amounts distributable to any Member.

"**Capital Contribution**" means, with respect to any Member, the total amount contributed to the capital of the Company by such Member, whether as an initial Capital Contribution or as an additional Capital Contribution, whether in Cash, securities or any other form of consideration reflected on the Schedule of Members.

"Cash" means the aggregate amount of cash, Cash Equivalents and marketable securities.

"Cash Equivalents" means and shall only include U.S. government Treasury bills, bank certificates of deposit, bankers' acceptances, corporate commercial paper and other money market instruments.

"**Certificate**" has the meaning set forth in the Recitals.

"Change in Control" means the occurrence of any of the following:

(a) The acquisition, directly or indirectly, in one transaction or a series of related transactions, by any person or group (within the meaning of Section 13(d)(3) of the Securities Exchange Act of 1934, as amended) of the beneficial ownership of securities of the Company possessing more than fifty percent (50%) of the total combined voting power of all outstanding securities of the Company, provided, however, that a Change in Control shall not result upon such acquisition of beneficial ownership if such acquisition occurs as a result of a public offering of the Company's securities or any financing transaction or series of financing transactions;

(b) The consummation of a merger or consolidation in which the Company is not the surviving entity, except for a transaction in which the holders of the outstanding voting securities of the Company immediately prior to such merger or consolidation hold as a result of holding Company securities prior to such transaction, in the aggregate, securities possessing at least fifty percent (50%) of the total combined voting power of all outstanding voting securities of the surviving entity immediately after such merger or consolidation;

(c) A reverse merger in which the Company is the surviving entity but in which the holders of the outstanding voting securities of the Company immediately prior to such merger hold, in the aggregate, securities possessing less than fifty percent (50%) of the total combined voting power of all outstanding voting securities of the Company or of the acquiring entity immediately after such merger; or

(d) The sale, transfer or other disposition (in one transaction or a series of related transactions) of all or substantially all of the assets of the Company, except for a transaction in which the holders of the outstanding voting securities of the Company immediately prior to such transaction(s) receive as a distribution with respect to securities of the Company, in the aggregate, securities possessing at least fifty percent (50%) of the total combined voting power of all outstanding voting securities of the acquiring entity immediately after such transaction(s).

"**Change in Form**" has the meaning set forth in Section 11.1.

"**Code**" means the Internal Revenue Code of 1986, as amended from time to time, or any successor statute. Any reference herein to a particular provision of the Code shall mean, where appropriate, the corresponding provision in any successor statute.

"**Company**" has the meaning set forth in the preamble to this Agreement.

"**Company Minimum Gain**" has the meaning set forth in Regulations Sections 1.704- 2(b)(2) and 1.704-2(d)(1) for the phrase "partnership minimum gain."

"**Company ROFR Election**" has the meaning set forth in Section 10.2(b)(ii).

"**Completion Deliverable**" means the deliverable upon completion of which a Phase is considered complete. Completion Deliverables for the different Phases are set forth in Exhibit B.

"**Contributed Assets**" has the meaning set forth in Section 3.2.

"**Depreciation**" means, for each Fiscal Year or other period, means an amount equal to the depreciation, amortization or other cost recovery deduction allowable with respect to an asset for that year or other period, except that if the Gross Asset Value of an asset differs from its adjusted basis for federal income tax purposes at the beginning of the Fiscal Year or other period, Depreciation shall be an amount which bears the same ratio to that different Gross Asset Value (as

originally computed) as the federal income tax depreciation, amortization, or other cost recovery deduction for that Fiscal Year or other period bears to the adjusted tax basis (as originally computed); provided, however, that if the federal income tax depreciation, amortization or other cost recovery deduction for the applicable year or period is zero, Depreciation shall be determined with reference to the Gross Asset Value (as originally computed) using any reasonable method selected by the Board of Managers in good faith.

"**Diligence Deadlines**" means the deadlines for completion of the Phases set forth in Exhibit B.

"**Dispute**" has the meaning set forth in Section 12.17.

"**Equity Securities**" means, as to any Person (i) shares of capital stock, units or other interests in such Person, (ii) obligations, evidences of indebtedness or other securities or interests convertible or exchangeable into capital stock, units or other interests in such Person and (iii) subscriptions, calls, warrants, options or commitments of any kind or character relating to, or entitling any Person to purchase or otherwise acquire, any capital stock, units or other interests in such Person.

"**ERISA**" means Title I of the U.S. Employee Retirement Income Security Act of 1974 as previously or hereafter amended.

"**Fair Market Value**" means, with respect to any assets or securities, the fair market value for such assets or securities, reflecting the amount that a willing buyer would pay to a willing seller in an arm's length transaction occurring on the date of valuation, as determined in good faith by the Board of Managers in its sole discretion, taking into account all relevant factors determinative of value; provided that the Fair Market Value of any publicly traded securities listed on one or more national securities exchanges, the NASDAQ or a non-United States securities exchange of similar standing shall be the closing price as reported for such securities on the trading day immediately prior to the date of valuation, or if no sale occurred on such trading day, then the mean between the closing bid and ask prices on such exchange or market on such trading day; provided further that any security that is publicly traded but is subject to contractual or other restrictions on marketability or transfer shall be valued at such discount from the foregoing value as the Board of Managers deems appropriate, taking into account all restrictions on marketability or transfer of such security. If either Party disagrees with the Fair Market Value determined by the Board of Managers, such party may, within fifteen days after receipt of such determination, deliver a notice (an "**Objection Notice**") to the Company and the other Party. If neither Party delivers an Objection Notice within such 15-day period, then the Fair Market Value determined by the Board of Managers shall be deemed final. The Party, which delivers the Objection Notice will retain, at its expense, an independent accounting firm of recognized national standing mutually acceptable to the other Party (the "**Firm**") to resolve any disagreements over the Fair Market Value. Such Firm shall be directed to render a determination within 30 days after its retention. The determination of the Firm will be conclusive and binding upon the Parties.

"**Fiscal Year**" means the twelve months ending on December 31 of each year.

"**Gross Asset Value**" means, with respect to any asset, the asset's adjusted basis for federal income tax purposes, except as follows and as otherwise agreed to in this Agreement:

(a) The initial Gross Asset Value of any asset contributed by a Member to the Company shall be the value stated in this Agreement.

(b) The Gross Asset Values of all Company assets immediately prior to the occurrence of any event described in subparagraphs (i) through (v) below shall be adjusted to equal their respective gross fair market values, as determined by the Board of Managers in good faith using such reasonable method of valuation as it may adopt, as of the following times, except otherwise agreed to in this Agreement:

(i) the acquisition of an additional Interest in the Company by a new or existing Member in exchange for more than a de minimis Capital Contribution, if the Board of Managers reasonably determines in good faith that such adjustment is necessary or appropriate to reflect the relative Interests of the Members in the Company;

(ii) the distribution by the Company to a Member of more than a de minimis amount of Company assets as consideration for an Interest in the Company, if the Board of Managers reasonably determines that such adjustment is necessary or appropriate to reflect the relative Interests of the Members in the Company;

(iii) the liquidation or dissolution of the Company within the meaning of Regulations Section 1.704-1(b)(2)(ii)(g);

(iv) the grant of an Interest in the Company (other than a de minimis interest) as consideration for the provision of services to or for the benefit of the Company by an existing Member acting in a partner capacity, or by a new Member acting in a partner capacity or in anticipation of becoming a Member of the Company, if the Board of Managers reasonably determines in good faith that such adjustment is necessary or appropriate to reflect the relative Interests of the Members in the Company; and

(v) at such other times as the Board of Managers shall reasonably determine in good faith necessary or advisable in order to comply with Regulations Sections 1.704- 1(b) and 1.704-2.

(c) The Gross Asset Value of any Company asset distributed to a Member shall be the gross fair market value of such asset on the date of distribution as determined by the Board of Managers.

(d) The Gross Asset Values of Company assets shall be increased (or decreased) to reflect any adjustments to the adjusted basis of such assets pursuant to Code Section 734(b) or Code Section 743(b), but only to the extent that such adjustments are taken into account in determining Capital Accounts pursuant to Regulations Section 1.704-1(b)(2)(iv)(m) and subparagraph (e) of the definition of Net Profits and Net Losses or Section 7.3(h); provided, however, that Gross Asset Values shall not be adjusted pursuant to this subparagraph (d) to the extent that an adjustment pursuant to subparagraph (b) above is made in connection with a transaction that would otherwise result in an adjustment pursuant to this subparagraph (d).

(e) If the Gross Asset Value of a Company asset has been determined or adjusted pursuant to subparagraphs (a), (b) or (d) above, such Gross Asset Value shall thereafter be adjusted by the Depreciation taken into account with respect to such Company asset for purposes of computing Net Profits and Net Losses.

"**Interest**" or "**Membership Interest**" means the entire ownership interest of a Member in the Company (including ownership of Units) at any particular time, including without limitation, any and all approval rights, if any, and rights to otherwise participate in the Company's affairs, and the rights to any and all benefits to which a Member may be entitled as provided in this Agreement, together with the obligations of such Member to comply with all of the terms and provisions of this Agreement.

"**Investment Company Act**" means the Investment Company Act of 1940, as amended.

"**ICC**" has the meaning set forth in Section 12.17(a).

"**ICC Rules**" has the meaning set forth in Section 12.17(a).

"**IRS Notice**" has the meaning set forth in Section 8.5.

"**Liquidator**" has the meaning set forth in Section 9.2.

"**Manager(s)**" means any Person or Persons appointed as a manager of the Company as provided in this Agreement (each in the capacity as a manager of the Company) serving on the Board of Managers, but does not include any Person who has ceased to be a manager of the Company.

"**Member**" has the meaning set forth in the Preamble.

"**Member Minimum Gain**" means an amount, with respect to each Member Nonrecourse Debt, equal to the Company Minimum Gain that would result if such Member Nonrecourse Debt were treated as a Nonrecourse Liability, determined in accordance with Regulations Section 1.704- 2(i) with respect to "partner minimum gain."

"**Member Nonrecourse Debt**" has the meaning set forth in Regulations Section 1.704- 2(b)(4) for the phrase "partner nonrecourse debt."

"**Member Nonrecourse Deductions**" has the meaning set forth in Regulations Section 1.704-2(i) for the phrase "partner nonrecourse deductions."

"**Net Profits**" or "**Net Losses**" means, for each Fiscal Year or other period, an amount equal to the Company's taxable income or loss for such year or period determined in accordance with Code Section 703(a) (for this purpose, all items of income, gain, loss, deduction or credit required to be stated separately pursuant to Code Section 703(a)(1) shall be included in taxable income or loss), with the following adjustments:

(a) Any income of the Company that is exempt from federal income tax and not otherwise taken into account in computing Net Profits or Net Losses pursuant to this definition of Net Profits and Net Losses shall increase the amount of such income and/or decrease the amount of such loss;

(b) Any expenditure of the Company described in Code Section 705(a)(2)(B) or treated as Code Section 705(a)(2)(B) expenditures pursuant to Regulations Section 1.704- 1(b)(2)(iv)(i), and not otherwise taken into account in computing Net Profits or Net Losses pursuant to this definition of Net Profits and Net Losses, shall decrease the amount of such income and/or increase the amount of such loss;

(c) Gain or loss resulting from any disposition of Company assets where such gain or loss is recognized for federal income tax purposes shall be computed by reference to the Gross Asset Value of the Company assets disposed of, notwithstanding that the adjusted tax basis of such Company assets differs from its Gross Asset Value;

(d) In lieu of the depreciation, amortization and other cost recovery deductions taken into account in computing such income or loss, there shall be taken into account Depreciation for such Fiscal Year or other period;

(e) To the extent an adjustment to the adjusted tax basis of any asset included in Company assets pursuant to Code Section 734(b) or Code Section 743(b) is required pursuant to Regulations Section 1.704-1(b)(2)(iv)(m)(4) to be taken into account in determining Capital Accounts as a result of a distribution other than in liquidation of a Member's Interest, the amount of such adjustment shall be treated as an item of gain (if the adjustment increases the basis of the asset) or loss (if the adjustment decreases the basis of the asset) from the disposition of the asset and shall be taken into account for the purposes of computing Net Profits and Net Losses;

(f) If the Gross Asset Value of any Company asset is adjusted in accordance with subparagraph (b) or subparagraph (c) of the definition of "Gross Asset Value" above, the amount of such adjustment shall be taken into account in the taxable year of such adjustment as gain or loss from the disposition of such asset for purposes of computing Net Profits or Net Losses; and

(g) Notwithstanding any other provision of this definition of Net Profits and Net Losses, any items that are specially allocated pursuant to Section 7.3 hereof shall not be taken into account in computing Net Profits or Net Losses. The amounts of the items of Company income, gain, loss or deduction available to be specially allocated pursuant to Section 7.3 hereof shall be determined by applying rules analogous to those set forth in this definition of Net Profits and Net Losses.

"**Nonrecourse Deductions**" has the meaning set forth in Regulations Sections 1.704-2(b)(1) and 1.704-2(c).

"**Nonrecourse Liability**" has the meaning set forth in Regulations Sections 1.704-2(b)(3) and 1.752-1(a)(2).

"**Officers**" has the meaning set forth in Section 6.3.

"**Percentage Interest**" means, with respect to each Member at any time, the quotient, expressed as a percentage, obtained by dividing the number of Units then held by such Member by the aggregate number of Units outstanding on a fully diluted basis. For the purposes of this Agreement and subject to Article X and XI of this Agreement, the initial Percentage Interest of Onconova and GVK Bio are ninety percent (90%) and ten percent (10%), respectively; provided, however, the Percentage Interest shall automatically be adjusted, and Units shall be issued to theMembers to reflect such adjustments, upon the making of additional Capital Contributions by GVK BIO or the completion of Completion Deliverables, as set forth in Exhibit B.

"**Permitted Transferee**" has the meaning set forth in Section 10.1(c).

"**Person**" means and includes an individual, a corporation, a partnership, a limited liability company, a joint venture, a joint stock company, a trust, an unincorporated organization or association, a government or any department or agency thereof, or any other entity, whether or not a legal entity.

"**Phases**" means different Phases in which the Programs are completed, as set forth in Exhibit B.

"**PoC Study**" means a proof of concept study conducted after the IND approval for a Program where the clinical efficacy of the IND candidate is determined in at least ** patients.

"**Qualified Public Offering**" means a firm commitment underwritten public offering registered under the Securities Act of the Equity Securities of the Company (or a successor entity) or any of its Subsidiaries underwritten by a nationally recognized investment banking firm in which the aggregate proceeds for such securities (net of discounts, commissions and related expenses) shall be at least ** and as a result of which such securities are listed or quoted on a United States national securities exchange or quoted in the United States Nasdaq Global Market System.

"**Regulations**" or "**Treasury Regulations**" means the regulations promulgated under the Code.

"**Regulatory Allocations**" has the meaning set forth in Section 7.3(h).

"**Remaining ROFR Units**" has the meaning set forth in Section 10.2(b)(ii).

"**Reserves**" means funds set aside or amounts allocated to reserves that shall be maintained in amounts deemed sufficient by the Board of Managers in good faith for working capital, to pay taxes, insurance, debt service, and other costs or expenses incident to the conduct of business by the Company as contemplated hereunder.

"**ROFR Sale Notice**" has the meaning set forth in Section 10.2(a).

"**ROFR Election**" has the meaning set forth in Section 10.2(b)(i).

"**ROFR Election Period**" has the meaning set forth in Section 10.2(b)(i).

"**ROFR Recipients**" has the meaning set forth in Section 10.2(a).

"**ROFR Units**" has the meaning set forth in Section 10.2(b).

"**Sale of the Company**" means any of the following: (a) a merger, consolidation or Transfer of Interests of the Company or any of its Subsidiaries into or with any other Person or Persons, or a Transfer of Interests in a single transaction or a series of transactions, in which in any case the Members of the Company immediately prior to such merger, consolidation, sale, exchange, conveyance or other disposition or first of such series of transactions possess less than a majority of the voting power of the Company's or any successor entity's issued and outstanding capital securities immediately after such transaction or series of such transactions; or (b) a single transaction or series of transactions, pursuant to which a Person or Persons who are not direct or indirect wholly-owned

Subsidiaries of the Company acquire all or substantially all of the Company's and/or any of its Subsidiaries' assets determined on a consolidated basis.

"**Securities Act**" means the Securities Act of 1933, as amended.

"**Securities Laws**" means the Securities Act, the Securities Exchange Act of 1934, as amended, the Investment Company Act, the Investment Advisers Act of 1940, as amended, and each and every other securities law of the United States and the states thereof, and all rule and regulations promulgated under any of such laws.

"**Selling Member**" has the meaning set forth in Section 10.2(a).

"**Schedule of Members**" means the Schedule of Members attached hereto as Exhibit A.

"**Subsidiaries**" means, with respect to any Person, any corporation, limited liability company, partnership, association, or other business entity of which (i) if a corporation, a majority of the total voting power of shares of stock entitled (without regard to the occurrence of any contingency) to vote in the election of directors, managers, or trustees thereof is at the time owned or controlled, directly or indirectly, by such Person or one or more of the other Subsidiaries of such Person or a combination thereof or (ii) if a limited liability company, partnership, association, or other business entity (other than a corporation), a majority of the partnership or other similar ownership interests thereof is at the time owned or controlled, directly or indirectly, by such Person or one or more Subsidiaries of such Person or a combination thereof and for this purpose, a Person or Persons own a majority ownership interest in such a business entity (other than a corporation) if such Person or Persons shall be allocated a majority of such business entity's gains or losses or shall be a, or control any, managing director or general partner of such business entity (other than a corporation). The term "Subsidiary" shall include all Subsidiaries of such Subsidiary.

"**Tag-Along Notice**" has the meaning set forth in Section 10.3(c).

"**Tag-Along Notice Date**" has the meaning set forth in Section 10.3(b).

"**Tag-Along Recipients**" has the meaning set forth in Section 10.3(a).

"**Tag-Along Sale Date**" has the meaning set forth in Section 10.3(b).

"**Tag-Along Sale Notice**" has the meaning set forth in Section 10.3(b).

"**Tag Transferring Member**" has the meaning set forth in Section 10.3(a).

"**Tax Liability Distribution**" has the meaning set forth in Section 4.5.

"**Tax Matters Partner**" has the meaning set forth in Section 8.3.

"**Taxable Income**" means, for each Fiscal Year or other period, an amount equal to the Company's taxable income for such year or period determined in accordance with Code

Section 703(a) (for this purpose, all items of income, gain, loss, deduction or credit required to be stated separately pursuant to Code Section 703(a)(1) shall be included in taxable income).

"**Transfer**" has the meaning set forth in Section 10.1(a).

"**Unit(s)**" means one or more ownership interests in the Company representing the right to allocations and distributions in accordance with this Agreement. For the purposes of this Agreement and subject to Article X and XI of this Agreement, the initial Units issued to Onconova and GVK Bio are ninety (90) Units and ten (10) Units, respectively; provided, however, the Percentage Interest shall automatically be adjusted, and Units shall be issued to the Members to reflect such adjustments, upon the making of additional Capital Contributions by GVK BIO, or the completion of Completion Deliverables, as set forth in Exhibit B.

ARTICLE II

GENERAL PROVISIONS

2.1 Continuation. The Company shall continue as a limited liability company under the Act for the purposes hereinafter set forth. The rights and obligations of the Members and the administration and termination of the Company shall be governed by this Agreement and the Act. This Agreement shall be considered the "Limited Liability Company Agreement" of the Company within the meaning of Section 18-101(7) of the Act.

2.2 Formation; Filings. The Certificate shall be filed in the Office of the Delaware Secretary of State as required by the Act. The Board of Managers may cause to be executed and filed any duly authorized amendments to the Certificate from time to time in a form prescribed by the Act. The Board of Managers shall also cause to be made, on behalf of the Company, such additional filings and recordings as the Board of Managers shall deem necessary or advisable.

2.3 Name. The name of the Company shall be GBO, LLC. All Company business shall be conducted in such name or such other names as the Board of Managers may select from time to time. The Board of Managers may change the name of the Company, from time to time, in accordance with applicable law with prior notice to the Members.

2.4 Principal Place of Business. The principal office of the Company shall initially be 375 Pheasant Run, Newtown, PA 18940, or such other place as may be determined from time to time by the Board of Managers. The Company may have such other offices as may be determined by the Board of Managers.

2.5 Registered Office and Registered Agent. The Company's initial registered office and agent shall be Corporation Trust Center, 1209 Orange Street, Wilmington, County of New Castle, Delaware 19801. The registered agent in charge thereof is The Corporation Trust Company. The Company may change its registered office to any other place or places in the State of Delaware as may be determined from time to time by the Board of Managers. The Company may change its registered agent to any other Person as may be determined from time to time by the Board of Managers.

2.6 Term. The term of the Company commenced on the date of filing of the Certificate in accordance with the Act and shall continue in perpetuity, unless the Company is dissolved in

accordance with Article IX. Notwithstanding the dissolution of the Company, the existence of the Company shall continue until termination pursuant to this Agreement.

2.7 No State Law Partnership. The Members intend that the Company (i) shall be taxed as a partnership for all applicable federal, state and local income tax purposes and (ii) shall not be a partnership (including, without limitation, a general partnership or a limited partnership) or joint venture for any other purpose, and that no Member shall be a partner or joint venturer of any other Member with respect to the business of the Company. Except as otherwise specifically provided for herein, no Member shall take any action inconsistent with the foregoing.

2.8 Purpose; Powers. The purpose and business of the Company shall be (i) to carry on any business, purpose or activity to develop the Programs by achieving the Deliverables, (ii) to exercise all rights and powers granted to the Company under this Agreement and any other agreements contemplated hereby, as the same may be amended from time to time; (iii) to engage in any other lawful acts or activities incidental or ancillary thereto as the Board of Managers deems necessary or advisable for which limited liability companies may be organized under the Act and (iv) with the approval of the Members, to engage in any other lawful act or activity for which limited liability companies may be organized under the Act.

(a) In furtherance of its purposes, the Company shall have all powers necessary, suitable or convenient for the accomplishment of its purposes, alone or with others, including, without limitation, the following:

(i) to open, maintain and close bank accounts and draw checks and other orders for the payment of moneys;

(ii) to engage accountants, custodians, attorneys and other advisors as may be necessary or advisable for the due and proper administration of the Company assets, and to compensate such Persons as may be reasonably necessary or advisable;

(iii) to enter into, make and perform all contracts, agreements and other undertakings as may be necessary or advisable or incident to carrying out its purposes;

(iv) to distribute, subject to the terms of this Agreement, at any time and from time to time to Members Cash or investments or securities or other property of the Company, or any combination thereof; and

(v) to form Subsidiaries and enter into, make and perform all contracts, agreements and other undertakings as may be necessary or advisable or incident to the formation of Subsidiaries.

ARTICLE III

CAPITALIZATION; ADMISSION OF MEMBERS; CAPITAL ACCOUNTS

3.1 Capitalization.

(a) Units. Each Member's interest in the Company, including such Member's interest, if any, in the capital, income, gains, losses, deductions and expenses of the Company and the right to vote, if any, on certain Company matters as provided in this Agreement shall be represented

by Units. The ownership by a Member of Units shall entitle such Member to allocations of Profits and Losses and other items and distributions of Cash and other property as set forth in this Agreement. Units shall be issued in non-certificated form; provided, that the Board of Managers may cause the Company to issue certificates to a Member representing Units held by such Member. Any Units that are forfeited by a Member pursuant to the terms of this Agreement or any other agreement between the Company and such Member shall be deemed to have been reacquired by the Company.

3.2 Admission of Initial Members; Contributions.

(a) Schedule of Members; Capital Contributions; Percentage Interest. The name and address of each Member, the number of Units owned by such Member at any time, and the amount of initial Capital Contributions made by such Member shall be set forth next to such Member's name on the Schedule of Members, as amended from time to time in accordance with this Agreement. Upon execution of this Agreement by a Member, such Member hereby contributes such amount set forth opposite the Member's name under the heading "Capital Contribution" on the Schedule of Members. As Capital Contribution, Onconova has contributed to the Company a sub-license to all the intellectual property controlled by Onconova related to the Programs ("**Contributed Assets**"). Onconova represents and warrants that it has full authority and absolute right to sub-license Contributed Assets without any direct or indirect obligation on the part of the Company or GVK BIO to any third party from which Onconova may have licensed Contributed Assets. GVK BIO shall contribute to the Company, as an initial Capital Contribution, a sum of Five Hundred Thousand Dollars ($500,000). In addition, GVK BIO shall make additional Capital Contributions necessary to complete the Phases; provided, that upon achieving the Completion Deliverables or investing up to the amounts set forth in Exhibit B to fund the Company's capital requirements in connection with achieving the Completion Deliverables, the Percentage Interest of the Members may change as set forth in Exhibit B. A portion of the Capital Contributions of GVK BIO shall be used to fund research relating to biology, mechanism of action and biomarkers to be conducted by Prem Reddy Labs on behalf of the Company, provided, however, the amount of such funds shall not exceed ** during any Fiscal Year unless approved by the Company's Board of Managers.

(b) Contributions. Except as otherwise required by applicable law or as specifically provided for herein, no Member shall be required and no Member shall be permitted to make any additional Capital Contributions to the Company unless approved in writing by the Board of Managers and such Member.

(c) Admission of Members. As of the date hereof, the Members have executed this Agreement in their own capacity or have caused it to be executed by proxy on their own behalf and have made the Capital Contributions to the Company set forth opposite the Members' names on the Schedule of Members in exchange for the number of Units set forth opposite such Member's name on the Schedule of Members and are hereby admitted as Members of the Company.

3.3 Negative Capital Accounts. No Member shall be required to pay to any other Member or the Company any deficit or negative balance which may exist from time to time in such Member's Capital Account (including upon and after dissolution of the Company).

3.4 No Withdrawal. Except as otherwise expressly provided in this Agreement (a) no Member shall demand or be entitled to receive a return of or interest on its Capital Contributions or Capital Account and (b) no Member shall withdraw any portion of its Capital Contributions or be entitled to receive any distributions from the Company as a return of capital on account of such

Capital Contributions or otherwise. Except with the unanimous approval of the Board of Managers, the Company shall not redeem the Units of any Member.

3.5 Loans From Members. No Member shall be required to make any loans or otherwise lend any funds to the Company, and no Members shall be permitted to do so except with the consent of the Board of Managers. Loans by Members to the Company shall not be considered Capital Contributions. If any Member shall lend funds to the Company in addition to making the Capital Contributions required hereunder from such Member to the capital of the Company, the making of such loans shall not result in any increase in the amount of the Capital Account of such Member. The amount of any such loans shall be a debt of the Company to such Member and shall be payable or collectible from the assets of the Company in accordance with the terms and conditions upon which such loans are made.

3.6 Representations and Warranties; Risk Factors.

(a) Representations and Warranties. Each Member, upon being admitted to the Company, represents and warrants to the Company and acknowledges that (i) the Member has such knowledge and experience in financial and business matters that the Member is capable of evaluating the merits and risks of an investment in the company and making an informed investment decision with respect thereto, (ii) the Member is able to bear the economic and financial risk of an investment in the Company for an indefinite period of time and understands that the Members has no right to withdraw and have its Units repurchased by the company, (iii) the Member is acquiring Units in the Company for investment only and not with a view to, or for resale in connection with, any distribution to the public or public offering thereof, (iv) the Member understands that the Units have not been registered under the securities laws of any jurisdiction and cannot be disposed of unless they are subsequently registered and/or qualified under applicable securities laws, or in accordance with an applicable exemption therefrom, and the provisions of this Agreement have been complied with and (v) the execution, delivery and performance of this Agreement including the grant of sublicense to the Contributed Assets do not require the Member to obtain any consent or approval that has not been obtained and do not contravene or result in a default under any provision of any existing law or regulation applicable to it, any provision of its charter, by-laws or other governing documents (if applicable) or any agreement or instrument to which it is a party or by which it is bound.

(b) Risk Factors. Each Member recognizes that the investment in the Company is extremely speculative and involves a high degree of risk. In addition, each Member specifically acknowledges such Member's understanding that a decline in economic conditions could materially and adversely affect the Company's business, results of operation and financial condition..

ARTICLE IV

DISTRIBUTIONS

4.1 Distributions Generally. Except as otherwise provided in Article IX hereof, distributions of Available Assets shall be made only when and as determined appropriate by the Board of Managers in its sole discretion, and when made, shall be made only in accordance with this Article IV. No repayment of any loans and accrued interest thereon made to the Company shall be deemed to be distributions pursuant to this Article IV or Article IX.

4.2 Distributions of Available Assets. To the extent that Available Assets arise from proceeds received from the Buy Back Transactions, such Available Assets shall be distributed in accordance with Section 5.7(c). All other Available Assets shall be available for distribution at the discretion of the Board of Managers, subject to Section 4.1 and Section 4.5 hereof, to the Members in accordance with their respective Percentage Interests; provided, however, for purposes of any calculations of distributions or amounts distributed under this Section 4.2, any Tax Liability Distributions will be treated as advances of distributions to be made under Section 4.2 and will be credited against and will reduce future distributions to be made to each Member under Section 4.2.

4.3 Distributions upon Liquidation. Distributions made in conjunction with the final liquidation of the Company shall be applied or distributed as provided in Article IX hereof.

4.4 Distributions In-Kind. No right is given to any Member to demand or receive property other than Cash as provided in this Agreement. The Board of Managers may determine, in its sole discretion, to make a distribution in kind of assets, and such assets shall be distributed in such a fashion as to ensure that the Fair Market Value thereof is distributed and allocated in accordance with this Article IV and Articles VII and IX hereof. To the extent that each Member is entitled to any such distribution in accordance with the foregoing and to the extent that such property is so divisible, such property shall be distributed among the Members pro rata in accordance with their respective equity interests in the Company.

4.5 Tax Distributions. Prior to any distribution pursuant to Section 4.2, the Company shall make Cash distributions on an annual basis to each Member to the extent the Company has adequate assets therefor in amounts intended to partially assist each Member and its beneficial owners, to discharge its actual or potential United States federal, state and local income tax liabilities arising from the allocations made to such Member pursuant to Article VII, without regard to the actual tax liability of such Member, but only to the extent provided in this Section 4.5 (each, a "**Tax Liability Distribution**"), provided, that in no event will any Tax Liability Distribution be made in violation of any contractual obligation of the Company. The amount of any such Tax Liability Distribution to a Member with respect to any Fiscal Year shall equal the product of (a) the maximum combined federal, state and local tax rates applicable to individuals or corporations (whichever is higher) residing in Wilmington, Delaware on the type of income allocated (i.e., ordinary income, net short-term capital gain or net long-term capital gain, as applicable), and taking into account the deductibility of state and local income taxes for United States federal income tax purposes and the character of the income in question and the holding period of any asset disposed of, multiplied by (b) an amount equal to the amounts of Taxable Income attributable to such Member pursuant to Article VII for such Fiscal Year.

4.6 Withholding. The Company may withhold distributions or portions thereof if it is required to do so by any applicable rule, regulation, or law, and each Member hereby authorizes the Company to withhold from or pay on behalf of or with respect to such Member any amount of federal, state, local or foreign taxes that the Board of Managers (other than any member of the Board of Managers who is (or is an Affiliate of) the Member that is the subject of such withholding) determines that the Company is required to withhold or pay with respect to any amount distributable or allocable to such Member pursuant to this Agreement, provided that the Company shall give such Member reasonable prior notice of the intent to so withhold or pay and the basis therefor. Any amount paid on behalf of or with respect to a Member pursuant to this Section 4.6 shall constitute a loan by the Company to such Member, which loan shall be repaid by such Member within fifteen (15) days after notice from the Company that such payment must be made unless: (i) the Company

withholds such payment from a distribution which would otherwise be made to the Member or (ii) the Board of Managers (other than any member of the Board of Managers who is (or is an Affiliate of) the Member that is the subject of such withholding) determines, in its sole and absolute discretion, that such payment may be satisfied out of Available Assets which would, but for such payment, be distributed to the Member. Any amounts withheld pursuant to this Section 4.6 shall be treated as having been distributed to such Member.

4.7 Limitations on Distributions. Notwithstanding any provision to the contrary contained in this Agreement, neither the Company nor the Board of Managers, on behalf of the Company, shall knowingly make a distribution to any Member in violation of Section 18-607 of the Act.

4.8 Distribution Adjustments. Notwithstanding any contrary provision in this Article IV, no Member shall be entitled to receive distributions in respect of any income or gain arising: (i) in the case of a new Member (other than a new Member who acquires his or her Interest directly from another or previous Member), prior to such Member's admission; and (ii) in the case of a Member who receives a new or increased interest in the Company, prior to such issuance or increase to the extent attributable to such issuance or increase. Distributions in respect of any income or gain arising prior to such admission, issuance or increase shall be made based upon the Interests of the Members at the time such income or gain arises, net of any deductions or losses, as reasonably determined by the Board of Managers. This Section 4.8 shall be interpreted and implemented consistently with the principles set forth in Regulations Section 1.704-1(b)(2)(iv)(f).

ARTICLE V

THE PROGRAMS

5.1 Program Development; Program Failure.

(a) From time to time, GVK BIO will make Capital Contributions necessary to complete each Phase into the Company, which shall be at least $500,000 per Phase; provided, that GVK BIO's Percentage Interest will increase only if the conditions set forth under the caption TRIGGER EVENTS in Exhibit B are fulfilled. To clarify, GVK BIO's investments above $500,000 to complete a Phase shall not increase GVK BIO's Percentage Interest above the corresponding threshold set forth in Exhibit B.

(b) The Company will use commercially reasonable efforts to advance the Programs by completing the Phases before the Diligence Deadlines; provided, that (i) if a Phase is not completed before the corresponding Board Diligence Deadline set forth in Exhibit B, the Board of Managers may declare the applicable Program as failed and (ii) if (A) a Phase is not completed before the corresponding Onconova Diligence Deadline set forth in Exhibit B, or (B) there is not a

significant progress in the achievement of the Completion Deliverables in connection with a Phase during any six (6) month period, Onconova may declare the applicable Program as failed (each a "Program Failure"). The Percentage Interest of the Members shall not be reduced as the result of a Program Failure.

(c) The Company will issue to the Members progress reports with regard to the status of the Programs and Completion Deliverables and updated project plans at least every ** months.

5.2 **Program Improvements**. All improvements to the Contributed Assets made in the course of conducting the Programs (or any other Replacement Programs added by the Board of Managers), including all data, know-how, inventions, regulatory submissions including specifically any IND, or other intellectual property whether solely by the Company or jointly with any Member (collectively, the "**Program Improvements**"), shall be solely owned by the Company.

5.3 Replacement Programs. If a Program Failure occurs for one or both Programs, upon Approval of the Board of Managers, Onconova may contribute additional assets to the Company to establish new programs (the "**Replacement Programs**"). The Percentage Interest of Onconova will not change upon Onconova's contribution of additional assets to the Company in connection with any Replacement Program. In connection with a Replacement Program, GVK BIO's Percentage Increase shall be adjusted in accordance with Exhibit B upon the Replacement Program achieving the first Completion Deliverable not achieved by the Program that resulted in a Program Failure (the "**Failed Program**"). In the event, no Replacement Program is established to replace a Failed Program, GVK BIO's Capital Contribution will be modified as mutually agreed upon by the Members.

5.4 Intellectual Property Protection. Appropriate intellectual property protection, including, without limitation, filing, prosecution and maintenance of patents, will be pursued by the Company (at the Company's expense) for all Program Improvements made in the United States of America and will be protected, at a minimum, in North America, major countries in Asia and the European Community. The Company will manage the Company's intellectual property rights and be responsible for protecting and maintaining the intellectual property rights for the benefit of the Company. The Company shall consult with Onconova in all intellectual property matters related to the Program Improvements. The Company shall consider in good faith Onconova's requests and suggestions with respect to the filing, prosecuting and maintaining patents related to Program Improvements. In the event the Company elects not to file, prosecute or maintain patent applications or patents in relation to Program Improvements hereunder ("**Abandoned Patents**"), it shall inform Onconova at least ** days before any relevant deadline for filing or other action, and Onconova shall then have the right to file, prosecute and maintain such Abandoned Patents. The Company shall, upon Onconova's request, assign, and hereby does assign all right, title and interest in such Abandoned Patents to Ononova.

5.5 Disposition of Company IP.

(a) Upon Approval of the Board of Managers, the Company shall have the right to license any of the Company's intellectual property assets to a third party for consideration equal to or greater than the Fair Market Value of such license.

(b) Upon Approval of the Board of Managers, the Company shall have the right to sell any of the Company's intellectual property assets to a third party for consideration equal to or greater than the Fair Market Value of such asset; provided, however, that Onconova shall have a right of first refusal to purchase such asset at such asset's Fair Market Value within ** days of receipt of written notice of the Company's intent to sell such asset. The notices delivered by the Company to Onconova in connection with this Section 5.5(b) shall include a description of the asset, the Fair Market Value of the asset and such other terms associated with the sale of the asset. If Onconova does not elect to purchase the asset, the Company may sell the asset to any third party at or above the Fair Market Value and on terms no more favorable than those offered to Onconova.

(c) The profit sharing from licensing or sale of Company's intellectual property to a third party will be based on the Percentage Interest of the Members.

