

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

Amendment No. 1
TO

FORM S-1

REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Onconova Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation or organization)

2834
(Primary Standard Industrial Classification Code Number)

22-3627252
(I.R.S. Employer Identification No.)

**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)

**Steven M. Fruchtman, M.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)

Copy to:

Joanne R. Soslow
Morgan, Lewis & Bockius LLP
1701 Market Street
Philadelphia, PA 19103
(215) 963-5000

**Steven M. Skolnick
Michael J. Lerner**
Lowenstein Sandler LLP
1251 Avenue of the Americas
New York, New York 10022
(212) 262-6700

Approximate date of commencement of proposed sale to the public: From time to time 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 check the following box. x

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act of 1933, please 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 of 1933, 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, smaller reporting company or an emerging growth company. See definitions of "large accelerated filer", "accelerated filer", "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	<input type="checkbox"/> o	Accelerated filer	<input type="checkbox"/> o
Non-accelerated filer	<input checked="" type="checkbox"/> x	Smaller reporting company	<input checked="" type="checkbox"/> x
		Emerging growth company	<input type="checkbox"/> o

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act. o

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant files a further amendment which 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 Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

The information in this prospectus is not complete and may be changed. We may not sell these securities until the Securities and Exchange Commission declares our registration statement effective. This preliminary prospectus is not an offer to sell these securities and we are not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

Subject to completion, dated November 12, 2019

PRELIMINARY PROSPECTUS



Onconova Therapeutics, Inc.

Up to 28,571,429 Units (each Unit contains one share of Common Stock and one Warrant to purchase one share of Common Stock)

Up to 28,571,429 Pre-Funded Units (each Pre-Funded Unit contains one Pre-Funded Warrant to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock)

(Up to 28,571,429 shares of Common Stock Underlying the Pre-Funded Warrants) and

(Up to 28,571,429 shares of Common Stock Underlying the Warrants)

We are offering up to 28,571,429 Units ("Units," each Unit consisting of one share of Common Stock, par value \$0.01 per share ("Common Stock") and one warrant (the "Warrant") to purchase one share of Common Stock. Each Warrant contained in a Unit has an exercise price of \$ per one share of Common Stock, representing 100% of the public offering price of a Unit. The Warrants contained in the Units will be exercisable immediately and will expire five years from the date of issuance.

We are also offering the shares of Common Stock that are issuable from time to time upon exercise of the Warrants contained in the Units.

We are also offering to each purchaser whose purchase of Units in this offering would otherwise result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% of our outstanding Common Stock immediately following the consummation of this offering, the opportunity to purchase, if the purchaser so chooses, up to 28,571,429 pre-funded units ("Pre-Funded Units," each Pre-Funded Unit consisting of one Pre-Funded Warrant ("Pre-Funded Warrant") to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock) in lieu of Units that would otherwise result in the purchaser's beneficial ownership exceeding 4.99% of our outstanding Common Stock (or at the election of the purchaser, 9.99%). Each Pre-Funded Warrant contained in a Pre-Funded Unit will be exercisable into one share of Common Stock. The purchase price of each Pre-Funded Unit will equal the price per Unit being sold to the public in this offering minus \$0.01, and the exercise price of each Pre-Funded Warrant included in the Pre-Funded Unit will be \$0.01 per share of Common Stock. This offering also relates to the shares of Common Stock issuable upon exercise of any Pre-Funded Warrants contained in the Pre-Funded Units sold in this offering. Each Warrant contained in a Pre-Funded Unit has an exercise price of \$ per share of Common Stock, representing 100% of the public offering price of a Unit. The Warrants contained in the Pre-Funded Units will be exercisable immediately and will expire five years from the date of issuance. We are also offering the shares of Common Stock that are issuable from time to time upon exercise of the Warrants contained in the Pre-Funded Units.

Our Common Stock is listed on the Nasdaq Capital Market under the symbol "ONTX." On November 11, 2019, the last reported sale price of Common Stock on the Nasdaq Capital Market was \$0.42 per share. The actual offering price per Unit and Pre-Funded Unit, and the exercise price of the Warrants, as applicable, will be determined by negotiation between us and the underwriter at the time of pricing, and may be at a discount to the current market price. We do not intend to apply for listing of the Pre-Funded Warrants or Warrants on any securities exchange or other nationally recognized trading system. There is no established public trading market for the Pre-Funded Warrants or Warrants, and we do not expect a market to develop.

For each Pre-Funded Unit we sell, the number of Units we are offering will be decreased on a one-for-one basis. The Units and the Pre-Funded Units will not be issued or certificated. The shares of Common Stock or Pre-Funded Warrants, as the case may be, and the Warrants can only be purchased together in this offering but the securities contained in the Units or Pre-Funded Units will be issued separately.

While none of our directors or executive officers has entered into any binding commitment or agreement to purchase Units sold in this offering, our directors and executive officers have indicated interests in subscribing for up to an aggregate of approximately one percent (1%) of the total offering price of the Units, subject to potential proration.

You should rely only on the information contained herein or incorporated by reference in this prospectus. We have not authorized any other person to provide you with different information.

Investing in our securities involves risks. See "Risk Factors" beginning on page 8 of this prospectus and in the documents incorporated by reference into this prospectus.

	Per Unit	Per Pre-Funded Unit	Total
Public offering price	\$	\$	\$
Underwriting discounts and commissions (1)	\$	\$	\$
Proceeds, before expenses, to us (2)	\$	\$	\$

(1) In addition, we have agreed to pay the underwriter a management fee in the amount of 1% of the aggregate offering price and to reimburse the underwriter for certain expenses. See "Underwriting" for additional information.

(2) Excludes potential proceeds from the exercise of the Warrants or the Pre-Funded Warrants being offered pursuant to this prospectus.

We have granted the underwriter the option to purchase up to 4,285,714 additional shares of Common Stock at a purchase price of \$ per share and/or Warrants to purchase up to an aggregate of 4,285,714 shares of Common Stock at a purchase price of \$0.01 per Warrant with an exercise price of \$ per share of Common Stock, less the underwriting discounts and commissions. The underwriter may exercise its option at any time and from time to time within 30 days from the date of this prospectus. If the underwriter exercises the option in full, the total underwriting discounts and commissions payable by us will be \$, and the total proceeds to us, before expenses, will be \$.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The underwriter expects to deliver the securities to purchasers on or about , 2019.

Sole Book-Running Manager
H.C. Wainwright & Co.

The date of this prospectus is , 2019.

TABLE OF CONTENTS

	<u>Page</u>
PROSPECTUS SUMMARY	1
THE OFFERING	3
RISK FACTORS	4
CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS	7
USE OF PROCEEDS	9
CAPITALIZATION	10
DILUTION	11
DESCRIPTION OF CAPITAL STOCK	13
DESCRIPTION OF SECURITIES WE ARE OFFERING	20
UNDERWRITING	23
EXPERTS	26
LEGAL MATTERS	26
WHERE YOU CAN FIND MORE INFORMATION	26
INCORPORATION BY REFERENCE	26

ABOUT THIS PROSPECTUS

Unless the context otherwise requires, references in this prospectus to “Onconova,” “Onconova Therapeutics,” “Company,” “we,” “us” and “our” refer to Onconova Therapeutics, Inc. and its consolidated subsidiaries. This prospectus is part of a registration statement that we have filed with the Securities and Exchange Commission, which we refer to as the SEC or the Commission, utilizing a registration process. It is important for you to read and consider all of the information contained in this prospectus and any applicable prospectus before making a decision whether to invest in our securities. You should also read and consider the information contained in the exhibits filed with our registration statement, of which this prospectus is a part, as described in “Where You Can Find More Information” in this prospectus.