5.6 GVK Bio Option. Upon the approval of the IND for a Program, GVK BIO will have an option for a period of ** months from such approval to conduct a PoC Study for such Program. GVK BIO may exercise such option by providing an exercise notice, in writing, to the Company and Onconova. If GVK BIO exercises the option, GVK BIO will make an additional Capital Contribution of $500,000 to fund the PoC Study. If the Company has achieved all Completion Deliverables or GVK BIO has made all of the additional Capital Contributions set forth in Exhibit B required for GVK BIO's Percentage Interest to reach **, then, upon GVK BIO's exercise of the PoC Study option and the additional Capital Contribution of $500,000 set forth in Exhibit B, each Member will have a Percentage Interest of fifty percent (50%) and the Units granted to the Members will be adjusted to reflect this change in the Percentage Interest. To clarify, GVK Bio will make an additional capital contribution of $500,000 for each Program if it exercises the option to conduct PoC Study for both Programs; provided, that GVK Bio's Percentage Interest will not exceed fifty percent (50%) even if GVK Bio exercises the option with respect to both the Programs.

5.7 Buy Back of Programs.

(a) For thirty (30) days after the fifteenth-month anniversary of the commencement of a Program, Onconova shall have an the option (the "**Buy Back Option**") to (i) cancel the license issued to the Company for the Contributed Assets related to such Program and (ii) purchase any and all rights, title and interest in and to the Program Improvements related to such Program (items (i) and (ii) are hereinafter referred to as the "**Buy Back Transaction**"); provided, that Onconova shall not be able to exercise the Buy Back Option prior to IND approval unless (i) the Company, as determined in good faith by Onconova, is failing to advance the Programs or (ii) Onconova is in the process of consummating a Change in Control. Onconova shall deliver written notice to the Company and GVK BIO to exercise the Buy Back Option and, within ** days of receipt of such notice, the Company shall enter into such documents as Onconova deems reasonably necessary to complete the Buy Back Transaction.

(b) As consideration for the Buy Back Transaction, Onconova shall pay the Company, the following amounts upon achievement of certain milestones:

(i) If Onconova gives the notice for Buy Back Transaction related to a Program prior to the "IND approval" of the Program and IND approval does not occur within ** days after the notice, Onconova shall pay the Company:

(A) a one-time payment upon the completion of the Buy Back Transaction equal to ** times the sum of all Capital Contributions made by GVK BIO in connection with the Program;

(B) a one-time payment of ** upon IND approval;

(C) a one-time payment of ** upon commencement of Phase II clinical trials;

(D) a one-time payment of ** upon commencement of Phase III clinical trials;

(E) a one-time payment of ** upon NDA approval; and

(F) a tiered royalty equal to ** of the first ** of worldwide annual net sales and ** of worldwide annual net sales greater than **; provided, that if Onconova licenses the Program to a third party, the royalties paid to GVK Bio pursuant to this Section 5.7(b)(i)(F) shall not exceed ** of the royalties paid to Onconova from the third party licensee.

(ii) If Onconova gives the notice for Buy Back Transaction related to a Program after IND approval or IND approval occurs within ** days after the notice, Onconova shall pay the Company:

(A) a one-time payment upon the completion of the Buy Back Transaction equal to ** times the Capital Contributions of GVK BIO in connection with the Program;

(B) a one-time payment of ** upon commencement of Phase I clinical trials;

(C) a one-time payment of ** upon commencement of Phase II clinical trials;

(D) a one-time payment of ** upon commencement of Phase III clinical trials;

(E) a one-time payment of ** upon NDA approval; and

(F) a recurring royalty of ** of the first ** of worldwide annual net sales and ** of worldwide annual net sales greater than **; provided, that if Onconova licenses the Program to a third party, the royalties paid to GVK Bio pursuant to this Section 5.7(b)(ii)(F) shall not exceed ** of the royalties paid to Onconova from the third party licensee.

(iii) If Onconova gives the notice for Buy Back Transaction related to a Program after the PoC Study or the PoC Study results are available within ** days of the notice, Onconova shall pay the Company:

(A) a one-time payment upon the completion of the Buy Back Transaction equal to ** times the Capital Contributions of GVK BIO in connection with the Program;

(B) a one-time payment of ** upon successful completion of Phase I study;

(C) a one-time payment of ** upon commencement of Phase II clinical trials;

(D) a one-time payment of ** upon commencement of Phase III clinical trials;

(E) a one-time payment of ** upon NDA approval; and

(F) a tiered royalty of ** of the first ** of worldwide annual net sales and ** of worldwide annual net sales greater than **; provided, that if Onconova licenses the Program to a third party, the royalties paid to GVK Bio pursuant to this Section 5.7(b)(ii)(F) shall not exceed ** of the royalties paid to Onconova from the third party licensee.

The amounts due in connection with completion of a Buy Back Transaction or a Program achieving each milestone shall be paid by Onconova to the Company within ** days of, as applicable, completion of such Buy Back Transaction or such Program achieving such milestone.

(c) The entire consideration received by the Company from Buy Back Transactions shall be distributed to GVK Bio.

ARTICLE VI

MANAGEMENT AND OPERATION OF THE COMPANY

6.1 Operational Control. Subject to Section 6.2 below, GVK BIO will provide operational support to advance the Programs and achieve the Completion Deliverables and GVK BIO will have final operational control over the activities conducted by GVK BIO to meet the Completion Deliverables; provided, that GVK BIO shall (i) prepare and deliver to the Board of Managers quarterly project plans, summarizing the material actions to be taken to achieve the Completion Deliverables, and (ii) provide to the Board of Managers progress reports with regard to the status of the Programs and Completion Deliverables at least monthly.

6.2 Strategic Control. Onconova will oversee and have control of all strategic and scientific decisions of the Company.

6.3 Power and Authority of Members. Except as otherwise provided in this Agreement, no Member shall, in its capacity as such, have the authority or power to act for, or on behalf, of the Company in any manner or to participate in the management or control of the affairs of the Company, to do any act that would be (or could be construed as) binding on the Company, or to make any expenditures on behalf of the Company, and the Members hereby consent to the exercise by the Board of Managers of the powers and rights conferred on it by applicable law and by this Agreement.

6.4 Board of Managers. Except as otherwise provided in this Agreement, the overall direction and management of the Company and the formulation of the policies to be applied to the Company and its business shall be the responsibility of a board of managers (the "**Board of**

Managers") acting in accordance with this Agreement. The Board of Managers shall have the right, power and authority to take any and all actions consistent with the purpose of the Company that is permitted hereunder and under applicable law. All actions, decisions, consents, determinations and elections made or taken by the Board of Managers in accordance with this Agreement shall be binding on the Company and all of the Members, it being understood that no single Manager shall have authority or power to act for or to bind the Company, other than where such Manager is acting in an executive role, as explicitly delegated by a resolution of the Board of Managers or as explicitly provided in this Agreement. Any actions, decisions, consents, determinations or elections required or permitted to be made by the Board of Managers under this Agreement shall be made by an Approval of the Board of Managers. Each member of the Board of Managers shall be considered the "Manager" of the Company within the meaning of Section 18-101(10) of the Act, it being understood that no single member of the Board of Managers may take actions, decisions, consents, determinations and elections on behalf of the Company or the Members. During the continuance of the Company, the Members shall take no part in the conduct or control of the Company business, and shall have no authority or power to act for or to bind the Company, other than as explicitly provided in this Agreement or as expressly required by non-waivable provisions of Act.

(a) Appointment of Managers. There shall be initially five (5) members of the Board of Managers. Onconova shall be entitled to designate three (3) members of the Board of Managers (the "**Onconova Managers**") and GVK BIO shall be entitled to designate two (2) member of the Board of Managers (the "**GVK BIO Managers**"). The initial Onconova Managers shall be Ramesh Kumar, Ph.D., E. Premkumar Reddy, Ph.D. and Manoj Maniar, Ph.D. and the initial GVK BIO Managers shall be Dr. Jung Bahadur Gupta and Manmahesh Kantipudi. After the first IND approval for a Program, the size of the Board of Managers shall be reduced to four (4) members with each of Onconova and GVK BIO being represented by two Managers and Onconova shall promptly notify GVK BIO of the member of the Board of Managers it is removing.

(b) Removal and Replacement of Managers. Each Manager elected hereunder shall serve as a Manager until such Manager resigns, is removed as provided herein or until such Manager's successor is elected by the Member entitled to designate such successor Manager. Any removal or resignation shall be effective as of the date of such notice unless such notice provides otherwise. Each Member may remove any Manager elected by that Member at that time, with or without cause, but only a Member who has elected a Manager may remove that Manager.

(c) Voting. Unless expressly provided otherwise in this Agreement, actions by the Board of Managers must be approved by a majority vote of the members of the Board of Managers ("**Approval of the Board of Managers**").

(d) Meetings. Meetings of the Board of Managers may be held at any time and place designated in the notice of such meeting provided pursuant to Section 6.2(f) below, to each of the Managers by any member of the Board of Managers.

(e) Telephonic Participation. Managers may participate in any regularly scheduled or special meetings of the Board of Managers telephonically or through other similar communications equipment, as long as all of the individuals participating in the meeting can hear and speak to one another. Participation in a meeting pursuant to the preceding sentence shall constitute presence in person at such meeting for all purposes of this Agreement.

(f) Notice and Attendance. Notice of any meeting of the Board of Managers shall be given not less than two (2) calendar days in advance thereof, shall provide the date, time, place and purpose of the meeting and may be given in the manner provided for in Section 12.4 (provided that such notice shall also be sent by email). Managers may waive notice of the date, time, place and purpose or purposes of a meeting. A waiver of notice is effective whether given before, at or after the meeting, and whether given in writing, orally or by attendance. A Manager's attendance at any meeting (in person or telephonically or through other communications equipment) shall be deemed a waiver by such Manager of notice with respect to such meeting.

(g) Quorum. A quorum shall be required to conduct any business at any meeting of the Board of Managers, and shall be deemed present if at least two (2) Onconova Managers and one (1) GVK Bio Manager are present at the meeting.

(h) Actions without Meetings. Any action required or permitted to be taken at a meeting of the Board of Managers may be taken without a meeting by unanimous written consent of the members of the Board of Managers, which consent shall set forth the actions to be so taken. Any such written consent shall have the same effect as an action of the Board of Managers taken, at a duly called and constituted meeting of the Board of Managers.

(i) Execution of Documents. All contracts, agreements and other documents or instruments affecting or relating to the business and affairs of the Company shall be executed on the Company's behalf only by such Member(s), Officer(s), or such other authorized Person(s), in each case, as may be duly designated by the Board of Managers. Any Person dealing with the Company or the Board of Managers may rely upon a certificate signed by a majority of the Board of Managers as to (i) the identity of any Officer; (ii) the existence or non-existence of any facts which constitute a condition precedent to acts by the Board of Managers or in any other manner germane to the affairs of the Company; (iii) the Persons who are authorized to execute and deliver any instrument or document for or on behalf of the Company; or (iv) any act or failure to act by the Company or as to any other matter whatsoever involving the Company or any Member.

(j) Compensation. The Managers shall not receive any salary or other compensation for their services in their role as Managers; provided that the Company shall reimburse (or shall cause its Affiliates to reimburse) the Managers for expenses incurred in connection with their services as Managers of the Company (subject to the presentation of reasonable supporting receipts and documentation). Notwithstanding the foregoing, nothing contained in this Agreement shall be construed to preclude any Manager from serving the Company or its Affiliates in any other capacity and receiving compensation for such service approved by the Board of Managers.

(k) Unauthorized Actions. None of the Members, Managers or Officers shall, without the prior consent of the Board of Managers, take any action on behalf of or in the name of the Company, or enter into any commitment or obligation binding upon the Company, except for (i) actions expressly authorized by this Agreement, (ii) actions by any Manager (or Officer) within the scope of such Manager's (or Officer's) authority expressly granted hereunder, and (iii) actions authorized by the Board of Managers in the manner set forth herein.

6.5 Designation of Officers. The Board of Managers may, from time to time, designate officers of the Company ("**Officers**") and delegate to such Officers such authority and duties as the Board of Managers may deem advisable and may assign titles (including, without limitation, Chief Executive Officer, Chief Financial Officer, President, Senior Vice-President, Vice-President,

Secretary and/or Treasurer and any other titles as the Board of Managers may assign) to any such Officer, it being understood that such delegation shall not cause any Manager to cease being a Manager of the Company. Unless the Board of Managers otherwise determines, if the title assigned to an officer of the Company is one commonly used for officers of a business corporation formed under the Delaware General Corporation Law, then the assignment of such title shall constitute the

delegation to such officer of the authority and duties that are customarily associated with such office pursuant to the Delaware General Corporation Law. Any number of titles may be held by the same Officer. Any Officer to whom a delegation is made pursuant to the foregoing shall serve in the capacity delegated unless and until such delegation is revoked by the Board of Managers for any reason or no reason whatsoever, with or without cause, or such Officer resigns.

6.6 Liability; Exculpation; Indemnity.

(a) Liability. Except as otherwise required by any non-waivable provision of the Act or other applicable law: (a) no Member, Officer or any member of the Board of Managers (whether in such Person's capacity as a Member (if applicable) or as a member of the Board of Managers) shall be personally liable in any manner whatsoever for any debt, liability or other obligation of the Company, whether such debt, liability or other obligation arises in contract, tort, or otherwise (including, without limitation, with respect to any loans to the Company from the Members); and (b) no Member shall in any event have any liability whatsoever in excess of (i) the amount of its Capital Contributions, (ii) without duplication, its share of any assets and undistributed Profits of the Company, and (iii) the amount of any wrongful distribution to such Member, if, and only to the extent, such Member has actual knowledge (at the time of the distribution) that such distribution is made in violation of Section 18-607 of the Act.

(b) Exculpation. No Member, Manager or Officer shall be liable, responsible or accountable in damages or otherwise to the Company or to any other Member for (i) any act performed in good faith on behalf of the Company and in a manner reasonably believed to be within the scope of authority conferred on the Member, Manager or Officer by this Agreement or by action of the Board of Managers except for the gross negligence or willful misconduct of the Member, Manager or Officer, (ii) the Member, Manager or Officer's failure or refusal to perform any act (unless such failure to act involves the gross negligence or willful misconduct of the Member, Manager or Officer), except those expressly required by or pursuant to the terms of this Agreement or action of the Board of Managers, (iii) the Member, Manager or Officer's performance of, or failure to perform, any act on the good faith and reasonable reliance on advice of legal counsel to the Company or (iv) the negligence, dishonesty or bad faith of any accountant, custodian, attorney or other legal advisor of the Company selected, engaged or retained in good faith.

(c) Indemnification. In any threatened, pending or completed action, suit or proceeding, each Member, its Affiliates, each Manager and each Officer shall be fully protected and indemnified and held harmless by the Company against all liabilities, obligations, losses, damages, penalties, actions, judgments, suits, proceedings, costs, expenses and disbursements of any kind or nature whatsoever (including, without limitation, reasonable attorneys' fees, costs of investigation, fines, judgments and amounts paid in settlement, actually incurred by any such Member, its Affiliates or any such Manager or Officer in connection with such action, suit or proceeding) by virtue of its status as a Member, Manager or Officer with respect to any action or omission taken or suffered in good faith, other than liabilities and losses resulting from the gross negligence or willful misconduct of any such Member, its Affiliates or any such Manager or Officer. For the avoidance of doubt, any

such costs, expenses and disbursements of any kind or nature whatsoever subject to indemnification by the Company pursuant to this Section 6.4(c) shall be expenses of the Company.

6.7 Other Activities. Except as expressly provided hereunder, this Agreement shall not be construed in any manner to preclude any Member from engaging in any activity whatsoever permitted by applicable law (whether or not such activity might compete, or constitute a conflict of interest, with the Company or be deemed a "corporate opportunity" of the Company), including, without limitation, making or managing investments or receiving compensation or profit from any of the foregoing.

ARTICLE VII

ALLOCATIONS

7.1 Capital Accounts. A Capital Account shall be established and maintained for each Member on the books of the Company.

7.2 Allocations. Except as otherwise provided in this Article VII, for each Fiscal Year of the Company, Net Profits or Net Loss for that Fiscal Year shall be allocated to the Members in a manner which causes each Member's Capital Account to equal the amount that would be distributed to such Member pursuant to Section 9.3 upon a hypothetical liquidation of the Company. In determining the amounts distributable to the Members under Section 9.3 upon such a hypothetical liquidation, it shall be presumed that (i) all of the Company's assets would be sold at their Gross Asset Value, (ii) payments to any holder of a nonrecourse debt would be limited to the Gross Asset Value of the assets secured by repayment of such debt, and (iii) the proceeds of such hypothetical sale would be used to reduce all Company indebtedness and then distributed in accordance with Section 9.3(d) hereof.

7.3 Regulatory Allocations. Notwithstanding Section 7.2, the following special allocations shall be made in the following order of priority:

(a) Limitation on Allocation of Net Loss. Net Losses allocated pursuant to Section 7.2 shall not exceed the maximum amount of Net Losses that can be so allocated without causing any Member to have an, or increase an existing, Adjusted Capital Account Deficit. In the event some but not all of the Members would have Adjusted Capital Account Deficits as a consequence of an allocation under Section 7.2, the limitation set forth in the preceding sentence shall be applied on a Member-by-Member basis so as to allocate the maximum permissible Net Losses to each Member under Section 1.704-1(b)(2)(ii)(d) of the Regulations. All Net Losses in excess of the limitations set forth in the preceding sentence shall be allocated to the Members in accordance with their respective Percentage Interests.

(b) Minimum Gain Chargeback. If there is a net decrease in Company Minimum Gain during a Company taxable year, then each Member shall be allocated items of Company income and gain for such taxable year (and, if necessary, for subsequent years) in an amount equal to such Member's share of the net decrease in Company Minimum Gain, determined in accordance with Regulations Section 1.704-2(g)(2). This Section 7.3(a) is intended to comply with the minimum gain chargeback requirement of Regulations Section 1.704-2(f) and shall be interpreted consistently therewith.

(c) Member Minimum Gain Chargeback. If there is a net decrease in Member Minimum Gain attributable to a Member Nonrecourse Debt during any Company taxable year, each Member who has a share of the Member Minimum Gain attributable to such Member Nonrecourse Debt, determined in accordance with Regulations Section 1.704-2(i)(5), shall be specially allocated items of Company income and gain for such taxable year (and, if necessary, subsequent years) in an amount equal to such Member's share of the net decrease in Member Minimum Gain attributable to such Member Nonrecourse Debt, determined in a manner consistent with the provisions of Regulations Section 1.704-2(g)(2). This Section 7.3(b) is intended to comply with the partner nonrecourse debt minimum gain chargeback requirement of Regulations Section 1.704-2(i)(4) and shall be interpreted consistently therewith.

(d) Qualified Income Offset. In the event any Member unexpectedly receives any adjustments, allocations, or distributions described in Sections 1.704-l(b)(2)(ii)(d)(4), (5) or (6) of the Regulations, items of Company income and gain shall be specially allocated to such Member in an amount and manner sufficient to eliminate, to the extent required by the Regulations, the Adjusted Capital Account Deficit of the Member as quickly as possible; provided, however, that an allocation pursuant to this Section 7.2(d) shall be made only if and to the extent that the Member would have an Adjusted Capital Account Deficit after all other allocations provided for in this Article VII have been tentatively made as if this Section 7.2(d) were not in the Agreement.

(e) Gross Income Allocation. In the event any Member has a deficit Capital Account at the end of any Fiscal Year which is in excess of the sum of: (i) the amount such Member is obligated to restore pursuant to any provision of this Agreement; and (ii) the amount such Member is deemed to be obligated to restore pursuant to the penultimate sentences of Sections 1.704-2(g)(1) and 1.704-2(i)(5) of the Regulations, each such Member shall be specially allocated items of Company income and gain in the amount of such excess as quickly as possible; provided, however, that an allocation pursuant to this Section 7.2(e) shall be made only if and to the extent that such Member would have a deficit Capital Account in excess of such sum after all other allocations provided for in this Article VII have been tentatively made as if Section 7.2(d) and this Section 7.2(e) were not in the Agreement.

(f) Nonrecourse Deductions. The Nonrecourse Deductions for each taxable year of the Company shall be allocated to the Members in proportion to their Percentage Interest.

(g) Member Nonrecourse Deductions. The Member Nonrecourse Deductions shall be allocated each year to the Member that bears the economic risk of loss (within the meaning of Regulations Section 1.752-2) for the Member Nonrecourse Debt to which such Member Nonrecourse Deductions are attributable in accordance with Regulations Section 1.704-2(i)(1).

(h) Certain Additional Adjustments. To the extent that an adjustment to the adjusted tax basis of any Company asset pursuant to Code Section 734(b) or Code Section 743(b) is required, pursuant to Regulations Section 1.704-1(b)(2)(iv)(m)(2) or Regulations Section 1.704- 1(b)(2)(iv)(m)(4), to be taken into account in determining Capital Accounts as the result of a distribution to a Member in complete liquidation of its Interest, the amount of such adjustment to the Capital Accounts shall be treated as an item of gain (if the adjustment increases the basis of the asset) or loss (if the adjustment decreases such basis), and such gain or loss shall be specially allocated to the Members in accordance with their Interests in the Company in the event that Regulations Section 1.704-1(b)(2)(iv)(m)(2) applies, or to the Members to whom such distribution was made in the event that Regulations Section 1.704-1(b)(2)(iv)(m)(4) applies.

(i) Curative Allocations. The allocations set forth in Sections 7.3(a) through (g) hereof (the "Regulatory Allocations") are intended to comply with certain requirements of the Regulations. Notwithstanding the provisions of Section 7.2, the Regulatory Allocations shall be taken into account in allocating other items of income, gain, loss and deduction among the Members so that, to the extent possible, the net amount of such allocations of other items and the Regulatory Allocations to each Member shall be equal to the net amount that would have been allocated to each such Member if the Regulatory Allocations had not occurred.

7.4 Tax Allocations.

(a) "Book" Income. Except as provided in Section 7.4(b) hereof, for income tax purposes under the Code and the Regulations, each Company item of income, gain, loss, deduction and credit shall be allocated between the Members as its correlative item of "book" income, gain, loss, deduction or credit is allocated pursuant to this Article VIII.

(b) Gross Asset Value. Tax items with respect to Company assets that are contributed to the Company with a Gross Asset Value that varies from its basis in the hands of the contributing Member immediately preceding the date of contribution shall be allocated between the Members for income tax purposes pursuant to Regulations promulgated under Code Section 704(c) so as to take into account such variation. The Company shall account for such variation under the traditional method described in Treasury Regulation Section 1.704-3. If the Gross Asset Value of any Company asset is adjusted pursuant to the definition of "Gross Asset Value" herein, subsequent allocations of income, gain, loss, deduction and credit with respect to such Company asset shall take account of any variation between the adjusted basis of such Company asset for federal income tax purposes and Gross Asset Value using the remedial method. Allocations pursuant to this Section 7.4(b) are solely for purposes of federal, state and local taxes and shall not affect, or in any way be taken into account in computing, any Member's Capital Account or share of Net Profits, Net Losses and any other items or distributions pursuant to any provision of this Agreement.

7.5 Other Tax Provisions.

(a) Allocation. For any Fiscal Year or other period during which any part of an Interest in the Company is transferred between the Members or to another person, the portion of the Net Profits, Net Losses and other items of income, gain, loss, deduction and credit that are allocable with respect to such part of an Interest in the Company shall be apportioned between the transferor and the transferee under any method allowed pursuant to Section 706 of the Code and the applicable Regulations as determined by the Manager in good faith.

(b) New Allocations. In the event that the Code or any Regulations require allocations of items of income, gain, loss, deduction or credit different from those set forth in this Article VII, the Board of Managers is hereby authorized to make new allocations in reliance on the Code and such Regulations, and no such new allocation shall give rise to any claim or cause of action by any Member in good faith.

(c) Excess Nonrecourse Liabilities. For purposes of determining a Member's proportional share of the Company's "excess nonrecourse liabilities" within the meaning of Regulations Section 1.752-3(a)(3), each Member's interest in Net Profits shall be such Member's Percentage Interest.

(d) Awareness. The Members acknowledge and are aware of the income tax consequences of the allocations made by this Article VII and hereby agree to be bound by the provisions of this Article VII in reporting their shares of Net Profits, Net Losses and other items of income, gain, loss, deduction and credit for federal, state and local income tax purposes.

ARTICLE VIII

BOOKS AND REPORTS; TAX MATTERS

8.1 General Accounting Matters. The Board of Managers shall keep or cause to be kept books and records pertaining to the Company's business showing all of its assets and liabilities, receipts and disbursements, realized profits and losses, Members' Capital Accounts and all transactions entered into by the

Company. The Company's books of account shall be kept on an accrual basis or as otherwise determined by the Board of Managers and otherwise in accordance with then-applicable generally accepted accounting principles.

8.2 Information Rights.

(a) Generally. Each Member shall have the right to receive from the Company upon written request a copy of the Certificate and of this Agreement, as in effect from time to time, and such other information regarding the Company as is required by non-waivable provisions of Act, subject to Section 12.4 and any other reasonable conditions and standards established by the Board of Managers.

(b) Tax Information. Within 90 days after the end of each Fiscal Year, if practicable, each Member shall be provided with an information letter with respect to such Member's distributive share of income, gain, deduction, losses and credits, as the case may be, for income tax reporting purposes for the previous Fiscal Year, together with any other information concerning the Company necessary for the preparation of a Member's income tax returns.

(c) Termination. The provisions of this Section 8.2 shall terminate and be of no further force or effect upon the consummation of a Qualified Public Offering.

8.3 Certain Tax Matters. The taxable year of the Company shall be the same as its Fiscal Year or such other taxable year as required by Code Section 706. The Board of Managers shall cause to be prepared (or shall cause the Officers of the Company to prepare) all federal, state and local tax returns of the Company for each year for which such returns are required to be filed and shall cause such returns to be filed (or shall cause the Officers of the Company to file such returns). The Board of Managers shall determine the appropriate treatment of each item of income, gain, loss, deduction and credit of the Company and the accounting methods and conventions under the tax laws of the United States, the several states and other relevant jurisdictions as to the treatment of any such item or any other method or procedure related to the preparation of such tax returns. The Board of Managers shall determine whether to make or refrain from making and any and all other elections permitted by the tax laws of the United States, the several states and other relevant jurisdictions, in its sole discretion. Each Member shall upon request supply any information necessary to give proper effect to such election. For the avoidance of doubt, the Board of Managers may delegate such of the functions described in the foregoing to the Officers and other employees of the Company as is permissible under applicable law. Onconova shall be the "tax matters partner" for purposes of Code

Section 6231(a)(7) (the "**Tax Matters Partner**") unless and until a successor is appointed by the Board of Managers.

8.4 Tax Controversies. The Tax Matters Partner is authorized and required to represent the Company (at the Company's expense) in connection with all examinations of the Company's affairs by tax authorities, including resulting administrative and judicial proceedings, and to expend Company funds for professional services reasonably incurred in connection therewith. Each Member agrees to cooperate with the Company and to do or refrain from doing any or all things reasonably requested by the Company with respect to the conduct of such proceedings. The Tax Matters Partner shall keep all Members reasonably informed of the progress of any examinations, audits or other proceedings. The Tax Matters Partner is authorized to take any action contemplated by Sections 6221 through 6232 of the Code without the consent of any Member except to the extent that any action is required under the Code to be left to the determination of a individual Member under such Sections, provided that any election, settlement or adjustment by the Tax Matters Partner shall require the consent of the Board of Managers. Notwithstanding anything to the contrary in this Article VIII, the Tax Matters Partner shall at all times act at the lawful direction of the Board of Managers.

8.5 Code §83 Safe Harbor Election.

(a) By executing this Agreement, each Member authorizes and directs the Company to elect to have the "Safe Harbor" described in the proposed Revenue Procedure set forth in Internal Revenue Service Notice 2005-43 (the "**IRS Notice**") apply to any interest in the Company transferred to a service provider by the Company on or after the effective date of such Revenue Procedure in connection with services provided to the Company. For purposes of making such Safe Harbor election, the Tax Matters Partner is hereby designated as the "partner who has responsibility for U.S. federal income tax reporting" by the Company and, accordingly, execution of such Safe Harbor election by the Tax Matters Partner constitutes execution of a "Safe Harbor Election" in accordance with Section 3.03(1) of the IRS Notice. The Company and each Member hereby agree to comply with all requirements of the Safe Harbor described in the IRS Notice, including, without limitation, the requirement that each Member shall prepare and file all U.S. federal income tax returns reporting the income tax effects of each "Safe Harbor Membership Interest" issued by the Company in a manner consistent with the requirements of the IRS Notice. A Member's obligations to comply with the requirements of this Section 8.5 shall survive such Member's ceasing to be a Member of the Company or the termination, dissolution, liquidation and winding up of the Company, and, for purposes of this Section 8.5, the Company shall be treated as continuing in existence.

(b) Each Member authorizes the Tax Matters Partner to amend this Section 8.5 and Article VII to the extent necessary to achieve substantially the same tax treatment with respect to any interest in the Company transferred to a service provider by the Company in connection with services provided to the Company as set forth in Section 4 of the IRS Notice (e.g., to reflect changes from the rules set forth in the IRS Notice in subsequent Internal Revenue Service guidance).

ARTICLE IX

DISSOLUTION

9.1 Dissolution. The Company may be dissolved, liquidated, and terminated and have its affairs wound up only pursuant to the provisions of this Article IX. The Members do hereby

irrevocably waive any and all other rights they may have to cause a dissolution of the Company or a sale or partition of any or all of the Company assets. Notwithstanding the Act, only the following events shall cause the Company to be dissolved, liquidated, and terminated:

(a) the Bankruptcy of the Company;

(b) The approval by the Members to dissolve, liquidate or terminate the Company;

(c) Program Failure of the Programs and the Replacement Programs, if any, and the decision by Onconova and/or the Board of Managers for Onconova not to contribute Replacement Programs to the Company;

(d) the entry of a decree of judicial dissolution under Section 18-802 of the Act; or

(e) Distribution of all the assets to the Members as per the terms of this Agreement.

Any dissolution of the Company other than as provided in this Section 9.1 shall be a dissolution in contravention of this Agreement and shall be of no force or effect.

9.2 Winding-up. When the Company is voluntarily dissolved, the business and property of the Company shall be wound up and liquidated by a liquidating trustee as may be approved by the Board of Managers, and retained by an executed agreement by and between such liquidating trustee and the Board of Managers (such liquidating trustee being hereinafter referred to as the "Liquidator"). Such agreement that retains such Liquidator shall require the Liquidator to use her best efforts to reduce to Cash and Cash Equivalent items such assets of the Company as the Liquidator shall deem it advisable to sell, subject to obtaining fair value for such assets and any tax or other legal considerations. Notwithstanding the foregoing, in the event that the Board of Managers or the Liquidator determines that an immediate sale of all or any portion of the Company assets would cause undue loss to the Members (or any subset thereof), the Board of Managers or the Liquidator, in order to avoid such loss to the extent not then prohibited by the Act, may either defer liquidation of and withhold from distribution for a reasonable time any Company assets except those necessary to satisfy the Company's debts and obligations, or distribute the Company assets to the Members in-kind.

9.3 Final Distribution. Within a reasonable time after the effective date of dissolution of the Company, the Company assets shall be distributed in the following manner and order:

(a) to the payment of the expenses of the winding-up, liquidation and dissolution of the Company;

(b) to pay all creditors of the Company (including amounts owed under any loans made by Members) either by the payment thereof or the making of reasonable provision therefor;

(c) to establish Reserves, in amounts established by the Board of Managers or such Liquidator, to meet other liabilities of the Company; and

(d) to the Members in accordance with the distribution provisions of Section 4.2.

9.4 Effect of Dissolution. The dissolution of the Company shall be effective on the day on which the event occurs giving rise to the dissolution, but the Company shall not terminate until it has been wound up and its assets have been distributed as provided in this Article IX and its Certificate has been cancelled by the filing of a certificate of cancellation with the office of the Delaware Secretary of State. Notwithstanding the dissolution of the Company, prior to the termination of the Company, the business of the Company and the affairs of the Members, as such, shall continue to be governed by this Agreement.

9.5 No Capital Contribution Upon Dissolution. Each Member shall look solely to the assets of the Company for all distributions with respect to its Capital Contributions, its Capital Account and its share of Net Profits and Losses, and shall have no recourse therefore (upon dissolution or otherwise) against any other Member. Accordingly, if any Member has a deficit balance in its Capital Account (after giving effect to all contributions, distributions and allocations for all taxable years, including the year during which the liquidation occurs), then such Member shall have no obligation to make any Capital Contribution with respect to such deficit, and such deficit shall not be considered a debt owed to the Company or to any other person for any purpose whatsoever.

ARTICLE X

TRANSFER OF UNITS; BUY-BACK OF PROGRAMS

10.1 Restrictions on Transfer of Units.

(a) No Member may in any manner, directly or indirectly, assign, sell, exchange, transfer, pledge, hypothecate or otherwise dispose of (any such assignment, sale exchange, transfer, pledge, hypothecation or other disposition of an Interest in the Company, whether by merger, operation of law or otherwise, being herein collectively called a "**Transfer**") any interest in his, her or its Units or other Equity Securities of the Company, if any, to any Person except in accordance with this Article X.

(b) Transfers. Subject to Section 10.1(e) and Section 10.8, no Transfer shall be permitted except for (i) Transfers to Permitted Transferees pursuant to and in accordance with Section 10.1(c), (ii) Transfers pursuant to and in accordance with Section 10.2, Section 10.3, Section 10.4, Section 10.5, Section 10.6, and Section 10.7 or (iii) any Transfer for which the transferring Member obtains prior written consent of the other Member.

(c) For purposes of this Agreement, "**Permitted Transferee**" shall mean an Affiliate or a Subsidiary of a Member. Notwithstanding the foregoing, in order to qualify as a Permitted Transferee, (x) the restrictions contained in this Section 10.1 and otherwise in this Agreement that were applicable to the transferor shall continue to be applicable to the Units after any such Transfer and (y) prior to any such Transfer hereunder, the Permitted Transferee of such Units shall have executed and delivered to the Company a joinder agreement agreeing to (i) be bound by the provisions of this Agreement affecting the Units so transferred, (ii) join this Agreement as a Member hereunder and (iii) Transfer the Units received by such Permitted Transferee back to the Member from whom it received the Units to the extent such transferee is no longer a Permitted Transferee of the Transferring Member.

(d) Prohibited Consequences. Notwithstanding any other provision herein, no Member shall be entitled to Transfer any of its Interests at any time if such Transfer would:

(i) violate the Securities Act or any state (or other jurisdiction) securities or "Blue Sky" laws applicable to the Company or the Interests or require the registration of the Interests pursuant to any applicable Securities Laws;

(ii) cause the Company to become subject to the registration requirements of the Securities Laws;

(iii) be a "prohibited transaction" under ERISA or the Code or cause all or any portion of the assets of the Company to constitute "plan assets" under ERISA or Section 4975 of the Code;

(iv) cause the Company to become a "publicly traded partnership", as such term is defined in Section 7704 of the Code;

(v) cause the Company to fail to meet the "private placement" safe harbor or any other safe harbor from treatment as a "publicly-traded partnership" selected by the Board of Managers, as described in Treasury Regulation 1.7704-1(h);

(vi) involve Interests being traded on an "established securities market" or a "secondary market or the substantial equivalent thereof" as those terms are defined in Treasury Regulations Section 1.7704-1 (in addition, such Transfers shall not be "recognized" (as that term is defined in Treasury Regulations Section 1.7704-1(d)(2)) by the Company);

(vii) result in a violation of applicable laws, regulations or administrative orders;

(viii) be made to any Person who lacks the legal right, power or capacity to own Interests; or

(ix) the Company does not receive written instruments (including, without limitation, an investor questionnaire, copies of any instruments of Transfer, written opinions of counsel and such transferee's consent to be bound by this Agreement) that are in a form satisfactory to the Board of Managers (as determined in the Board of Managers' sole discretion).

(e) Any Transfer or attempted Transfer of any Units or other Equity Securities of the Company, if any, in violation of any provision of this Agreement shall be void *ab initio* and ineffectual, and the Company shall not record such Transfer on its books or treat any purported transferee of such Units as a Member or the owner of such Units for any purpose. Without limiting the foregoing, in the event of any Transfer in contravention of this Agreement, the purported transferee shall have no right to any Profits, Losses or distributions of the Company or any other rights of a Member. If any Member Transfers all or any portion of its Units (or beneficial interest therein) to a Permitted Transferee and such transferee ceases to be a Permitted Transferee of the transferor at any time thereafter, then such transferor and such transferee shall be in material breach of this Agreement with respect to all Units held by either of them in the Company.

(f) Substitute Members. Any Person who acquires Units from a Member shall become a Member with the same Interest as those of the class or series of Units being transferred by

the Transferring Member only if (i) the admission of such Person as a Member is consented to by the Board of Managers, and (ii) such Person has executed and delivered the written instruments referred to in Section 10.1(d)(ix) hereof.

10.2 Right of First Refusal.

(a) Either Member may transfer all the Units held by such Member subject to the provisions of Section 10.2 and Section 10.3 hereof.

(b) Subject to Section 10.1, if a Member (the "**Selling Member**") intends to accept one or more bona fide offers (a "**Bona Fide Offer**") from any Person (the "**Bona Fide Offeror**") to Transfer all the Units held by such Member (other than a Transfer to a Permitted Transferee) in one or more related transactions, then the Selling Member shall first offer to Transfer such Units in accordance with this Section 10.2 by delivering written notice (the "**ROFR Sale Notice**") to the non-selling Members (the "**ROFR Recipients**") and the Company.

(c) The ROFR Sale Notice shall include a copy of any written agreement relating to the proposed sale and shall set forth (i) the number of Units proposed to be transferred by the Selling Member (the "**ROFR Units**"), (ii) the proposed amount and form of consideration to be paid for such Units and the terms and conditions of payment, (iii) all other material terms and conditions of the Bona Fide Offer and (iv) the name and address of the proposed transferee. If part or all of the consideration to be paid for the ROFR Units as stated in the ROFR Sale Notice is other than Cash, the price stated in such ROFR Sale Notice shall be deemed to be the sum of the Cash consideration, if any, specified in such ROFR Sale Notice plus the Fair Market Value of the non-Cash consideration, as determined by the Board of Managers in good faith.

(i) The ROFR Recipients shall have the right to purchase the ROFR Units in proportion to their Percentage Interest of the Units upon the terms set forth in the ROFR Sale Notice. If a ROFR Recipient desires to purchase ROFR Units, the ROFR Recipients may exercise such right by delivering to the Company and the Selling Member within ** days following its receipt of the ROFR Sale Notice (the "**ROFR Election Period**"), a written election (a "**ROFR Election**") to purchase such number of ROFR Units as it wishes to acquire (**) upon the terms set forth in the ROFR Sale Notice. In the event that a ROFR recipient does not exercise its right to purchase its allocable share of ROFR Units, the other ROFR Recipients may purchase such Person's allocable share of ROFR Units.

(ii) In the event the ROFR Recipients fail to fully exercise their respective rights pursuant to the foregoing such that the ROFR Recipients have not, collectively, offered to purchase ** of the ROFR Units, the Selling Member may, within a period of ** business days from the date of the ROFR Sale Notice, complete the sale of all of the ROFR Units to the Bona Fide Offeror upon the terms set forth in the ROFR Sale Notice, subject to Sections 10.1(d), (e) and (f), and subject to Bona Fide Offeror agreeing in writing to abide by the terms and conditions of this Agreement.

(iii) If the Selling Member does not complete the sale of such ROFR Units within the aforementioned ** day period, the provisions of this Section 10.2 shall again apply to the unsold ROFR Units, and no sale of such ROFR Units by the Selling Member shall be made otherwise than in accordance with the terms of this Agreement. If there is any change in the terms of the Bona Fide Offer disclosed in the ROFR Sale Notice, the provisions of this Section 10.2 shall

retrigger and this Section 10.2 must be again complied with in its entirety with respect to all such ROFR Units, and no sale of ROFR Units by the Selling Member shall be made otherwise than in accordance with the terms of this Agreement.

10.3 Tag-Along Rights.

(a) If a Member (the "**Tag Transferring Member**") intends to Transfer all the Units held by such Member (other than a Transfer to a Permitted Transferee) in a single or series of related transactions, then the Tag Transferring Member shall provide the other Members (such recipients of rights, the "**Tag-Along Recipients**") the opportunity to participate proportionately by selling the pro rata percentage of the Units held by such Tag-Along Recipient(s) on the same terms as the Tag Transferring Member in such sale in accordance with this Section 10.3.

(b) The Tag Transferring Member shall provide the Tag-Along Recipient(s) and the Company with written notice (the "**Tag-Along Sale Notice**") not less than thirty (30) days prior to the proposed date of a sale pursuant to Section 10.3(a) (the "**Tag-Along Sale Date**"). Each Tag-Along Sale Notice shall be accompanied by a copy of any written agreement relating to the proposed sale and shall include (i) the number of Units proposed to be transferred by the Tag Transferring Member, (ii) the proposed amount and form of consideration to be paid for such Units and the terms and conditions of payment, (iii) all other material terms and conditions of the offer, (iv) the aggregate number of Units held of record by the Tag Transferring Member as of the close of business on the day immediately prior to the date of the Tag-Along Sale Notice (the "**Tag-Along Notice Date**"); (v) the aggregate number of Units that the Tag-Along Recipient may Transfer pursuant to its rights under this Section 10.3; (vi) confirmation that the proposed transferee has been informed of the "Tag-Along Rights" provided for herein and has agreed to purchase Units from any Member in accordance with the terms hereof; and (vii) the Tag-Along Sale Date.

(c) In order to participate in a sale pursuant to this Section 10.3, the Tag-Along Recipients shall provide written notice (the "**Tag-Along Notice**") to the Tag Transferring Member within fifteen (15) days of the date of the Tag-Along Sale Notice. The Tag-Along Notice shall set forth the number of Units that the Tag-Along Recipients elect to include in the sale, which may be less than, but shall not exceed the number specified in the Tag-Along Sale Notice. The Tag-Along Notice given by a Tag-Along Recipient shall constitute such Tag-Along Recipient's binding agreement to sell the Units specified in the Tag-Along Notice on the terms and conditions applicable to the sale; provided, however, that in the event there is any material change in the terms and conditions of such sale applicable to such Tag-Along Recipients (including, but not limited to, any decrease in the purchase price that occurs other than pursuant to an adjustment mechanism set forth in the agreement relating to the sale) after such Tag-Along Recipient gives its Tag-Along Notice, then, notwithstanding anything herein to the contrary, such Tag-Along Recipient shall have the right to withdraw from participation in the sale with respect to all of its Units affected thereby. If the proposed transferee does not consummate the purchase of all of the Units included in the sale by such Tag-Along Recipient on the same terms and conditions applicable to the Tag Transferring Member, then the Tag Transferring Member shall not consummate the sale of any of its Units to such transferee, unless the Units of the Tag Transferring Member and such Tag-Along Recipient are reduced or limited pro rata in proportion to the respective amount of Units actually sold in any such sale and all other terms and conditions of the sale are the same for the Tag Transferring Member and such Tag-Along Recipient.

(d) If a Tag-Along Notice is not received by the Tag Transferring Member prior to the lapse of the fifteen (15) day period specified above, the Tag Transferring Member shall have the

right to consummate the sale without the participation of the Tag-Along Recipient(s), on the terms and conditions as stated in the Tag-Along Sale Notice. Each Tag-Along Recipient that did not elect to participate in the tag-along sale pursuant to this Section 10.3 shall be deemed to have waived its rights under this Section 10.3 with respect to such sale.

(e) In case of Transfer of Units to a third party, the third party shall be obligated to be bound by all the terms and conditions of this Agreement and obligations of the transferring Member under this Agreement.

10.4 Onconova Purchase Right upon GVK BIO Exit.

(a) If GVK BIO intends to terminate its participation in the Programs for any reason other than a Change in Control, then GVK BIO shall offer to Transfer 100% of its Interest (the "**GVK BIO Interest**") in accordance with this Section 10.4 by delivering a written notice (the "**GVK BIO Sale Notice**") to Onconova.

(b) If Onconova desires to purchase the GVK BIO Interest, Onconova may exercise such right by delivering to GVK BIO, within ** days following its receipt of the GVK BIO Sale Notice, a written election to purchase the GVK BIO Interest. Onconova's right to purchase the GVK BIO Interest under this Section 10.4 shall be for an amount equal to GVK BIO's Percentage Interest of the Fair Market Value of the Company ("**GVK BIO Interest Transfer Price**"). Upon election to purchase the GVK BIO Interest, Onconova shall pay the GVK BIO Interest Transfer Price.

(c) Concurrent with receiving the GVK BIO Interest Transfer Price from Onconova, GVK Bio agrees to provide (i) an assignment to Onconova of GVK BIO Interest in a form acceptable to Onconova, executed by GVK BIO and (ii) such other documents as Onconova deems reasonably necessary to effectuate the Transfer of the GVK BIO Interest. Prior and subsequent to the Transfer of the GVK BIO Interest, GVK Bio agrees to take any other action reasonably requested by Onconova or the Company to facilitate the Company's advancement of the Programs.

10.5 GVK BIO Purchase Right upon Onconova Exit.

(a) If Onconova intends to terminate its participation in the Programs for any reason other than a Change in Control, then Onconova shall Transfer 100% of its Interest (the "**Onconova Interest**") in accordance with this Section 10.5 by delivering written notice (the "**Onconova Sale Notice**") to GVK BIO.

(b) If GVK BIO desires to purchase the Onconova Interest, GVK BIO may exercise such right by delivering to Onconova, within ** days following its receipt of the Onconova Sale Notice, a written election to purchase the Onconova Interest. GVK BIO's right to purchase the Onconova Interest under this Section 10.5 shall be for an amount equal to Onconova's Percentage Interest of the Fair Market Value of the Company ("**Onconova Interest Transfer Price**"). Upon election to purchase the Onconova Interest, Onconova shall pay the Onconova Interest Transfer Price.

(c) Concurrent with receiving the Onconova Interest Transfer Price from GVK BIO, Onconova agrees to provide (i) an assignment to GVK BIO of the Onconova Interest in a form acceptable to GVK BIO, executed by Onconova and (ii) such other documents as GVK BIO deems reasonably necessary to effectuate the Transfer of the Onconova Interest.

10.6 Onconova Purchase Right Upon Change in Control.

(a) At least ** business days prior to the consummation of a Change in Control of GVK BIO, the prospective purchaser of GVK BIO (the "**GVK BIO Successor**") shall deliver a written notice (the "**GVK BIO Election Notice**") to Onconova stating whether it elects to continue to advance the Programs following the completion of the Change in Control of GVK BIO. If the GVK BIO Successor elects not to continue to advance the Programs, GVK BIO will Transfer the GVK BIO's Units in the Company to Onconova without consideration prior to the closing of the Change in Control of GVK BIO.

(b) In connection with the Transfer set forth in Section 10.6(a), GVK BIO agrees to provide (i) an assignment to Onconova of GVK BIO Interest in a form acceptable to Onconova, executed by GVK BIO and (ii) such other documents as Onconova deems reasonably necessary to effectuate the Transfer

of the GVK BIO Interest.

10.7 GVK BIO Purchase Right Upon Change in Control.

(a) At least ** business days prior to the consummation of a Change in Control of Onconova, the prospective purchaser of Onconova (the "**Onconova Successor**") shall deliver a written notice (the "**Onconova Election Notice**") to Onconova stating whether it elects to continue to advance the Programs following the completion of the Change in Control of Onconova. If the Onconova Successor elects not to continue to advance the Programs, Onconova will Transfer the Onconova Interest to GVK BIO without consideration prior to the closing of the Change in Control of Onconova.

(b) In connection with the Transfer set forth in Section 10.7(a), Onconova agrees to provide (i) an assignment to GVK BIO of the Onconova Interest in a form acceptable to GVK BIO, executed by Onconova and (ii) such other documents as GVK BIO deems reasonably necessary to effectuate the Transfer of the Onconova Interest.

(c) In case of Change in Control of Onconova, GVK BIO shall have an option to transfer its entire Interest to a prospective buyer based on Fair Market Value.

10.8 Termination. The rights and obligations of the applicable Members set forth in Section 10.2, shall terminate upon the earliest to occur of any one of the following events:

(a) A Qualified Public Offering; or

(b) Any Sale of the Company, provided that this Section 10.8(b) shall not apply to a merger effected exclusively for the purpose of changing the domicile of the Company or to a Change in Form.

ARTICLE XI

CHANGE IN FORM

11.1 Change in Circumstances. The Members acknowledge and agree that there may be one or more circumstances, including but not limited to a desire to undertake a Qualified Public Offering, that would cause it to be in the best interests of the Company that the business of the Company be conducted in, or that the ownership structure be modified to, a form different from that

of the current form of the Company (a "**Change in Form**"). Accordingly, the Members agree that upon such a determination and approval by the Board of Managers, the Board of Managers shall take any and all actions necessary or desirable so that the Company may continue its business and undergo one or more Changes in Form. The Board of Managers shall effect the Change in Form in such manner as determined by the Board of Managers (as provided for in this Agreement) to fairly represent the relative economic and other rights of the Members as members of the Company at the time and shall strive to minimize taxes and costs to be incurred by the Company, the Members or the resulting entity (subject to the requirements of Section 11.3). The Change in Form may take the form of, without limitation, a merger of the Company into another entity, a contribution of all of the interests of the Members in the Company to another entity, and the distribution of its ownership interests to the Members, a transfer of the assets, subject to the liabilities, of the Company to another entity and the distribution of its ownership interests to the Members, a conversion authorized by Section 18-216 of the Act, or such other form as the Board of Managers shall reasonably determine to be appropriate. Any Change in Form pursuant to this Section 11.1 may be completed by the Board of Managers with no further action by any Member acting in the capacity of a Member and no Member shall have any veto or other right to vote on a Change in Form. Each Member hereby agrees to take any and all action that may be necessary or desirable in connection with a Change in Form authorized by the Board of Managers pursuant to this Section 11.1 including any such action necessary or desirable to achieve the Federal or other tax effect of the Change in Form desired by the Board of Managers at the time of the Change in Form. The Members acknowledge that a Change in Form pursuant to this Section 11.1 may be effected by the Company one or more times during the existence of the Company, including any successor Company due to a previous Change in Form.

11.2 Specific Types of Change in Form. The Change in Form may include but not necessarily be limited to one or more of the following: (a) a change to a corporation, statutory trust or association, other trust, a general or limited partnership, another limited liability company or other entity or association organized, formed or created under the laws of Delaware or any other jurisdiction; (b) a change to a limited liability company organized, formed or created under the laws of a jurisdiction other than Delaware; or (c) filing an election with the Internal Revenue Service to be classified as a corporation.

11.3 Ownership Interests in the Resulting Entity. The shares, membership interests or other ownership interests of the entity or association resulting from the Change in Form shall be divided into classes and series and shall be allocated to and among the Members in such manner as shall result in the Members having substantially the same relative rights with respect to voting, rights, assets, and profits and losses of the resulting entity or association as the Members had in voting, rights, assets, and Profits and Losses of the Company immediately prior to the Change in Form, subject, however to any change resulting from any difference in taxation of the resulting entity or association that may occur as a result of the Change in Form. In addition, all other material rights of the Members specified in this Agreement shall be substantially the same in the resulting entity or association, with such reasonable adjustments as are required to accommodate the change in form of the resulting entity or association. The Board of Managers shall establish the terms of the organizational documents of any resulting entity or association, in its sole discretion, but consistent with the terms of this Section 11.3.

ARTICLE XII

MISCELLANEOUS

12.1 Equitable Relief. The Members hereby confirm that damages at law may be an inadequate remedy for a breach or threatened breach of this Agreement and agree that, in the event of a breach or threatened breach of any provision hereof, the respective rights and obligations hereunder shall be enforceable by specific performance, injunction or other equitable remedy, but, nothing herein contained is intended to, nor shall it, limit or affect any right or rights at law or by statute or otherwise of a Member aggrieved as against the other for a breach or threatened breach of any provision hereof, it being the intention by this Section 12.1 to make clear the agreement of the Members that the respective rights and obligations of the Members hereunder shall be enforceable in equity as well as at law or otherwise and that the mention herein of any particular remedy shall not preclude a Member from any other remedy such Member might have, either in law or in equity.

12.2 Governing Law. This Agreement, including its existence, validity, construction, and operating effect, and the rights of each of the parties hereto, shall be governed by and construed in accordance with the laws of the State of Delaware without regard to otherwise governing principles of conflicts of law.

12.3 Access; Confidentiality.

(a) All books, records, financial statements, tax returns, budgets, business plans and projections of the Company (and/or its Subsidiaries), all other information concerning the business, affairs and properties of the Company (and/or its Subsidiaries) and all of the terms and provisions of this Agreement shall be held in confidence by each Member and their respective officers, directors or Affiliates, subject to any obligation to comply with (i) any applicable law, (ii) any applicable rule or regulation of any legal authority or securities exchange and (iii) any subpoena or other legal process to make information available to the Persons entitled thereto; provided that an affected Member shall use its best efforts to provide prior written notice to the Board of Managers prior to disclosing any information pursuant to subsections (i) through (iii) above and shall cooperate with the Board of Managers, if practicable, to minimize the extent of disclosure. For the avoidance of doubt, a Member shall be entitled to disclose information relating to the Company (and/or its Subsidiaries) to such Member's auditors, legal counsel and other professional advisors who are subject to an obligation of confidentiality. Such confidentiality shall be maintained until such time, if any, as any such confidential information either is, or becomes, published or a matter of public knowledge (other than as a result of a breach of this Section 12.3 by such Person or its Affiliate).

(b) Each of the Board of Managers and the Company shall be entitled to enforce the obligations of each Member under this Section 12.3 to maintain the confidentiality of the information described herein. The remedies provided for in this Section 12.3 are in addition to and not in limitation of any other right or remedy of the Board of Managers and the Company provided by law or equity, this Agreement or any other agreement entered into by or among one or more of the Members and/or the Company. Each Member expressly acknowledges that the remedy at law for damages resulting from a breach of this Section 12.3 may be inadequate and that the Board of Managers or the Company shall be entitled to institute an action for specific performance of a Member's obligations hereunder. The provisions of this Section 12.3 shall survive the termination of the Company.

12.4 Notices. Unless otherwise provided in this Agreement, all notices provided for in this Agreement shall be delivered, sent via an overnight courier service, telecopied or mailed by registered or certified mail, as follows:

(a) If given to the Company or an Officer, at the address specified in Section 2.4 of this Agreement;

(b) If given to a Manager, at such Manager's mailing address as provided to the Company; or

(c) If given to a Member, at the address set forth on the Schedule of Members (as amended from time to time), or at such other address as such Member may hereafter designate by written notice to the Company.

All such notices shall be effective: (i) if given by mail, on the fourth day after deposit in the mails (certified or registered return receipt requested), (ii) if sent by nationally recognized overnight courier service, on the next business day after sent for overnight delivery, or (iii) if given by any other means, when delivered to and receipted for, or receipt electronically confirmed, by or on behalf of such Manager, Member or the Company.

12.5 Lock-Up Agreement. In connection with any underwritten public offering of the Company's securities, each of the Members agrees that such Member shall execute a customary "lock-up" or "holdback" agreement in the form requested by the underwriter(s) for such offering whereby such Member shall agree not to sell, transfer, offer to sell or otherwise dispose of any securities other than pursuant to such offering for such period of time following the consummation of such offering as is required by such underwriter(s) pursuant to such "lock-up" or "holdback" agreement.

12.6 Counterparts. This Agreement may be executed in any number of counterparts with the same effect as if all parties hereto had signed the same document. All counterparts shall be construed together and shall constitute one instrument. Counterparts of this Agreement (or applicable signature pages hereof) that are manually signed and delivered by facsimile transmission or email shall be deemed to constitute signed original counterparts hereof and shall bind the parties signing and delivering in such manner.

12.7 Entire Agreement. This Agreement embodies the entire agreement and understanding of the parties hereto in respect of the subject matter contained herein. This Agreement supersedes all prior agreements and understandings between the parties with respect to such subject matter hereof.

12.8 Amendments. Any amendment to this Agreement shall be effective only if such amendment is evidenced by a written instrument duly executed and delivered by a Majority of the Board of Managers; provided, however, that no provision of this Agreement may be so amended, waived or terminated (x) in a manner that adversely affects the Units held by a Member on a per Unit basis in a manner differently than other holders of the same class of Units without such Member's consent or (y) in a manner that adversely affects the rights held by a Member under this Agreement in a manner differently than other holders of the same class of Units without such Member's consent. Notwithstanding the foregoing, the Board of Managers may amend this Agreement without the consent of any Member if such amendment is (a) to take such actions as may be necessary (if any) to

ensure that the Company will be treated as a partnership for federal income tax purposes and (b) to take such actions as may be necessary (if any) to ensure that the Company will not be subject to regulation under ERISA or the Securities Laws. The Board of Managers shall provide prompt written notice to the Members of any such amendments adopted without the consent of the Members.

12.9 Interpretive Provisions. To the fullest extent permitted by law, the parties hereto intend that any ambiguities shall be resolved without reference to which party may have drafted this Agreement. Unless the context otherwise requires, the following shall apply:

(a) An accounting term not otherwise defined has the meaning assigned to it in accordance with then-applicable generally accepted accounting principles.

(b) Provisions apply to successive events and transactions.

(c) The meanings of defined terms are equally applicable to the singular and plural forms of the defined terms.

(d) The words "hereof," "herein," "hereunder" and similar words refer to this Agreement as a whole and not to any particular provision of this Agreement; and subsection, Section, Exhibit, Schedule and Annex references are to this Agreement unless otherwise specified.

(e) The words "include" and "including" will be deemed to be followed by the phrase "without limitation" and the word "or" shall not be exclusive.

(f) The captions and headings of this Agreement are for convenience of reference only and shall not affect the interpretation of this Agreement.

(g) Whenever the context requires, any pronouns used herein shall include the corresponding masculine, feminine or neuter forms.

(h) All references to any Member shall mean and include such Member and any Person duly admitted as a member in the Company in substitution therefor in accordance with this Agreement.

12.10 Appointment of the Board of Managers as Attorney-in-Fact.

(a) Each Member irrevocably constitutes and appoints the Board of Managers as its true and lawful attorney-in-fact with full power and authority in its name, place and stead to execute, acknowledge, deliver, swear to, file and record at the appropriate public offices such documents as may be necessary or appropriate to carry out the following:

(i) All certificates and other instruments (including counterparts of this Agreement), and all amendments thereto, which the Board of Managers deems appropriate to form, qualify, continue or otherwise operate the Company as a limited liability company (or other entity in which the Members will have limited liability comparable to that provided in the Act), in the jurisdictions in which the Company may conduct business or in which such formation, qualification or continuation is, in the opinion of the Board of Managers, necessary or desirable to protect the limited liability of the Members.

(ii) All amendments to this Agreement adopted in accordance with the terms hereof, and all instruments which the Board of Managers deems appropriate to reflect a change or modification of the Company in accordance with the terms of this Agreement.

(iii) All conveyances of Company assets, and other instruments which the Board of Managers reasonably deems necessary in order to complete a dissolution and termination of the Company pursuant to this Agreement but only if permitted in accordance with the terms of this Agreement.

(iv) An Approved Company Sale.

(b) The appointment by all Members of the Board of Managers as attorney-in-fact shall be deemed to be a power coupled with an interest, in recognition of the fact that each Member under this Agreement will be relying upon the power of the Board of Managers to act as contemplated by this Agreement in any filing and other action by it on behalf of the Company, shall survive the incapacity of any Person hereby giving such power, and the Transfer or assignment of all or any portion of the Interest of such Person in the Company, and shall not be affected by the subsequent incapacity of any Manager; provided, however, that in the event of the assignment by a Member of all of its Interest in the Company, the foregoing power of attorney of an assignor Member shall survive such assignment only until such time as the Assignee shall have been admitted to the Company as a substitute Member and all required documents and instruments shall have been duly executed, filed and recorded to effect such substitution.

12.11 Appraisal. No Member shall have or be entitled to any appraisal rights or similar minority interest holder rights in connection with any Sale of the Company, reorganization, Change in Form or any similar transaction involving the Company or the Interests.

12.12 Third Party Beneficiaries. Except as provided in Section 6.6, this Agreement does not create any rights, claims or benefits inuring to any Person that is not a party hereto, and it does not create or establish any third party beneficiary hereto.

12.13 Severability. In the event that any provision of this Agreement as applied to any party or to any circumstance shall be adjudged by a court to be void, unenforceable or inoperative as a matter of law, then the same shall in no way affect any other provision in this Agreement, the application of such provision in any other circumstance or with respect to any other party, or the validity or enforceability of the Agreement as a whole.

12.14 Binding Effect. Except as otherwise provided in this Agreement to the contrary, this Agreement shall be binding upon and inure to the benefit of the Members, their distributees, heirs, legal representatives, executors, administrators, successors and permitted assigns.

12.15 Further Assurances. In connection with this Agreement and the transactions contemplated hereby, each Member shall execute and deliver any additional documents and instruments and perform any additional acts as may be necessary or appropriate and reasonably requested by the other Members or by the Company to effectuate and perform the provisions of this Agreement and those transactions.

12.16 Waiver; Remedies. Except where a time period is otherwise specified, no delay on the part of any party in the exercise of any right, power, privilege or remedy hereunder shall operate

as a waiver thereof, nor shall any exercise or partial exercise of any such right, power, privilege or remedy preclude any further exercise thereof or the exercise of any right, power, privilege or remedy. The rights and remedies provided by this Agreement are cumulative and the use of any one right or remedy by any party shall not preclude or waive its right to use any or all other remedies. Such rights and remedies are given in addition to any other rights the parties may have by law, statute, ordinance or otherwise.

12.17 Dispute Resolution.

(a) Subject to Section 12.17(b) and except for ancillary measures in aid of arbitration and for proceedings to obtain provisional or equitable remedies and interim relief, including, without limitation, injunctive relief, any controversy, dispute or claim arising out of or in connection with or relating to this Agreement, or the breach, termination or validity thereof or any transaction contemplated hereby (any such controversy, dispute or claim being referred to as a "Dispute") shall be finally settled by arbitration conducted expeditiously in accordance with the applicable Arbitration Rules then in force (the "**ICC Rules**") of the International Chamber of Commerce or any successor entity (the "**ICC**"). There shall be one arbitrator agreed to by the parties that shall be appointed to the arbitration

within thirty (30) calendar days of receipt of the demand for arbitration by initiating party in any such proceeding. If the parties cannot agree on an arbitrator, the International Chamber of Commerce shall make such appointment under UK laws. An arbitration pursuant to this Section 12.17(a) shall take place in London, England and the arbitration proceedings shall be conducted in English. A final award shall be rendered as soon as reasonably possible and, in any event, within 90 calendar days of the filing with ICC any demand for arbitration. The parties agree that the arbitrator shall have the right and power to shorten the length of any notice periods or other time periods provided in the ICC Rules in order to ensure that the arbitration process is completed within the time frames provided herein. The arbitration decision or award shall be in writing. Judgment on the decision or award rendered by the arbitrator may be entered and specifically enforced in any court having jurisdiction thereof. All arbitrations commenced pursuant to this Agreement or any other related agreement or document shall be consolidated and heard by the initially appointed arbitrator. Each party to the arbitration shall be responsible for its own share of the arbitration fees in accordance with the ICC Rules. In the event a party fails to proceed to arbitration, unsuccessfully challenges the arbitrator's award, or fails to comply with the arbitrator's award, the other party shall be entitled to all costs of suit, including reasonable attorney's fees.

(b) Prior to making any demand for arbitration, Onconova and GVK BIO agree that:

(i) the Board of Managers shall meet and make a good faith effort to resolve any Dispute. The Board of Managers shall have the opportunity to engage third parties to assist with the resolution of such Dispute.

(ii) If the Board of Managers fail to resolve any such Dispute at the conclusion of a meeting held for such purpose, there shall be a written appeal to each Member's Chairman asking such Persons to resolve the Dispute.

(iii) If no resolution can be reached within thirty days of delivery of such written appeals, the Dispute shall be referred for binding arbitration in accordance with Section 12.17(a).

12.18 Aggregation. All Interests held by Affiliates of a Person shall be aggregated together for the purpose of determining the availability of any rights under this Agreement to such Person.

[Rest of page left blank intentionally.]

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first above written.

Members:

Onconova Therapeutics, Inc.

y: /s/ Ramesh Kumar
Name: Ramesh Kumar, Ph.D.
President & CEO
Date: December 12, 2012

[GVK Biosciences]

By: /s/ Manni Kantipudi
Name: Manni Kantipudi
CEO
Date: December 12, 2012

[SIGNATURE PAGE TO LIMITED LIABILITY COMPANY AGREEMENT OF JOINT VENTURE, LLC]

EXHIBIT A
Schedule of Members

Name and Address	Units	Capital Contribution
Onconova Therapeutics® Inc.	90	Contributed Assets
GVK Biosciences	10	$500,000

EXHIBIT B

Programs Schedule, GVK Future Capital Contributions, Diligence Deadlines and Changes to Percentage Interest

Programs Schedule:

Programs shall be conducted as per the following phases and diligence deadlines:

PHASE	COMPLETION DELIVERABLES	BOARD/ONCONOVA DILIGENCE DEADLINE
Phase 1	IND Candidate for Program 1	Board Diligence Deadline: ** Onconova Diligence Deadline: **
Phase 2	IND Studies Completed for Program 1	Board Diligence Deadline: ** Onconova Diligence Deadline: **
Phase 3	IND Approved for Program 1	Board Diligence Deadline: **
	Backup Candidate for Program 1 if IND is not Approved for Program 1	Onconova Diligence Deadline: **
	IND Candidate for Program 2	Board Diligence Deadline: ** Onconova Diligence Deadline: **
Phase 4	IND Studies Completed for Program 2	Board Diligence Deadline: ** Onconova Diligence Deadline: **

Trigger Events and Changes to Percentage Interest Trigger Event	GVK BIO Percentage Interest	Onconova Percentage Interest
Initial Capital Contributions set forth on Exhibit A.	10%	90%
Completion of Phase 1 or GVK BIO's Capital Contribution of $500,000 prior to completion of Phase 1	**	**
Completion of Phase 2 or GVK BIO's Capital Contribution of $500,000 after completion of Phase 1 but prior to completion of Phase 2	**	**
Completion of Phase 3 or GVK BIO's Capital Contribution of $500,000 after the completion of Phase 2 but prior to the completion of Phase 3	**	**
Completion of Phase 4 or GVK BIO's Capital Contribution of $500,000 after the completion of Phase 3 but prior to the completion of Phase 4	**	**
Exercise of the PoC Study option and additional Capital Contribution of $500,000 to fund the PoC Study	50%	50%

Exhibit 10.14

EMPLOYMENT AGREEMENT RENEWAL

January 10, 2013

Ramesh Kumar, Ph.D.
60 Yard Road
Pennington, NJ 08534

Dear Ramesh:

This letter is to extend your Employment Agreement with Onconova Therapeutics Inc. We wish to renew this agreement to cover the period April 1, 2012 through March 31, 2015.

If you are in agreement with this renewal, please sign below and return a copy to me. As always, if you have any questions, please don't hesitate to contact me.

Thank you for your leadership to Onconova and its Employees.

Kind regards

Lisa Kuprewicz
Human Resources and
Investor Relations Manager

Agree to above renewal:

/s/ Ramesh Kumar
Ramesh Kumar, Ph.D.

April 10, 2010

Ramesh Kumar. Ph.D.
60 Yard Road
Penninuton, NJ 08534

Dear Ramesh:

I am pleased to inform you that the Compensation Committee has approved a 15% salary increase to your annual salary, Your new salary of $371,450, is effective January 01, 2010. In addition, the Committee has also decided to extend your Employment Agreement with for another two years (March 31, 2012) with an additional 100,000 options vesting over 4 years.

Kindly sign and return one copy of this letter to Lisa Kuprewicz.

Kinds regards,

Alan Williamson
Chairman, Compensation Committee

Agreed:

/s/ Michael B. Hoffman
Michael B. Hoffman

Accepted:

/s/ Ramesh Kumar
Ramesh Kumar, Ph.D.

EMPLOYMENT AGREEMENT

This Employment Agreement (hereinafter this "Agreement") is effective as of April 1, 2007 (the "Effective Date"), between Onconova Therapeutics, Inc., a Delaware corporation (hereinafter "the Company") and Ramesh Kumar, Ph.D. (hereinafter "Dr. Kumar").

WHEREAS, the Company deems it to be in its best interest to secure and retain the services of Dr. Kumar, and Dr. Kumar desires to work for the Company upon the terms and conditions hereinafter set forth.

WHEREAS, the Company and Dr. Kumar desire to have the terms of this Agreement supersede the terms of any and all of Dr. Kumar's prior employment agreements as of the effective date hereof.

NOW, THEREFORE, in consideration of the mutual promises and undertakings herein contained, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Term of Employment. Subject to the terms and conditions of this Agreement, the Company hereby employs Dr. Kumar, and Dr. Kumar hereby accepts employment by the Company. The term of this Agreement shall be for a period of four years, commencing on April 1, 2007 through March 31, 2011, unless sooner terminated as hereinafter provided or extended by mutual agreement of the parties (the "Term").

2. Duties. Subject to all the terms and conditions hereof, the Company shall employ Dr. Kumar, and Dr. Kumar shall serve the Company, as President and Chief Executive Officer.

(a) Dr. Kumar's duties, powers and responsibilities as President and Chief Executive Officer shall be those which are customary for such positions, as may be determined from time to time by the Board of Directors of the Company ("the Board"). Dr. Kumar agrees to perform and discharge such duties well and faithfully and to be subject to the supervision and direction of the Board. Dr. Kumar shall devote sufficient time, attention, energy, and his best efforts to the performance of his duties hereunder and to the promotion of the business and interests of the Company.

(b) The position of President and Chief Executive Officer is a full-time position. Dr. Kumar agrees to devote his full-time effort, attention, and energies to this position. Dr. Kumar will not render any professional services or engage in any activity which might be competitive with, adverse to the best interest of, or create the appearance of a conflict of interest with the Company. The Company acknowledges that Dr. Kumar currently serves on the following boards: Gene to Genetics, Inc. Prior to serving on any additional board of directors, Dr. Kumar shall obtain the written permission of the Board, which shall not be unreasonably withheld. Dr. Kumar agrees to abide by the policies and rules and regulations of the Company as they may be amended from time to time.

(c) In the event that contracts with or grants from the United States Government are sought by or awarded to the Company, Dr. Kumar will devote his best efforts to obtain for the Company, and to maintain throughout the duration of this Agreement, the requisite security clearances and prerequisites required by agencies and entities with oversight or

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compliance responsibilities for U.S. Government contractors, in order that the Company be considered for and able to compete or receive as a qualified vendor for contracts with, and a qualified recipient of grants from, the U.S. Government, including but not limited to contracts or grants requiring access to classified information and restricted data, and other contracts or grants with U.S. Government agencies.

3. Compensation and Other Benefits.

(a) Salary. For all services rendered by Dr. Kumar under this Agreement, the Company agrees to pay Dr. Kumar at an initial annualized rate of Two Hundred Ninety Nine Thousand, Seventy-Six Dollars ($299,076) (the "Base Salary"), in bi-weekly installments in accordance with the Company's normal payroll cycle, less customary and legally required withholdings.

(b) Annual Bonus. In addition to his other remuneration, Dr. Kumar shall be eligible to receive an annual bonus (the "Bonus") in the amount of up to thirty-five percent (35%) of Dr. Kumar's Base Salary, payable upon the Company's achievement during such year of certain revenue or profit objectives, specific business plan goals or other performance milestones that have been mutually agreed to by Dr. Kumar and the Board; provided, however, that Dr. Kumar shall not be entitled to any Bonus for a specific year unless he has been employed by the Company throughout such year. The applicable performance milestones shall be presented to the Compensation Committee by Dr. Kumar by [insert date], and the determination of the achievement of such business goals or performance milestones and the amount of the bonus shall be at the sole discretion of the Compensation Committee. In the event that Dr. Kumar has earned a Bonus for a specific year, such Bonus shall be paid to Dr. Kumar in the form of cash, stock options, shares of the Company's stock, or a combination thereof, at the Compensation Committee's discretion within sixty (60) days of the end of such year.

In addition to the Bonus described above, Dr. Kumar may be entitled to additional compensation in future years in recognition of extraordinary contributions. The determination of such contributions and the amount of any additional compensation shall be at the sole discretion of the Compensation Committee.

(c) Stock Options. Subject to the approval of the Compensation Committee and the Board, Dr. Kumar is granted One Hundred Forty Thousand (140,000) Incentive Stock Options (as defined in the Company's 2007 Equity Compensation Plan) (the "Options") pursuant to the terms of the Company's 2007 Equity Compensation Plan. These Options shall vest proportionately over the four-year period beginning April 1, 2007. The exercise of the Options pertaining to these shares of stock shall be subject to the provisions of the Company's 2007 Equity Compensation Plan. Each provision of the Company's 2007 Equity Compensation Plan and each agreement relating to an Incentive Stock Option shall be construed and interpreted in a manner consistent with the requirements of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"). In no event may Dr. Kumar be granted an Incentive Stock Option which does not comply with the grant and vesting limitations prescribed by Section 422 of the Code.

(d) Employee Benefits. During the term of this Agreement, Dr. Kumar shall be entitled to participate in all employee benefit plans and programs of the Company that are made generally available from time to time to its executive officers, including but not limited to health insurance, a flexible spending account, and 401(k) participation. The Company shall also provide Dr. Kumar with term life insurance coverage in the face amount of Three Hundred Thousand Dollars ($300,000) during the term of this Agreement.

(e) Vacation and Holidays. Dr. Kumar shall be entitled each year to five (5) weeks of vacation and to those holidays observed by the Company. As an essential employee of the Company, Dr. Kumar shall schedule his vacation and holiday observances so as not to interfere with the performance of his duties as President and Chief Executive Officer.

(f) Professional Expenses. The Company shall reimburse Dr. Kumar for all reasonable expenses incurred by Dr. Kumar in connection with his employment hereunder, provided, however, that such expenses were incurred in conformance with the policies of the Company, as established from time to time, and that Dr. Kumar submits detailed vouchers and other records reasonably required by the Company in support of the amount and nature of such expense.

In the event the Company relocates its research facility more than forty (40) miles away from its present location, Dr. Kumar shall be entitled to a reasonable transportation allowance to cover the additional transportation costs associated with such relocation.

Dr. Kumar shall also be entitled to up to Ten Thousand Dollars ($10,000) per year for educational programs related to the performance of his duties hereunder.

(g) Taxes and Withholding. All compensation payable and other benefits provided under this Agreement shall be subject to customary and legally required withholding for income, F.I.C.A., and other employment taxes.

4. Termination of Employment.

(a) Death. If Dr. Kumar dies during the term of this Agreement, this Agreement shall terminate immediately, and the Company shall pay to Dr. Kumar's then-spouse, if she survives him, or if not, to his estate, the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused accrued vacation time through the termination date.