You should rely only on the information contained in this prospectus and any applicable prospectus supplement, including the information incorporated by reference. Neither we nor the underwriter have authorized anyone to provide you with different information. We are not offering to sell or soliciting offers to buy, and will not sell, any securities in any jurisdiction where it is unlawful. You should assume that the information contained in this prospectus or any prospectus supplement, as well as information contained in a document that we have previously filed or in the future will file with the SEC is accurate only as of the date of this prospectus, the applicable prospectus supplement or the document containing that information, as the case may be.

PROSPECTUS SUMMARY

The following summary highlights certain information contained elsewhere in this prospectus and the documents incorporated by reference herein. This summary does not contain all the information you will need in making your investment decision. You should carefully read this entire prospectus and the documents incorporated by reference herein. You should pay special attention to the “Risk Factors” section of this prospectus and the financial statements and other information incorporated by reference in this prospectus. Onconova Therapeutics, Inc. is sometimes referred to as “we” or the “Company.”

Our Business

Overview

We are a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule product candidates primarily to treat cancer. Using our proprietary chemistry platform, we have created a library of targeted anti-cancer agents designed to work against specific cellular pathways that are important to cancer cells. We believe that the product candidates in our pipeline have the potential to be efficacious in a variety of cancers. We have one Phase 3 clinical-stage product candidate and two other clinical-stage product candidates (one of which has been studied for treatment of acute radiation syndromes) and several preclinical programs. Substantially all of our current effort is focused on our lead product candidate, rigosertib. Rigosertib has been tested in an intravenous formulation as a single agent for patients with higher-risk myelodysplastic syndromes (“MDS”), and an oral formulation as a single agent in lower risk MDS or in combination with azacitidine for patients with higher-risk MDS.

In December 2015, we enrolled the first patient into our INSPIRE trial, a randomized controlled Phase 3 clinical trial of intravenous rigosertib (“rigosertib IV”) in a population of patients with higher-risk MDS after failure of hypomethylating agent (“HMA”) therapy. The primary endpoint of INSPIRE is improvement in overall survival. An interim analysis of the trial was performed in January 2018. We anticipate completion of the INSPIRE Trial in the first half of 2020 based on approaching 90 percent or 324 randomized patients of the required 360 randomized patients, and the number of confirmed death events reached to date. We are planning to open new trial sites in Brazil in November 2019 and China thereafter. We believe the addition of sites in Brazil, China, and other additional new sites, could contribute significantly to achieving our timelines for completing enrollment and for reporting survival top-line data.

Our net losses were \$15.8 million and \$14.8 million for the nine months ended September 30, 2019 and 2018, respectively. As of September 30, 2019, we had an accumulated deficit of \$397.7 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 if milestones under our license and collaboration agreements may be met. As of September 30, 2019, we had \$4.8 million in cash and cash equivalents.

Corporate Information

We were incorporated in Delaware in December 1998 and commenced operations in January 1999. Our principal executive offices are located at 375 Pheasant Run, Newtown, Pennsylvania 18940, and our telephone number is (267) 759-3680. Our website address is www.onconova.com. The information on, or that can be accessed through, our website is not part of this prospectus.

THE OFFERING

Units offered by us in this offering	Up to 28,571,429 Units, each consisting of one share of Common Stock and one Warrant to purchase one share of Common Stock.
Pre-Funded Units offered by us in this offering	We are also offering to each purchaser whose purchase of Units in this offering would otherwise result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% of our outstanding Common Stock immediately following the consummation of this offering, the opportunity to purchase, if the purchaser so chooses, Pre-Funded Units (each Pre-Funded Unit consisting of one Pre-Funded Warrant to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock) in lieu of Units that would otherwise result in the purchaser's beneficial ownership exceeding 4.99% of our outstanding Common Stock (or at the election of the purchaser, 9.99%). Each Pre-Funded Warrant contained in a Pre-Funded Unit will be exercisable for one share of Common Stock. The purchase price of each Pre-Funded Unit will equal the price per Unit being sold to the public in this offering minus \$0.01, and the exercise price of each Pre-Funded Warrant included in the Pre-Funded Unit will be \$0.01 per share of Common Stock. This offering also relates to the shares of Common Stock issuable upon exercise of any Pre-Funded Warrants contained in the Pre-Funded Units sold in this offering. For each Pre-Funded Unit we sell, the number of Units we are offering will be decreased on a one-for-one basis. Because we will issue a Warrant as part of each Unit or Pre-Funded Unit, the number of Warrants sold in this offering will not change as a result of a change in the mix of the Units and Pre-Funded Units sold.
Warrants offered by us in this offering	Warrants to purchase an aggregate of up to 28,571,429 shares of Common Stock. Each Unit and each Pre-Funded Unit includes a Warrant to purchase one share of Common Stock. Each Warrant contained in a Unit has an exercise price of \$ per share of Common Stock, representing 100% of the public offering price of a Unit, will be immediately separable from the Common Stock or Pre-Funded Warrant, as the case may be, will be exercisable immediately and will expire five years from the date of issuance.
Insider Participation	While none of our directors or executive officers has entered into any binding commitment or agreement to purchase Units sold in this offering, our directors and executive officers have indicated interests in subscribing for up to an aggregate of approximately one percent (1%) of the total offering price of the Units, subject to potential proration.
Offering Price	\$ per Unit \$ per Pre-Funded Unit
Option to purchase additional securities	The underwriter has the option to purchase up to 4,285,714 additional shares of Common Stock at a purchase price of \$ per share and/or Warrants to purchase up to an aggregate of 4,285,714 shares of Common Stock at a purchase price of \$0.01 per Warrant with an exercise price of \$ per share of Common Stock, representing 100% of the public offering price of a Unit, less the underwriting discounts and commissions. The underwriter may exercise its option at any time and from time to time within 30 days from the date of this prospectus.
Common stock to be outstanding after this offering	36,768,891 shares of Common Stock (assuming no sale of any Pre-Funded Units), or 41,054,605 shares of Common Stock if the underwriter exercises its option to purchase additional Common Stock and/or Warrants in full (assuming no sale of any Pre-Funded Units).
Use of proceeds	We estimate that the net proceeds to us from this offering will be approximately \$10.7 million (\$12.3 million if the underwriter's option to purchase additional Common Stock and/or Warrants is exercised in full), based on an assumed public offering price of \$0.42 per Unit, the last reported sale price of Common Stock on the Nasdaq Capital Market on November 11, 2019, after deducting estimated underwriting discounts and commissions and estimated

offering expenses payable by us, assuming no sale of any Pre-Funded Units in this offering and excluding the proceeds, if any, from the exercise of the Warrants. We intend to use the net proceeds from this offering to fund the development of our clinical and preclinical programs, for other research and development activities and for general corporate purposes, which may include capital expenditures and funding working capital needs.

See “Use of Proceeds” on page 13.

Risk factors

You should read the “Risk Factors” section of this prospectus and in the documents incorporated by reference into this prospectus for a discussion of factors to consider before deciding to invest in our securities.

Listing

Common Stock is listed on the Nasdaq Capital Market under the symbol “ONTX.” We do not intend to apply for listing of the Pre-Funded Warrants or Warrants on any securities exchange or other nationally recognized trading system. There is no established public trading market for the Pre-Funded Warrants or Warrants, and we do not expect a market to develop.

The number of shares of Common Stock outstanding after the offering is based on 8,197,462 shares outstanding as of November 11, 2019, and excludes as of such date:

- 394,788 shares of Common Stock issuable upon the exercise of stock options outstanding at November 11, 2019 with a weighted average exercise price of approximately \$69.36 per share;
- 5,614,307 shares of Common Stock issuable upon the exercise of outstanding or issuable warrants at November 11, 2019 with a weighted average exercise price of approximately \$7.08 per share (includes Common Stock issuable for warrants which are exercisable for our Series A or Series B Convertible Preferred Stock, each of which is convertible to Common Stock);
- 28,571,429 shares of Common Stock issuable upon the exercise of Warrants to be issued to investors in this offering at an exercise price of \$ per share;
- 1,428,571 shares (or 1,642,857 shares if the underwriter’s option to purchase additional Common Stock and/or Warrants is exercised in full) of Common Stock issuable upon exercise of the warrants being issued to the underwriter in connection with this offering; and
- 659,396 shares of Common Stock reserved for future issuance under our 2018 Equity Compensation Plan, as amended, at November 11, 2019.

As of November 11, 2019, the total number of our outstanding shares of Common Stock was 8,197,462. All share and per share data has been restated to reflect our one-for-fifteen reverse stock split effective September 25, 2018, subject to final adjustments for treatment of fractional share interests.

Unless otherwise indicated, all information contained in this prospectus assumes (i) no exercises by the underwriter of its option to purchase additional securities and (ii) no sale of any Pre-Funded Units.

RISK FACTORS

Our business is influenced by many factors that are difficult to predict, and that involve uncertainties that may materially affect actual operating results, cash flows and financial condition. Before making an investment decision, you should carefully consider these risks, including those set forth below and those described in the “Risk Factors” section of our [Annual Report on Form 10-K, as filed with the SEC on April 1, 2019](#), and our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2019, June 30, 2019 and September 30, 2019, as filed with the SEC on [May 15, 2019](#), [August 14, 2019](#) and November 12, 2019, respectively, which are incorporated by reference into this prospectus, as well as any amendment or update to our risk factors reflected in subsequent filings with the SEC, and you should also carefully consider any other information we include or incorporate by reference in this prospectus.

Any of the risks we describe below or in the information incorporated herein by reference in this prospectus could cause our business, financial condition or operating results to suffer. The market price of Common Stock could decline if one or more of these risks and uncertainties develop into actual events. You could lose all or part of your investment.

Risks Associated with this Offering

Our management will have broad discretion over the use of any net proceeds from this offering, you may not agree with how we use the proceeds, and the proceeds may not be invested successfully.

Our management will have broad discretion as to the use of any net proceeds from this offering and could use them for purposes other than those contemplated at the time of this offering. Accordingly, you will be relying on the judgment of our management with regard to the use of any proceeds from the sale of shares of our securities in this offering, and you will not have the opportunity, as part of your investment decision, to assess whether the proceeds are being used appropriately. It is possible that the proceeds will be invested in a way that does not yield a favorable, or any, return for you.

We may be required to raise additional financing by issuing new securities with terms or rights superior to those of our existing securityholders, which could adversely affect the market price of shares of Common Stock and our business.

We will require additional financing to fund future operations, including expansion in current and new markets, development and acquisition, capital costs and the costs of any necessary implementation of technological innovations or alternative technologies. We may not be able to obtain financing on favorable terms, if at all. If we raise additional funds by issuing equity securities, the percentage ownership of our current stockholders will be reduced, and the holders of the new equity securities may have rights superior to those of our existing securityholders, which could adversely affect the market price of Common Stock and the voting power of shares of Common Stock. If we raise additional funds by issuing debt securities, the holders of these debt securities would similarly have some rights senior to those of our existing securityholders, and the terms of these debt securities could impose restrictions on operations and create a significant interest expense for us which could have a materially adverse effect on our business.

You will experience immediate and substantial dilution in the net tangible book value per share of Common Stock included in the Units or issuable upon exercise of the Pre-Funded Warrants in this offering.

Since the effective price per share of Common Stock included in the Units or issuable upon exercise of the Pre-Funded Warrants being offered is substantially higher than the net tangible book

deficit per share of Common Stock outstanding prior to this offering, you will suffer immediate and substantial dilution in the net tangible book value of Common Stock included in the Units or issuable upon the exercise of the Pre-Funded Warrants issued in this offering. See the section titled "Dilution" below for a more detailed discussion of the dilution you will incur if you purchase Units in this offering. To the extent outstanding stock options or warrants to purchase Common Stock are exercised, or outstanding warrants to purchase shares of our Series A or Series B Convertible Preferred Stock are exercised and the resulting shares of Series A or Series B Convertible Preferred Stock are converted into shares of Common Stock, there will be further dilution to new investors.

Our shareholders may experience significant dilution as a result of future equity offerings or issuances and exercise of outstanding options and warrants.

In order to raise additional capital or pursue strategic transactions, we may in the future offer, issue or sell additional shares of Common Stock or other securities convertible into or exchangeable for shares of Common Stock. We cannot assure you that we will be able to sell shares or other securities in any other transaction at a price per share or that have an exercise price or conversion price per share that is equal to or greater than the price for the securities purchased by investors in this offering, and investors purchasing shares or other securities in the future could have rights superior to existing stockholders. The price per share at which we sell or issue additional shares of Common Stock or other securities convertible into or exchangeable for Common Stock future transactions may be higher or lower than such price.

There is no public market for the Warrants or the Pre-Funded Warrants.

There is no established public trading market for the Warrants or the Pre-Funded Warrants, and we do not expect a market to develop. In addition, we do not intend to apply to list the Warrants or the Pre-Funded Warrants on any national securities exchange or other nationally recognized trading system, including The Nasdaq Capital Market. Without an active market, the liquidity of the Warrants and the Pre-Funded Warrants.

The Warrants and the Pre-Funded Warrants in this offering are speculative in nature.

Neither the Warrants nor the Pre-Funded Warrants in this offering confer any rights of Common Stock ownership on its holders, such as voting rights or the right to receive dividends, but rather merely represent the right to acquire shares of Common Stock at a fixed price, as the case maybe. In addition, following this offering, the market value of the Warrants and the Pre-Funded Warrants, if any, is uncertain and there can be no assurance that the market value of the Warrants or the Pre-Funded Warrants will equal or exceed their imputed offering price. Neither the Warrants nor the Pre-Funded Warrants will be listed or quoted for trading on any market or exchange.

Sales of a significant number of shares of Common Stock in the public markets, or the perception that such sales could occur, could depress the market price of Common Stock.

Sales of a substantial number of shares of Common Stock or securities convertible or exchangeable into Common Stock in the public markets could depress the market price of Common Stock and impair our ability to raise capital through the sale of additional equity securities. We cannot predict the effect that future sales of Common Stock would have on the market price of Common Stock.