(b) Disability. If Dr. Kumar is unable to perform his full-time regular duties by reason of incapacity, either physical or mental, as determined by a licensed physician mutually acceptable to the parties in the event of a disagreement, for a period of twelve (12) consecutive weeks or ninety (90) days within any twelve (12) month period, the Company shall have the right to terminate Dr. Kumar's employment upon written notice to Dr. Kumar. If the Company decides to terminate Dr. Kumar's employment under this Section 4(b), the Company shall pay to Dr. Kumar only the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. If the Company decides not to terminate Dr. Kumar's employment as allowed under this Section, the Company shall have the option of reducing the salary thereafter payable to Dr. Kumar by

the amount of payment Dr. Kumar receives pursuant to any disability insurance policy or program.

(c) Termination for Cause. If Dr. Kumar's employment is terminated by the Company for "Cause," as defined below, during the Term, the Company shall pay Dr. Kumar only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. The Company shall have the right to set off any amounts due to Dr. Kumar by any amounts owed by Dr. Kumar to the Company at the time Dr. Kumar's employment terminates, and Dr. Kumar hereby authorizes the Company to make this setoff.

Dr. Kumar's employment may be terminated for "Cause" at any time upon delivery of written notice to Dr. Kumar. "Cause" means the occurrence of any of the following events: (i) any gross failure on the part of Dr. Kumar (other than by reason of disability as provided in Section 4(b)) to faithfully and professionally carry out his duties or to comply with any other material provision of this Agreement, which failure continues after written notice thereof by the Company, provided that the Company shall not be required to provide such notice in the event that such failure (A) is not susceptible to remedy or (B) relates to the same type of acts or omissions as to which such notice has been given on a prior occasion; (ii) Dr. Kumar's dishonesty (which shall include without limitation any misuse or misappropriation of the Company's assets), or other willful misconduct (including without limitation any conduct on the part of Dr. Kumar intended to or likely to injure the business of the Company); (iii) Dr. Kumar's conviction for any felony or for any other crime involving moral turpitude, whether or not relating to his employment; (iv) in accordance with applicable federal, state or local laws, Dr. Kumar's insobriety or use of illegal drugs, chemicals or controlled substances either (A) in the course of performing his duties and responsibilities under this Agreement, or (B) otherwise affecting the ability of Dr. Kumar to perform the same; (v) Dr. Kumar's failure to comply with a lawful written direction of the Company; or (vi) any wanton and willful dereliction of duties by Dr. Kumar. The existence of any of the foregoing events or conditions shall be determined by the Board of Directors in the exercise of its reasonable business judgment.

(d) Termination Without Cause. The Company may terminate Dr. Kumar's employment under this Agreement for any reason at any time upon written notice to Dr. Kumar. In the event of a termination "without cause," Dr. Kumar shall be entitled to receive bi-weekly severance payments in amounts equal to his then-current bi-weekly base salary, less applicable payroll withholdings, in accordance with the Company's normal payroll schedule, commencing as of the date written notice of termination is mailed or otherwise delivered to Dr. Kumar and ending on the earlier of (i) the date on which the Term specified by this Agreement expires or (ii) the date Dr. Kumar accepts Comparable Employment (defined as receiving total compensation equal to at least seventy-five percent (75%) of his final total compensation from the Company), whether as an employee, consultant, partner, independent contractor or in any other capacity with another business entity. Provided, however, that if Dr. Kumar accepts Comparable Employment while receiving payments under this Section within one year of the commencement of the payments under this Section, he shall continue to receive the payments until the earlier of (i) the date on which the Term specified by this Agreement expires, or (ii) one year after the commencement of the payments under this Section. All incentive stock options that are unvested at the time of such termination shall fully vest upon written notice of

such termination. Except as provided in this Section 4(d), all other compensation and benefits shall cease as of the date written notice of termination is mailed to Dr. Kumar.

It is the intention of Dr. Kumar and of the Company that no payments by the Company to or for the benefit of Dr. Kumar under this Agreement or any other agreement or plan, if any, pursuant to which Dr. Kumar is entitled to receive payments or benefits shall be nondeductible to the Company by reason of the operation of Section 280G of the Code, relating to parachute payments or any like statutory or regulatory provision. Accordingly, and notwithstanding any other provision of this Agreement or any such agreement or plan, if by reason of the operation of said Section 280G or any like statutory or regulatory provision, any such payments exceed the amount which can be deducted by the Company, such payments shall be reduced to the maximum amount which can be deducted by the Company. The Company shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including, without limitation, securing approval of the payments or benefits from the appropriate stockholders of the Company as required by Section 280G of the Code; provided that the necessity of seeking the foregoing stockholder approval is subject to a determination by the Board of Directors of the Company, after consulting with its accountants and other advisors, that there will be no adverse affect on the Company. To the extent that payments exceeding such maximum deductible amount have been made to or for the benefit of Dr. Kumar, such excess payments shall be refunded to the Company with interest thereon at the applicable Federal rate determined under Section 1274(d) of the Code, compounded annually, or at such other rate as may be required in order that no such payments shall be nondeductible to the Company by reason of the operation of said Section 280G or any like statutory or regulatory provision. To the extent that there is more than one method of reducing the payments to bring them within the limitations of said Sections 280G or any like statutory or regulatory provision, Dr. Kumar shall determine which method shall be followed; provided that if Dr. Kumar fails to make such determination within forty-five (45) days after the Company has given notice of the need for such reduction, the Company may determine the method of such reduction in its sole discretion.

(e) Termination by Dr. Kumar for Good Reason.

During the Term, Dr. Kumar shall be entitled to terminate this Agreement upon the establishment of "Good Reason" by giving notice to that effect to the Company. For purposes hereof, "Good Reason" shall mean: (i) a reduction in Dr. Kumar's base salary by more than twenty percent (20%) in and for any twelve month period; (ii) the breach by the Company of any material provision of this Agreement that continues without steps being taken to cure such breach for a period of ten (10) days after written notice thereof by Dr. Kumar to the Company; (iii) at any time within the Term, there occurs any of the following, which results in a material

change in Dr. Kumar's duties, position, or compensation, without the express prior written consent of Dr. Kumar: (1) the sale or transfer, whether in one transaction or in a series of transactions, of substantially all of the assets of the Company; (2) the merger or consolidation of the Company with or into any other person or entity under circumstances where the Company is not the surviving entity in such merger or where persons having control of the Company immediately prior to the admission of such member are not in control of the Company immediately after the admission of such member

If Dr. Kumar terminates this Agreement for Good Reason, the Company shall pay

Dr. Kumar in accordance with the terms and conditions set forth in Section 4(d).

(f) Voluntary Resignation. Dr. Kumar may voluntarily resign from his employment with the Company at any time prior to the expiration of the Term of this Agreement. In the event Dr. Kumar voluntarily resigns from his employment with the Company, Dr. Kumar shall provide the Company with thirty (30) days notice of his intent to resign, provided that following the termination of his employment, Dr. Kumar will provide reasonable assistance to the Company relating to the orderly transition of Dr. Kumar's job duties to such successor as the Board of Directors may designate. The Company shall pay Dr. Kumar only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through his last day of work.

5. Non-Competition.

(a) For purposes of this Agreement, "Competitor" shall mean any person, company, or entity whose primary business at the time is, or whose then-current business plan contemplates engaging in activities which may be, competitive with products and services that were or were being designed, conceived, marketed, sold, distributed and/or developed by the Company during Dr. Kumar's employment by the Company or at the time of termination of Dr. Kumar's employment by the Company.

(b) Dr. Kumar agrees that so long as he is employed by the Company, and for a period of twelve (12) months thereafter, he will not, directly or indirectly, whether for compensation or not, own, manage, operate, join, control, work for or participate in, or be connected as a stockholder, officer, employee, partner, creditor, guarantor, advisor or otherwise, with a Competitor. The foregoing shall not be construed, however, as preventing Dr. Kumar from investing his assets in such form or manner as will not require services on the part of Dr. Kumar in the operations of the businesses in which such investments are made, provided that any such business is publicly owned, and the interest of Dr. Kumar therein is solely that of an investor owning not more than five percent (5%) of the outstanding equity securities of any such business. Should Dr. Kumar breach the provisions of this Paragraph, the Company shall, in addition to any equitable or legal relief to which it is otherwise entitled, be entitled to cease all payments and benefits under the terms of this Agreement.

(c) For the period of twelve (12) months after the termination of this Agreement for any reason whatsoever, Dr. Kumar shall not hire, retain or engage as a director, officer, employee, agent or in any other capacity any person or persons who are employed by the Company or who were at any time (within a period of six (6) months immediately prior to the date of Dr. Kumar's termination) employed by the Company or otherwise interfere with the relationship between such persons and the Company.

(d) If the period of time or area herein specified should be adjudged unreasonable in any court proceeding, then the period of time shall be reduced by such number of months or the area shall be reduced by elimination of such portion thereof as deemed unreasonable, so that this covenant may be enforced during such period of time and in such area as is adjudged to be reasonable.

6. Confidential Information.

(a) At all times during Dr. Kumar's employment and thereafter, Dr. Kumar will hold in strictest confidence and will not disclose, use, lecture upon or publish any of the Company's Proprietary Information (defined below), except as such use may be required in connection with Dr. Kumar's work for the Company, or unless an officer of the Company expressly authorizes such disclosure in writing. Dr. Kumar will obtain Company's written approval before publishing or submitting for publication any material (written, verbal, or otherwise) that relates to Dr. Kumar's work for Company and/or incorporates any Proprietary Information. Dr. Kumar hereby assigns to the Company any rights Dr. Kumar may have or acquire in such Proprietary Information and recognizes that all Proprietary Information shall be the sole property of the Company and its assigns.

(b) The term "Proprietary Information" shall mean any and all confidential and/or proprietary knowledge, data or information of the Company, whether acquired by Dr. Kumar during the Term of this Agreement, during Dr. Kumar's prior service as a consultant to the Company, or otherwise. By way of illustration but not limitation, "Proprietary Information" includes but is not limited to (i) trade secrets, inventions, mask works, ideas, methods, processes, formulas, chemical structures and methods for chemical synthesis, structure-activity relationships, assay methodologies, characteristics, equipment and equipment designs, results, formulations and biological, pharmacological, toxicological and clinical data, physical, chemical or biological materials, source and object codes, data, programs, other works of authorship, know-how, improvements, discoveries, developments, compilations, shop practices, supplier lists, designs and techniques (hereinafter collectively referred to as "Inventions"); and (ii) information regarding plans for research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, suppliers and customers; and (iii) information regarding the skills and compensation of other employees of the Company. Notwithstanding the foregoing, it is understood that, at all times, Dr. Kumar is free to use information which is generally known in the trade or industry, which is not gained as a result of a breach of this Agreement, and which is acquired as a result of Dr. Kumar's own skill, knowledge, know-how and experience.

(c) Dr. Kumar understands, in addition, that the Company has received and in the future will receive from third parties confidential or proprietary information ("Third Party Information") subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During the term of Dr. Kumar's employment and thereafter, Dr. Kumar will hold Third Party Information in the strictest confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for the Company) or use, except in connection with Dr. Kumar's work for the Company, Third Party Information unless expressly authorized by an officer of the Company in writing.

(d) During Dr. Kumar's employment by the Company, Dr. Kumar will not improperly use or disclose any confidential information or trade secrets, if any, of any of his former employers or any other person to whom Dr. Kumar has an obligation of confidentiality, and Dr. Kumar will not bring onto the premises of the Company any unpublished documents or any property belonging to any former employer or any other person to whom Dr. Kumar has an

obligation of confidentiality, unless such action is consented to in writing by all persons to whom the relevant obligation of confidentiality is owed. Dr. Kumar shall not work on Company projects on the grounds of, or using the equipment of, any third party, unless such work is agreed to by the Company in writing.

(e) Upon termination of his employment, Dr. Kumar shall return to the Company all Proprietary Information in any tangible form in his possession, including copies thereof.

7. Company Right to Inventions.

(a) Inventions, if any, patented or unpatented, which Dr. Kumar made prior to the commencement of Dr. Kumar's employment with the Company are excluded from the scope of this Agreement. To preclude any possible uncertainty, Dr. Kumar has provided on Appendix A (Previous Inventions) attached hereto a complete list of all Inventions that Dr. Kumar has, alone or jointly with others, conceived, developed or reduced to practice or caused to be conceived, developed or reduced to practice prior to the commencement of Dr. Kumar's employment with the Company, that Dr. Kumar considers to be Dr. Kumar's property or the property of third parties, and that Dr. Kumar wishes to have excluded from the scope of this Agreement (collectively referred to as "Prior Inventions"). If disclosure of any such Prior Invention would cause Dr. Kumar to violate any prior confidentiality agreement, Dr. Kumar understands that Dr. Kumar shall not list such Prior Inventions in Appendix A but shall only disclose a cursory name for each such invention (bearing in mind that where necessary, the naming shall not be so specific as to violate the confidentiality obligation), a listing of the party(ies) to whom the invention belongs, and the fact that full disclosure as to such invention has not been made for that reason. Space is provided on Appendix A for this purpose. If, in the course of Dr. Kumar's employment with the Company, Dr. Kumar incorporates a Prior Invention into a Company product, process or machine, the Company is hereby granted and shall have, to the extent of Dr. Kumar's right to make such grant, a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license (with rights to sublicense through multiple tiers of sublicensees) to make, have made, modify, use, import, sell and offer to sell such Prior Invention. Notwithstanding the foregoing, Dr. Kumar agrees that he will not incorporate, or permit to be incorporated, Prior Inventions in any Company Inventions without the Company's prior written consent.

(b) Subject to Section 7(d), Dr. Kumar hereby assigns and agrees to assign in the future (when any such Inventions are first reduced to practice or a description thereof first fixed in a tangible medium, as applicable) to the Company all of Dr. Kumar's right, title and interest in and to any and all Inventions, whether or not patentable or registerable under patent, intellectual property, copyright or similar statutes, made or conceived or reduced to practice or learned by Dr. Kumar, either alone or jointly with others, during the period of Dr. Kumar's employment with the Company. Inventions assigned to the Company, or to a third party as directed by the Company pursuant to this Section 7(b), are hereinafter referred to as "Company Inventions."

(c) During the period of Dr. Kumar's employment, Dr. Kumar will promptly disclose to the Company fully and in writing all Inventions authored, conceived or reduced to

practice by Dr. Kumar, either alone or jointly with others. In addition, Dr. Kumar will promptly disclose to the Company all patent applications filed by Dr. Kumar or on Dr. Kumar's behalf within one (1) year after termination of employment. At the time of each such disclosure, Dr. Kumar will advise the Company in writing of any Inventions that Dr. Kumar believes qualify for exclusion from Dr. Kumar's obligation to assign hereunder; and Dr. Kumar will at that time provide to the Company in writing all evidence necessary to substantiate that belief.

(d) As directed by the Company, Dr. Kumar agrees to assign all Dr. Kumar's right, title and interest in and to any particular Company Invention to a third party, including without limitation the United States.

(e) Dr. Kumar acknowledges that all original works of authorship which are made by Dr. Kumar (solely or jointly with others) within the scope of Dr. Kumar's employment and which are protectable by copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C. § 101).

(f) Dr. Kumar will assist the Company in every proper way to obtain, and from time to time enforce, United States and foreign trade secret, patent, copyright, mask work and other intellectual property rights ("Proprietary Rights") relating to Company Inventions in any and all countries. To that end, Dr. Kumar will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as the Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Proprietary Rights and the assignment thereof. In addition, Dr. Kumar will execute, verify and deliver assignments of such Proprietary Rights to the Company, its successor in interest, or its designee. Dr. Kumar's obligation to assist the Company with respect to Proprietary Rights relating to such Company Inventions in any and all countries shall continue beyond the termination of Dr. Kumar's employment.

In the event the Company is unable for any reason, after reasonable effort, to secure Dr. Kumar's signature on any document needed in connection with the actions specified in this Section 7(f), Dr. Kumar hereby irrevocably designates and appoints the Company and its duly authorized officers and agents as Dr. Kumar's agent and attorney-in-fact, which appointment is coupled with an interest, to act for and on Dr. Kumar's behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of the preceding paragraph with the same legal force and effect as if executed by Dr. Kumar.

(g) Dr. Kumar agrees to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that may be required by the Company) of all Proprietary Information developed by Dr. Kumar and all Inventions made by Dr. Kumar during the period of Dr. Kumar's employment at the Company, which records shall be available to and remain the sole property of the Company at all times.

(h) Dr. Kumar represents that Dr. Kumar's performance of all the terms of this Agreement and as an employee of the Company does not and will not breach any agreement to keep in confidence information acquired by Dr. Kumar in confidence or in trust prior to Dr. Kumar's employment by the Company. Dr. Kumar has not entered into, and Dr. Kumar agrees that he will not enter into, any agreement either written or oral in conflict herewith.

8. Remedies. Because Dr. Kumar's services are personal and unique and because Dr. Kumar may have access to and become acquainted with the Proprietary Information of the Company, the Company shall have the right to enforce this Agreement and any of its provisions by injunction or other equitable relief, without bond (if allowed by applicable law), and without prejudice to any other rights and remedies that the Company may have for a breach of this Agreement. In the event that Dr. Kumar performs services for other entities during the Term of this Agreement or leaves the employ of the Company, Dr. Kumar hereby consents to the notification of Dr. Kumar's new employer of Dr. Kumar's rights and obligations under this Agreement.

9. Arbitration. Any and all disputes between the parties (except actions to enforce the provisions of Sections 5, 6 or 7 of this Agreement), arising under or relating to this Agreement or any other dispute arising between the parties, including claims arising under any employment discrimination laws, shall be adjudicated and resolved exclusively through binding arbitration before the American Arbitration Association pursuant to the American Arbitration Association's then-in-effect National Rules for the Resolution of Employment Disputes (hereafter "Rules"). The initiation and conduct of any arbitration hereunder shall be in accordance with the Rules and each side shall bear its own costs and counsel fees in such arbitration. Any arbitration hereunder shall be conducted in Philadelphia, Pennsylvania, and any arbitration award shall be final and binding on the Parties. The arbitrator shall have no authority to depart from, modify, or add to the written terms of this Agreement. The arbitration provisions of this Section 9 shall be interpreted according to, and governed by, the Federal Arbitration Act, 9 U.S.C. § 1 *et seq.*, and any action pursuant to such Act to enforce any rights hereunder shall be brought exclusively in the United States District Court for the Eastern District of Pennsylvania. The parties consent to the jurisdiction of (and the laying of venue in) such court.

10. Severability. The terms of this Agreement and each Paragraph thereof shall be considered severable and the invalidity or unenforceability of any part thereof shall not affect the validity or enforceability of the remaining portions or provisions hereof.

11. Notices. Any notice required or permitted to be given under this Agreement shall be sufficient, if in writing and delivered by registered or certified mail or overnight delivery service to his residence in the case of Dr. Kumar, or to its principal office in the case of the Company.

12. Assignment. The rights and obligations of the Company under this Agreement shall inure to the benefit of and be binding upon its successors and assigns. Neither this Agreement nor any rights or interests herein or created hereby may be assigned or otherwise transferred voluntarily or involuntarily by Dr. Kumar.

13. Waiver. The waiver by the Company or Dr. Kumar of a breach of any provision of this Agreement by the other shall not operate or be construed as a waiver of any subsequent breach.

14. Applicable Law. This Agreement shall be interpreted and construed under the laws of the Commonwealth of Pennsylvania.

15. Indemnification. The Company agrees to indemnify Dr. Kumar in connection with any action Dr. Kumar is required to defend in his official capacity as President and Chief Executive Officer of the Company to the fullest extent permitted by law.

16. Entire Agreement. This instrument contains the entire agreement of the parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements with respect to such subject matter. It may not be changed or altered, except by an agreement in writing signed by the party against whom enforcement of any waiver, change, modification, extension or discharge is sought.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

ONCONOVA THERAPEUTICS. INC.

By: /s/ Ramesh Kumar

Ramesh Kumar, Ph.D.

By: /s/ Michael B. Hoffman

Michael Hoffman, Chairman

APPENDIX A

TO: Board of Directors

FROM: Ramesh Kumar, Ph.D.

DATE:

SUBJECT: PREVIOUS INVENTIONS

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Onconova therapeutics, inc. (the "company") that have been made or conceived or first reduced to practice by me alone or jointly with other prior to my engagement by the Company:

x no inventions or improvements.

o See below.

o Additional sheets attached.

2. Due to a prior confidentiality agreement I cannot complete the disclosure under Section 1 I above with respect to inventions or improvements generally listed below, the proprietary rights and duty of confidentiality with respect to which I owe to the following party(ies):

	INVENTION OR IMPROVEMENT	PARTY(IES)	RELATIONSHIP
1.			
2.			
3.			
4.			
5.			
6.			
7.			

Exhibit 10.15

AMENDMENT TO EMPLOYMENT AGREEMENT

WHEREAS, Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), and Ramesh Kumar, Ph.D. (the "Employee") entered into an employment agreement (the "Agreement") dated as of April 1, 2007.

WHEREAS, the Company and the Employee wish to amend the Agreement to clarify certain provisions subject to Section 409A of the Internal Revenue Code of 1986, as amended.

NOW, THEREFORE, in accordance with Section 16 of the Agreement and intending to be legally bound hereby, the parties agree to amend the Agreement, effective as of December 21, 2012, as follows (section references below refer to the section references of the Agreement):

1. The following is hereby inserted into the Agreement as a new Section 17:

"17. Code Section 409A.

(a) Notwithstanding anything herein to the contrary, this Agreement is intended to be interpreted and applied so that the payments and benefits set forth herein shall either be exempt from the requirements of Section 409A of the Internal Revenue Code of 1986, as amended (the "Code") or shall comply with the requirements of Code Section 409A and, accordingly, to the maximum extent permitted, this Agreement shall be interpreted to be exempt from or in compliance with Code Section 409A. The parties hereto agree that the payments and benefits set forth herein comply with or are exempt from the requirements of Code Section 409A and agree not to take any position, and to cause their affiliates, successors and assigns not to take any position, inconsistent with such interpretation for any reporting purposes, whether internal or external.

(b) Notwithstanding anything in this Agreement or elsewhere to the contrary, a termination of employment shall not be deemed to have occurred for purposes of any provision of this Agreement providing for the payment of any amounts or benefits that constitute "non-qualified deferred compensation" within the meaning of Code Section 409A upon or following a termination of Dr. Kumar's employment unless such termination is also a "separation from service" within the meaning of Code Section 409A and, for purposes of any such provision of this Agreement, references to a "termination," "termination of employment" or like terms shall mean "separation from service" and the date of such separation from service shall be treated as the date of termination for purposes of any such payment or benefits. Notwithstanding any other provision of this Agreement to the contrary, if Dr. Kumar is a "specified employee" within the meaning of Code Section 409A and the regulations issued thereunder, and a payment or benefit provided for in this Agreement would be subject to additional tax under Code Section 409A if such payment or benefit is paid within six (6) months after Dr. Kumar's "separation from service" (within the meaning of Code Section 409A), then such payment or benefit required under this Agreement shall not be paid (or commence) during the six-month period immediately following Dr. Kumar's separation from service except as provided in the immediately following sentence. In such an event, any payments or benefits that would otherwise have been made or provided during such six-month period and which would have incurred such additional tax under Code Section 409A shall instead be paid to Dr. Kumar in a lump-sum cash payment on the earlier of (i) the first regular payroll date of the seventh month following Dr. Kumar's separation from service or (ii) the 10th business day following Dr. Kumar's death.

(c) It is intended that each installment of any severance payments and benefits provided under this Agreement shall be treated as a separate "payment" for purposes of Code Section 409A. Neither Dr. Kumar nor the Company shall have the right to accelerate or defer the delivery of any such payments or benefits except to the extent specifically permitted or required by Code Section 409A. All reimbursements and in-kind benefits provided under this Agreement shall be made or provided in accordance with the requirements of Code Section 409A to the extent that such reimbursements or in-kind benefits are subject to Code Section 409A, including, where applicable, the requirements that (i) the amount of expenses eligible for reimbursement during a calendar year may not affect the expenses eligible for reimbursement in any other calendar year, (ii) the reimbursement of an eligible expense shall be made promptly and in all cases on or before the last day of the calendar year following the year in which the expense is incurred and (iii) the right to reimbursement is not subject to set off or liquidation or exchange for any other benefit. Notwithstanding anything contained herein to the contrary, if the period in which any general waiver and release of claims may be executed overlaps two calendar years (regardless of when such release is actually executed), then, to the extent required by Code Section 409A, any payments that are subject to such general waiver and release of claims that would otherwise be made in such first calendar year shall instead be withheld and paid on the first normal payment date in the second calendar year, with all remaining payments to be paid as if such delay had not occurred."

The Agreement, as amended by this Amendment, shall remain in full force and effect, and this Amendment shall be deemed to be incorporated into the Agreement and made a part thereof. Except for the amendments expressly described herein, this Amendment shall not otherwise amend or modify any other provision of the Agreement. This Amendment may be executed in two or more counterparts, each of which shall be deemed to be an original and all of which together shall constitute one instrument. Delivery of an executed counterpart of this Amendment by facsimile or other electronic method of transmission shall be equally effective as delivery of an original executed counterpart of this Amendment.

IN WITNESS WHEREOF, the undersigned have duly executed this Amendment as of the date first written above.

EMPLOYEE	ONCONOVA THERAPEUTICS, INC.
/s/ Ramesh Kumar	By: /s/ E. Premkumar Reddy
Ramesh Kumar, Ph.D.	E. Premkumar Reddy, Ph.D., Secretary

EMPLOYMENT AGREEMENT

This Employment Agreement (the "Agreement") is effective as of **September 1, 2012** (the "Effective Date") between Onconova Therapeutics, Inc., a Delaware corporation (hereinafter the "Company") and Thomas J. McKearn, M.D., Ph.D. (hereinafter "Employee").

WHEREAS, The Company deems it to be in its best interest to secure and retain the services of Employee, and Employee desires to work for the Company upon the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the mutual promises and undertakings herein contained, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Term of Employment. Subject to the terms and conditions of this Agreement, the Company hereby employs Employee, and Employee hereby accepts employment by the Company. The term of this Agreement shall be for a period of two (2) years, commencing on **September 1, 2012 through August, 31, 2014** unless sooner terminated as hereinafter provided or extended by mutual agreement of the parties (the "Term"). Notwithstanding the foregoing, the Term will automatically renew for successive one (1) year periods unless the Company or Employee provides written notification to the other party of its desire to terminate this Agreement at least ten (10) business days prior to the expiration of the Term.

2. Duties. Subject to all the terms and conditions hereof, the Company shall employ Employee, and Employee shall serve the Company, as **President, Research and Development**. Employee shall report directly to the **President and CEO** of the Company. Employee's position as **President, Research and Development** is a **full-time** position, Employee agrees to devote *Employee's minimum effort of 50% either from our Newtown office or from offsite*, to this position and to the promotion of the business and interests of the Company. Employee will not render any professional services or engage in any activity which might be competitive with, adverse to the best interest of, or create the appearance of a conflict of interest with the Company. Employee agrees to abide by the policies, rules and regulations of the Company as they may be amended from time to time. Employee may not engage in outside employment or consulting without first obtaining prior express permission of the Company.

3. Compensation and Other Benefits.

(a) Salary. For all services rendered by Employee under this Agreement, the Company agrees to pay Employee at an initial annualized rate of **Two Hundred and Five Thousand Dollars ($205,000.00)** (the "Base Salary"), in bi-weekly installments in accordance with the Company's normal payroll cycle, less customary and legally required withholdings.

(b) Annual Bonus. In addition to his other remuneration, Employee shall be eligible to receive an annual bonus (the "Bonus"), based on the performance of Employee and the Company. The determination of such performance and the amount of the bonus, if any, shall be at the sole discretion of the Compensation Committee but shall not exceed thirty-five percent

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(**35%**) of Employee's Base Salary. In the event that Employee has earned a Bonus for the Term, such Bonus shall be paid to Employee in the form of cash, stock options, shares of the Company's stock, or a combination thereof, at the Compensation Committee's discretion within sixty (60) days of the end of such year.

(c) Stock Options. Subject to the approval of the Compensation Committee and the Board, Employee is granted Incentive Stock Options (as defined in the Company's 2007 Equity Compensation Plan) (the "Options"), pursuant to the terms of the Company's 2007 Equity Compensation Plan, in an amount substantially equal to one percent (1%) of the total shares of Company stock outstanding as of the Effective Date. The Options shall vest proportionately over a four (4) year period beginning with the Effective Date. The exercise of the Options pertaining to these shares of stock shall be subject to the provisions of the Company's 2007 Equity Compensation Plan. Each provision of the Company's 2007 Equity Compensation Plan, and each agreement relating to an Incentive Stock Option shall be construed and interpreted in a manner consistent with the requirements of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"). The parties intend that the Options granted to Employee under this Section shall be treated as Incentive Stock Options within the meaning of Section 422 to the maximum extent permitted by law. In no event may the Employee be granted an Incentive Stock Option which does not comply with the grant and vesting limitations prescribed by Section 422 of the Code. Any Option which cannot be treated as an Incentive Stock Option shall instead be treated as a Non-Qualified Stock Option pursuant to the terms of the Company's 2007 Equity Compensation Plan.

(d) Employee Benefits. During the Term of this Agreement, the Employee shall be entitled to participate in any employee benefit plans or programs of the Company that are made generally available from time to time by the Company to similarly situated employees, including but not limited to health insurance, a flexible spending account, and 401(k) participation.

(e) Vacation and Holidays. The Employee shall be entitled each year to **Two (2)** weeks of vacation, and to those holidays observed by the Company. Vacation shall be taken by the Employee at such time or times as are mutually convenient to the Employee and the Company.

(f) Reimbursement of Expenses. The Company shall reimburse the Employee for all reasonable expenses incurred by Employee in connection with his employment hereunder provided, however, that such expenses were incurred in conformance with the policies of the Company, as established from time to time, and that Employee submits detailed vouchers and other records reasonably required by the Company in support of the amount and nature of such expense.

(g) Taxes and Withholding. All compensation payable and other benefits provided under this Agreement shall be subject to customary and legally required withholding for income, F.I.C.A., and other employment taxes.

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4. Termination of Employment.

(a) Death of Employee. If Employee dies during the Term of this Agreement, this Agreement shall terminate immediately and the Company shall pay to Employee's then-current spouse, if she survives him, or if not, to his estate, the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused accrued vacation time through the termination date.

(b) Disability of Employee. If Employee is unable to perform his full-time regular duties by reason of incapacity, either physical or mental, for a period of twelve (12) consecutive weeks or ninety (90) days within any twelve (12) month period, the Company shall have the right to terminate Employee's employment upon written notice to the Employee. If the Company decides to terminate Employee's employment under this Section 4(b), the Company shall pay to Employee only the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. If the Company decides not to terminate Employee's employment as allowed under this Section, the Company shall have the option of reducing the salary thereafter payable to Employee by the amount of payment the Employee receives pursuant to any disability insurance policy or program.

(c) Termination for Cause. If Employee's employment is terminated by the Company for "Cause," as defined below, during the Term, the Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. The Company shall have the right to set off any amounts due to Employee by any amounts owed by Employee to the Company at the time Employee's employment terminates, and Employee hereby authorizes the Company to make this setoff.

Employee's employment may be terminated for "Cause" at any time upon delivery of written notice to Employee. "Cause" means the occurrence of any of the following events: (i) any gross failure on the part of Employee (other than by reason of disability as provided in Section 4(b)) to faithfully and professionally carry out his duties or to comply with any other material provision of this Agreement, which failure continues after written notice thereof by the Company, provided that the Company shall not be required to provide such notice in the event that such failure (A) is not susceptible to remedy or (B) relates to the same type of acts or omissions as to which such notice has been given on a prior occasion; (ii) Employee's dishonesty (which shall include without limitation any misuse or misappropriation of the Company's assets), or other willful misconduct (including without limitation any conduct on the part of Employee intended to or likely to injure the business of the Company); (iii) Employee's conviction for any felony or for any other crime involving moral turpitude, whether or not relating to his employment; (iv) in accordance with applicable federal, state or local laws, Employee's insobriety or use of illegal drugs, chemicals or controlled substances either (A) in the course of performing his duties and responsibilities under this Agreement, or (B) otherwise affecting the ability of Employee to perform the same; (v) Employee's failure to comply with a lawful written direction of the Company; or (vi) any wanton and willful dereliction of duties by

Employee. The existence of any of the foregoing events or conditions shall be determined by the Company in the exercise of its reasonable judgment.

(d) Termination Without Cause. During the Term, the Company may terminate Employee's employment under this Agreement for any reason at any time upon three (3) months' written notice to the Employee. During the notice period. Employee will not be required to perform his duties, but shall continue to receive salary in the amount and manner provided in Section 3(a) hereof. Other than as set forth above, Employee shall not be entitled to any other compensation or benefits from the Company during the notice period. All Options that are unvested at the time of such termination shall fully vest upon written notice of such termination. Except as provided in this Section 4(d), all other compensation and benefits shall cease as of the date written notice of termination is mailed or otherwise delivered to Employee.

It is the intention of Employee and of the Company that no payments by the Company to or for the benefit of Employee under this Agreement or any other agreement or plan, if any, pursuant to which Employee is entitled to receive payments or benefits shall be nondeductible to the Company by reason of the operation of Section 280G of the Code relating to parachute payments or any like statutory or regulatory provision. Accordingly, and notwithstanding any other provision of this Agreement or any such agreement or plan, if by reason of the operation of said Section 280G or any like statutory or regulatory provision, any such payments exceed the amount which can be deducted by the Company, such payments shall be reduced to the maximum amount which can be deducted by the Company. The Company shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including, without limitation, securing approval of the payments or benefits from the appropriate stockholders of the Company as required by Section 280G of the Code; provided that the necessity of seeking the foregoing stockholder approval is subject to a determination by the Board of Directors of the Company, after consulting with its accountants and other advisors, that there will be no adverse affect on the Company. To the extent that payments exceeding such maximum deductible amount have been made to or for the benefit of Employee, such excess payments shall be refunded to the Company with interest thereon at the applicable Federal rate determined under Section 1274(d) of the Code, compounded annually, or at such other rate as may be required in order that no such payments shall be nondeductible to the Company by reason of the operation of said Section 280G or any like statutory or regulatory provision. To the extent that there is more than one method of reducing the payments to bring them within the limitations of said Sections 280G or any like statutory or regulatory provision, Employee shall determine which method shall be followed; provided that if Employee fails to make such determination within forty-five (45) days after the Company has given notice of the need for such reduction, the Company may determine the method of such reduction in its sole discretion.

(e) Voluntary Resignation. Employee may voluntarily resign from his employment with the Company at any time prior to the expiration of the Term of this Agreement. In the event Employee voluntarily resigns from his employment with the Company, Employee shall provide the Company with thirty (30) days notice of his intent to resign. The

Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through Employee's last day of work.

(f) Termination by Employee for Good Reason. During the Term, Employee shall be entitled to terminate this Agreement upon the establishment of "Good Reason by giving notice to that effect to the Company. For purposes hereof, "Good Reason" shall mean: (i) a reduction in Employee's base salary by more than twenty percent (20%) in and for any twelve month period; (ii) the breach by the Company of any material provision of this Agreement that continues without steps being taken to cure such breach for a period of ten (10) days after written notice thereof by Employee to the Company; (iii) at any time within the Term, there occurs any of the following which results in a material change in Employee's duties, position, or compensation without the express prior written consent of Employee: (1) the sale or transfer, whether in one transaction or in a series of transactions, of substantially all of the assets of the Company; (2) the merger or consolidation of the Company with or into any other person under circumstances where the Company is not the surviving entity in such merger or where persons having control of the Company immediately prior to the admission of such member are not in control of the Company immediately after the admission of such member.

If Employee terminates this Agreement for Good Reason, the Company shall pay Employee in accordance with the terms and conditions set forth in Section 4(d).

(g) Termination of Employment at the Expiration of the Term. In the event that the Company or Employee provides written notification of its intention to terminate this Agreement at the expiration of the Term, in accordance with Section 1 above, Employee shall be paid severance in an amount equal to three (3) months' salary. This payment shall be made in the form of a lump sum, less all customary and legally required withholding for income, F.I.C.A., and other employment taxes, within sixty (60) days of the expiration of the Term. As a condition of the Company's obligation to pay the severance described in this

Section 4(g), to which Employee would not otherwise be entitled, Employee must sign, in a form satisfactory to the Company, a general release of all claims against the Company (and related entities/persons).

5. Non-Competition.

(a) For purposes of this Agreement, "Competitor" shall mean any person, company, or entity whose primary business at the time is, or whose then-current business plan contemplates engaging in activities which may be, competitive with products and services that were or were being designed, conceived, marketed, sold, distributed and/or developed by the Company during Employee's employment by the Company or at the time of termination of Employee's employment by the Company.

(b) Employee agrees that so long as he is employed by the Company, and for a period of twelve (12) months thereafter, he will not, directly or indirectly, whether for compensation or not, own, manage, operate, join, control, work for, or participate in, or be connected as a stockholder, officer, employee, partner, creditor, guarantor, advisor or otherwise, with a Competitor. The foregoing shall not be construed, however, as preventing Employee

from investing his assets in such form or manner as will not require services on the part of Employee in the operations of the businesses in which such investments are made, provided that any such business is publicly owned and the interest of Employee therein is solely that of an investor owning not more than five percent (5%) of the outstanding equity securities of any such business. Should Employee breach the provisions of this Paragraph, the Company shall, in addition to any equitable or legal relief to which it is otherwise entitled, be entitled to cease all payments and benefits under the terms of this Agreement and shall be entitled to pursue all remedies it might have including, but not limited to, those contained in this Agreement.