Upon completion of this offering, based on our shares outstanding as of November 11, 2019, we will have 36,768,891 shares of Common Stock outstanding (41,054,605 shares of Common Stock if the underwriter exercises its option to purchase additional Common Stock and/or Warrants in full) based on the issuance and sale of 28,571,429 Units in this offering (32,857,143 Units if the underwriter exercises its option to purchase additional Common Stock and/or Warrants in full), assuming no sale of any Pre-Funded Units. Of these shares, only 278,917 shares are subject to a contractual lock-up with the underwriter for this offering for a period of 90 days following this offering. These shares can be sold, subject to any applicable volume limitations under federal securities laws, after the earlier of the expiration of, or release from, the 90-day lock-up period. The balance of our outstanding shares of Common Stock, including any shares of Common Stock included in the Units or issuable upon the exercise of the Pre-Funded Warrants or Warrants, purchased in this offering other than shares acquired by our current stockholders who are also subject to the contractual lock-up, may be resold into the public market immediately without restriction, unless owned or purchased by our affiliates. Moreover, some of the holders of Common Stock have the right, subject to specified 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.

As of November 11, 2019, there were approximately 659,396 shares subject to outstanding options or that are otherwise issuable under our 2018 Equity Compensation Plan, as amended, all of which shares we have registered under the Securities Act of 1933, as amended, or the Securities Act, on a registration statement on Form S-8. These shares can be freely sold in the public market

upon issuance, subject to volume limitations applicable to affiliates and the lock-up agreements described above, to the extent applicable.

We do not intend to pay any cash dividends on Common Stock in the foreseeable future and, therefore, any return on your investment in Common Stock must come from increases in the fair market value and trading price of Common Stock.

We do not intend to pay any cash dividends on Common Stock in the foreseeable future and, therefore, any return on your investment in Common Stock must come from increases in the fair market value and trading price of Common Stock.

Future issuances of preferred stock may adversely affect the market price for Common Stock.

Additional issuances and sales of preferred stock, or the perception that such issuances and sales could occur, may cause prevailing market prices for Common Stock to decline and may adversely affect our ability to raise additional capital in the financial markets at times and prices favorable to us.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference herein and therein contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. All statements, other than statements of historical facts, contained in this prospectus and the documents incorporated by reference herein regarding our strategy, future operations, financial position, future revenues, projected costs, prospects, plans and objectives of management are 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 the documents incorporated by reference herein, 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, protection of our intellectual property portfolio, the degree of clinical utility of our products, particularly in specific patient populations, our ability to develop commercial and manufacturing functions, expectations regarding clinical trial data, our results of operations, cash needs, 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 and in documents incorporated by reference herein, 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.

Actual results could differ materially and adversely from our forward-looking statements due to a number of factors, including, without limitation, risks related to:

- our need for additional financing for our INSPIRE trial and other operations, and our ability to obtain sufficient funds on acceptable terms when needed, and our plans and future needs to scale back operations if adequate financing is not obtained;
- our ability to continue as a going concern;
- our estimates regarding expenses, future revenues, capital requirements and needs for additional financing;
- the success and timing of our preclinical studies and clinical trials, including site initiation and patient enrollment, and regulatory approval of protocols for future clinical trials;
- our ability to enter into, maintain and perform collaboration agreements with other pharmaceutical companies, for funding and commercialization of our clinical product candidates or preclinical compounds, and our ability to achieve certain milestones under those agreements;
- 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, manufacture 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;
- 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 and regulation regarding the healthcare system;
- the success of competing therapies and products that are or may become available;
- our ability to maintain the listing of our securities on a national securities exchange;
- the potential for third party disputes and litigation;
- the performance of third parties, including contract research organizations (“CROs”) and third-party manufacturers; and
- our expectations regarding CRO transition.

Any forward-looking statements that we make in this prospectus and the documents incorporated by reference herein speak only as of the date of such statement, and we undertake no obligation to update such statements whether as a result of any new information, future events, changed circumstances or otherwise. 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 in documents incorporated by reference herein, 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 and in documents incorporated by reference herein 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.

We obtained the industry, market and competitive position data in this prospectus and in documents incorporated by reference herein 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 the net proceeds to us from this offering will be approximately \$10.7 million, based on an assumed public offering price of \$0.42 per Unit, the last reported sale price of Common Stock on the Nasdaq Capital Market on November 11, 2019, assuming the sale of 28,571,429 Units and no sale of any Pre-Funded Units in this offering, after deducting underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of Warrants issued pursuant to this offering. If the underwriter exercises its option to purchase the additional shares of Common Stock and/or Warrants in full, we estimate that the net proceeds will be approximately \$12.3 million, based on an assumed public offering price of \$0.42 per Unit, the last reported sale price of Common Stock on the Nasdaq Capital Market on November 11, 2019, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of Warrants issued pursuant to this offering.

We intend to use the net proceeds from this offering to fund the development of our clinical and preclinical programs, for other research and development activities and for general corporate purposes, which may include capital expenditures and funding working capital needs.

The amounts actually expended for each purpose may vary significantly depending upon numerous factors, including the amount and timing of the proceeds from this offering and progress with the clinical development of our product candidates. Expenditures will also depend upon the establishment of collaborative arrangements with other companies, the availability of additional financing and other factors. Investors will be relying on the judgment of our management regarding the application of the proceeds of any sale of shares of our securities.

As of the date of this prospectus, we cannot specify with certainty all of the particular uses of the proceeds from this offering. Accordingly, we will retain broad discretion over the use of such proceeds. Pending the use of the net proceeds from this offering as described above, we intend to invest the net proceeds in investment-grade, interest-bearing securities.

The actual offering price per Unit and Pre-Funded Unit, and the exercise price of the Warrants, as applicable, will be as determined by negotiation between us and the underwriter at the time of pricing, and may be at a discount to the current market price of Common Stock. These estimates exclude the proceeds, if any, from the exercise of the Warrants in this offering. If all of the Warrants sold in this offering were to be exercised in cash at an assumed exercise price of \$0.42 per share of Common Stock, we would receive additional net proceeds of approximately \$12 million (\$13 million if the underwriter exercises its option to purchase the additional shares of Common Stock and/or Warrants in full). However, the Warrants contain a cashless exercise provision that permits exercise of the Warrants on a cashless basis (i) at any time when there is no effective registration statement under the Securities Act of 1933, as amended, covering the issuance of the underlying shares of Common Stock or (ii) on the expiration date of the Warrant. We cannot predict when or if the Warrants will be exercised or whether they will be exercised for cash. It is possible that the Warrants may be exercised solely on a cashless basis.

A \$0.25 increase or decrease in the assumed public offering price per Unit of \$0.42, the last reported sale price of Common Stock on the Nasdaq Capital Market on November 11, 2019, would increase or decrease the net proceeds to us from this offering by \$6.6 million, assuming that the number of Units offered by us, as set forth on the cover page of this prospectus, remains the same, assuming no sale of any Pre-Funded Units, after deducting the estimated underwriter discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering.

Similarly, each increase or decrease of 1,000,000 Units offered by us would increase or decrease the net proceeds to us by approximately \$0.4 million, assuming the assumed public offering price per Unit of \$0.42 remains the same, assuming no sale of any Pre-Funded Units, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering.

CAPITALIZATION

The following table presents our cash, cash equivalents and capitalization, as of September 30, 2019:

- on an actual basis; and
- on an as adjusted basis to give further effect to the sale of 28,571,429 Units in this offering at an assumed public offering price of \$0.42 per Unit, the last reported sale price of Common Stock on the Nasdaq Capital Market on November 11, 2019, assuming no sale of any Pre-Funded Units, after deducting estimated underwriting discounts and commissions and estimate offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering.

You should read this information in conjunction with our consolidated financial statements and notes thereto incorporated by reference into this prospectus.

	<u>Actual</u>	<u>as Adjusted</u>
Cash and cash equivalents	\$ 4,821,000	\$ 15,496,000
Long-term liabilities	3,848,000	\$ 3,848,000
Stockholders' equity*:		
Preferred stock, \$0.01 par value, 5,000,000 authorized at September 30, 2019 and September 30, 2019 as Adjusted, none issued and outstanding at September 30, 2019	—	—
Common stock, \$0.01 par value, 250,000,000 authorized at September 30, 2019 and September 30, 2019 as Adjusted; 8,197,462 shares issued and outstanding at September 30, 2019 and 36,768,891 shares issued and outstanding at September 30, 2019 as Adjusted	82,000	368,000
Additional paid-in capital	391,556,000	401,945,000
Accumulated other comprehensive loss	(27,000)	(27,000)
Accumulated deficit	(397,652,000)	(397,652,000)
Total Onconova Therapeutics, Inc. stockholders' (deficit) equity	(6,041,000)	4,634,000
Non-controlling interest	—	—
Total stockholders' (deficit) equity	(6,041,000)	4,634,000

*

The above table is based on 8,197,462 shares of Common Stock outstanding as of September 30, 2019 and excludes:

- 409,788 shares of common stock issuable upon the exercise of stock options outstanding at September 30, 2019 with a weighted average exercise price of approximately \$66.09 per share;
- 5,614,307 shares of common stock issuable upon the exercise of outstanding or issuable warrants at September 30, 2019 with a weighted average exercise price of approximately \$7.08 per share (includes common stock issuable for warrants which are exercisable for our Series A or Series B Convertible Preferred Stock, each of which is convertible to common stock); and
- 644,396 shares of common stock reserved for future issuance under our 2018 Equity Compensation Plan, as amended, at September 30, 2019.

Each \$0.25 increase or decrease in the assumed public offering price per Unit of \$0.42, the last reported sale price of our Common Stock on the Nasdaq Capital Market on November 11, 2019, would increase or decrease the net proceeds to us from this offering by \$6.6 million, assuming that the number of Units offered by us, as set forth on the cover page of this prospectus, remains the same, assuming no sale of any Pre-Funded Units, after deducting the estimated underwriter discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering. We may also increase or decrease the number of Units offered in this offering. Each increase or decrease of 1,000,000 Units offered by us would increase or decrease the net proceeds to us by approximately \$0.4 million, assuming the assumed public offering price per Unit of \$0.42 remains the same, assuming no sale of any Pre-Funded Units, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering. The as adjusted information discussed above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering as determined between us and the underwriter at pricing.

DILUTION

If you invest in Common Stock in this offering, your interest will be diluted to the extent of the difference between the effective public offering price per share of Common Stock included in the Units or issuable upon the exercise of the Pre-Funded Warrants and the as adjusted net tangible book value per share of Common Stock after this offering. As of September 30, 2019, our historical net tangible book value (deficit) was \$(6,041,000), or \$(0.737) per share, based on 8,197,462 shares of Common Stock outstanding as of September 30, 2019. Our historical net tangible book value per share represents the amount of our total tangible assets reduced by the amount of our total liabilities, divided by the total number of shares of Common Stock outstanding as of September 30, 2019.

After giving effect to our sale in this offering of 28,571,429 Units at an assumed public offering price per Unit of \$0.42, the last reported sale price of our Common Stock on the Nasdaq Capital Market on November 11, 2019, assuming no sale of any Pre-Funded Units in this offering, and after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued in this offering, our as adjusted net tangible book value as of September 30, 2019 would be \$4,634,000, or \$0.126 per share. This represents an immediate increase of net tangible book value of \$0.863 per share to our existing stockholders and an immediate dilution of pro forma tangible book value of \$0.294 per share to investors purchasing Units in this offering. The following table illustrates this per share dilution.

Public offering price per Unit		\$	0.420
Historical net tangible book value (deficit) per share at September 30, 2019	\$	(0.737)	
Increase in net tangible book value per share attributable to investors purchasing Units in this offering		<u>0.863</u>	
As adjusted net tangible book value per share as of September 30, 2019 after giving effect to this offering			<u>0.126</u>
Dilution per share to investors purchasing Units in this offering		\$	<u>0.294</u>

Each \$0.25 increase or decrease in the assumed public offering price per Unit of \$0.42, the last reported sale price of our Common Stock on the Nasdaq Capital Market on November 11, 2019, would increase or decrease the net proceeds to us from this offering by \$6.6 million, increase or decrease our as adjusted net tangible book value per share after this offering by \$0.18, and increase or decrease the dilution per share to new investors purchasing in this offering by \$0.7, assuming that the number of Units offered by us, as set forth on the cover page of this prospectus, remains the same, assuming no sale of any Pre-Funded Units, after deducting the estimated underwriter discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering. We may also increase or decrease the number of Units offered in this offering. Each increase or decrease of 1,000,000 Units offered by us would increase or decrease the net proceeds to us by \$0.4 million, increase or decrease our as adjusted net tangible book value per share after this offering by \$0.01, and increase or decrease the dilution per share to new investors purchasing in this offering by \$0.01, assuming the assumed public offering price per Unit of \$0.42 remains the same, assuming no sale of any Pre-Funded Units, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the Warrants issued pursuant to this offering. The as adjusted information discussed above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering as determined between us and the underwriter at pricing.

If the underwriter exercises its option to purchase additional Common Stock and/or Warrants in full, and assuming no sale of any Pre-Funded Units in this offering, the as adjusted net tangible book value per share after this offering would be \$0.153 per share, the increase in net tangible book value per share to existing stockholders would be \$0.890 per share and the dilution to new investors purchasing Units in this offering would be \$0.267 per share.

The above discussion and table are based on 8,197,462 shares of Common Stock outstanding as of September 30, 2019 and exclude:

- 409,788 shares of common stock issuable upon the exercise of stock options outstanding at September 30, 2019 with a weighted average exercise price of approximately \$66.09 per share;
- 5,614,307 shares of common stock issuable upon the exercise of outstanding or issuable warrants at September 30, 2019 with a weighted average exercise price of approximately \$7.08 per share (includes common stock issuable for warrants which are exercisable for our Series A or Series B Convertible Preferred Stock, each of which is convertible to common stock); and
- 644,396 shares of common stock reserved for future issuance under our 2018 Equity Compensation Plan, as amended, at September 30, 2019

To the extent that outstanding options or warrants are exercised, you will experience further dilution. In addition, we may choose to raise additional capital 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 additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

DESCRIPTION OF CAPITAL STOCK

Our authorized capital stock consists of 250,000,000 shares of Common Stock, par value \$0.01 per share, and 5,000,000 shares of preferred stock, par value \$0.01 per share. As of November 11, 2019, 8,197,462 shares of Common Stock, and no shares of our preferred stock, were outstanding.

Common Stock

Subject to the preferences that may be applicable to any outstanding preferred stock, holders of Common Stock are entitled to receive ratably any dividends that may be declared by our board of directors out of funds legally available for that purpose. Holders of Common Stock are entitled to one vote for each share on all matters voted on by stockholders, including the election of directors. Holders of Common Stock do not have any conversion, redemption, sinking fund or preemptive rights. In the event of our dissolution, liquidation or winding up, holders of Common Stock are entitled to share ratably in any assets remaining after the satisfaction in full of the prior rights of creditors and the aggregate liquidation preference of any preferred stock then outstanding. The rights, preferences and privileges of the holders of Common Stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future. All outstanding shares of Common Stock are, and any shares of Common Stock that we may issue in the future will be, fully paid and non-assessable.