(c) For the period of twelve (12) months after the termination of this Agreement for any reason whatsoever, Employee shall not hire, retain or engage as a director, officer, employee, agent or in any other capacity any person or persons who are employed by the Company or who were at any time (within a period of six (6) months immediately prior to the date of Employee's termination) employed by the Company or otherwise interfere with the relationship between such persons and the Company.

(d) If the period of time or area herein specified should be adjudged unreasonable in any court proceeding, then the period of time shall be reduced by such number of months or the area shall be reduced by elimination of such portion thereof as deemed unreasonable, so that this covenant may be enforced during such period of time and in such area as is adjudged to be reasonable.

6. Confidential Information.

(a) At all times during Employee's employment and thereafter, Employee will hold in strictest confidence and will not disclose, use, lecture upon or publish any of the Company's Proprietary Information (defined below), except as such use may be required in connection with Employee's work for the Company, or unless an officer of the Company expressly authorizes such disclosure in writing. Employee will obtain Company's written approval before publishing or submitting for publication any material (written, verbal, or otherwise) that relates to Employee's work for Company and/or incorporates any Proprietary Information. Employee hereby assigns to the Company any rights Employee may have or acquire in such Proprietary Information and recognizes that all Proprietary Information shall be the sole property of the Company and its assigns.

(b) The term "Proprietary Information" shall mean any and all confidential and/or proprietary knowledge, data or information of the Company, whether acquired by Employee during the Term of this Agreement, during Employee's prior service as a consultant to the Company, or otherwise. By way of illustration but not limitation, "Proprietary Information" includes but is not limited to (i) trade secrets, inventions, mask works, ideas, methods, processes, formulas, chemical structures and methods for chemical synthesis, structure-activity relationships, assay methodologies, characteristics, equipment and equipment designs, results, formulations and biological, pharmacological, toxicological and clinical data, physical, chemical or biological materials, source and object codes, data, programs, other works of authorship, know-how, improvements, discoveries, developments, compilations, shop practices, supplier

lists, designs and techniques (hereinafter collectively referred to as "Inventions"); and (ii) information regarding plans for research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, suppliers and customers; and (iii) information regarding the skills and compensation of other employees of the Company. Notwithstanding the foregoing, it is understood that, at all times, Employee is free to use information which is generally known in the trade or industry, which is not gained as a result of a breach of this Agreement, and which is acquired as a result of Employee's own skill, knowledge, know-how and experience.

(c) Employee understands, in addition, that the Company has received and in the future will receive from third parties confidential or proprietary information ("Third Party Information") subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During the Term of Employee's employment and thereafter, Employee will hold Third Party Information in the strictest confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for the Company) or use, except in connection with Employee's work for the Company, Third Party Information unless expressly authorized by an officer of the Company in writing.

(d) During Employee's employment by the Company, Employee will not improperly use or disclose any confidential information or trade secrets, if any, of any of his former employers or any other person to whom Employee has an obligation of confidentiality, and Employee will not bring onto the premises of the Company any unpublished documents or any property belonging to any former employer or any other person to whom Employee has an obligation of confidentiality, unless such action is consented to in writing by all persons to whom the relevant obligation of confidentiality is owed. Employee shall not work on Company projects on the grounds of, or using the equipment of, any third party, unless such work is agreed to by the Company in writing.

(e) Upon termination of his employment, Employee shall return to the Company all Proprietary Information in any tangible form in his possession, including copies thereof.

7. Company Right to Inventions.

(a) Inventions, if any, patented or unpatented, which Employee made prior to the commencement of Employee's employment with the Company are excluded from the scope of this Agreement. To preclude any possible uncertainty, Employee has provided on Appendix A (Previous Inventions) attached hereto a complete list of all Inventions that Employee has, alone or jointly with others, conceived, developed or reduced to practice or caused to be conceived, developed or reduced to practice prior to the commencement of Employee's employment with the Company, that Employee considers to be Employee's

property or the property of third parties, and that Employee wishes to have excluded from the scope of this Agreement (collectively referred to as "Prior Inventions"). If disclosure of any such Prior Invention would cause Employee to violate any prior confidentiality agreement, Employee

understands that Employee shall not list such Prior Inventions in Appendix A but shall only disclose a cursory name for each such invention (bearing in mind that where necessary the naming shall not be so specific as to violate the confidentiality obligation), a listing of the party(ies) to whom the invention belongs, and the fact that full disclosure as to such invention has not been made for that reason. Space is provided on Appendix A for this purpose. If, in the course of Employee's employment with the Company, Employee incorporates a Prior Invention into a Company product, process or machine, the Company is hereby granted and shall have, to the extent of Employee's right to make such grant, a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license (with rights to sublicense through multiple tiers of sublicensees) to make, have made, modify, use, import, sell and offer to sell such Prior Invention. Notwithstanding the foregoing, Employee agrees that Employee will not incorporate, or permit to be incorporated, Prior Inventions in any Company Inventions without the Company's prior written consent.

(b) Subject to Section 7(d), Employee hereby assigns and agrees to assign in the future (when any such Inventions are first reduced to practice or a description thereof first fixed in a tangible medium, as applicable) to the Company all of Employee's right, title and interest in and to any and all Inventions, whether or not patentable or registerable under patent, intellectual property, copyright or similar statutes, made or conceived or reduced to practice or learned by Employee, either alone or jointly with others, during the period of Employee's employment with the Company. Inventions assigned to the Company, or to a third party as directed by the Company pursuant to this Section 7(b), are hereinafter referred to as "Company Inventions."

(c) During the period of Employee's employment, Employee will promptly disclose to the Company fully and in writing all Inventions authored, conceived or reduced to practice by Employee, either alone or jointly with others. In addition, Employee will promptly disclose to the Company all patent applications filed by Employee or on Employee's behalf during Employee's employment and within one (1) year after termination of employment. At the time of each such disclosure, Employee will advise the Company in writing of any Inventions that Employee believes qualify for exclusion from Employee's obligation to assign hereunder; and Employee will at that time provide to the Company in writing all evidence necessary to substantiate that belief.

(d) As directed by the Company, Employee agrees to assign all Employee's right, title and interest in and to any particular Company Invention to a third party, including without limitation the United States.

(e) Employee acknowledges that all original works of authorship which are made by Employee (solely or jointly with others) within the scope of Employee's employment and which are protectable by copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C. § 101).

(f) Employee will assist the Company in every proper way to obtain, and from time to time enforce, United States and foreign trade secret, patent, copy mask work and

other intellectual property rights ("Proprietary Rights") relating to Company Inventions in any and all countries. To that end, Employee will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as the Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Proprietary Rights and the assignment thereof. In addition, Employee will execute, verify and deliver assignments of such Proprietary Rights to the Company, its successor in interest, or its designee. Employee's obligation to assist the Company with respect to Proprietary Rights relating to such Company Inventions in any and all countries shall continue beyond the termination of Employee's employment.

In the event the Company is unable for any reason, after reasonable effort, to secure Employee's signature on any document needed in connection with the actions specified in this Section 7(f), Employee hereby irrevocably designates and appoints the Company and its duly authorized officers and agents as Employee's agent and attorney-in-fact, which appointment is coupled with an interest, to act for and on Employee's behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of the preceding paragraph with the same legal force and effect as if executed by Employee.

(g) Employee agrees to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that may be required by the Company) of all Proprietary Information developed by Employee and all Inventions made by Employee during the period of Employee's employment at the Company, which records shall be available to and remain the sole property of the Company at all times.

(h) Employee represents that Employee's performance of all the terms of this Agreement and as an employee of the Company does not and will not breech any agreement to keep in confidence information acquired by Employee in confidence or in trust prior to Employee's employment by the Company. Employee has not entered into, and Employee agrees that he will not enter into, any agreement either written or oral in conflict herewith.

8. Remedies. Because Employee's services are personal and unique and because Employee may have access to and become acquainted with the Proprietary Information of the Company, the Company shall have the right to enforce this Agreement and any of its provisions by injunction, or other equitable relief, without bond (if allowed by applicable law), and without prejudice to any other rights and remedies that the Company may have for a breach of this Agreement. In the event that Employee performs services for other entities during the Term of this Agreement or leaves the employ of the Company, Employee hereby consents to the notification of Employee's new employer of Employee's rights and obligations under this Agreement.

9. Arbitration. Any and all disputes between the parties (except actions to enforce the provisions of Sections 5, 6 or 7 of this Agreement), arising under or relating to this Agreement or any other dispute arising between the parties, including claims arising under any employment discrimination laws, shall be adjudicated and resolved exclusively through binding arbitration before the American Arbitration

Association pursuant to the American Arbitration Association's then-in-effect National Rules for the Resolution of Employment Disputes (hereafter "Rules"). The initiation and conduct of any arbitration hereunder shall be in accordance with the Rules and each side shall bear its own costs and counsel fees in such arbitration. Any arbitration hereunder shall be conducted in Philadelphia, Pennsylvania, and any arbitration award shall be final and binding on the Parties. The arbitrator shall have no authority to depart from, modify, or add to the written terms of this Agreement. The arbitration provisions of this Section 9 shall be interpreted according to, and governed by the Federal Arbitration Act, 9 U.S.C. § 1 *et seq*., and any action pursuant to such Act to enforce any rights hereunder shall be brought exclusively in the United States District Court for the Eastern District of Pennsylvania. The parties consent to the jurisdiction of (and the laying of venue in) such court.

10. Severability. The terms of this Agreement and each Paragraph thereof shall be considered severable and the invalidity or unenforceability of any part thereof shall not affect the validity or enforceability of the remaining portions or provisions hereof.

11. Notices. Any notice required or permitted to be given under this Agreement shall be sufficient, if in writing and delivered by registered or certified mail or overnight delivery service to his residence in the case of Employee, or to its principal office in the case of the Company.

12. Assignment. The rights and obligations of the Company under this Agreement shall inure to the benefit of and be binding upon its successors and assigns. Neither this Agreement nor any rights or interests herein or created hereby may be assigned or otherwise transferred voluntarily or involuntarily by Employee.

13. Waiver. The waiver by the Company or Employee of a breach of any provision of this Agreement by the other shall not operate or be construed as a waiver of any subsequent breach.

14. Applicable Law. This Agreement shall be interpreted and construed under the laws of the Commonwealth of Pennsylvania.

15. Entire Agreement; Prior Agreements. This instrument contains the entire agreement of the parties with respect to the subject matter hereof and supersedes any and all prior or contemporaneous agreements, oral or written, concerning the subject matter contained herein, including without limitation any prior agreements between the Company and Employee. It may not be changed or altered, except by an agreement in writing signed by the party against whom enforcement of any waiver, change, modification, extension or discharge is sought.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Ramesh Kumar, Ph.D., President & CEO

By: /s/ Thomas J. McKearn
Thomas J. McKearn, M.D, Ph.D.

APPENDIX A

TO: Ramesh Kumar, Ph.D.

FROM:

DATE:

SUBJECT: PREVIOUS INVENTIONS

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Onconova Therapeutics, Inc. (the "Company") that have been made or conceived or first reduced to practice by me alone or jointly with others prior to my engagement by the Company:

o No inventions or improvements.

o See below:

o Additional sheet(s) attached.

2. Due to a prior confidentiality agreement, I cannot complete the disclosure under Section 1 above with respect to inventions or improvements generally listed below, the proprietary rights and duty of confidentiality with respect to which I owe to the following party(ies):

	INVENTION OR IMPROVEMENT	PARTY(IES)	RELATIONSHIP
1.			
2.			
3.			
4.			
5.			
6.			

o Additional sheet(s) attached.

Exhibit 10.17

AMENDMENT TO EMPLOYMENT AGREEMENT

WHEREAS, Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), and Thomas J. McKearn (the "Employee") entered into an employment agreement (the "Agreement") dated as of September 1, 2012.

WHEREAS, the Company and the Employee wish to amend the Agreement to clarify certain provisions subject to Section 409A of the Internal Revenue Code of 1986, as amended.

NOW, THEREFORE, in accordance with Section 15 of the Agreement and intending to be legally bound hereby, the parties agree to amend the Agreement, effective as of April, 9, 2013, as follows (section references below refer to the section references of the Agreement):

1. The following is hereby inserted into the Agreement as a new Section 16:

"16. Code Section 409A.

(a) Notwithstanding anything herein to the contrary, this Agreement is intended to be interpreted and applied so that the payments and benefits set forth herein shall either be exempt from the requirements of Section 409A of the Internal Revenue Code of 1986, as amended (the "Code") or shall comply with the requirements of Code Section 409A and, accordingly, to the maximum extent permitted, this Agreement shall be interpreted to be exempt from or in compliance with Code Section 409A. The parties hereto agree that the payments and benefits set forth herein comply with or are exempt from the requirements of Code Section 409A and agree not to take any position, and to cause their affiliates, successors and assigns not to take any position, inconsistent with such interpretation for any reporting purposes, whether internal or external.

(b) Notwithstanding anything in this Agreement or elsewhere to the contrary, a termination of employment shall not be deemed to have occurred for purposes of any provision of this Agreement providing for the payment of any amounts or benefits that constitute "non-qualified deferred compensation" within the meaning of Code Section 409A upon or following a termination of the Employ cc- s employment unless such termination is also a "separation from service" within the meaning of Code Section 409A and, for purposes of any such provision of this Agreement, references to a "termination," "termination of employment" or like terms shall mean "separation from service" and the date of such separation from service shall be treated as the date of termination for purposes of any such payment or benefits. Notwithstanding any other provision of this Agreement to the contrary, if the Employee is a "specified employee" within the meaning of Code Section 409A and the regulations issued thereunder, and a payment or benefit provided for in this Agreement would be subject to additional tax under Code Section 409A if such payment or benefit is paid within six (6) months after the Employee's "separation from service" (within the meaning of Code Section 409A), then such payment or benefit required under this Agreement shall not be paid (or commence) during the six-month period immediately

following the Employee's separation from service except as provided in the immediately following sentence. In such an event, any payments or benefits that would otherwise have been made or provided during such six-month period and which would have incurred such additional tax under Code Section 409A shall instead be paid to the Employee in a lump-sum cash payment on the earlier of (i) the first regular payroll date of the seventh month following the Employee's separation from service or (ii) the 10th business day following the Employee's death.

(c) It is intended that each installment of any severance payments and benefits provided under this Agreement shall be treated as a separate "payment" for purposes of Code Section 409A. Neither the Employee nor the Company shall have the right to accelerate or defer the delivery of any such payments or benefits except to the extent specifically permitted or required by Code Section 409A. All reimbursements and in-kind benefits provided under this Agreement shall be made or provided in accordance with the requirements of Code Section 409A to the extent that such reimbursements or in-kind benefits are subject to Code Section 409A, including, where applicable, the requirements that (i) the amount of expenses eligible for reimbursement during a calendar year may not affect the expenses eligible for reimbursement in any other calendar year, (ii) the reimbursement of an eligible expense shall be made promptly and in all cases on or before the last day of the calendar year following the year in which the expense is incurred and (iii) the right to reimbursement is not subject to set off or liquidation or exchange for any other benefit. Notwithstanding anything contained herein to the contrary, if the period in which any general waiver and release of claims may be executed overlaps two calendar years (regardless of when such release is actually executed), then, to the extent required by Code Section 409A, any payments that are subject to such general waiver and release of claims that would otherwise be made in such first calendar year shall instead be withheld and paid on the first normal payment date in the second calendar year. with all remaining payments to be paid as if such delay had not occurred."

The Agreement, as amended by this Amendment, shall remain in full force and effect, and this Amendment shall be deemed to be incorporated into the Agreement and made a part thereof. Except for the amendments expressly described herein, this Amendment shall not otherwise amend or modify any other provision of the Agreement. This Amendment may be executed in two or more counterparts, each of which shall be deemed to be an original and all of which together shall constitute one instrument. Delivery of an executed counterpart of this Amendment by facsimile or other electronic method of transmission shall be equally effective as delivery of an original executed counterpart of this Amendment.

IN WITNESS WHEREOF, the undersigned have duly executed this Amendment as of the date first written above.

EMPLOYEE	ONCONOVA THERAPEUTICS, INC.
/s/ Thomas J. McKearn	By: /s/ Ramesh Kumar
Thomas J. McKearn, M.D, Ph.D.	Ramesh Kumar, Ph.D., President

Exhibit 10.18

EMPLOYMENT AGREEMENT RENEWAL

January 10, 2013

Francois Wilhelm, MD, PhD
604 Princeton-Kingston Road
Princeton, NJ 08540

Dear Francois:

This letter is to extend your Employment Agreement with Onconova Therapeutics, Inc. We wish to renew your agreement to cover the period of May 6, 2012 through May 5th, 2014.

Please sign and return a copy of this letter at your earliest convenience.

Thank you for all of your hard work at Onconova.

Kind regards,

Lisa Kuprewicz
Human Resources and
Investor Relations Manager

Agree to above renewal:

/s/ Francois Wilhelm
Francois Wilhelm, MD, PhD

December 28, 2012

Dear Francois:

I am pleased to inform you that the Compensation Committee has approved a 5% salary increase for the year 2013. Your new salary effective January 1, 2013 will be $393,316.56.

Your bonus for the year will be 100% of target (30%), payable in cash.

Your employment agreement was extended by two years. You have received 40,000 options subject to the usual vesting schedule. A Stock Option Agreement will be sent to you shortly.

Congratulations and thank you for your continued hard work at Onconova.

Kind regards,

James R. Altland
Senior, VP Finance and
Corporate Development

EMPLOYMENT AGREEMENT RENEWAL

March 30, 2010

Francois Wilhelm, MD, PhD
604 Princeton-Kingston Road
Princeton, NJ 08540

Dear Francois:

This letter refers to your Employment Agreement with Onconova Therapeutics, Inc. which will soon expire. We wish to extend your agreement to May 5th, 2012.

The Compensation Committee has also approved a 15% salary increase. Your new salary effective January 1, 2010 will be $333,500.15. You will receive a retroactive paycheck to bring your salary up to date.

Please sign and return a copy of this letter at your earliest convenience.

Congratulations and thank you for all of your hard work at Onconova.

Kind regards,

Ramesh Kumar, Ph.D.
President & CEO

I agree to renew my employment contract for two years through May 5th, 2012

/s/ Francois Wilhelm
Francois Wilhelm

EMPLOYMENT AGREEMENT

This Employment Agreement (the "Agreement") is effective as of April 17, 2008 (the "Effective Date") between Onconova Therapeutics, Inc., a Delaware corporation (hereinafter the "Company") and François Wilhelm, M.D. (hereinafter "Employee").

WHEREAS, The Company deems it to be in its best interest to secure and retain the services of Employee, and Employee desires to work for the Company upon the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the mutual promises and undertakings herein contained, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Term of Employment. Subject to the terms and conditions of this Agreement, the Company hereby employs Employee, and Employee hereby accepts employment by the Company. The term of this Agreement shall be for a period of two (2) years, commencing on May 5, 2008, through May 5, 2010, unless sooner terminated as hereinafter provided or extended by mutual agreement of the parties (the "Term"). Notwithstanding the foregoing, the Term will automatically renew for successive one (1) year periods unless the Company or Employee provides written notification to the other party of its desire to terminate this Agreement at least ten (10) business days prior to the expiration of the Term.

2. Duties. Subject to all the terms and conditions hereof, the Company shall employ Employee, and Employee shall serve the Company, as Chief Medical Officer and Senior Vice President. Employee shall report directly to the Chief Executive Officer of the Company. As Employee's position as Chief Medical Officer and Senior Vice President is a full-time position, Employee agrees to devote Employee's full time effort, attention, and energies to this position and to the promotion of the business and interests of the Company. Employee will not render any professional services or engage in any activity which might be competitive with, adverse to the best interest of, or create the appearance of a conflict of interest with the Company. Employee agrees to abide by the policies, rules and regulations of the Company as they may be amended from time to time. Employee may not engage in outside employment or consulting without first obtaining prior express permission of the Company.

3. Compensation and Other Benefits.

(a) Salary. For all services rendered by Employee under this Agreement, the Company agrees to pay Employee at an initial annualized rate of Two Hundred Ninety Thousand Dollars ($290,000) (the "Base Salary"), in bi-weekly installments in accordance with the Company's normal payroll cycle, less customary and legally required withholdings.

(b) Annual Bonus. In addition to his other remuneration, Employee shall be eligible to receive an annual bonus (the "Bonus"), based on the performance of Employee and the Company. The determination of such performance and the amount of the bonus, if any, shall be at the sole discretion of the Compensation Committee but shall not exceed thirty percent

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(30%) of Employee's Base Salary. In the event that Employee has earned a Bonus for the Term, such Bonus shall be paid to Employee in the form of cash, stock options, shares of the Company's stock, or a combination thereof, at the Compensation Committee's discretion within sixty (60) days of the end of such year.

(c) Stock Options. Subject to the approval of the Compensation Committee and the Board, Employee is granted Incentive Stock Options (as defined in the Company's 2007 Equity Compensation Plan) (the "Options"), pursuant to the terms of the Company's 2007 Equity Compensation Plan, in an amount substantially equal to one percent (1%) of the total shares of Company stock outstanding as of the Effective Date. The Options shall vest proportionately over a four (4) year period beginning with the Effective Date. The exercise of the Options pertaining to these shares of stock shall be subject to the provisions of the Company's 2007 Equity Compensation Plan. Each provision of the Company's 2007 Equity Compensation Plan, and each agreement relating to an Incentive Stock Option shall be construed and interpreted in a manner consistent with the requirements of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"). The parties intend that the Options granted to Employee under this Section shall be treated as Incentive Stock Options within the meaning of Section 422 to the maximum extent permitted by law. In no event may the Employee be granted an Incentive Stock Option which does not comply with the grant and vesting limitations prescribed by Section 422 of the Code. Any Option which cannot be treated as an Incentive Stock Option shall instead be treated as a Non-Qualified Stock Option pursuant to the terms of the Company's 2007 Equity Compensation Plan.

(d) Employee Benefits. During the Term of this Agreement, the Employee shall be entitled to participate in any employee benefit plans or programs of the Company that are made generally available from time to time by the Company to similarly situated employees, including but not limited to health insurance, a flexible spending account, and 401(k) participation.

(e) Vacation and Holidays. The Employee shall be entitled each year to four (4) weeks of vacation, and to those holidays observed by the Company. Vacation shall be taken by the Employee at such time or times as are mutually convenient to the Employee and the Company.

(f) Reimbursement of Expenses. The Company shall reimburse the Employee for all reasonable expenses incurred by Employee in connection with his employment hereunder provided, however, that such expenses were incurred in conformance with the policies of the Company, as established from time to time, and that Employee submits detailed vouchers and other records reasonably required by the Company in support of the amount and nature of such expense.

(g) Taxes and Withholding. All compensation payable and other benefits provided under this Agreement shall be subject to customary and legally required withholding for income, F.I.C.A., and other employment taxes.

4. Termination of Employment.

(a) Death of Employee. If Employee dies during the Term of this Agreement, this Agreement shall terminate immediately and the Company shall pay to Employee's then-current spouse, if she survives him, or if not, to his estate, the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused accrued vacation time through the termination date.

(b) Disability of Employee. If Employee is unable to perform his full-time regular duties by reason of incapacity, either physical or mental, for a period of twelve (12) consecutive weeks or ninety (90) days within any twelve (12) month period, the Company shall have the right to terminate Employee's employment upon written notice to the Employee. If the Company decides to terminate Employee's employment under this Section 4(b), the Company shall pay to Employee only the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. If the Company decides not to terminate Employee's employment as allowed under this Section, the Company shall have the option of reducing the salary thereafter payable to Employee by the amount of payment the Employee receives pursuant to any disability insurance policy or program.

(c) Termination for Cause. If Employee's employment is terminated by the Company for "Cause," as defined below, during the Term, the Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. The Company shall have the right to set off any amounts due to Employee by any amounts owed by Employee to the Company at the time Employee's employment terminates, and Employee hereby authorizes the Company to make this setoff.

Employee's employment may be terminated for "Cause" at any time upon delivery of written notice to Employee. "Cause" means the occurrence of any of the following events: (i) any gross failure on the part of Employee (other than by reason of disability as provided in Section 4(b)) to faithfully and professionally carry out his duties or to comply with any other material provision of this Agreement, which failure continues after written notice thereof by the Company, provided that the Company shall not be required to provide such notice in the event that such failure (A) is not susceptible to remedy or (B) relates to the same type of acts or omissions as to which such notice has been given on a prior occasion; (ii) Employee's dishonesty (which shall include without limitation any misuse or misappropriation of the Company's assets), or other willful misconduct (including without limitation any conduct on the part of Employee intended to or likely to injure the business of the Company); (iii) Employee's conviction for any felony or for any other crime involving moral turpitude, whether or not relating to his employment; (iv) in accordance with applicable federal, state or local laws, Employee's insobriety or use of illegal drugs, chemicals or controlled substances either (A) in the course of performing his duties and responsibilities under this Agreement, or (B) otherwise affecting the ability of Employee to perform the same; (v) Employee's failure to comply with a lawful written direction of the Company; or (vi) any wanton and willful dereliction of duties by

Employee. The existence of any of the foregoing events or conditions shall be determined by the Company in the exercise of its reasonable judgment.

(d) Termination Without Cause. During the Term, the Company may terminate Employee's employment under this Agreement for any reason at any time upon three (3) months' written notice to the Employee. During the notice period, Employee will not be required to perform his duties, but shall continue to receive salary in the amount and manner provided in Section 3(a) hereof. Other than as set forth above, Employee shall not be entitled to any other compensation or benefits from the Company during the notice period. All Options that are unvested at the time of such termination shall fully vest upon written notice of such termination. Except as provided in this Section 4(d), all other compensation and benefits shall cease as of the date written notice of termination is mailed or otherwise delivered to Employee.

It is the intention of Employee and of the Company that no payments by the Company to or for the benefit of Employee under this Agreement or any other agreement or plan, if any, pursuant to which Employee is entitled to receive payments or benefits shall be nondeductible to the Company by reason of the operation of Section 280G of the Code relating to parachute payments or any like statutory or regulatory provision. Accordingly, and notwithstanding any other provision of this Agreement or any such agreement or plan, if by reason of the operation of said Section 280G or any like statutory or regulatory provision, any such payments exceed the amount which can be deducted by the Company, such payments shall be reduced to the maximum amount which can be deducted by the Company. The Company shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including, without limitation, securing approval of the payments or benefits from the appropriate stockholders of the Company as required by Section 280G of the Code; provided that the necessity of seeking the foregoing stockholder approval is subject to a determination by the Board of Directors of the Company, after consulting with its accountants and other advisors, that there will be no adverse affect on the Company. To the extent that payments exceeding such maximum deductible amount have been made to or for the benefit of Employee, such excess payments shall be refunded to the Company with interest thereon at the applicable Federal rate determined under Section 1274(d) of the Code, compounded annually, or at such other rate as may be required in order that no such payments shall be nondeductible to the Company by reason of the operation of said Section 280G or any like statutory or regulatory provision. To the extent that there is more than one method of reducing the payments to bring them within the limitations of said Sections 280G or any like statutory or regulatory provision, Employee shall determine which method shall be followed; provided that if Employee fails to make such determination within forty-five (45) days after the Company has given notice of the need for such reduction, the Company may determine the method of such reduction in its sole discretion.

(e) Voluntary Resignation. Employee may voluntarily resign from his employment with the Company at any time prior to the expiration of the Term of this Agreement. In the event Employee voluntarily resigns from his employment with the Company, Employee shall provide the Company with thirty (30) days notice of his intent to resign. The

Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through Employee's last day of work.

(f) Termination by Employee for Good Reason. During the Term, Employee shall be entitled to terminate this Agreement upon the establishment of "Good Reason" by giving notice to that effect to the Company. For purposes hereof, "Good Reason" shall mean: (i) a reduction in Employee's base salary by more than twenty percent (20%) in and for any twelve month period; (ii) the breach by the Company of any material provision of this Agreement that continues without steps being taken to cure such breach for a period of ten (10) days after written notice thereof by Employee to the Company; (iii) at any time within the Term, there occurs any of the following which results in a material change in Employee's duties, position, or compensation without the express prior written consent of Employee: (1) the sale or transfer, whether in one transaction or in a series of transactions, of substantially all of the assets of the Company; (2) the merger or consolidation of the Company with or into any other person under circumstances where the Company is not the surviving entity in such merger or where persons

having control of the Company immediately prior to the admission of such member are not in control of the Company immediately after the admission of such member.

If Employee terminates this Agreement for Good Reason, the Company shall pay Employee in accordance with the terms and conditions set forth in Section 4(d).

(g) Termination of Employment at the Expiration of the Term. In the event that the Company or Employee provides written notification of its intention to terminate this Agreement at the expiration of the Term, in accordance with Section 1 above, Employee shall be paid severance in an amount equal to three (3) months' salary. This payment shall be made in the form of a lump sum, less all customary and legally required withholding for income, F.I.C.A., and other employment taxes, within sixty (60) days of the expiration of the Term. As a condition of the Company's obligation to pay the severance described in this Section 4(g), to which Employee would not otherwise be entitled, Employee must sign, in a form satisfactory to the Company, a general release of all claims against the Company (and related entities/persons).

5. Non-Competition.

(a) For purposes of this Agreement, "Competitor" shall mean any person, company, or entity whose primary business at the time is, or whose then-current business plan contemplates engaging in activities which may be, competitive with products and services that were or were being designed, conceived, marketed, sold, distributed and/or developed by the Company during Employee's employment by the Company or at the time of termination of Employee's employment by the Company.

(b) Employee agrees that so long as he is employed by the Company, and for a period of twelve (12) months thereafter, he will not, directly or indirectly, whether for compensation or not, own, manage, operate, join, control, work for, or participate in, or be connected as a stockholder, officer, employee, partner, creditor, guarantor, advisor or otherwise, with a Competitor. The foregoing shall not be construed, however, as preventing Employee

from investing his assets in such form or manner as will not require services on the part of Employee in the operations of the businesses in which such investments are made, provided that any such business is publicly owned and the interest of Employee therein is solely that of an investor owning not more than five percent (5%) of the outstanding equity securities of any such business. Should Employee breach the provisions of this Paragraph, the Company shall, in addition to any equitable or legal relief to which it is otherwise entitled, be entitled to cease all payments and benefits under the terms of this Agreement and shall be entitled to pursue all remedies it might have including, but not limited to, those contained in this Agreement.

(c) For the period of twelve (12) months after the termination of this Agreement for any reason whatsoever, Employee shall not hire, retain or engage as a director, officer, employee, agent or in any other capacity any person or persons who are employed by the Company or who were at any time (within a period of six (6) months immediately prior to the date of Employee's termination) employed by the Company or otherwise interfere with the relationship between such persons and the Company.

(d) If the period of time or area herein specified should be adjudged unreasonable in any court proceeding, then the period of time shall be reduced by such number of months or the area shall be reduced by elimination of such portion thereof as deemed unreasonable, so that this covenant may be enforced during such period of time and in such area as is adjudged to be reasonable.

6. Confidential Information.

(a) At all times during Employee's employment and thereafter, Employee will hold in strictest confidence and will not disclose, use, lecture upon or publish any of the Company's Proprietary Information (defined below), except as such use may be required in connection with Employee's work for the Company, or unless an officer of the Company expressly authorizes such disclosure in writing. Employee will obtain Company's written approval before publishing or submitting for publication any material (written, verbal, or otherwise) that relates to Employee's work for Company and/or incorporates any Proprietary Information. Employee hereby assigns to the Company any rights Employee may have or acquire in such Proprietary Information and recognizes that all Proprietary Information shall be the sole property of the Company and its assigns.

(b) The term "Proprietary Information" shall mean any and all confidential and/or proprietary knowledge, data or information of the Company, whether acquired by Employee during the Term of this Agreement, during Employee's prior service as a consultant to the Company, or otherwise. By way of illustration but not limitation, "Proprietary Information" includes but is not limited to (i) trade secrets, inventions, mask works, ideas, methods, processes, formulas, chemical structures and methods for chemical synthesis, structure-activity relationships, assay methodologies, characteristics, equipment and equipment designs, results, formulations and biological, pharmacological, toxicological and clinical data, physical, chemical or biological materials, source and object codes, data, programs, other works of authorship, know-how, improvements, discoveries, developments, compilations, shop practices, supplier

lists, designs and techniques (hereinafter collectively referred to as "Inventions"); and (ii) information regarding plans for research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, suppliers and customers; and (iii) information regarding the skills and compensation of other employees of the Company. Notwithstanding the foregoing, it is understood that, at all times, Employee is free to use information which is generally known in the trade or industry, which is not gained as a result of a breach of this Agreement, and which is acquired as a result of Employee's own skill, knowledge, know-how and experience.

(c) Employee understands, in addition, that the Company has received and in the future will receive from third parties confidential or proprietary information ("Third Party Information") subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During the Term of Employee's employment and thereafter, Employee will hold Third Party Information in the strictest confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for the Company) or use, except in connection with Employee's work for the Company, Third Party Information unless expressly authorized by an officer of the Company in writing.

(d) During Employee's employment by the Company, Employee will not improperly use or disclose any confidential information or trade secrets, if any, of any of his former employers or any other person to whom Employee has an obligation of confidentiality, and Employee will not bring onto the premises of the Company any unpublished documents or any property belonging to any former employer or any other person to whom Employee has an obligation of confidentiality, unless such action is consented to in writing by all persons to whom the relevant obligation of confidentiality is owed. Employee shall not work on Company projects on the grounds of, or using the equipment of, any third party, unless such work is agreed to by the Company in writing.

(e) Upon termination of his employment, Employee shall return to the Company all Proprietary Information in any tangible form in his possession, including copies thereof.

7. Company Right to Inventions.

(a) Inventions, if any, patented or unpatented, which Employee made prior to the commencement of Employee's employment with the Company are excluded from the scope of this Agreement. To preclude any possible uncertainty, Employee has provided on Appendix A (Previous Inventions) attached hereto a complete list of all Inventions that Employee has, alone or jointly with others, conceived, developed or reduced to practice or caused to be conceived, developed or reduced to practice prior to the commencement of Employee's employment with the Company, that Employee considers to be Employee's property or the property of third parties, and that Employee wishes to have excluded from the scope of this Agreement (collectively referred to as "Prior Inventions"). If disclosure of any such Prior Invention would cause Employee to violate any prior confidentiality agreement, Employee

understands that Employee shall not list such Prior Inventions in Appendix A but shall only disclose a cursory name for each such invention (bearing in mind that where necessary the naming shall not be so specific as to violate the confidentiality obligation), a listing of the party(ies) to whom the invention belongs, and the fact that full disclosure as to such invention has not been made for that reason. Space is provided on Appendix A for this purpose. If, in the course of Employee's employment with the Company, Employee incorporates a Prior Invention into a Company product, process or machine, the Company is hereby granted and shall have, to the extent of Employee's right to make such grant, a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license (with rights to sublicense through multiple tiers of sublicensees) to make, have made, modify, use, import, sell and offer to sell such Prior Invention. Notwithstanding the foregoing, Employee agrees that Employee will not incorporate, or permit to be incorporated, Prior Inventions in any Company Inventions without the Company's prior written consent.

(b) Subject to Section 7(d), Employee hereby assigns and agrees to assign in the future (when any such Inventions are first reduced to practice or a description thereof first fixed in a tangible medium, as applicable) to the Company all of Employee's right, title and interest in and to any and all Inventions, whether or not patentable or registerable under patent, intellectual property, copyright or similar statutes, made or conceived or reduced to practice or learned by Employee, either alone or jointly with others, during the period of Employee's employment with the Company. Inventions assigned to the Company, or to a third party as directed by the Company pursuant to this Section 7(b), are hereinafter referred to as "Company Inventions."

(c) During the period of Employee's employment, Employee will promptly disclose to the Company fully and in writing all Inventions authored, conceived or reduced to practice by Employee, either alone or jointly with others. In addition, Employee will promptly disclose to the Company all patent applications filed by Employee or on Employee's behalf during Employee's employment and within one (1) year after termination of employment. At the time of each such disclosure, Employee will advise the Company in writing of any Inventions that Employee believes qualify for exclusion from Employee's obligation to assign hereunder; and Employee will at that time provide to the Company in writing all evidence necessary to substantiate that belief.

(d) As directed by the Company, Employee agrees to assign all Employee's right, title and interest in and to any particular Company Invention to a third party, including without limitation the United States.

(e) Employee acknowledges that all original works of authorship which are made by Employee (solely or jointly with others) within the scope of Employee's employment and which are protectable by copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C. § 101).

(f) Employee will assist the Company in every proper way to obtain, and from time to time enforce, United States and foreign trade secret, patent, copyright, mask work

and other intellectual property rights ("Proprietary Rights") relating to Company Inventions in any and all countries. To that end, Employee will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as the Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Proprietary Rights and the assignment thereof. In addition, Employee will execute, verify and deliver assignments of such Proprietary Rights to the Company, its successor in interest, or its designee. Employee's obligation to assist the Company with respect to Proprietary Rights relating to such Company Inventions in any and all countries shall continue beyond the termination of Employee's employment.

In the event the Company is unable for any reason, after reasonable effort, to secure Employee's signature on any document needed in connection with the actions specified in this Section 7(f), Employee hereby irrevocably designates and appoints the Company and its duly authorized officers and agents as Employee's agent and attorney-in-fact, which appointment is coupled with an interest, to act for and on Employee's behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of the preceding paragraph with the same legal force and effect as if executed by Employee.

(g) Employee agrees to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that may be required by the Company) of all Proprietary Information developed by Employee and all Inventions made by Employee during the period of Employee's employment at the Company, which records shall be available to and remain the sole property of the Company at all times.

(h) Employee represents that Employee's performance of all the terms of this Agreement and as an employee of the Company does not and will not breech any agreement to keep in confidence information acquired by Employee in confidence or in trust prior to Employee's employment by the Company. Employee has not entered into, and Employee agrees that he will not enter into, any agreement either written or oral in conflict herewith.

8. Remedies. Because Employee's services are personal and unique and because Employee may have access to and become acquainted with the Proprietary Information of the Company, the Company shall have the right to enforce this Agreement and any of its provisions by injunction, or other equitable relief, without bond (if allowed by applicable law), and without prejudice to any other rights and remedies that the Company may have for a breach of this Agreement. In the event that Employee performs services for other entities during the Term of this Agreement or leaves the employ of the Company, Employee hereby consents to the notification of Employee's new employer of Employee's rights and obligations under this Agreement.

9. Arbitration. Any and all disputes between the parties (except actions to enforce the provisions of Sections 5, 6 or 7 of this Agreement), arising under or relating to this Agreement or any other dispute arising between the parties, including claims arising under any employment discrimination laws, shall be adjudicated and resolved exclusively through binding arbitration before the American Arbitration Association pursuant to the American Arbitration

Association's then-in-effect National Rules for the Resolution of Employment Disputes (hereafter "Rules"). The initiation and conduct of any arbitration hereunder shall be in accordance with the Rules and each side shall bear its own costs and counsel fees in such arbitration. Any arbitration hereunder shall be conducted in Philadelphia, Pennsylvania, and any arbitration award shall be final and binding on the Parties. The arbitrator shall have no authority to depart from, modify, or add to the written terms of this Agreement. The arbitration provisions of this Section 9 shall he interpreted according to, and governed by, the Federal Arbitration Act, 9 U.S.C. § 1 *et seq.*, and any action pursuant to such Act to enforce any rights hereunder shall be brought exclusively in the United States District Court for the Eastern District of Pennsylvania. The parties consent to the jurisdiction of (and the laying of venue in) such court.

10. Severability. The terms of this Agreement and each Paragraph thereof shall be considered severable and the invalidity or unenforceability of any part thereof shall not affect the validity or enforceability of the remaining portions or provisions hereof.

11. Notices. Any notice required or permitted to be given under this Agreement shall be sufficient, if in writing and delivered by registered or certified mail or overnight delivery service to his residence in the case of Employee, or to its principal office in the case of the Company.

12. Assignment. The rights and obligations of the Company under this Agreement shall inure to the benefit of and be binding upon its successors and assigns. Neither this Agreement nor any rights or interests herein or created hereby may be assigned or otherwise transferred voluntarily or involuntarily by Employee.

13. Waiver. The waiver by the Company or Employee of a breach of any provision of this Agreement by the other shall not operate or be construed as a waiver of any subsequent breach.

14. Applicable Law. This Agreement shall be interpreted and construed under the laws of the Commonwealth of Pennsylvania.

15. Entire Agreement; Prior Agreements. This instrument contains the entire agreement of the parties with respect to the subject matter hereof and supersedes any and all prior or contemporaneous agreements, oral or written, concerning the subject matter contained herein, including without limitation any prior agreements between the Company and Employee. It may not be changed or altered, except by an agreement in writing signed by the party against whom enforcement of any waiver, change, modification, extension or discharge is sought.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Dr. Ramesh Kumar, President & CEO

/s/ Francois Wilhelm
Dr. François Wilhelm

APPENDIX A

TO: Ramesh Kumar, Ph.D.

FROM: François Wilhelm, M.D.

DATE:

SUBJECT: PREVIOUS INVENTIONS

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Onconova Therapeutics, Inc. (the "Company") that have been made or conceived or first reduced to practice by me alone or jointly with others prior to my engagement by the Company:

o No inventions or improvements.

o See below:

o Additional sheet(s) attached.

2. Due to a prior confidentiality agreement, I cannot complete the disclosure under Section 1 above with respect to inventions or improvements generally listed below, the proprietary rights and duty of confidentiality with respect to which I owe to the following party(ies):

	INVENTION OR IMPROVEMENT	PARTY(IES)	RELATIONSHIP
1.			
2.			
3.			
4.			

5.
6.

o Additional sheet(s) attached.

Exhibit 10.19

AMENDMENT TO EMPLOYMENT AGREEMENT

WHEREAS, Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), and Francois Wilhelm, M.D. (the "Employee") entered into an employment agreement (the "Agreement") dated as of April 17, 2008.

WHEREAS, the Company and the Employee wish to amend the Agreement to clarify certain provisions subject to Section 409A of the Internal Revenue Code of 1986, as amended.

NOW, THEREFORE, in accordance with Section 15 of the Agreement and intending to be legally bound hereby, the parties agree to amend the Agreement, effective as of December 21, 2012, as follows (section references below refer to the section references of the Agreement):

1. The following is hereby inserted into the Agreement as a new Section 16:

"16. Code Section 409A.

(a) Notwithstanding anything herein to the contrary, this Agreement is intended to be interpreted and applied so that the payments and benefits set forth herein shall either be exempt from the requirements of Section 409A of the Internal Revenue Code of 1986, as amended (the "Code") or shall comply with the requirements of Code Section 409A and, accordingly, to the maximum extent permitted, this Agreement shall be interpreted to be exempt from or in compliance with Code Section 409A. The parties hereto agree that the payments and benefits set forth herein comply with or are exempt from the requirements of Code Section 409A and agree not to take any position, and to cause their affiliates, successors and assigns not to take any position, inconsistent with such interpretation for any reporting purposes, whether internal or external.

(b) Notwithstanding anything in this Agreement or elsewhere to the contrary, a termination of employment shall not be deemed to have occurred for purposes of any provision of this Agreement providing for the payment of any amounts or benefits that constitute "non-qualified deferred compensation" within the meaning of Code Section 409A upon or following a termination of the Employee's employment unless such termination is also a "separation from service" within the meaning of Code Section 409A and, for purposes of any such provision of this Agreement, references to a "termination," "termination of employment" or like terms shall mean "separation from service" and the date of such separation from service shall be treated as the date of termination for purposes of any such payment or benefits. Notwithstanding any other provision of this Agreement to the contrary, if the Employee is a "specified employee" within the meaning of Code Section 409A and the regulations issued thereunder, and a payment or benefit provided for in this Agreement would be subject to additional tax under Code Section 409A if such payment or benefit is paid within six (6) months after the Employee's "separation from service" (within the meaning of Code Section 409A), then such payment or benefit required under this Agreement shall not be paid (or commence) during the six-month period immediately following the Employee's separation from service except as provided in the immediately following sentence. In such an event, any payments or benefits that would otherwise have been made or provided during such six-month period and which would have incurred such additional tax under Code Section 409A shall instead be paid to the Employee in a lump-sum cash payment

on the earlier of (i) the first regular payroll date of the seventh month following the Employee's separation from service or (ii) the 10th business day following the Employee's death.

(c) It is intended that each installment of any severance payments and benefits provided under this Agreement shall be treated as a separate "payment" for purposes of Code Section 409A. Neither the Employee nor the Company shall have the right to accelerate or defer the delivery of any such payments or benefits except to the extent specifically permitted or required by Code Section 409A. All reimbursements and in-kind benefits provided under this Agreement shall be made or provided in accordance with the requirements of Code Section 409A to the extent that such reimbursements or in-kind benefits are subject to Code Section 409A, including, where applicable, the requirements that (i) the amount of expenses eligible for reimbursement during a calendar year may not affect the expenses eligible for reimbursement in any other calendar year, (ii) the reimbursement of an eligible expense shall be made promptly and in all cases on or before the last day of the calendar year following the year in which the expense is incurred and (iii) the right to reimbursement is not subject to set off or liquidation or exchange for any other benefit. Notwithstanding anything contained herein to the contrary, if the period in which any general waiver and release of claims may be executed overlaps two calendar years (regardless of when such release is actually executed), then, to the extent required by Code Section 409A, any payments that are subject to such general waiver and release of claims that would otherwise be made in such first calendar year shall instead be withheld and paid on the first normal payment date in the second calendar year, with all remaining payments to be paid as if such delay had not occurred."

The Agreement, as amended by this Amendment, shall remain in full force and effect, and this Amendment shall be deemed to be incorporated into the Agreement and made a part thereof. Except for the amendments expressly described herein, this Amendment shall not otherwise amend or modify any other provision of the Agreement. This Amendment may be executed in two or more counterparts, each of which shall be deemed to be an original and all of which together shall constitute one instrument. Delivery of an executed counterpart of this Amendment by facsimile or other electronic method of transmission shall be equally effective as delivery of an original executed counterpart of this Amendment.

IN WITNESS WHEREOF, the undersigned have duly executed this Amendment as of the date first written above.

EMPLOYEE	ONCONOVA THERAPEUTICS, INC.
/s/ Francois Wilhelm	By: /s/ Ramesh Kumar
Francois Wilhelm, M.D.	Ramesh Kumar, Ph.D., President

Exhibit 10.20

EMPLOYMENT AGREEMENT RENEWAL

January 10, 2013

Manoj Maniar, Ph.D.
46750 Sentinel Drive
Fremont, CA 94539

Dear Manoj:

This is to extend your Employment Agreement with Onconova Therapeutics, Inc. We wish to renew your agreement to cover the period of June 1, 2012 through May 31st, 2014.

Please sign and return a copy of this letter at your earliest convenience.

Thank you for all of your hard work at Onconova.

Kind regards,

Lisa Kuprewicz
Human Resources and
Investor Relations Manager

Agree to renewal:

/s/ Manoj Maniar
Manoj Maniar, Ph.D.

EMPLOYMENT AGREEMENT RENEWAL

March 30, 2010

Manoj Maniar, Ph.D.
46750 Sentinel Drive
Fremont, CA 94539

Dear Manoj:

This letter refers to your Employment Agreement with Onconova Therapeutics, Inc. which has expired. We wish to extend your agreement to May 31st, 2012.

The Compensation Committee has also approved a 15% salary increase. Your new salary effective January 1, 2010 will be $290,950.15. You will receive a retroactive paycheck to bring your salary up to date.

Please sign and return a copy of this letter at your earliest convenience.

Congratulations and thank you for all of your hard work at Onconova.

Kind regards,

Ramesh Kumar, Ph.D.
President & CEO

I agree to renew my employment contract for two years through May 31st, 2012

/s/ Manoj Maniar
Manoj Maniar

EMPLOYMENT AGREEMENT

This Employment Agreement (the "Agreement") is effective as of January 1, 2007 (the "Effective Date") between Onconova Therapeutics, Inc., a Delaware corporation (hereinafter the "Company") and Dr. Manoj Maniar (hereinafter "Employee").

WHEREAS, The Company deems it to be in its best interest to secure and retain the services of Employee, and Employee desires to work for the Company upon the terms and conditions hereinafter set forth.

WHEREAS, the Company and the Employee desire to have the terms of this Agreement supersede the terms of the Employee's August 1, 2005 employment agreement as of the effective date hereof.

NOW, THEREFORE, in consideration of the mutual promises and undertakings herein contained, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Term of Employment. Subject to the terms and conditions of this Agreement, the Company hereby employs Employee, and Employee hereby accepts employment by the Company. The term of this Agreement shall be for a period of two (2) years, commencing on January 1, 2007, through December 31, 2008, unless sooner terminated as hereinafter provided or extended by mutual agreement of the parties (the "Term").

2. Duties. Subject to all the terms and conditions hereof, the Company shall employ Employee, and Employee shall serve the Company, as Senior Vice President, Development. Employee shall report directly to the Chief Executive Officer of the Company. Employee's position as Senior Vice President, Development, is a full-time position and Employee agrees to devote appropriate and sufficient effort, attention, and energies to the performance of his duties hereunder and to the promotion of the business and interests of the Company. During the Term, Employee shall be permitted to provide services to Palm Pharmaceuticals, provided that the provision of such services does not interfere or conflict in any way with Employee's performance of his duties hereunder or the interests of the Company, and that Employee devotes a normal full-time work schedule (as reasonably determined by the Chief Executive Officer) to the Company. Employee agrees to abide by the policies, rules and regulations of the Company as they may be amended from time to time. Except as stated in this Section 2, Employee may not engage in outside employment or consulting without first obtaining prior express permission of the Company.

3. Compensation and Other Benefits.

(a) Salary. For all services rendered by Employee under this Agreement, the Company agrees to pay Employee at an initial annualized rate of Two Hundred Thirty-Six Thousand Five Hundred Dollars ($236,500) (the "Base Salary"), in bi-weekly installments in accordance with the Company's normal payroll cycle, less customary and legally required withholdings.

(b) Annual Bonus. In addition to his other remuneration, Employee shall be eligible to receive an annual bonus (the "Bonus"), based on the performance of Employee and

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the Company. The determination or such performance and the amount or the bonus, if any, shall be at the sole discretion or the Compensation Committee but shall not exceed thirty percent (30%) of Employee's Base Salary. In the event that Employee has earned a Bonus for the Term, such Bonus shall be paid to Employee in the form of cash, stock options, shares of the Company's stock, or a combination thereof, at the Compensation Committee's discretion within sixty (60) days of the end of such year.

(c) Stock Options. Subject to the approval of the Compensation Committee and the Board, Employee is granted Forty Thousand (40,000) Incentive Stock Options (as defined in the Company's 2007 Equity Compensation Plan) (the "Options") pursuant to the terms of the Company's 2007 Equity Compensation Plan. The Options shall vest proportionately over the four (4) year period beginning with the Effective Date. The exercise of the Options pertaining to these shares of stock shall be subject to the provisions of the Company's 2007 Equity Compensation Plan. Each provision of the Company's 2007 Equity Compensation Plan, and each agreement relating to an Incentive Stock Option shall be construed and interpreted in a manner consistent with the requirements of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"). The parties intend that the Options granted to Employee under this Section shall be treated as Incentive Stock Options within the meaning of Section 422 to the maximum extent permitted by law. In no event may the Employee be granted an Incentive Stock Option which does not comply with the grant and vesting limitations prescribed by Section 422 of the Code. Any Option which cannot be treated as an Incentive Stock Option shall instead be treated as a Non-Qualified Stock Option pursuant to the terms of the Company's 2007 Equity Compensation Plan.

(d) Employee Benefits. During the Term of this Agreement, Employee shall be entitled to participate in any employee benefit plans or programs of the Company that are made generally available from time to time by the Company to similarly situated employees, including but not limited to health insurance, a flexible spending account, and 401(k) participation.

(e) Vacation and Holidays. Employee shall be entitled each year to four (4) weeks of vacation, and to those holidays observed by the Company. Vacation shall be taken by Employee at such time or times as are mutually convenient to Employee and the Company.

(f) Reimbursement of Expenses. The Company shall reimburse Employee for all reasonable expenses incurred by Employee in connection with his employment hereunder provided, however, that such expenses were incurred in conformance with the policies of the Company, as established from time to time, and that Employee submits detailed vouchers and other records reasonably required by the Company in support of the amount and nature of such expense.

(g) Taxes and Withholding. All compensation payable and other benefits provided under this Agreement shall be subject to customary and legally required withholding for income, F.I.C.A., and other employment taxes.

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4. Termination of Employment.

(a) Death of Employee. If Employee dies during the Term of this Agreement, this Agreement shall terminate immediately and the Company shall pay to Employee's then-current spouse, if she survives him, or if not, to his estate, the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused accrued vacation time through the termination date.

(b) Disability of Employee. If Employee is unable to perform his full-time regular duties by reason of incapacity, either physical or mental, for a period of twelve (12) consecutive weeks or ninety (90) days within any twelve (12) month period, the Company shall have the right to terminate Employee's employment upon written notice to Employee. If the Company decides to terminate Employee's employment under this Section 4(b), the Company shall pay to Employee only the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. If the Company decides not to terminate Employee's employment as allowed under this Section, the Company shall have the option of reducing the salary thereafter payable to Employee by the amount of payment Employee receives pursuant to any disability insurance policy or program.

(c) Termination for Cause. If Employee's employment is terminated by the Company for "Cause," as defined below, during the Term, the Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. The Company shall have the right to set off any amounts due to Employee by any amounts owed by Employee to the Company at the time Employee's employment terminates, and Employee hereby authorizes the Company to make this setoff.

Employee's employment may be terminated for "Cause" at any time upon delivery of written notice to Employee. "Cause" means the occurrence of any of the following events: (i) any gross failure on the part of Employee (other than by reason of disability as provided in Section 4(b)) to faithfully and professionally carry out his duties or to comply with any other material provision of this Agreement, which failure continues after written notice thereof by the Company, provided that the Company shall not be required to provide such notice in the event that such failure (A) is not susceptible to remedy or (B) relates to the same type of acts or omissions as to which such notice has been given on a prior occasion; (ii) Employee's dishonesty (which shall include without limitation any misuse or misappropriation of the Company's assets), or other willful misconduct (including without limitation any conduct on the part of Employee intended to or likely to injure the business of the Company); (iii) Employee's conviction for any felony or for any other crime involving moral turpitude, whether or not relating to his employment; (iv) in accordance with applicable federal, state or local laws, Employee's insobriety or use of illegal drugs, chemicals or controlled substances either (A) in the course of performing his duties and responsibilities under this Agreement, or (B) otherwise affecting the ability of Employee to perform the same; (v) Employee's failure to comply with a lawful written direction of the Company; or (vi) any wanton and willful dereliction of duties by Employee. The existence of any of the foregoing events or conditions shall be determined by the Company in the exercise of its reasonable judgment.

(d) Termination Without Cause. The Company may terminate Employee's employment under this Agreement for any reason at any time upon written notice to Employee. During the notice period, Employee will not be required to perform his duties, but shall continue

to receive salary in the amount and manner provided in Section 3(a) hereof. Other than as set forth above, Employee shall not be entitled to any other compensation or benefits from the Company during the notice period. For purposes of this Section 4(d), the amount of required advance notice shall be the lesser of (i) six (6) months, (ii) the time remaining in the then-current Term of this Agreement, or (iii) the date Employee accepts Comparable Employment (defined as receiving total compensation equal to at least seventy-five percent (75%) of his final total compensation from the Company), whether as an employee, consultant, partner, independent contractor or in any other capacity with another business entity. All Options that are unvested at the time of such termination shall fully vest upon written notice of such termination. Except as provided in this Section 4(d), all other compensation and benefits shall cease as of the date written notice of termination is mailed or otherwise delivered to Employee.

It is the intention of Employee and of the Company that no payments by the Company to or for the benefit of Employee under this Agreement or any other agreement or plan, if any, pursuant to which Employee is entitled to receive payments or benefits shall be nondeductible to the Company by reason of the operation of Section 280G of the Internal Revenue Code of 1986, as amended (the "Code"), relating to parachute payments or any like statutory or regulatory provision. Accordingly, and notwithstanding any other provision of this Agreement or any such agreement or plan, if by reason of the operation of said Section 280G or any like statutory or regulatory provision, any such payments exceed the amount which can be deducted by the Company, such payments shall be reduced to the maximum amount which can be deducted by the Company. The Company shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including, without limitation, securing approval of the payments or benefits from the appropriate stockholders of the Company as required by Section 280G of the Code; provided that the necessity of seeking the foregoing stockholder approval is subject to a determination by the Board of Directors of the Company, after consulting with its accountants and other advisors, that there will be no adverse affect on the Company. To the extent that payments exceeding such maximum deductible amount have been made to or for the benefit of Employee, such excess payments shall be refunded to the Company with interest thereon at the applicable Federal rate determined under Section 1274(d) of the Code, compounded annually, or at such other rate as may be required in order that no such payments shall be nondeductible to the Company by reason of the operation of said Section 280G or any like statutory or regulatory provision. To the extent that there is more than one method of reducing the payments to bring them within the limitations of said Sections 280G or any like statutory or regulatory provision, Employee shall determine which method shall be followed; provided that if Employee fails to make such determination within forty-five (45) days after the Company has given notice of the need for such reduction, the Company may determine the method of such reduction in its sole discretion.

(e) Voluntary Resignation. Employee may voluntarily resign from his employment with the Company at any time prior to the expiration of the Term of this Agreement. In the event Employee voluntarily resigns from his employment with the Company, Employee shall provide the Company with thirty (30) days notice of his intent to resign. The Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through Employee's last day of work.

(f) Termination by Employee for Good Reason. During the Term, Employee shall be entitled to terminate this Agreement upon the establishment of "Good Reason" by giving notice to that effect to the Company. For purposes hereof, "Good Reason" shall mean: (a) a reduction in Employee's base salary by more than twenty percent (20%) in and for any twelve month period; (b) the breach by the Company of any material provision of this Agreement which

continues without steps being taken to cure such breach for a period of ten (10) days after written notice thereof by Employee to the Company; (c) at any time within the Term and without the express prior written consent of Employee, there occurs any of the following which results in a material change in Employee's duties, position, or compensation: (1) the sale or transfer, whether in one transaction or in a series of transactions, of substantially all of the assets of the Company; (2) the merger, consolidation of the Company with or into any other person under circumstances where the Company is not the surviving entity in such merger or where persons having control of the Company immediately prior to the admission of such member are not in control of the Company immediately after the admission of such member.

If Employee terminates this Agreement for Good Reason, the Company shall pay Employee in accordance with the terms and conditions set forth in Section 4(d).

5. Non-Competition.

(a) For purposes of this Agreement, "Competitor" shall mean any person, company, or entity other than Palm Pharmaceuticals whose primary business at the time is, or whose then-current business plan contemplates engaging in activities which may be, competitive with products and services that were or were being designed, conceived, marketed, sold, distributed and/or developed by the Company during Employee's employment by the Company or at the time of termination of Employee's employment by the Company.

(b) Except as stated in Section 2 above, Employee agrees that so long as he is employed by the Company, and for a period of twelve (12) months thereafter, he will not, directly or indirectly, whether for compensation or not, own, manage, operate, join, control, work for, or participate in, or be connected as a stockholder, officer, employee, partner, creditor, guarantor, advisor or otherwise, with a Competitor. The foregoing shall not be construed, however, as preventing Employee from investing his assets in such form or manner as will not require services on the part of Employee in the operations of the businesses in which such investments are made, provided that any such business is publicly owned and the interest of Employee therein is solely that of an investor owning not more than five percent (5%) of the outstanding equity securities of any such business. Should Employee breach the provisions of this Paragraph, the Company shall, in addition to any equitable or legal relief to which it is otherwise entitled, be entitled to cease all payments and benefits under the terms of this Agreement.

(c) For the period of twelve (12) months after the termination of this Agreement for any reason whatsoever, Employee shall not hire, retain or engage as a director, officer, employee, agent or in any other capacity any person or persons who are employed by the Company or who were at any time (within a period of six (6) months immediately prior to the date of Employee's termination) employed by the Company or otherwise interfere with the relationship between such persons and the Company.

(d) If the period of time or area herein specified should be adjudged unreasonable in any court proceeding, then the period of time shall he reduced by such number of months or the area shall be reduced by elimination of such portion thereof as deemed

unreasonable, so that this covenant may be enforced during such period of time and in such area as is adjudged to be reasonable.

6. Confidential Information.

(a) At all times during Employee's employment and thereafter, Employee will hold in strictest confidence and will not disclose, use, lecture upon or publish any of the Company's Proprietary Information (defined below), except as such use may be required in connection with Employee's work for the Company, or unless an officer of the Company expressly authorizes such disclosure in writing. Employee will obtain Company's written approval before publishing or submitting for publication any material (written, verbal, or otherwise) that relates to Employee's work for Company and/or incorporates any Proprietary Information. Employee hereby assigns to the Company any rights Employee may have or acquire in such Proprietary Information and recognizes that all Proprietary Information shall be the sole property of the Company and its assigns.

(b) The term "Proprietary Information" shall mean any and all confidential and/or proprietary knowledge, data or information of the Company, whether acquired by Employee during the Term of this Agreement, during Employee's prior service as a consultant to the Company, or otherwise. By way of illustration but not limitation, "Proprietary Information" includes but is not limited to (i) trade secrets, inventions, mask works, ideas, methods, processes, formulas, chemical structures and methods for results, formulations and biological, pharmacological, toxicological and clinical data, physical, chemical or biological materials, source and object codes, data, programs, other works of authorship, know-how, improvements, discoveries, developments, compilations, shop practices, supplier lists, designs and techniques (hereinafter collectively referred to as "Inventions"); and (ii) information regarding plans for research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, suppliers and customers; and (iii) information regarding the skills and compensation of other employees of the Company. Now the foregoing, it is understood that at all such times, the Employee is free to use information which is generally known in the trade or industry, which is not gained as result of a breach of this Agreement, and the Employee's own, skill, knowledge, know-how and experience.

(c) The Employee understands, in addition, that the Company has received and in the future will receive from third parties confidential or proprietary information ("Third Party Information") subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During the term of the Employee's employment and thereafter, the Employee will hold Third Party Information in the strictest confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for the Company) or use, except in connection with the Employee's work for the Company, Third Party Information unless expressly authorized by an officer of the Company in writing.

(d) During the Employee's employment by the Company, the Employee will not improperly use or disclose any confidential information or trade secrets, if any, of any former employer or any other person to whom the Employee has an obligation of confidentiality, and the Employee will not bring onto the premises of the Company any unpublished documents or any

property belonging to any former employer or any other person to whom the Employee has an obligation of confidentiality, unless such action is consented to in writing by all persons to whom the relevant obligation of confidentiality is owed. The Employee shall not work on Company projects on the grounds of, or using the equipment of, any third party, unless such work is agreed to by the Company in writing.

(e) Upon termination of his employment, the Employee shall return to the Company all confidential information in any tangible form in his possession, including copies thereof. Notwithstanding the foregoing, the Employee shall be permitted to retain one copy of any and all confidential information for compliance purposes.

7. Company Right to Inventions.

(a) Inventions, if any, patented or unpatented, which the Employee made prior to the commencement of the Employee's employment with the Company are excluded from the scope of this Agreement. To preclude any possible uncertainty, the Employee has provided on Appendix A (Previous Inventions) attached hereto a complete list of all Inventions that the Employee has, alone or jointly with others, conceived, developed or reduced to practice or caused to be conceived, developed or reduced to practice prior to the commencement of the Employee's employment with the Company, that the Employee considers to be the Employee's property or the property of third parties, and that the Employee wishes to have excluded from the scope of this Agreement (collectively referred to as "Prior Inventions"). If disclosure of any such Prior Invention would cause the Employee to violate any prior confidentiality agreement, the Employee understands that the Employee shall not list such Prior Inventions in Appendix A but shall only to disclose a cursory name for each such invention (bearing in mind that where necessary the naming shall not be so specific as to violate the confidentiality obligation), a listing of the party(ies) to invention belongs, and the fact that full disclosure as to such invention has not been made for that reason. Space is provided on Appendix A for this purpose. If, in the course of Employee's employment with the Company, Employee incorporates a Prior Invention into a Company product, process or machine, the Company is hereby granted and shall have, to the extent of Employee's right to make such grant, a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license (with rights to sublicense through multiple tiers of sublicensees) to make, have made, modify, use, import, sell and offer to sell such Prior Invention. Notwithstanding the foregoing, Employee agrees that Employee will not incorporate, or permit to be incorporated, Prior Inventions in any Company Inventions without the Company's prior written consent.

(b) Subject to Section 7(d), Employee hereby assigns and agrees to assign in the future (when any such Inventions are first reduced to practice or a description thereof first fixed in a tangible medium, as applicable) to the Company all of Employee's right, title and interest in and to any and all Inventions, whether or not patentable or registerable under patent, intellectual property, copyright or similar statutes, made or conceived or reduced to practice or learned by Employee, either alone or jointly with others, during the period of Employee's employment with the Company. Inventions assigned to the Company, or to a third party as directed by the Company pursuant to this Section 7(b), are hereinafter referred to as "Company Inventions."

(c) During the period of Employee's employment. Employee will promptly disclose to the Company fully and in writing all Inventions authored, conceived or reduced to practice by Employee, either alone or jointly with others. In addition, Employee will promptly disclose to the Company all patent applications filed by Employee or on Employee's behalf during Employee's employment and within one (1) year after termination of employment. At the time of each such disclosure, Employee will advise the Company in writing of any Inventions that Employee believes qualify for exclusion from Employee's obligation to assign hereunder; and Employee will at that time provide to the Company in writing all evidence necessary to substantiate that belief.

(d) As directed by the Company, Employee agrees to assign all Employee's right, title and interest in and to any particular Company Invention to a third party, including without limitation the United States.

(e) Employee acknowledges that all original works of authorship which are made by Employee (solely or jointly with others) within the scope of Employee's employment and which are protectable by copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C. § 101).

(f) Employee will assist the Company in every proper way to obtain, and from time to time enforce, United States and foreign trade secret, patent, copyright, mask work and other intellectual property rights ("Proprietary Rights") relating to Company Inventions in any and all countries. To that end, Employee will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as the Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Proprietary Rights and the assignment thereof. In addition, Employee will execute, verify and deliver assignments of such Proprietary Rights to the Company, its successor in interest, or its designee. Employee's obligation to assist the Company with respect to Proprietary Rights relating to such Company Inventions in any and all countries shall continue beyond the termination of Employee's employment.

In the event the Company is unable for any reason, after reasonable effort, to secure Employee's signature on any document needed in connection with the actions specified in this Section 7(f), Employee hereby irrevocably designates and appoints the Company and its duly authorized officers and agents as Employee's agent and attorney-in-fact, which appointment is coupled with an interest, to act for and on Employee's behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of the preceding paragraph with the same legal force and effect as if executed by Employee.

(g) Employee agrees to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that may be required by the Company) of all Proprietary Information developed by Employee and all Inventions made by Employee during the period of Employee's employment at the Company, which records shall be available to and remain the sole property of the Company at all times.

(h) Employee represents that Employee's performance of all the terms of this Agreement and as an employee of the Company does not and will not breech any agreement to

keep in confidence information acquired by Employee in confidence or in trust prior to Employee's employment by the Company. Employee has not entered into, and Employee agrees that he will not enter into, any agreement either written or oral in conflict herewith.

8. Remedies. Because Employee's services are personal and unique and because Employee may have access to and become acquainted with the Proprietary Information of the Company, the Company shall have the right to enforce this Agreement and any of its provisions by injunction, or other equitable relief, without bond (if allowed by applicable law), and without prejudice to any other rights and remedies that the Company may have for a breach of this Agreement. In the event that Employee performs services for other entities during the Term of this Agreement or leaves the employ of the Company, Employee hereby consents to the notification of Employee's new employer of Employee's rights and obligations under this Agreement.

9. Arbitration. Any and all disputes between the parties (except actions to enforce the provisions of Sections 5, 6 or 7 of this Agreement), arising under or relating to this Agreement or any other dispute arising between the parties, including claims arising under any employment discrimination laws, shall be adjudicated and resolved exclusively through binding arbitration before the American Arbitration Association pursuant to the American Arbitration Association's then-in-effect National Rules for the Resolution of Employment Disputes (hereafter "Rules"). The initiation and conduct of any arbitration hereunder shall be in accordance with the Rules and each side shall bear its own costs and counsel fees in such arbitration. Any arbitration hereunder shall be conducted in Philadelphia, Pennsylvania, and any arbitration award shall be final and binding on the Parties. The arbitrator shall have no authority to depart from, modify, or add to the written terms of this Agreement. The arbitration provisions of this Section 9 shall be interpreted according to, and governed by, the Federal Arbitration Act, 9 U.S.C. § 1 *et seq.*, and any action pursuant to such Act to enforce any rights hereunder shall be brought exclusively in the United States District Court for the Eastern District of Pennsylvania. The parties consent to the jurisdiction of (and the laying of venue in) such court.

10. Severability. The terms of this Agreement and each Paragraph thereof shall be considered severable and the invalidity or unenforceability of any part thereof shall not affect the validity or enforceability of the remaining portions or provisions hereof.

11. Notices. Any notice required or permitted to be given under this Agreement shall be sufficient, if in writing and delivered by registered or certified mail or overnight delivery service to his residence in the case of Employee, or to its principal office in the case of the Company.

12. Assignment. The rights and obligations of the Company under this Agreement shall inure to the benefit of and be binding upon its successors and assigns. Neither this Agreement nor any rights or interests herein or created hereby may be assigned or otherwise transferred voluntarily or involuntarily by Employee.

13. Waiver. The waiver by the Company or Employee of a breach of any provision of this Agreement by the other shall not operate or be construed as a waiver of any subsequent breach.

14. Applicable Law. This Agreement shall be interpreted and construed under the laws of the Commonwealth of Pennsylvania.

15. Entire Agreement; Prior Agreements. This instrument contains the entire agreement of the parties with respect to the subject matter hereof and supersedes any and all prior or contemporaneous agreements, oral or written, concerning the subject matter contained herein, including without limitation any prior

agreements between the Company and Employee. It may not be changed or altered, except by an agreement in writing signed by the party against whom enforcement of any waiver, change, modification, extension or discharge is sought.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Dr. Ramesh Kumar, President & CEO

/s/ Manoj Maniar
Dr. Manoj Maniar

APPENDIX A

TO: Ramesh Kumar, Ph.D.

FROM: Dr. Manoj Maniar

DATE:

SUBJECT: PREVIOUS INVENTIONS

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Onconova Therapeutics, Inc. (the "Company") that have been made or conceived or first reduced to practice by me alone or jointly with others prior to my engagement by the Company:

o No inventions or improvements.

o See below

o Additional sheet(s) attached.

2. Due to a prior confidentiality agreement. I cannot complete the disclosure under Section 1 above with respect to inventions or improvements generally listed below, the proprietary rights and duty of confidentiality with respect to which I owe to the following party(ies):

	INVENTION OR IMPROVEMENT	PARTY(IES)	RELATIONSHIP
1.			
2.			
3.			
4.			
5.			

6.

o Additional sheet(s) attached.

Exhibit 10.21

AMENDMENT TO EMPLOYMENT AGREEMENT

WHEREAS, Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), and Dr. Manoj Maniar (the "Employee") entered into an employment agreement (the "Agreement") dated as of August 1, 2005.

WHEREAS, the Company and the Employee wish to amend the Agreement to clarify certain provisions subject to Section 409A of the Internal Revenue Code of 1986, as amended.

NOW, THEREFORE, in accordance with Section 16 of the Agreement and intending to be legally bound hereby, the parties agree to amend the Agreement, effective as of December 21, 2012, as follows (section references below refer to the section references of the Agreement):

1. The following is hereby inserted into the Agreement as a new Section 17:

"17. Code Section 409A.

(a) Notwithstanding anything herein to the contrary, this Agreement is intended to be interpreted and applied so that the payments and benefits set forth herein shall either be exempt from the requirements of Section 409A of the Internal Revenue Code of 1986, as amended (the "Code") or shall comply with the requirements of Code Section 409A and, accordingly, to the maximum extent permitted, this Agreement shall be interpreted to be exempt from or in compliance with Code Section 409A. The parties hereto agree that the payments and benefits set forth herein comply with or are exempt from the requirements of Code Section 409A and agree not to take any position, and to cause their affiliates, successors and assigns not to take any position, inconsistent with such interpretation for any reporting purposes, whether internal or external.

(b) Notwithstanding anything in this Agreement or elsewhere to the contrary, a termination of employment shall not be deemed to have occurred for purposes of any provision of this Agreement providing for the payment of any amounts or benefits that constitute "non-qualified deferred compensation" within the meaning of Code Section 409A upon or following a termination of the Employee's employment unless such termination is also a "separation from service" within the meaning of Code Section 409A and, for purposes of any such provision of this Agreement, references to a "termination," "termination of employment" or like terms shall mean "separation from service" and the date of such separation from service shall be treated as the date of termination for purposes of any such payment or benefits. Notwithstanding any other provision of this Agreement to the contrary, if the Employee is a "specified employee" within the meaning of Code Section 409A and the regulations issued thereunder, and a payment or benefit provided for in this Agreement would be subject to additional tax under Code Section 409A if such payment or benefit is paid within six (6) months after the Employee's "separation from service" (within the meaning of Code Section 409A), then such payment or benefit required under this Agreement shall not be paid (or commence) during the six-month period immediately following the Employee's separation from service except as provided in the immediately following sentence. In such an event, any payments or benefits that would otherwise have been made or provided during such six-month period and which would have incurred such additional tax under Code Section 409A shall instead be paid to the Employee in a lump-sum cash payment

on the earlier of (i) the first regular payroll date of the seventh month following the Employee's separation from service or (ii) the 10th business day following the Employee's death.

(c) It is intended that each installment of any severance payments and benefits provided under this Agreement shall be treated as a separate "payment" for purposes of Code Section 409A. Neither the Employee nor the Company shall have the right to accelerate or defer the delivery of any such payments or benefits except to the extent specifically permitted or required by Code Section 409A. All reimbursements and in-kind benefits provided under this Agreement shall be made or provided in accordance with the requirements of Code Section 409A to the extent that such reimbursements or in-kind benefits are subject to Code Section 409A, including, where applicable, the requirements that (i) the amount of expenses eligible for reimbursement during a calendar year may not affect the expenses eligible for reimbursement in any other calendar year, (ii) the reimbursement of an eligible expense shall be made promptly and in all cases on or before the last day of the calendar year following the year in which the expense is incurred and (iii) the right to reimbursement is not subject to set off or liquidation or exchange for any other benefit. Notwithstanding anything contained herein to the contrary, if the period in which any general waiver and release of claims may be executed overlaps two calendar years (regardless of when such release is actually executed), then, to the extent required by Code Section 409A, any payments that are subject to such general waiver and release of claims that would otherwise be made in such first calendar year shall instead be withheld and paid on the first normal payment date in the second calendar year, with all remaining payments to be paid as if such delay had not occurred."