Preferred Stock

We may issue any class of preferred stock in any series. Our board of directors has the authority, subject to limitations prescribed under 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 can also 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.

Series A Convertible Preferred Stock

General

Our Board of Directors has designated 1,044,488 shares of preferred stock as Series A Convertible Preferred Stock, which we refer to herein as the Series A Preferred Stock. As of September 30, 2019, there were no shares of Series A Preferred Stock outstanding.

Rank

The Series A Preferred Stock ranks (1) on parity with common stock on an “as converted” basis, (2) senior to any series of our capital stock hereafter created specifically ranking by its terms junior to the Series A Preferred Stock, (3) on parity with any series of our capital stock hereafter created specifically ranking by its terms on parity with the Series A Preferred Stock, and (4) junior to any series of our capital stock hereafter created specifically ranking by its terms senior to the Series A Preferred Stock in each case, as to dividends or distributions of assets upon our liquidation, dissolution or winding up whether voluntary or involuntary.

Conversion

Each 0.1 share of the Series A Preferred Stock is convertible into one (1) share of common stock, provided that the holder will be prohibited from converting Series A Preferred Stock into shares of common stock if, as a result of such conversion, the holder would own more than 4.99% of the number of shares of common stock outstanding immediately after giving effect to the issuance of the shares of common stock issuable upon conversion of the Series A Preferred Stock, or, at the election of a holder, together with its affiliates, would own more than 9.99% of the number of shares of common stock outstanding immediately after giving effect to the issuance of the shares of common stock issuable upon conversion of the Series A Preferred Stock. The conversion rate of the Series A Preferred Stock is subject to proportionate adjustments for stock splits, reverse stock splits and similar events, but is not subject to adjustment based on price anti-dilution provisions.

Dividends

In addition to stock dividends or distributions for which proportionate adjustments will be made, holders of Series A Preferred Stock are entitled to receive dividends on shares of Series A Preferred Stock equal, on an as-if-converted-to-common-stock basis, to and in the same form as dividends actually paid on shares of the common stock when, as and if such dividends are paid on shares of the common stock. No other dividends are payable on shares of Series A Preferred Stock.

Voting Rights

Except as provided in the Certificate of Designation or as otherwise required by law, the holders of Series A Preferred Stock will have no voting rights. However, we may not, without the consent of holders of a majority of the outstanding shares of Series A Preferred Stock, alter or change adversely the powers, preferences or rights given to the Series A Preferred Stock, increase the number of authorized shares of Series A Preferred Stock, or enter into any agreement with respect to the foregoing.

Liquidation Rights

Upon any liquidation, dissolution or winding-up of the Company, whether voluntary or involuntary, the holders of Series A Preferred Stock are entitled to receive, pari passu with the holders of common stock, out of the assets available for distribution to stockholders an amount equal to such amount per share as would have been payable had all shares of Series A Preferred Stock been converted into common stock immediately before such liquidation, dissolution or winding up, without giving effect to any limitation on conversion as a result of the Beneficial Ownership Limitation, as described below.

Beneficial Ownership Limitation

We may not effect any conversion of the Series A Preferred Stock, and a holder does not have the right to convert any portion of the Series A Preferred Stock to the extent that, after giving effect to the conversion set forth in a notice of conversion such holder would beneficially own in excess of the Beneficial Ownership Limitation, or such holder, together with such holder's affiliates, and any persons acting as a group together with such holder or affiliates, would beneficially own in excess of the Beneficial Ownership Limitation. The "Beneficial Ownership Limitation" is 4.99% of the number of shares of the common stock outstanding immediately after giving effect to the issuance of shares of common stock issuable upon conversion of Series A Preferred Stock held by the applicable holder. A holder may, with 61 days prior notice to us, elect to increase or decrease the Beneficial Ownership Limitation; provided, however, that in no event may either the holder Beneficial Ownership Limitation or the affiliate Beneficial Ownership Limitation be 9.99% or greater.

Exchange Listing

Our Series A Preferred Stock is not listed on the Nasdaq Capital Market, any national securities exchange or other nationally recognized trading system. Our common stock issuable upon conversion of the Series A Preferred Stock is listed on the Nasdaq Capital Market.

Failure to Deliver Conversion Shares.

If we fail to timely deliver shares of common stock upon conversion of the Series A Preferred Stock (the "Conversion Shares") within the time period specified in the Certificate of Designation (within three trading days after delivery of the notice of conversion, or any shorter standard settlement period in effect with respect to trading market on the date notice is delivered), and if the holder has not exercised its Buy-In rights as described below with respect to such shares, then we are obligated to pay to the holder, as liquidated damages, an amount equal to \$50 per trading day (increasing to \$100 per trading day after the third trading day and \$200 per trading day after the tenth trading day) for each \$5,000 of Conversion Shares for which the Series A Preferred Stock converted which are not timely delivered. If we make such liquidated damages payments, we are not also obligated to make Buy-In payments with respect to the same Conversion Shares.

Compensation for Buy-In on Failure to Timely Deliver Shares

If we fail to timely deliver the Conversion Shares to the holder, and if after the required delivery date the holder is required by its broker to purchase (in an open market transaction or otherwise) or the holder or its brokerage firm otherwise purchases, shares of common stock to deliver in satisfaction of a sale by the holder of the Conversion Shares which the holder anticipated receiving upon such conversion or exercise (a "Buy-In"), then we are obligated to (A) pay in cash to the holder the amount, if any, by which (x) the holder's total purchase price (including brokerage commissions, if any) for the shares of common stock so purchased, minus any amounts paid to the holder by us as liquidated damages for late delivery of such shares, exceeds (y) the amount obtained by multiplying (1) the number of Conversion Shares that we were required to deliver times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the holder, either reinstate the portion of the Series A Preferred

Stock and equivalent number of Conversion Shares for which such conversion was not honored (in which case such conversion shall be deemed rescinded) or deliver to the holder the number of shares of common stock that would have been issued had we timely complied with its conversion and delivery obligations.

Subsequent Rights Offerings; Pro Rata Distributions

If we grant, issue or sell any common stock equivalents pro rata to the record holders of any class of shares of common stock (the “Purchase Rights”), then a holder of Series A Preferred Stock will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the holder could have acquired if the holder had held the number of shares of common stock acquirable upon conversion of the Series A Preferred Stock (without regard to any limitations on conversion). If we declare or make any dividend or other distribution of its assets (or rights to acquire its assets) to holders of common stock, then a holder of Series A Preferred Stock is entitled to participate in such distribution to the same extent as if the holder had held the number of shares of common stock acquirable upon complete conversion of the Series A Preferred Stock (without regard to any limitations on conversion).