The Agreement, as amended by this Amendment, shall remain in full force and effect, and this Amendment shall be deemed to be incorporated into the Agreement and made a part thereof. Except for the amendments expressly described herein, this Amendment shall not otherwise amend or modify any other provision of the Agreement. This Amendment may be executed in two or more counterparts, each of which shall be deemed to be an original and all of which together shall constitute one instrument. Delivery of an executed counterpart of this Amendment by facsimile or other electronic method of transmission shall be equally effective as delivery of an original executed counterpart of this Amendment.

IN WITNESS WHEREOF, the undersigned have duly executed this Amendment as of the date first written above.

EMPLOYEE

/s/ Manoj Maniar
Dr. Manoj Maniar

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Ramesh Kumar, Ph.D.,
President

EMPLOYMENT AGREEMENT

This Employment Agreement (the "Agreement") is effective as of **March 20, 2013** (the "Effective Date") between Onconova Therapeutics, Inc., a Delaware corporation (hereinafter the "Company") and **Ajay Bansal** (hereinafter "Employee").

WHEREAS, The Company deems it to be in its best interest to secure and retain the services of

Employee, and Employee desires to work for the Company upon the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the mutual promises and undertakings herein contained, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Term of Employment. Subject to the terms and conditions of this Agreement, the Company hereby employs Employee, and Employee hereby accepts employment by the Company. The term of this Agreement shall be for a period of two (2) years, commencing on **March 20, 2013 through March 19, 2015** unless sooner terminated as hereinafter provided or extended by mutual agreement of the parties (the "Term"). Notwithstanding the foregoing, the Term will automatically renew for successive one (1) year periods unless the Company or Employee provides written notification to the other party of its desire to terminate this Agreement at least ten (10) business days prior to the expiration of the Term.

2. Duties. Subject to all the terms and conditions hereof, the Company shall employ Employee, and Employee shall serve the Company as **Chief Financial Officer**. Employee shall report directly to the **President and CEO** of the Company. As Employee's position as **Chief Financial Officer** is a **full-time** position, Employee agrees to devote to this position and to the promotion of the business and interests of the Company. Employee will either work offsite or at one of the Company locations, as needed. Employee will not render any professional services or engage in any activity which might be competitive with, adverse to the best interest of, or create the appearance of a conflict of interest with the Company. Employee agrees to abide by the policies, rules and regulations of the Company as they may be amended from time to time. Employee may not engage in outside employment or consulting without first obtaining prior express permission of the Company.

3. Compensation and Other Benefits.

(a) Salary. For all services rendered by Employee under this Agreement, the Company agrees to pay Employee at an initial annualized rate of **Three Hundred and Ten Thousand Dollars** (**$310,000/year**) (the "Base Salary"), in bi-weekly installments in accordance with the Company's normal payroll cycle, less customary and legally required withholdings.

(b) Annual Bonus. In addition to his other remuneration, Employee shall be eligible to receive an annual bonus (the "Bonus"), based on the performance of Employee and the Company. The determination of such performance and the amount of the bonus, if any, shall be at the sole discretion of the Compensation Committee but shall not exceed thirty percent (**30%**) of Employee's Base Salary. In the event that Employee has earned a Bonus for the Term,

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such Bonus shall be paid to Employee in the form of cash, stock options, shares of the Company's stock, or a combination thereof, at the Compensation Committee's discretion within sixty (60) days of the end of such year.

(c) Stock Options. Subject to the approval of the Compensation Committee and the Board, Employee is granted Incentive Stock Options (as defined in the Company's 2007 Equity Compensation Plan) (the "Options"), pursuant to the terms of the Company's 2007 Equity Compensation Plan. The number of options will be determined by the Compensation Committee. The Options shall vest proportionately over a four (4) year period beginning with the Effective Date. The exercise of the Options pertaining to these shares of stock shall be subject to the provisions of the Company's 2007 Equity Compensation Plan. Each provision of the Company's 2007 Equity Compensation Plan, and each agreement relating to an Incentive Stock Option shall be construed and interpreted in a manner consistent with the requirements of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"). The parties intend that the Options granted to Employee under this Section shall be treated as Incentive Stock Options within the meaning of Section 422 to the maximum extent permitted by law. In no event may the Employee be granted an Incentive Stock Option which does not comply with the grant and vesting limitations prescribed by Section 422 of the Code. Any Option which cannot be treated as an Incentive Stock Option shall instead be treated as a Non-Qualified Stock Option pursuant to the terms of the Company's 2007 Equity Compensation Plan.

(d) Employee Benefits. For each year of service, until the employee elects to be covered by company provided health insurance, he will be paid a lump-sum of $10,000 annual in lieu of the health coverage under the Company Plan. During the Term of this Agreement, the Employee shall be entitled to participate in any employee benefit plans or programs of the Company that are made generally available from time to time by the Company to similarly situated employees, including but not limited to health insurance, a flexible spending account, and 401(k) participation.

(e) Vacation and Holidays. The Employee shall be entitled each year to Four (4) weeks of vacation, and to those holidays observed by the Company. Vacation shall be taken by the Employee at such time or times as are mutually convenient to the Employee and the Company.

(f) Reimbursement of Expenses. The Company shall reimburse the Employee for all reasonable expenses incurred by Employee in connection with his employment hereunder provided, however, that such expenses were incurred in conformance with the policies of the Company, as established from time to time, and that Employee submits detailed vouchers and other records reasonably required by the Company in support of the amount and nature of such expense.

(g) Taxes and Withholding. All compensation payable and other benefits provided under this Agreement shall be subject to customary and legally required withholding for income, F.I.C.A., and other employment taxes.

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4. Termination of Employment.

(a) Death of Employee. If Employee dies during the Term of this Agreement, this Agreement shall terminate immediately and the Company shall pay to Employee's then-current spouse, if she survives him, or if not, to his estate, the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused accrued vacation time through the termination date.

(b) Disability of Employee. If Employee is unable to perform his full-time regular duties by reason of incapacity, either physical or mental, for a period of twelve (12) consecutive weeks or ninety (90) days within any twelve (12) month period, the Company shall have the right to terminate Employee's employment upon written notice to the Employee. If the Company decides to terminate Employee's employment under this Section 4(b), the Company shall pay to Employee only the balance of his accrued and unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. If the Company decides not to terminate Employee's employment as allowed under this Section, the Company shall have the option of reducing the salary thereafter payable to Employee by the amount of payment the Employee receives pursuant to any disability insurance policy or program.

Termination for Cause. If Employee's employment is terminated by the Company for "Cause," as defined below, during the Term, the Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through the termination date. The Company shall have the right to set off any amounts due to Employee by any amounts owed by Employee to the Company at the time Employee's employment terminates, and Employee hereby authorizes the Company to make this setoff.

Employee's employment may be terminated for "Cause" at any time upon delivery of written notice to Employee. "Cause" means the occurrence of any of the following events: (i) any gross failure on the part of Employee (other than by reason of disability as provided in Section 4(b)) to faithfully and professionally carry out his duties or to comply with any other material provision of this Agreement, which failure continues after written notice thereof by the Company, provided that the Company shall not be required to provide such notice in the event that such failure (A) is not susceptible to remedy or (B) relates to the same type of acts or omissions as to which such notice has been given on a prior occasion; (ii) Employee's dishonesty (which shall include without limitation any misuse or misappropriation of the Company's assets), or other willful misconduct (including without limitation any conduct on the part of Employee intended to or likely to injure the business of the Company); (iii) Employee's conviction for any felony or for any other crime involving moral turpitude, whether or not relating to his employment; (iv) in accordance with applicable federal, state or local laws, Employee's insobriety or use of illegal drugs, chemicals or controlled substances either (A) in the course of performing his duties and responsibilities under this Agreement, or (B) otherwise affecting the ability of Employee to perform the same; (v) Employee's failure to comply with a lawful written direction of the Company; or (vi) any wanton and willful dereliction of duties by Employee. The existence of any of the foregoing events or conditions shall be determined by the Company in the exercise of its reasonable judgment.

(c) Termination Without Cause. During the Term, the Company may terminate Employee's employment under this Agreement for any reason at any time upon three (3) months' written notice to the Employee. During the notice period, Employee will not be required to perform his duties, but shall continue to receive salary in the amount and manner provided in Section 3(a) hereof. Other than as set forth above, Employee shall not be entitled to any other compensation or benefits from the Company during the notice period. All Options that are unvested at the time of such termination shall fully vest upon written notice of such termination. Except as provided in this Section 4(d), all other compensation and benefits shall cease as of the date written notice of termination is mailed or otherwise delivered to Employee.

It is the intention of Employee and of the Company that no payments by the Company to or for the benefit of Employee under this Agreement or any other agreement or plan, if any, pursuant to which Employee is entitled to receive payments or benefits shall be nondeductible to the Company by reason of the operation of Section 280G of the Code relating to parachute payments or any like statutory or regulatory provision. Accordingly, and notwithstanding any other provision of this Agreement or any such agreement or plan, if by reason of the operation of said Section 280G or any like statutory or regulatory provision, any such payments exceed the amount which can be deducted by the Company, such payments shall be reduced to the maximum amount which can be deducted by the Company. The Company shall make all reasonable efforts to avoid rendering such payments or benefits nondeductible, including, without limitation, securing approval of the payments or benefits from the appropriate stockholders of the Company as required by Section 280G of the Code; provided that the necessity of seeking the foregoing stockholder approval is subject to a determination by the Board of Directors of the Company, after consulting with its accountants and other advisors, that there will be no adverse affect on the Company. To the extent that payments exceeding such maximum deductible amount have been made to or for the benefit of Employee, such excess payments shall be refunded to the Company with interest thereon at the applicable Federal rate determined under Section 1274(d) of the Code, compounded annually, or at such other rate as may be required in order that no such payments shall be nondeductible to the Company by reason of the operation of said Section 280G or any like statutory or regulatory provision. To the extent that there is more than one method of reducing the payments to bring them within the limitations of said Sections 280G or any like statutory or regulatory provision, Employee shall determine which method shall be followed; provided that if Employee fails to make such determination within forty-five (45) days after the Company has given notice of the need for such reduction, the Company may determine the method of such reduction in its sole discretion.

(d) Voluntary Resignation. Employee may voluntarily resign from his employment with the Company at any time prior to the expiration of the Term of this Agreement. In the event Employee voluntarily resigns from his employment with the Company, Employee shall provide the Company with thirty (30) days notice of his intent to resign. The Company shall pay Employee only the balance of his accrued, but unpaid salary, unreimbursed expenses, and his unused, accrued vacation time through Employee's last day of work.

(e) Termination by Employee for Good Reason. During the Term, Employee shall be entitled to terminate this Agreement upon the establishment of "Good Reason" by giving notice to that effect to the Company. For purposes hereof, "Good Reason" shall mean: (i) a

reduction in Employee's base salary by more than twenty percent (20%) in and for any twelve month period; (ii) the breach by the Company of any material provision of this Agreement that continues without steps being taken to cure such breach for a period of ten (10) days after written notice thereof by Employee to the Company; (iii) at any time within the Term, there occurs any of the following which results in a material change in Employee's duties, position, or compensation without the express prior written consent of Employee: (1) the sale or transfer, whether in one transaction or in a series of transactions, of substantially all of the assets of the Company; (2) the merger or consolidation of the Company with or into any other person under circumstances where the Company is not the surviving entity in such merger or where persons having control of the Company immediately prior to the admission of such member are not in control of the Company immediately after the admission of such member.

If Employee terminates this Agreement for Good Reason, the Company shall pay Employee in accordance with the terms and conditions set forth in Section 4(d).

(g) Termination of Employment at the Expiration of the Term. In the event that the Company or Employee provides written notification of its intention to terminate this Agreement at the expiration of the Term, in accordance with Section 1 above, Employee shall be paid severance in an amount equal to three (3) months' salary. This payment shall be made in the form of a lump sum, less all customary and legally required withholding for income, F.I.C.A., and other employment taxes, within sixty (60) days of the expiration of the Term. As a condition of the Company's obligation to pay the severance described in this Section 4(g), to which

Employee would not otherwise be entitled, Employee must sign, in a form satisfactory to the Company, a general release of all claims against the Company (and related entities/persons).

5. Non-Competition.

(a) For purposes of this Agreement, "Competitor" shall mean any person, company, or entity whose primary business at the time is, or whose then-current business plan contemplates engaging in activities which may be, competitive with products and services that were or were being designed, conceived, marketed, sold, distributed and/or developed by the Company during Employee's employment by the Company or at the time of termination of Employee's employment by the Company.

(b) Employee agrees that so long as he is employed by the Company, and for a period of twelve (12) months thereafter, he will not, directly or indirectly, whether for compensation or not, own, manage, operate, join, control, work for, or participate in, or be connected as a stockholder, officer, employee, partner, creditor, guarantor, advisor or otherwise, with a Competitor. The foregoing shall not be construed, however, as preventing Employee from investing his assets in such form or manner as will not require services on the part of Employee in the operations of the businesses in which such investments are made, provided that any such business is publicly owned and the interest of Employee therein is solely that of an investor owning not more than five percent (5%) of the outstanding equity securities of any such business. Should Employee breach the provisions of this Paragraph, the Company shall, in addition to any equitable or legal relief to which it is otherwise entitled, be entitled to cease all

payments and benefits under the terms of this Agreement and shall be entitled to pursue all remedies it might have including, but not limited to, those contained in this Agreement.

(c) For the period of twelve (12) months after the termination of this Agreement for any reason whatsoever, Employee shall not hire, retain or engage as a director, officer, employee, agent or in any other capacity any person or persons who are employed by the Company or who were at any time (within a period of six (6) months immediately prior to the date of Employee's termination) employed by the Company or otherwise interfere with the relationship between such persons and the Company.

(d) If the period of time or area herein specified should be adjudged unreasonable in any court proceeding, then the period of time shall be reduced by such number of months or the area shall be reduced by elimination of such portion thereof as deemed unreasonable, so that this covenant may be enforced during such period of time and in such area as is adjudged to be reasonable.

6. Confidential Information.

(a) At all times during Employee's employment and thereafter, Employee will hold in strictest confidence and will not disclose, use, lecture upon or publish any of the Company's Proprietary Information (defined below), except as such use may be required in connection with Employee's work for the Company, or unless an officer of the Company expressly authorizes such disclosure in writing. Employee will obtain Company's written approval before publishing or submitting for publication any material (written, verbal, or otherwise) that relates to Employee's work for Company and/or incorporates any Proprietary Information. Employee hereby assigns to the Company any rights Employee may have or acquire in such Proprietary Information and recognizes that all Proprietary Information shall be the sole property of the Company and its assigns.

(b) The term "Proprietary Information" shall mean any and all confidential and/or proprietary knowledge, data or information of the Company, whether acquired by Employee during the Term of this Agreement, during Employee's prior service as a consultant to the Company, or otherwise. By way of illustration but not limitation, "Proprietary Information" includes but is not limited to (i) trade secrets, inventions, mask works, ideas, methods, processes, formulas, chemical structures and methods for chemical synthesis, structure-activity relationships, assay methodologies, characteristics, equipment and equipment designs, results, formulations and biological, pharmacological, toxicological and clinical data, physical, chemical or biological materials, source and object codes, data, programs, other works of authorship, know-how, improvements, discoveries, developments, compilations, shop practices, supplier lists, designs and techniques (hereinafter collectively referred to as "Inventions"); and (ii) information regarding plans for research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, suppliers and customers; and (iii) information regarding the skills and compensation of other employees of the Company. Notwithstanding the foregoing, it is understood that, at all times, Employee is free to use information which is generally known in the trade or industry, which is

not gained as a result of a breach of this Agreement, and which is acquired as a result of Employee's own skill, knowledge, know-how and experience.

(c) Employee understands, in addition, that the Company has received and in the future will receive from third parties confidential or proprietary information ("Third Party Information") subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During the Term of Employee's employment and thereafter, Employee will hold Third Party Information in the strictest confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for the Company) or use, except in connection with Employee's work for the Company, Third Party Information unless expressly authorized by an officer of the Company in writing.

(d) During Employee's employment by the Company, Employee will not improperly use or disclose any confidential information or trade secrets, if any, of any of his former employers or any other person to whom Employee has an obligation of confidentiality, and Employee will not bring onto the premises of the Company any unpublished documents or any property belonging to any former employer or any other person to whom Employee has an obligation of confidentiality, unless such action is consented to in writing by all persons to whom the relevant obligation of confidentiality is owed. Employee shall not work on Company projects on the grounds of, or using the equipment of, any third party, unless such work is agreed to by the Company in writing.

(e) Upon termination of his employment, Employee shall return to the Company all Proprietary Information in any tangible form in his possession, including copies thereof.

7. Company Right to Inventions.

(a) Inventions, if any, patented or unpatented, which Employee made prior to the commencement of Employee's employment with the Company are excluded from the scope of this Agreement. To preclude any possible uncertainty, Employee has provided on Appendix A (Previous Inventions) attached hereto a complete list of all Inventions that Employee has, alone or jointly with others, conceived, developed or reduced to practice or caused to be

conceived, developed or reduced to practice prior to the commencement of Employee's employment with the Company, that Employee considers to be Employee's property or the property of third parties, and that Employee wishes to have excluded from the scope of this Agreement (collectively referred to as "Prior Inventions"). If disclosure of any such Prior Invention would cause Employee to violate any prior confidentiality agreement, Employee understands that Employee shall not list such Prior Inventions in Appendix A but shall only disclose a cursory name for each such invention (bearing in mind that where necessary the naming shall not be so specific as to violate the confidentiality obligation), a listing of the party(ies) to whom the invention belongs, and the fact that full disclosure as to such invention has not been made for that reason. Space is provided on Appendix A for this purpose. If, in the course of Employee's employment with the Company, Employee incorporates a Prior Invention into a Company product, process or machine, the Company is hereby granted and shall have, to

the extent of Employee's right to make such grant, a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license (with rights to sublicense through multiple tiers of sublicensees) to make, have made, modify, use, import, sell and offer to sell such Prior Invention. Notwithstanding the foregoing, Employee agrees that Employee will not incorporate, or permit to be incorporated, Prior Inventions in any Company Inventions without the Company's prior written consent.

(b) Subject to Section 7(d), Employee hereby assigns and agrees to assign in the future (when any such Inventions are first reduced to practice or a description thereof first fixed in a tangible medium, as applicable) to the Company all of Employee's right, title and interest in and to any and all Inventions, whether or not patentable or registerable under patent, intellectual property, copyright or similar statutes, made or conceived or reduced to practice or learned by Employee, either alone or jointly with others, during the period of Employee's employment with the Company. Inventions assigned to the Company, or to a third party as directed by the Company pursuant to this Section 7(b), are hereinafter referred to as "Company Inventions."

(c) During the period of Employee's employment, Employee will promptly disclose to the Company fully and in writing all Inventions authored, conceived or reduced to practice by Employee, either alone or jointly with others. In addition, Employee will promptly disclose to the Company all patent applications filed by Employee or on Employee's behalf during Employee's employment and within one (1) year after termination of employment. At the time of each such disclosure, Employee will advise the Company in writing of any Inventions that Employee believes qualify for exclusion from Employee's obligation to assign hereunder; and Employee will at that time provide to the Company in writing all evidence necessary to substantiate that belief.

(d) As directed by the Company, Employee agrees to assign all Employee's right, title and interest in and to any particular Company Invention to a third party, including without limitation the United States.

(e) Employee acknowledges that all original works of authorship which are made by Employee (solely or jointly with others) within the scope of Employee's employment and which are protectable by copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C. § 101).

(f) Employee will assist the Company in every proper way to obtain, and from time to time enforce, United States and foreign trade secret, patent, copyright, mask work and other intellectual property rights ("Proprietary Rights") relating to Company Inventions in any and all countries. To that end, Employee will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as the Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Proprietary Rights and the assignment thereof. In addition, Employee will execute, verify and deliver assignments of such Proprietary Rights to the Company, its successor in interest, or its designee. Employee's obligation to assist the Company with respect to

Proprietary Rights relating to such Company Inventions in any and all countries shall continue beyond the termination of Employee's employment.

In the event the Company is unable for any reason, after reasonable effort, to secure Employee's signature on any document needed in connection with the actions specified in this Section 7(f), Employee hereby irrevocably designates and appoints the Company and its duly authorized officers and agents as Employee's agent and attorney-in-fact, which appointment is coupled with an interest, to act for and on Employee's behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of the preceding paragraph with the same legal force and effect as if executed by Employee.

(g) Employee agrees to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that may be required by the Company) of all Proprietary Information developed by Employee and all Inventions made by Employee during the period of Employee's employment at the Company, which records shall be available to and remain the sole property of the Company at all times.

(h) Employee represents that Employee's performance of all the terms of this Agreement and as an employee of the Company does not and will not breech any agreement to keep in confidence information acquired by Employee in confidence or in trust prior to Employee's employment by the Company. Employee has not entered into, and Employee agrees that he will not enter into, any agreement either written or oral in conflict herewith.

8. Remedies. Because Employee's services are personal and unique and because Employee may have access to and become acquainted with the Proprietary Information of the Company, the Company shall have the right to enforce this Agreement and any of its provisions by injunction, or other equitable relief, without bond (if allowed by applicable law), and without prejudice to any other rights and remedies that the Company may have for a breach of this Agreement. In the event that Employee performs services for other entities during the Term of this Agreement or leaves the employ of the Company, Employee hereby consents to the notification of Employee's new employer of Employee's rights and obligations under this Agreement.

9. Arbitration. Any and all disputes between the parties (except actions to enforce the provisions of Sections 5, 6 or 7 of this Agreement), arising under or relating to this Agreement or any other dispute arising between the parties, including claims arising under any employment discrimination laws, shall be adjudicated and resolved exclusively through binding arbitration before the American Arbitration Association pursuant to the American Arbitration Association's then-in-effect National Rules for the Resolution of Employment Disputes (hereafter "Rules"). The initiation and conduct of any arbitration hereunder shall be in accordance with the Rules and each side shall bear its own costs and counsel fees in such arbitration. Any arbitration hereunder shall be conducted in Philadelphia, Pennsylvania, and any arbitration award shall be final and binding on the Parties. The arbitrator shall have no authority to depart from, modify, or add to the written terms of this Agreement. The arbitration provisions of this Section 9 shall be interpreted according to, and governed by, the Federal Arbitration Act, 9 U.S.C. § 1 et seq., and any action pursuant to such Act to enforce any rights hereunder shall be

brought exclusively in the United States District Court for the Eastern District of Pennsylvania. The parties consent to the jurisdiction of (and the laying of venue in) such court.

10. Severability. The terms of this Agreement and each Paragraph thereof shall be considered severable and the invalidity or unenforceability of any part thereof shall not affect the validity or enforceability of the remaining portions or provisions hereof.

11. Notices. Any notice required or permitted to be given under this Agreement shall be sufficient, if in writing and delivered by registered or certified mail or overnight delivery service to his residence in the case of Employee, or to its principal office in the case of the Company.

12. Assignment. The rights and obligations of the Company under this Agreement shall inure to the benefit of and be binding upon its successors and assigns. Neither this Agreement nor any rights or interests herein or created hereby may be assigned or otherwise transferred voluntarily or involuntarily by Employee.

13. Waiver. The waiver by the Company or Employee of a breach of any provision of this Agreement by the other shall not operate or be construed as a waiver of any subsequent breach.

14. Applicable Law. This Agreement shall be interpreted and construed under the laws of the Commonwealth of Pennsylvania.

15. Entire Agreement; Prior Agreements. This instrument contains the entire agreement of the parties with respect to the subject matter hereof and supersedes any and all prior or contemporaneous agreements, oral or written, concerning the subject matter contained herein, including without limitation any prior agreements between the Company and Employee. It may not be changed or altered, except by an agreement in writing signed by the party against whom enforcement of any waiver, change, modification, extension or discharge is sought.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

ONCONOVA THERAPEUTICS, INC.

By: /s/ Ramesh Kumar
Ramesh Kumar, Ph.D., President & CEO

By: /s/ Ajay Bansal
Ajay Bansal

APPENDIX A

TO: Ramesh Kumar, Ph.D.

FROM: **Ajay Bansal**

DATE:

SUBJECT: PREVIOUS INVENTIONS

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Onconova Therapeutics, Inc. (the "Company") that have been made or conceived or first reduced to practice by me alone or jointly with others prior to my engagement by the Company:

o No inventions or improvements.

o See below:

o Additional sheet(s) attached.

2. Due to a prior confidentiality agreement, I cannot complete the disclosure under Section 1 above with respect to inventions or improvements generally listed below, the proprietary rights and duty of confidentiality with respect to which I owe to the following party(ies):

	INVENTION OR IMPROVEMENT	PARTY(IES)	RELATIONSHIP
1.			
2.			
3.			
4.			
5.			
6.			

o Additional sheet(s) attached.

Exhibit 10.23

CONSULTING AGREEMENT

Effective Date: January 1, 2012

Name and Address of Consultant:

E. Premkumar Reddy, Ph.D. ("Consultant")
Mount Sinai School of Medicine
Department of Oncological Sciences
One Gustave L. Levy Place
New York, NY 10029

Federal Tax ID# or SSN#:

Name and Address of Onconova Contact:
Ramesh Kumar, Ph.D., President
Onconova Therapeutics, Inc.
375 Pheasant Run
Newtown, PA 18940

Terms and Conditions of Consulting Service

Onconova and Consultant agree:

1. Scope of Work

Consultant will perform consulting and/or advisory services (the "Services") as it relates to Onconova's existing proprietary products and/or those already in planning and development prior to Consultant's employment with Mount Sinai School of Medicine (MSSM) (collectively, the "Field") for Onconova ("Onconova") as described in greater detail in Schedule 1. All services performed under this Agreement shall be in the Field. Therefore all references herein (and in any attached schedule) to "Services" shall be understood as references to Services in the Field. The attached schedules are hereby incorporated into and made fully a part of this Agreement. Consultant is entering into this Agreement in Consultant's individual capacity and not as an employee or agent of MSSM and confirms that Consultant's performance of the Services in the Field under and during the Term of this Agreement shall be separate and distinct from Consultant's job responsibilities as an employee of MSSM.

Consultant shall not perform any services for Onconova that would encroach on (i) Consultant's job responsibilities as an employee of Mount Sinai or (ii) any non-publicly available, confidential, or proprietary information related to processes or clinical trials performed at Mount Sinai. In performing the Services,

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Consultant shall not function as an investigator on any research project and shall not perform any of the Services on Mount Sinai School of Medicine ("MSSM") premises (with the exception of de minimis use of Consultant's MSSM office, office computer, and school library). Any photograph, videotape, reproduction, likeness or image of Consultant shall not be used by Onconova, its affiliates, subsidiaries or successors for recruiting, publicity, marketing, company/product endorsement or promotional purposes. Any presentation Consultant provides in Consultant's performance of the Services shall be of Consultant's own creation; Consultant shall control the content of such presentation, and such presentation shall become the property of Onconova subject to the terms of Paragraph 7 of this Agreement.

2. Compensation

Onconova will pay Consultant a consulting fee in the amount and on the terms specified in attached Schedule 1.

3. Manner of Performance

Consultant will perform no Services on MSSM premises. Consultant represents that Consultant's performance of the Services in the Field under and during the Term of this Agreement shall not involve (i) the use of any facilities, space, materials or other resources of MSSM, including resources provided by outside sources, except de minimis use of Consultant's MSSM office, office computer, and school library, or (ii) the use of financial support from MSSM, including funding from any outside source awarded to or administered by MSSM, or (iii) the use of any intellectual property developed within an area of research that Consultant has conducted or will conduct under a research project sponsored by MSSM or a third party, each of (i), (ii) and (iii) during the Term of this Agreement. Consultant represents that Consultant has the requisite expertise, ability, and legal right to render the Services and will perform the Services in an efficient manner. Consultant will abide by all laws, rules, and regulations that apply to the performance of the Services, including applicable requirements regarding equal employment opportunity and related rules.

4. Confidentiality

Consultant hereby acknowledges that, in Consultant's performance of the Services in the Field under and during the Term of this Agreement, Consultant may be provided with confidential and proprietary Onconova information ("Confidential Information") and therefore, Consultant hereby confirms that all such Confidential Information will be kept confidential by Consultant, except to the extent required for performance of the Services in the Field. "Developments" as defined below, shall also be considered Confidential Information. Consultant shall not publish regarding the Services in the Field performed under and during

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the Term of this Agreement without first providing Onconova with the opportunity to review and offer reasonable objection to the contemplated publication. The confidentiality obligations and use restrictions of this Agreement regarding Confidential Information shall apply during the Term

of this Agreement and for five (5) years after its termination or expiration. Within fifteen (15) days of the termination or expiration of this Agreement, Consultant will return to Onconova all Confidential Information, including all copies thereof.

The confidentiality obligations and use restrictions regarding Confidential Information shall not apply to information that: (a) becomes part of the public domain without the fault of Consultant; (b) is rightfully obtained by Consultant from a third party with the right to transfer such information without imposing an obligation of confidentiality; (c) is independently developed by Consultant without use of Onconova's Confidential Information, as evidenced by written record; or (d) was lawfully in Consultant's possession at the time of disclosure to Consultant by Onconova, without restriction on disclosure, as evidenced by written record. In addition, Consultant may disclose Confidential Information as required by law, court order, or other governmental authority with jurisdiction, provided that Consultant promptly notifies Onconova in writing of such requirement and complies, at Onconova's written request and expense, with Onconova's lawful efforts to prevent or limit the scope of such required disclosure.

5. Notwithstanding the foregoing or anything else in this Agreement, Onconova acknowledges that Consultant is a full-time employee of Mount Sinai School of Medicine ("MSSM") and agrees that, in the event the terms and conditions of this Agreement are in conflict with the terms and conditions of Consultant's employment by MSSM, including the terms of any grants or contracts administered by MSSM for which Consultant performs services, the latter shall prevail. Consultant represents that, as of the date of his/her execution of this Agreement, to the best of Consultant's knowledge there are no such conflicts, and if any arise during the Term of this Agreement, Consultant shall promptly inform Onconova and Onconova shall have the right in such event immediately to terminate this Agreement.

6. Independent Contractor

Consultant is an independent contractor, not an employee or agent of Onconova. Nothing in this Agreement shall render Consultant, or any of his/her agents or employees, an employee or agent of Onconova, nor authorize or empower Consultant or his/her agents or employees to speak for, represent, or obligate Onconova in any way. Onconova recognizes that Consultant retains all the rights and privileges of an employer, including but not limited to the right to hire, direct, discipline, compensate, and terminate its employees assigned to the Onconova

account. Consultant assumes any and all liabilities regarding Section 1706 and Section 414(n) of the Internal Revenue Code of 1986. Consultant is entering into this Agreement in Consultant's individual capacity and not as an employee or agent of MSSM and confirms that Consultant's performance of the Services in the Field under and during the Term of this Agreement shall be separate and distinct from Consultant's job responsibilities as an employee of MSSM.

7. Ownership of Developments

All written materials and other works that may be subject to copyright and all patentable and unpatentable inventions, and discoveries (including but not limited to any computer software) that are made, conceived, or written by Consultant in Consultant's performance of the Services in the Field under and during the Term of this Agreement ("Developments") shall be Onconova's property. Consultant agrees to hold all Developments confidential in accordance with paragraph 4 of this Agreement.

Notwithstanding the foregoing, Onconova shall not acquire any rights by reason of this Agreement in any publication, invention, discovery, improvement or other intellectual property, whether or not publishable, patentable or copyrightable, or any other results of research developed as a result of a program of research financed, in whole or in part, by funds under the control of MSSM. Any intellectual property right regarding works, inventions and/or discoveries made under any agreement between Onconova and MSSM shall be governed by such agreement.

8. Disclosure and Transfer of Developments

Consultant will disclose promptly to Onconova each Development and, upon Onconova's request and at Onconova's expense, Consultant will assist Onconova, or anyone it designates, in filing a patent or copyright application in any country in the world covering such Development. Each Development that is a copyrightable work, to the extent permitted by law, will be considered a work made for hire and the authorship and copyright in the work shall be in Onconova's name. During the Term, Consultant will execute all papers and do all things, which may be necessary or advisable, in the opinion of Onconova, to process such applications and to vest in Onconova, or its designee, all the right, title, and interest in and to Developments. If for any reason Consultant is unable to effectuate a full assignment of any Development, Consultant will transfer to Onconova, or its designee, its transferable rights, whether they be exclusive or nonexclusive, or as a joint inventor or partial owner of the Development.

9. Disclosures to Onconova

If during the term of this Agreement, Consultant discloses any copyrightable works, inventions, or discoveries, to Onconova that were conceived or written prior to this Agreement, or which are not made or conceived in performance of the Services in the Field under and during the Term of this Agreement, Onconova will have no liability to Consultant because of its use of such works, inventions, or discoveries, except liability for infringement of any valid copyright or patent now or hereafter issued thereon.

10. Term

The term of this Agreement shall be from the Effective Date through the termination date specified in Schedule 1 unless earlier terminated in accordance with paragraph 11 (the "Term"). This agreement may be renewed through written amendment agreed to by the parties, including review and approval by Consultant's employer MSSM for compliance with MSSM's policies.

11. Termination

Onconova may terminate this Agreement effective the day of notice by giving Consultant written notice of such termination if: (a) Consultant breaches any of his/her material obligations under paragraphs 4, 8, or 9 of this Agreement; or (b) fails to provide the standard of performance of Services that substantially meets Onconova's reasonable expectations; or (c) fails at any time, given reasonable notice, to provide the contracted Services defined in the Schedules attached hereto. If Onconova determines that it no longer requires the services of Consultant, it may terminate this Agreement by giving Consultant thirty (30) days' written notice. Likewise, Consultant may terminate this Agreement by giving Onconova thirty

(30) days' written notice. Consultant will have the right to terminate this Agreement immediately if Onconova fails to provide payment for Services rendered within a period of thirty (30) days following submission of an invoice.

12. MSSM Name Use

Except for accurately describing Consultant's affiliation with MSSM, neither party shall use MSSM's name in a manner that would identify MSSM with any product or any commercial or Other activity that would imply endorsement or support thereof by MSSM.

13. General

Neither party may assign this Agreement. This Agreement supersedes all prior agreements between the parties respecting the Services in the Field. This

Agreement may not be changed or terminated orally by or on behalf of either party. In the event either party breaches this Agreement, the other party will have the right to terminate this Agreement. In the event of actual or threatened breach of any of the terms of paragraphs 4, 8, or 9, Onconova will have the right to seek specific performance and injunctive relief. The rights granted by this paragraph are in addition to all other remedies and rights available at law or in equity. This Agreement shall be construed according to the laws of the Commonwealth of Pennsylvania for contracts made within that state.

Any notice required or permitted to be given under this Agreement will be sufficient if in writing and if delivered personally, or sent by certified or registered mail as follows (or to such address as will be set forth in a notice given in the same manner):

If to Consultant:

E. Premkumar Reddy, Ph.D.
Mount Sinai School of Medicine
Department of Oncological Sciences
One Gustave L. Levy Place
New York, NY 10029

If to Onconova:

Ramesh Kumar, Ph.D., President
Onconova Therapeutics, Inc.
375 Pheasant Run
Newtown, PA 18940

Accepted and Agreed by:

Consultant:

/s/ E. Premkumar Reddy	July 25, 2012
E. Premkumar Reddy, Ph.D.	Date

Onconova Therapeutics, Inc.:

/s/ Ramesh Kumar	July 27, 2012
Ramesh Kumar, Ph.D.	Date

Schedule 1

Description of Services in the Field:

Consultant's consulting and/or advisory services shall include:

Guidance and opinion on Temple University's Intellectual Property that has been licensed for commercialization through Onconova (the "Patents"), including:

- Explanation of development of original compounds, as it relates to Patents
- Synthesis of compounds, as it relates to Patents
- Feasibility aspects of Patents
- Commercialization aspects of Patents

Compensation

Consultancy will be for a maximum of 25 full days (or 200 hours) at the annual rate of $165,000.00. Payment will be made quarterly.

Term

This Agreement will be in effect until 12/31/2012, renewable.

CONSULTANT AGREEMENT RENEWAL

February 27, 2013

E. Premkumar Reddy, Ph.D.
Professor, Department of Oncological Sciences
and Department of Structural and Chemical Biology
Director, Experimental Cancer Therapeutics
Mount Sinai School of Medicine
1425 Madison Avenue
New York, NY 10029

Dear Dr. Reddy:

This letter refers to your Consulting Agreement with Onconova Therapeutics Inc. We wish to renew this agreement thru December 31, 2013. If in agreement, please sign and return a copy of this letter via email: lisa@onconova.us or via fax: 215-529-6580.

Best regards,

/s/ Ramesh Kumar

Ramesh Kumar, Ph.D.
President and CEO

I agree to renew my consulting agreement thru December 31, 2013.

/s/ E. Premkumar Reddy
E. Premkumar Reddy, Ph.D.