Fundamental Transaction

If, at any time while the Series A Preferred Stock is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another person, (ii) the Company, directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another person) is completed pursuant to which holders of common stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding common stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the common stock or any compulsory share exchange pursuant to which the common stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off or scheme of arrangement) with another person whereby such other person acquires more than 50% of the outstanding shares of common stock (not including any shares of common stock held by the other person or other persons making or party to, or associated or affiliated with the other persons making or party to, such stock or share purchase agreement or other business combination) (each a “Series A Preferred Stock Fundamental Transaction”), then the Series A Preferred Stock automatically converts and the holder will receive, for each Conversion Share that would have been issuable upon such conversion immediately prior to the occurrence of such Series A Preferred Stock Fundamental Transaction (without regard to the Beneficial Ownership Limitation), the number of shares of common stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the “Series A Preferred Stock Alternate Consideration”) receivable as a result of such Series A Preferred Stock Fundamental Transaction by a holder of the number of shares of common stock for which the Series A Preferred Stock is convertible immediately prior to such Series A Preferred Stock Fundamental Transaction (without regard to the Beneficial Ownership Limitation). For purposes of any such conversion, the determination of the conversion ratio will be appropriately adjusted to apply to such Series A Preferred Stock Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of common stock in such Series A Preferred Stock Fundamental Transaction. If holders of common stock are given any choice as to the securities, cash or property to be received in a Series A Preferred Stock Fundamental Transaction, then the holder will be given the same choice as to the Series A Preferred Stock Alternate Consideration it receives upon automatic conversion of the Series A Preferred Stock following such Fundamental Transaction.

Series B Convertible Preferred Stock

General

Our Board of Directors has designated 1,796,875 shares of preferred stock as Series B Convertible Preferred Stock, which we refer to herein as the Series B Preferred Stock. As of September 30, 2019, there were no shares of Series B Preferred Stock outstanding.

Rank

The Series B Preferred Stock ranks (1) on parity with common stock on an “as converted” basis, (2) senior to any series of our capital stock hereafter created specifically ranking by its terms junior to the Series B Preferred Stock, (3) on parity with Series A Preferred Stock and any series of our capital stock hereafter created specifically ranking by its terms on parity with the Series B Preferred Stock, and (4) junior to any series of our capital stock hereafter created specifically ranking by its terms senior to the Series B Preferred Stock in each case, as to dividends or distributions of assets upon our liquidation, dissolution or winding up whether voluntary or involuntary.

Conversion

Each 0.025 share of the Series B Preferred Stock is convertible into one (1) share of common stock, provided that the holder will be prohibited from converting Series B Preferred Stock into shares of common stock if, as a result of such conversion, the holder would own more than 4.99% of the number of shares of common stock outstanding immediately after giving effect to the issuance of the shares of common stock issuable upon conversion of the Series B Preferred Stock, or, at the election of a holder, together with its affiliates, would own more than 9.99% of the number of shares of common stock outstanding immediately after giving effect to the issuance of the shares of common stock issuable upon conversion of the Series B Preferred Stock. The conversion rate of the Series B Preferred Stock is subject to proportionate adjustments for stock splits, reverse stock splits and similar events, but is not subject to adjustment based on price anti-dilution provisions.

Dividends

In addition to stock dividends or distributions for which proportionate adjustments will be made, holders of Series B Preferred Stock are entitled to receive dividends on shares of Series B Preferred Stock equal, on an as-if-converted-to-common-stock basis, to and in the same form as dividends actually paid on shares of the common stock when, as and if such dividends are paid on shares of the Common Stock. No other dividends are payable on shares of Series B Preferred Stock.

Voting Rights

Except as provided in the Certificate of Designation or as otherwise required by law, the holders of Series B Preferred Stock will have no voting rights. However, we may not, without the consent of holders of a majority of the outstanding shares of Series B Preferred Stock, alter or change adversely the powers, preferences or rights given to the Series B Preferred Stock, increase the number of authorized shares of Series B Preferred Stock, or enter into any agreement with respect to the foregoing.

Liquidation Rights

Upon any liquidation, dissolution or winding-up of the Company, whether voluntary or involuntary, the holders of Series B Preferred Stock are entitled to receive, pari passu with the holders of common stock, out of the assets available for distribution to stockholders an amount equal to such amount per share as would have been payable had all shares of Series B Preferred Stock been converted into common stock immediately before such liquidation, dissolution or winding up, without giving effect to any limitation on conversion as a result of the Beneficial Ownership Limitation, as described below.

Beneficial Ownership Limitation

We may not effect any conversion of the Series B Preferred Stock, and a holder does not have the right to convert any portion of the Series B Preferred Stock to the extent that, after giving effect to the conversion set forth in a notice of conversion such holder would beneficially own in excess of the Beneficial Ownership Limitation, or such holder, together with such holder's affiliates, and any persons acting as a group together with such holder or affiliates, would beneficially own in excess of the Beneficial Ownership Limitation. The "Beneficial Ownership Limitation" is 4.99% of the number of shares of the common stock outstanding immediately after giving effect to the issuance of shares of common stock issuable upon conversion of Series B Preferred Stock held by the applicable holder. A holder may, with 61 days prior notice to us, elect to increase or decrease the Beneficial Ownership Limitation; provided, however, that in no event may either the holder Beneficial Ownership Limitation or the affiliate Beneficial Ownership Limitation be 9.99% or greater.

Exchange Listing

Our Series B Preferred Stock is not listed on the Nasdaq Capital Market, any national securities exchange or other nationally recognized trading system. Our common stock issuable upon conversion of the Series B Preferred Stock is listed on the Nasdaq Capital Market.

Failure to Deliver Conversion Shares.

If we fail to timely deliver shares of common stock upon conversion of the Series B Preferred Stock (the "Conversion Shares") within the time period specified in the Certificate of Designation (within three trading days after delivery of the notice of conversion, or any shorter standard settlement period in effect with respect to trading market on the date notice is delivered), and if the holder has not exercised its Buy-In rights as described below with respect to such shares, then we are obligated to pay to the holder, as liquidated damages, an amount equal to \$50 per trading day (increasing to \$100 per trading day after the third trading day and \$200

per trading day after the tenth trading day) for each \$5,000 of Conversion Shares for which the Series B Preferred Stock converted which are not timely delivered. If we make such liquidated damages payments, we are not also obligated to make Buy-In payments with respect to the same Conversion Shares.

Compensation for Buy-In on Failure to Timely Deliver Shares

If we fail to timely deliver the Conversion Shares to the holder, and if after the required delivery date the holder is required by its broker to purchase (in an open market transaction or otherwise) or the holder or its brokerage firm otherwise purchases, shares of common stock to deliver in satisfaction of a sale by the holder of the Conversion Shares which the holder anticipated receiving upon such conversion or exercise (a “Buy-In”), then we are obligated to (A) pay in cash to the holder the amount, if any, by which (x) the holder’s total purchase price (including brokerage commissions, if any) for the shares of common stock so purchased, minus any amounts paid to the holder by us as liquidated damages for late delivery of such shares, exceeds (y) the amount obtained by multiplying (1) the number of Conversion Shares that we were required to deliver times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the holder, either reinstate the portion of the Series B Preferred Stock and equivalent number of Conversion Shares for which such conversion was not honored (in which case such conversion shall be deemed rescinded) or deliver to the holder the number of shares of common stock that would have been issued had we timely complied with its conversion and delivery obligations.

Subsequent Rights Offerings; Pro Rata Distributions

If we grant, issue or sell any common stock equivalents pro rata to the record holders of any class of shares of common stock (the “Purchase Rights”), then a holder of Series B Preferred Stock will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the holder could have acquired if the holder had held the number of shares of common stock acquirable upon conversion of the Series B Preferred Stock (without regard to any limitations on conversion). If we declare or make any dividend or other distribution of its assets (or rights to acquire its assets) to holders of common stock, then a holder of Series B Preferred Stock is entitled to participate in such distribution to the same extent as if the holder had held the number of shares of common stock acquirable upon complete conversion of the Series B Preferred Stock (without regard to any limitations on conversion).