Exhibit 16.1

June 14, 2013

Securities and Exchange Commission
100 F Street, NE
Washington, D.C. 20549

RE: Onconova Therapeutics, Inc.
File No: 377-00169

Ladies and Gentleman:

We have read Onconova Therapeutics, Inc.'s statements regarding our dismissal as principal accountants, included under the heading "Management's Discussion and Analysis of Financial Condition and Results of Operations" within the Form S-1 Registration Statement to be filed on or about June 14, 2013 and we agree with such statements.

Very truly yours,

/s/ EISNERAMPER LLP

Exhibit 21.1

Subsidiaries of the Registrant

Name	Jurisdiction of Organization
Onconova Europe GmbH*	Germany
GBO, LLC	Delaware

* wholly owned

EXHIBIT 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption "Experts" and to the use of our report dated May 3, 2013, in the Registration Statement (Form S-1) and related Prospectus of Onconova Therapeutics, Inc. for the registration of shares of its common stock.

/s/ Ernst & Young LLP

Philadelphia, Pennsylvania
June 14, 2013

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Exhibit 23.2

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the inclusion in this Registration Statement of Onconova Therapeutics, Inc. on Form S-1 to be filed on or about June 14, 2013 of our report dated May 2, 2013, on our audit of the financial statements as of December 31, 2011 and for year ended December 31, 2011. We also consent to the reference to our firm under the caption "Experts" in the Registration Statement on Form S-1.

/s/ EISNERAMPER LLP

Edison, NJ
June 14, 2013

QuickLinks

DAVID S. ROSENTHAL

david.rosenthal@dechert.com
+1 212 698 3616 Direct
+1 212 698 0416 Fax

June 14, 2013

VIA EDGAR

Jeffrey P. Riedler
Assistant Director
Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549

Re: Onconova Therapeutics, Inc. (the "Company")
Confidential Draft Registration Statement on Form S-1 (File No. 377-00169)

Dear Mr. Riedler:

On behalf of Onconova Therapeutics, Inc. (the "Company"), set forth below is the Company's response to the comment letter dated May 30, 2013 provided by the staff of the Division of Corporation Finance (the "Staff") of the Securities and Exchange Commission (the "Commission") to the Company regarding the Company's Confidential Draft Registration Statement on Form S-1 (File No. 377-00169) (the "Draft Registration Statement") and the prospectus included therein (the "Prospectus").

We also describe below the changes that we have made in response to the Staff's comments in the Registration Statement on Form S-1 (the "Registration Statement") that the Company filed on June 14, 2013. For your convenience, the Staff's comments are numbered and presented in italicized text below, and each comment is followed by the Company's proposed response. The Company will also provide the Staff courtesy copies of the Registration Statement as-filed and marked to reflect the changes from the Draft Registration Statement.

General

1. ***Please submit all outstanding exhibits as soon as practicable. We may have further comments upon examination of these exhibits.***

The Company respectfully acknowledges the Staff's comment and has filed or confidentially filed each exhibit that is currently available to the Company and that is required to be filed pursuant to Item 601(a) of Regulation S-K. The Company intends to file all remaining exhibits sufficiently in advance of effectiveness of the Registration Statement to provide the Staff time to review such exhibits and to enable the Company to respond to any additional comments the Staff may have as a result of the inclusion of such exhibits.

2. ***Please provide us proofs of all graphic, visual or photographic information you will provide in the printed prospectus prior to its use, for example in a preliminary prospectus. Please note that we may have comments regarding this material.***

The Company respectfully acknowledges the Staff's comment and submits that it does not currently intend to use graphic, visual or photographic information in the printed prospectus. In the event the Company subsequently determines to use graphic, visual or photographic information in the printed prospectus, the Company intends to supplementally provide the Staff copies of any such materials as promptly as practicable.

3. ***Please supplementally provide us with copies of all written communications, as defined in Rule 405 under the Securities Act, that you, or anyone authorized to do so on your behalf, present to potential investors in reliance on Section 5(d) of the Securities Act, whether or not they retain copies of the communications. Similarly, please supplementally provide us with any research reports about you that are published or distributed in reliance upon Section 2(a)(3) of the Securities Act of 1933 added by Section 105(a) of the Jumpstart Our Business Startups Act by any broker or dealer that is participating or will participate in your offering.***

The Company respectfully acknowledges the Staff's comment. The Company has supplementally provided the Staff written communications presented to potential investors in reliance on Section 5(d) of the Securities Act. The Company submits that potential investors have not been permitted to retain copies of such written communications. The Company further submits that, as of the date hereof, no research reports have been distributed by any broker or dealer participating in the offering. The Company intends to supplementally provide the Staff copies of any such materials as promptly as practicable in the event that any additional materials are presented to potential investors or any materials are distributed by any broker or dealer participating in the offering.

4. ***We will deliver comments to your confidential treatment request under separate cover.***

The Company respectfully acknowledges the Staff's comment.

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5. ***Please update your filing to include unaudited interim financial statements and related financial schedules for the quarterly periods ended March 31, 2013 and 2012 as required by Rule 3-12 of Regulation S-X.***

The Company respectfully acknowledges the Staff's comment and has included the unaudited interim financial statements for the quarterly periods ended March 31, 2012 and 2013 in the Registration Statement.

6. ***Please provide the information required (including Exhibit 16) under Regulation S-K Item 304 and Item 11(i) of Form S-1 regarding the change in accountants for year 2012.***

The Company respectfully acknowledges the Staff's comment and has included the disclosure required under Item 304 of Regulation S-K regarding the change in accountants for the year 2012 on page 83 of the Registration Statement. Further, the Company notes that in response to the Staff's comment, Exhibit 16.1 has been filed as an exhibit to the Registration Statement.

Risk Factors
"Our product candidates may cause undesirable side effects...," page 16

7. ***Please expand the discussion in this risk factor to disclose the extent to which you have observed undesirable side effects in your trials, including any safety or toxicity issues, and the impact, if any, on the prospects for obtaining marketing approval of your product candidates. We note, for example, your disclosure on pages 85-88 detailing certain drug-related adverse events occurring in your rigosertib trials.***

The Company respectfully acknowledges the Staff's comment and has revised the applicable risk factor on pages 16 and 17 of the Registration Statement.

Special Note Regarding Forward-Looking Statements and Industry Data, page 46

8. ***Please note that it is not appropriate to state or imply that you do not have liability for the statements in your registration statement. Your statements at the bottom of page 47 that you have not independently verified market and industry data obtained from third-party sources or your own internal company research could imply that you are not taking liability for the statistical and other industry and market data included in your registration statement. In order to eliminate any inference that you are not liable for all of the information in your registration statement, please delete these statements or include a statement specifically accepting liability for these statements.***

The Company respectfully acknowledges the Staff's comment and has revised the disclosure on page 48 of the Registration Statement.

Use of Proceeds, page 48

9. ***We note your statement that you have not yet determined the amount of proceeds to be spent on any of the areas listed in the second paragraph of this section, such as research and development and clinical trial expenditures. However, if the company has specific purposes in mind for the use of proceeds, Item 504 of Regulation S-K requires disclosure of the approximate amount intended to be used for each such purpose. This is required even if, as you note in your prospectus, management will have broad discretion in allocating the proceeds and that the ultimate use of proceeds will depend on several contingencies and is subject to change.***

The Company respectfully acknowledges the Staff's comment and has revised the disclosure on page 49 of the Registration Statement. The Company notes that upon determination of the estimated offering price, the blank numbers included in the revised disclosure will be completed.

Management's Discussion and Analysis of Financial Condition and Results of Operations Financial Overview, page 57

10. ***We note your disclosure of "research funding" for 2011 and 2012 in the table on page 57. Please clarify the amount of research funding attributable to payments from LLS.***

The Company respectfully acknowledges the Staff's comment and notes that no amount of research funding is attributable to payment from LLS. On page 60 of the Registration Statement, the Company states that the $8.0 million of milestone payments received from LLS through March 31, 2013 have been recorded as deferred revenue as a result of the potential obligation to pay the total amount back to LLS. The Company notes that the majority of research funding in 2011 related to a grant received from the Department of Defense to advance recilisib towards marketing approval by the FDA, while research funding in 2012 represented a grant received from the National Institutes of Health to advance ON 1231320 towards IND filing.

Research and Development Expenses, page 62

11. ***You state on page 59 that research and development activities are central to your business model and that you plan to increase your research and development expenses***

for the foreseeable future. While you state that you do not currently utilize a formal time allocation system to capture expenses on a project-by-project basis, please expand your disclosure to provide the following:

- ***The costs you do track by project for each period presented and to date and a reconciliation of the total of these project costs to the total expenses presented on your statement of operations and comprehensive loss. In this regard, it appears, for example, that you may track external cost by project as you are able to quantify on page 70 that $8.4 million of the increase in research and development expenses in 2012 as compared to 2011 relates to clinical trials expenses for rigosertib.***

- ***Explain why management does not maintain and evaluate all research and development costs by project. Explain how you use functional area expenditures to evaluate and prioritize your R&D activities.***

- ***Explain how you monitor development progress for individual projects.***

- ***Absent costs by project, please provide other quantitative or qualitative disclosure that indicates the amount of the company's resources being used on the project such as by stage of development (i.e. discovery, pre-clinical, clinical phase I, clinical II and phase III) and/or other meaningful breakout.***

The Company respectfully acknowledges the Staff's comment and has included a summary of the Company's research and development expenses by functional area on page 62 of the Registration Statement as well as the Company's research and development expenses by compound on pages 62 and 63 of the Registration

Statement. The Company notes that the primary purpose for tracking expenditures by functional area and by compound is to track and manage the Company's actual expenses in an organized and logical way. Managing the Company's expenses in this way enables it to evaluate and appropriately set the relative level of expense across the research and development continuum and to establish appropriate expense levels within each functional area and compound. The Company prioritizes its activities based upon an evaluation of many factors, including, but not limited to, scientific rationale and its expertise in any particular disease area, drug development and regulatory pathways, and commercial market opportunity. The Company generally monitors development progress by evaluating the completion of pre-clinical research activities, clinical manufacturing, clinical trial advancement from Phase 1 through Phase 3 and regulatory progress.

Additionally, in response to the Staff's comments regarding the Company's clinical progress, the Company refers the Staff to the Company's disclosure relating to its product candidates beginning on page 87 of the Registration Statement. The Company discloses the status of its clinical projects as well as that its expenses typically increase as the Company's drug candidates progress

to later phases of clinical development. The Company believes that disclosing the status of its clinical projects is useful to potential investors as a way to gauge past or future clinical expense levels. The absolute level of the Company's clinical development costs, which includes its clinical trial costs, can be found on page 62 of the Registration Statement.

The Company submits that it is not providing a clinical project listing and cost summary. As the Company has disclosed on page 61 of the Registration Statement, the Company does not maintain a formal accounting system that captures or allocates all costs, both direct and indirect, on a per-project basis.

Stock-Based Compensation, page 63

12. We have the following comments regarding your disclosure and accounting for stock-based compensation:

- ***Since you have not disclosed an estimated offering price we are deferring a final evaluation of stock compensation and other costs recognized until the estimated offering price is specified. We may have further comments in this regard when the amendment containing that information is filed.***

- ***In the first paragraph of your discussion about the fair value of stock option grants from January 1, 2011 to February 1, 2012 you indicate that you utilized an assumed annual volatility rate of 64.0% based on historical share price trading data for a group of 10 companies you considered comparable to yours. Please tell us the name of these 10 companies and explain to us why you deemed them to be comparable to you. In your response, for each of these companies tell us the following information at your valuation date:***

  - ***annual revenues;***
  - ***annual product revenues;***
  - ***net income/loss;***
  - ***assets;***
  - ***equity;***
  - ***number of products in development and their stages of development; and***
  - ***number of marketed products***

- ***Please provide in your filing containing the IPO price range, a discussion of each significant factor contributing to the difference between the fair value as of the date of each grant and the estimated IPO price range. Please reconcile and explain the differences between the mid-point of your estimated offering price range and the fair values included in your analysis.***

The Company respectfully acknowledges the Staff's comment and advises the Staff that the requested information for the comparable companies considered in estimating the volatility is listed below. The Company notes that page 69 of the Registration Statement reflects the correct number of comparable companies at 13.

At September 30, 2010, the Company was a pre-revenue company primarily developing oncology drugs. Thus, the Company selected comparable companies that were operating in the oncology space, especially those in the drug development stage or those that had just started generating revenues. The Company selected these companies since most of them had minimal or no product revenue and a similar number of products under development. Additionally, the Company considered the stages of the products in development for the comparable companies and noted that the products were in various stages of development. This was consistent with the status of the Company's products at the time, which were also in various stages of development. The Company utilized 2009 financial information for the comparable companies below because it was the latest publicly available information at the time of the valuation (dollars in millions).

Company	Revenue 2009	Product revenues 2009	Net income (loss)	Total Assets	Market capitalization of equity	No. of marketed products	No. of Products under development
Cyclacel Pharmaceuticals	$ 0.91	$ 0.91	$ (19.60)	$ 14.47	$ 64.00	3	5
Curis Inc	8.59	none	(9.80)	36.10	102.85	0	4
Sunesis Pharmaceuticals	3.76	none	(67.80)	5.17	94.08	0	7
Enzon Pharmaceuticals	130.47	116.50	3.70	332.75	679.21	5	6
Arqule Inc	25.20	none	(36.10)	171.88	234.76	0	6
Telik Inc	none	none	(23.70)	46.15	36.72	0	7
Infinity Pharmaceuticals	49.54	none	(32.50)	157.32	145.89	0	7
Synta Pharmaceuticals	144.25	none	79.10	48.91	161.38	0	11
Supergen Inc	41.25	none	4.70	110.52	126.41	0	3

Allos Therapeutics	3.60	3.6	(73.60)	175.38	487.48	1	1
Poniard Pharmaceuticals	none	none	(46.20)	52.44	28.30	0	6
Cytrx Corp.	9.50	9.4	(4.80)	35.28	80.68	1	4
Adherex Technologies Inc	none	none	(2.80)	0.83	12.89	0	7

The Company also notes that its September 30, 2010 valuation was based on an income approach utilizing a discounted cash flow model and the Company has updated its discussion on page 68 of the Registration Statement to further describe its valuation methodology. The option pricing back-solve method utilizing the noted volatility was prepared by an independent valuation firm to corroborate the valuation prepared using the income approach.

As disclosed in Note 11 to its audited consolidated financial statements, the Company is accounting for stock-based compensation under the liability method, the fair value of which is re-measured at

each balance sheet date as determined by its board of directors based in part on an independent third-party valuation.

With respect to the last bullet point of the Staff's comment, the Company has added proposed disclosure on page 72 of the Registration Statement, which the Company will update as appropriate once the estimated offering price range has been determined.

Operating and Capital Expenditure Requirements, page 73

13. To the extent practicable, please quantify the estimated costs mentioned in this section that you will incur as a result of being a public company.

The Company respectfully acknowledges the Staff's comment and has revised the disclosure on page 80 of the Registration Statement.

Business, page 81
Our Product Candidates, page 79

14. Please disclose in this section whether there is an effective investigational new drug application (IND) for each of the following:

- ***Rigosertib for treatment of higher risk MDS in intravenous formulation***
- ***Rigosertib for treatment of lower risk MDS in oral formulation***
- ***Rigosertib for treatment of head and neck cancer***
- ***Rigosertib for treatment of pancreatic cancer***
- ***ON 013105 for treatment of lymphoma***
- ***Recilisib for treatment of ARS***

In each case, if an IND has been filed for the compound and corresponding treatment indicated, please disclose the identity of the filer and the date of filing. If an IND has not been filed, please explain why.

The Company respectfully acknowledges the Staff's comment and has revised the Registration Statement to include the requested disclosure relating to the filing of effective INDs for each product candidate and the applicable indications.

Treating Myelodysplastic Syndromes, page 81

15. Please explain how the mechanism of action for hypomethylating drugs differs from rigosertib. Specifically, please clarify why rigosertib does not pose the same risk of patient failure and drug resistance as azacitidine or decitabine, the current standard of care for higher risk MDS patients.

The Company respectfully acknowledges the Staff's comment and has included additional disclosure on page 90 of the Registration Statement.

Phase 1/2 Trial Results of Rigosertib in Patients with Myelodysplastic Syndromes, page 83

16. Please clarify the reason why a follow-up bone marrow biopsy was only available for 30 of the 39 patients treated in these clinical trials. Please also disclose whether you expect any similar difficulties in obtaining follow-up biopsies in the ONTIME trial. If so, explain what effect, if any, this could have on the evaluation of trial results and the support of efficacy claims for rigosertib.

The Company respectfully acknowledges the Staff's comment and has included additional disclosure on page 92 of the Registration Statement.

Collaborations, page 90

17. Please clarify in this section whether your $10.2 million in government funding for recilisib was part of a formal agreement with the Department of Defense. If so, please describe the material terms of that agreement and the parties' respective obligations in this section and file the agreement as an exhibit to the registration statement.

The Company respectfully acknowledges the Staff's comment and has included additional disclosure on page 99 of the Registration Statement. The Company further notes that the government funding was received over time pursuant to the Peer Reviewed Medical Research Program as well as Congressional earmarks issued by the Uniformed Services University of the Health Sciences. The Company notes that all agreements related to this funding have expired and no funding or other obligations remain outstanding at this time.

The Leukemia and Lymphoma Society

18. Please explain more specifically what "advancing the clinical development of rigosertib" means under the terms of the LLS agreement, as well as the process for determining that the company has failed to fulfill this obligation.

The Company respectfully acknowledges the Staff's comment and has revised the disclosure on pages 59, 60, 103 and 104 of the Registration Statement.

Intellectual Property, page 93

19. We note your research agreement with Mount Sinai School of Medicine. Please disclose all material terms of that agreement in this section, including which, if any, of your products and patents are implicated under this research agreement. Please also file this agreement as an exhibit to the registration statement.

In response to the Staff's comment, the Company respectfully submits that the research agreement with Mount Sinai is not a material agreement required to be filed as an exhibit under Item 601(b)(10) of Regulation S-K. The Company has concluded that the research agreement with Mount Sinai is not required to be filed because it (i) is an agreement that was made in the ordinary course of the Company's business, (ii) is not an agreement on which the Company's business is substantially dependent and (iii) does not fall within any of the other categories of Item 601(b)(10)(ii) of Regulation S-K. Additionally, none of the Company's current clinical product candidates or patents is implicated by the research agreement with Mount Sinai.

The Company notes that two patent applications related to the Company's preclinical programs have resulted from the Mount Sinai research agreement. The Company does not yet know whether the work being done under the research agreement with Mount Sinai will result in the development of a commercializable drug or therapy. In the event that a commercializable drug or therapy is developed pursuant to the research agreement with Mount Sinai, the Company will evaluate whether the research agreement with Mount Sinai has become one on which the Company is substantially dependent, and if so, will then file the research agreement with Mount Sinai with the SEC.

20. Please disclose whether you license or own the composition-of-matter patent and the method of treatment patent for rigosertib.

The Company respectfully acknowledges the Staff's comment and has revised the disclosure on page 104 of the Registration Statement.

Manufacturing, page 96

21. Please identify the material terms of your manufacturing and supply agreements. Please file these agreements as exhibits to the registration statement as well. Alternatively, if you do not believe any of these agreements is material, please advise us as to the basis of your conclusions.

The Company respectfully acknowledges the Staff's comment and submits that it is not currently party to any manufacturing or supply agreements with its contract manufacturing organizations ("CMOs"). In response to the Staff's comment, the Company has revised the disclosure on page 107 of the Registration Statement to clarify that the Company currently orders any products from its CMOs through purchase orders. The Company notes that it is currently negotiating supply agreements with its CMOs. Upon entering into any material supply agreement with a CMO, the Company will file such supply agreement with the SEC.

Management, pages 113-115

22. We note your discussion of consulting agreements with certain members of your clinical advisory and scientific advisory boards "covering their respective financial arrangements." Please describe payments and other material terms of these agreements and file them as exhibits to the registration statement. If you do not believe these agreements are material, please advise us as to the basis of your conclusions.

The Company acknowledges the Staff's comment and advises the Staff that it has a standing clinical advisory board ("CAB") and a standing scientific advisory board ("SAB") that are each comprised of several individuals. The CAB consulting agreements and SAB consulting agreements entered into by the Company with substantially all of the CAB and SAB members provide for modest compensation, including annual cash retainers ranging from $3,750 to $15,000 or annual stock option retainers ranging from grants of 2,000 to 4,000 stock options. In response to the Staff's comment, the Company has revised the disclosure on pages 125 and 127 of the Registration Statement to remove the references to financial arrangements with CAB and SAB members as such arrangements are not material. The Company is not dependent on any one of these individuals, and if one or more CAB and/or SAB members were to resign from such position, the Company could either replace them or rely on the remaining members of the CAB or SAB. Consequently, and in reliance on Item 601(b)(10)(ii)(B) of Regulation S-K, the Company submits that none of the agreements is material and, therefore, none need to be filed as an exhibit to the Registration Statement.

Shares Eligible for Future Sale, page 144

23. Once available, please file the form of lock-up agreement as an exhibit to your registration statement.

The Company respectfully acknowledges the Staff's comment and notes that the form of lock-up agreement will be included as an exhibit to the form of underwriting agreement that will be filed as an exhibit prior to the effectiveness of the Registration Statement.

Consolidated Financial Statements
Notes to Consolidated Financial Statements
Report of Independent Registered Public Accounting Firm, page F-3

24. Please tell us if May 2, 2013 is the original signature date for EisnerAmper LLP's audit of your financial statements for the year ended December 31, 2011. If not, tell us the original signature date and the reason(s) it changed. Tell us if any of the adjustments referred to on pages 68-69 related to and were recorded in year 2011 as a restatement of those financial statements.

The Company respectfully acknowledges the Staff's comment and notes that the original signature date for EisnerAmper LLP's opinion relating to the audit of the Company's financial statements for the year ended December 31, 2011 (the "2011 Financial Statements") was July 6, 2012. Subsequent to that date, the Company determined that the 2011 Financial Statements required changes to conform with public company reporting requirements and to correct certain errors that were detected. Accordingly, the 2011 Financial Statements were revised to reflect those adjustments. EisnerAmper LLP issued their opinion with the revised date upon completion of audit procedures performed related to the revised financial statements and evaluation of subsequent events. The adjustments referred to on page 74 of the Registration Statement were related to the Company's 2012 financial statements. The following adjustments related to 2011:

- Accounting for the Company's outstanding warrants to purchase shares of its preferred stock as liabilities including accounting for warrant re-measurements and exercises: The adjustment related to the 2011 Financial Statements was to increase warrant liability by $1,064,000, increase preferred stock by $642,000, increase the benefit from the change in the fair value of the warrant liability by $1,287,000 and increase stockholders deficit by $2,993,000.

- Accounting for the Company's stock options pursuant to liability accounting: The adjustment related to the Company's 2011 Financial Statements was to increase stock option liabilities by $2,648,000, increase stockholders deficit by $4,080,000, decrease general and administrative expenses by $655,000 and decrease research and development expenses by $777,000.

- Accounting for the accretion of the Company's preferred stock: The adjustment related to the 2011 Financial Statements was to decrease preferred stock by $1,331,000 and decrease stockholders deficit by $1,331,000.

15. License and Collaboration Agreements
Baxter Agreement, page F-34

25. In 2012, you recognized $42.4 million in revenue relating to the Baxter agreement. Please address the following and reference for us any authoritative literature you relied upon to support your position:

- ***Please elaborate on your assertion that the license has standalone value to Baxter. In your response, tell us how Baxter can exploit the license without the additional development services that you are obligated to perform. Tell us:***
  - ***whether and how Baxter or any other party can perform these development services given your expertise with your intellectual property;***
  - ***whether Baxter has the rights and full access to past and future intellectual information in order to obtain regulatory approval of rigosertib in Europe;***
  - ***whether Baxter is performing any development activities related to rigosertib; and***
  - ***how the fact that you will own all marketing approvals and regulatory filings pursuant to section 6.1 of your agreement with Baxter filed as Exhibit 10.1 to your draft submission impacts Baxter's ability to exploit the license.***
- ***Please tell us why it is appropriate to recognize the revenue allocated to the research and development services deliverable through March 31, 2014 when it appears that you are obligated to file all regulatory submissions in Europe and it appears unlikely that you will be in a position to have these submissions filed and approved by then.***
- ***Please tell us why you do not believe your participation on the joint committee as disclosed in the third paragraph on page F-36 is a deliverable under your Baxter agreement. In your response, please tell us:***
  - ***the composition of the committee;***
  - ***the term of the committee;***
  - ***your obligation to participate;***
  - ***what happens if you do not participate; and***
  - ***the dispute resolution provisions.***

License Stand-Alone Value

The Company respectfully acknowledges the Staff's comment and submits that, as disclosed in Note 15 to its audited consolidated financial statements, the Company determined that the deliverables under the Baxter agreement include the exclusive, royalty-bearing, sublicensable license to rigosertib and the research and development services to be performed by the Company. The Company concluded that the license had stand-alone value to Baxter and was separable from the research and development services because the license is sublicensable, there are no restrictions as to Baxter's use of the license and Baxter has significant research capabilities in this field.

In determining the separate units of accounting, the Company considered ASC 605-25-25-5a and noted that in an arrangement with multiple deliverables, the delivered item or items shall be considered a separate unit of accounting if the delivered item or items have value to the customer on a stand-alone basis. The item or items have value on a stand-alone basis if they are sold separately by any vendor or the customer could resell the delivered item(s) on a stand-alone basis.

In the context of a customer's ability to resell the delivered item(s), this criterion does not require the existence of an observable market for the deliverable(s).

The Company determined that the deliverables could be separated into two units of accounting: a license and certain research and development services. In performing its assessment, the Company considered, in addition to the language in the ASC, the contents of a Staff speech dated December 7, 2009, where it was noted that if a license could be resold, or if the research and development services are not proprietary, and could be performed by other vendors, that these are indications that the license might have stand-alone value.

Pursuant to the agreement with Baxter, the Company granted Baxter an exclusive license to research, develop, manufacture and supply and commercialize the Company's anti-cancer compound, rigosertib, for all therapeutic indications in Europe. The agreement also allows Baxter to sublicense rigosertib. The ability of Baxter to sublicense is not contingent on the approval or right of first refusal by the Company. The Company determined that Baxter's ability to sublicense the intellectual property to others demonstrates that the license has stand-alone value. In addition, at the time of entering into the agreement in September 2012, the rigosertib program was in a phase 3 clinical trial for higher risk MDS, a phase 3 clinical trial for pancreatic cancer and a phase 2 trial for lower risk MDS. The protocols for the clinical trials had been written and provided to Baxter and a Special Protocol Assessment (SPA) had already been granted to the Company by the FDA for higher risk MDS. These later stage clinical trials, where protocols have been prepared and trials are in process, can be completed more easily by entities other than the Company, as compared to earlier stage clinical trials. The remaining services to be performed by the Company are not proprietary and could be performed by other qualified parties. For example, the Company relies heavily on clinical research organizations ("CROs") to complete the clinical trials, and Baxter could engage the same or similar CROs to complete the trials on its behalf. Although Baxter is not performing development activities related to rigosertib, Baxter possesses the internal expertise (or a vendor could be hired) to complete the efforts under the rigosertib programs without further assistance from the Company.

Baxter develops, manufactures and markets products that save and sustain the lives of people with hemophilia, immune disorders, infectious diseases, kidney disease, trauma, and other chronic and acute medical conditions. As a global, diversified healthcare company, Baxter applies a unique combination of expertise in medical devices, pharmaceuticals and biotechnology to create products that advance patient care worldwide. Baxter employs over 50,000 people, with revenues totaling approximately $14.2 billion in 2012 and research and development expense of approximately $1.2 billion. Baxter has expertise in completing clinical trials, assessing clinical trial results and preparing regulatory filings and has also developed and obtained regulatory and marketing approval in Europe for numerous products used to treat hematologic conditions. Baxter has expertise in rare hematologic conditions, and rigosertib is a natural

complement to Baxter's existing treatments for patients with these conditions. Given these important attributes, Baxter was selected as the Company's exclusive partner in Europe.

Baxter has the rights and full access to past and future intellectual information in order to obtain regulatory approval of rigosertib in Europe. In connection with the agreement, the Company licensed to Baxter all information and all patents controlled by the Company necessary for the development, manufacture, use and sale of rigosertib and all present and future formulations and dosages in all present and future therapeutic indications in the licensed territory.

Pursuant to the agreement, the Company will own all marketing approvals and regulatory filings related to rigosertib. However, as indicated above, Baxter has been granted a license to commercialize all present and future formulations of rigosertib in all present and future therapeutic indications in Europe and is responsible for all commercialization activities in Europe. The agreement further provides that in instances where the Company may decide not to progress a certain indication, Baxter has the right, if it so chooses, to progress development of the indication for purposes of obtaining marketing approval. Baxter's right and ability to commercialize rigosertib in Europe will allow Baxter to exploit the license to its benefit. Therefore, the fact that the Company will own all marketing approvals and regulatory filings will not impact Baxter's ability to exploit the license.

Accordingly, given Baxter's ability to sublicense under the agreement and its ability internally or with outside help to conduct the ongoing development efforts, the Company concluded that the license has stand-alone value. In order to determine if the license can be treated as a separate unit of accounting, the Company also considered whether there is a general right of return associated with the license. The $50 million upfront payment received by the Company is non-refundable; therefore, there is no right of return for the license. As a result, the Company concluded that the license is a separate unit of accounting.

Revenue Recognition-Research and Development Services

The Company respectfully acknowledges the Staff's comment and submits that, as disclosed in Note 15 to its audited consolidated financial statements, the Company is recognizing the revenue related to the research and development services on a proportional performance basis. The majority of the efforts in connection with the completion of the non-contingent obligations to perform research and development services are expected to be completed through the first quarter of 2014 and therefore the Company expects the majority of the related revenue to be recognized through

this time period as well. Should the decision be made to advance an indication to a regulatory filing in Europe, the Company will be responsible for the regulatory submission. However, the efforts associated with such submission are not deemed significant to the agreement. The regulatory filing will be based on a global dossier of the clinical results maintained by the Company, and the Company expects the information required to prepare the global dossier to support the regulatory filing in Europe to be available during the first quarter of 2014. The Company expects to first file for regulatory approval in the United States, where the Company maintains commercialization rights, and such filings will support the submissions in Europe. Further, Baxter is responsible for all regulatory filing fees in Europe and all discussions and negotiations with the European regulatory authorities, consistent with Baxter's obligation to obtain marketing approval in Europe.

The Company's obligation to complete any regulatory filings as it relates initially to higher risk MDS is also contingent on the results of the related phase 3 clinical trial and the mutual agreement of the Company and Baxter to proceed with the filing for marketing approval. The decision to advance rigosertib for pancreatic cancer and rigosertib for lower risk MDS is also contingent on the results of the current and any future clinical trials and the mutual agreement and decision by the Company and Baxter to progress these indications to a filing for marketing approval. If a decision is made to proceed with a filing for marketing approval, the Company is entitled to significant milestone payments for each indication upon filing for marketing approval.

Joint Committee Participation

The Company respectfully acknowledges the Staff's comment and submits that article 3 of the agreement provides for the formation of a Joint Steering Committee ("JSC") and provides that the JSC will be comprised of three employees from the Company and three employees from Baxter. The chairperson of the JSC for an initial period of time will be appointed by the Company and thereafter shall alternate on a meeting-by-meeting basis between the Company and Baxter, although the chairperson will not have any greater power or authority than any other member of the JSC. The JSC will meet at least once during a pre-determined period in person and all other meetings may be held by videoconference or

teleconference. If a representative of a party is unable to attend a meeting, such party may designate an alternate to attend such meeting. If the members of the JSC are unable to reach consensus on a particular issue, such issue shall be referred to an executive officer of each party or their designees for resolution. The term of the JSC is consistent with the term of the agreement, which will remain in effect until the expiration of all applicable royalty terms and satisfaction of all payment obligations in each licensed country, unless terminated earlier due to the uncured material breach or bankruptcy of a party, force majeure, or in the event of a specified commercial failure.

The Company concluded that its participation on the JSC did not represent a deliverable to be evaluated in accordance with ASC 605-25 for purposes of determining whether it represented a separate unit of accounting or should be included with another identified unit of accounting. In reaching this conclusion, the Company considered the following factors:

- Participation on the JSC is not explicitly referred to as an obligation in the agreement;
- As noted above, the Company concluded that Baxter had the expertise to pursue the continued development and commercialization of rigosertib without any further involvement from the Company;
- The responsibilities of the JSC are of a "review and monitor" type as opposed to a "develop or create" type. The JSC responsibilities include the review and evaluation of the progress under the development plan that was included in the agreement when signed, monitoring the progress of the clinical studies, and review and comment on regulatory submissions, publication strategy and commercial plan; and
- As the JSC provides primarily governance activities that do not require the Company's unique skills or expertise, the agreement does not provide for any penalty for non-participation on the JSC and the inclusion or exclusion of participation on the JSC would not be expected to cause the arrangement consideration to vary by more than an insignificant amount.

While the Company does not believe that its participation on the JSC would represent a deliverable, the Company has also considered the accounting effect of a conclusion that such participation does represent a deliverable. Under that scenario, the Company has concluded that if such participation was deemed to be a deliverable it would represent a separate unit of accounting. The Company also notes the JSC deliverable

would have stand-alone value upon delivery because there are other vendors that could provide oversight or strategic direction similar to that provided by the Company in connection with its participation on the JSC and that such services are sold separately in the marketplace. As previously described, the JSC exists to provide governance and oversee the implementation and coordination of the development and commercialization plans. The Company is required to use commercially reasonable efforts to direct, coordinate and manage the development of rigosertib in the initial indications in accordance with a development plan that was agreed upon and included in the agreement when signed. The Company is required to provide clinical trial results, data and findings as well as regulatory information to Baxter and as such, the Company believes that there are many vendors in the marketplace that could fulfill the governance and oversight functions since they would have access to the data they would need to provide effective oversight. As a result, the Company believes that Baxter has the expertise, or could obtain any necessary expertise from other vendors (e.g., clinical research organizations, contract manufacturers, third party logistics providers, etc.), necessary to pursue the development and commercialization of rigosertib without the Company's participation on the JSC.

In estimating the selling price of a JSC deliverable, the Company determined that neither vendor specific objective evidence nor third party evidence of selling price exists. Accordingly, the Company estimated the selling price of the JSC deliverable based on management's best estimate of selling price. To determine the best estimate of selling price of the JSC deliverable, the Company considered factors such as the number of the Company's representatives participating on the JSC, the annual number of contractually required meetings for the JSC and an estimated rate charged by a third-party consultant for the activities, and the expected term of the JSC. Based on this analysis, the Company determined a preliminary best estimate of selling price of a potential JSC deliverable of approximately $500,000. Further, once the relative selling price allocation of the arrangement consideration was completed, the amount of arrangement consideration allocated to this deliverable would be less than $200,000.

The Company has concluded that, while it does not believe the JSC is a substantive obligation, the identification of it as a deliverable would have only an immaterial effect on the Company's proposed accounting.

26. Please revise your filing to disclose each individual potential future milestone you could receive and its related contingent consideration as required by ASC 605-28-50-2b.

The Company respectfully acknowledges the Staff's comment and has revised the disclosure on pages F-35 and F-37 of the Registration Statement. The Company notes that it has provided substantially greater detail regarding each clinical development- and regulatory-based milestone under both the Baxter and SymBio agreements. Further, with respect to sales-based milestones, the Company believes that the aggregated milestone disclosure complies in all material respects with the requirements of ASC 605-28-50-2b,

given the uncertainty regarding the achievement of each individual sales-based milestone and the size and nature of each individual sales-based milestone in the context of the Company's anticipated operations at the time. The Company also believes that this level of aggregation properly reflects the fact that while the Company is typically involved with respect to development and regulatory activities, the Company may not necessarily be involved with respect to commercialization and sales activities and therefore makes the Company's ability to determine the probability of receipt of such commercial milestone payments more difficult, and further differentiates pre-sales activities from sales activities.

The Company believes that providing a detailed description of each and every sales-based milestone it may potentially earn under the existing agreements with Baxter and SymBio would not provide its investors meaningful or material information, and could be confusing and potentially misleading to investors as the Company's sales-based milestones are highly speculative and contingent. As the Supreme Court noted in its *TSC v. Northway* decision establishing the standard for materiality in securities disclosures, a standard that requires too much disclosure would cause a company "simply to bury the shareholders in an avalanche of trivial information—a result that is hardly conducive to informed decision making." 426 U.S. at 448-49 (1976). A long list of such milestones, especially those that may never be achieved, risks creating "information overload." Further, doing so without a discussion of the related risk factors associated with each of them individually may be misleading to investors, leading them to mistakenly place an unrealistic value on the revenue stream from future milestone payments, as the likelihood of achieving each milestone may vary greatly, and the addition of such additional risk factors creates the potential for additional "information overload." The Company therefore submits the disclosure in the Registration Statement on sales-based milestones is the appropriate level of disclosure.

Index to Exhibits, page II-7

27. Please file your joint venture agreement with GVK Biosciences as an exhibit to your registration statement.

The Company respectfully acknowledges the Staff's comment and has included the limited liability company agreement creating the joint venture with GVK Biosciences as Exhibit 10.12 to the Registration Statement.

* * * * * * *

If you have any questions, or if you require additional information, please do not hesitate to contact me at (212) 698-3616.

Sincerely,

/s/ David S. Rosenthal
David S. Rosenthal

Cc: Ramesh Kumar, Ph.D.
Ajay Bansal
Onconova Therapeutics, Inc.
James J. Marino, Esq.
Dechert LLP
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