Fundamental Transaction

If, at any time while the Series B Preferred Stock is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another person, (ii) the Company, directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another person) is completed pursuant to which holders of common stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding common stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the common stock or any compulsory share exchange pursuant to which the common stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off or scheme of arrangement) with another person whereby such other person acquires more than 50% of the outstanding shares of common stock (not including any shares of common stock held by the other person or other persons making or party to, or associated or affiliated with the other persons making or party to, such stock or share purchase agreement or other business combination) (each a “Series B Preferred Stock Fundamental Transaction”), then the Series B Preferred Stock automatically converts and the holder will receive, for each Conversion Share that would have been issuable upon such conversion immediately prior to the occurrence of such Series B Preferred Stock Fundamental Transaction (without regard to the Beneficial Ownership Limitation), the number of shares of common stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the “Series B Preferred Stock Alternate Consideration”) receivable as a result of such Series B Preferred Stock Fundamental Transaction by a holder of the number of shares of common stock for which the Series B Preferred Stock is convertible immediately prior to such Series B Preferred Stock Fundamental Transaction (without regard to the Beneficial Ownership Limitation). For purposes of any such conversion, the determination of the conversion ratio will be appropriately adjusted to apply to such Series B Preferred Stock Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of common stock in such Series B Preferred Stock Fundamental Transaction. If holders of common stock are given any choice as to the securities, cash or property to be received in a Series B Preferred Stock Fundamental Transaction, then the holder will be given the same choice as to the Series B Preferred Stock Alternate Consideration it receives upon automatic conversion of the Series B Preferred Stock following such Fundamental Transaction.

Other Currently Outstanding Warrants

On May 1, 2018, we issued pre-funded common stock and Series B Preferred Stock warrants, referred to as our “participating warrants,” to purchase up to 12,235,295 shares of our common stock and 1,470,588.225 shares of our Series B Preferred Stock at an exercise price equal to \$0.425 per 0.025 share of Series B Preferred Stock, subject to customary adjustments and as adjusted for our one-for-fifteen reverse stock split effective September 25, 2018. Subject to limited exceptions, a holder of participating warrants will not have the right to exercise any portion of its participating warrants if the holder, together with its affiliates, would beneficially own in excess of 9.99% of the number of shares of our common stock outstanding immediately after giving effect to such exercise.

On February 12, 2018, we issued pre-funded common stock and Series A Preferred Stock warrants, referred to as our “participating warrants,” to purchase up to 2,942,500 shares of our common stock and 865,000 shares of our Series A Preferred Stock at an exercise price equal to \$0.01 per share, subject to customary adjustments and as adjusted for our one-for-fifteen reverse stock split effective September 25, 2018. Subject to limited exceptions, a holder of participating warrants will not have the right to exercise any portion of its participating warrants if the holder, together with its affiliates, would beneficially own in excess of 9.99% of the number of shares of our common stock outstanding immediately after giving effect to such exercise.

On July 27, 2016, we issued common stock purchase warrants, referred to as our “participating warrants,” to purchase up to 3,192,140 shares of our common stock at an exercise price equal to \$5.88 per share, subject to customary adjustments and as adjusted for our one-for-fifteen reverse stock split effective September 25, 2018. Upon the terms and subject to the limitations on exercise and the conditions set forth in the participating warrants, the participating warrants are exercisable at any time on or after July 27, 2016 and on or prior to July 27, 2021. The participating warrants expire on July 27, 2021. The participating warrants entitle the holder to participate in any dividend or distribution, including any distribution of rights to purchase common stock, to the holders of our common stock. Subject to limited exceptions, a holder of participating warrants will not have the right to exercise any portion of its participating warrants if the holder, together with its affiliates, would beneficially own in excess of 9.99% of the number of shares of our common stock outstanding immediately after giving effect to such exercise.

On January 11, 2016, we issued common stock purchase warrants, referred to as our “participating warrants,” to purchase up to 96,842 shares of our common stock at an exercise price equal to \$11.50 per share, subject to customary adjustments and as adjusted for our one-for-fifteen reverse stock split effective September 25, 2018. Upon the terms and subject to the limitations on exercise and the conditions set forth in the participating warrants, the participating warrants are exercisable at any time on or after July 11, 2016 and on or prior to July 11, 2021. The participating warrants expire on July 11, 2021. The participating warrants entitle the holder to participate in any dividend or distribution, including any distribution of rights to purchase common stock, to the holders of our common stock. Subject to limited exceptions, a holder of participating warrants will not have the right to exercise any portion of its participating warrants if the holder, together with its affiliates, would beneficially own in excess of 9.99% of the number of shares of our common stock outstanding immediately after giving effect to such exercise.

The participating warrants and the shares of our common stock issuable upon exercise of the participating warrants were offered and sold without registration under the Securities Act of 1933, as amended (“the Securities Act”), or state securities laws, in reliance on the exemptions provided by Section 4(a)(2) of the Act and/or Regulation D promulgated thereunder and in reliance on similar exemptions under applicable state laws. Accordingly, neither the participating warrants nor the shares of our common stock underlying the participating warrants may be offered or sold except pursuant to an effective registration statement under the Securities Act or pursuant to an available exemption from, or in a transaction not subject to, the registration requirements of the Securities Act and in accordance with applicable state securities laws.

Delaware Anti-Takeover Law and Provisions in 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 66²/₃% 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 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 Common Stock. Among other things, our certificate of incorporation and bylaws will:

- permit our board of directors to issue up to 5,000,000 shares of preferred stock, with any rights, preferences and privileges as they may designate; 1,044,488 shares of preferred stock have been designated as Series A Preferred Stock and 1,796,875 shares of preferred stock have been designated as Series B Preferred Stock;

- 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.

Exclusive Forum Charter Provision

Our certificate of incorporation requires that the Court of Chancery of the State of Delaware will, to the fullest extent permitted by applicable law, be the sole and exclusive forum for the following:

- any derivative action or proceeding brought on behalf of the corporation;
- any action asserting a claim of breach of a fiduciary duty owed by any director, officer or other employee of the corporation to the corporation or the corporation's stockholders, creditors or other constituents;
- any action asserting a claim against the corporation arising pursuant to any provision of the Delaware General Corporation Law, the corporation's certificate of incorporation or the bylaws of the corporation; or
- any action asserting a claim against the corporation governed by the internal affairs doctrine, in each such case subject to said Court of Chancery having personal jurisdiction over the indispensable parties named as defendants therein.

Provided, that, if and only if the Court of Chancery of the State of Delaware dismisses any of the foregoing actions for lack of subject matter jurisdiction, any such action or actions may be brought in another state court sitting in the State of Delaware.

Because the applicability of the exclusive forum provision is limited to the extent permitted by applicable law, we do not intend that the exclusive forum provision would apply to suits brought to enforce any duty or liability created by the Exchange Act or any other claim for which the federal courts have exclusive jurisdiction, and acknowledge that federal courts have concurrent jurisdiction over all suits brought to enforce any duty or liability created by the Securities Act. We note that there is uncertainty as to whether a court would enforce the provision and that investors cannot waive compliance with the federal securities laws and the rules and regulations thereunder. Although we believe this provision benefits us by providing increased consistency in the application of Delaware law in the types of lawsuits to which it applies, the provision may have the effect of discouraging lawsuits against our directors and officers.

Transfer Agent

The transfer agent and registrar for Common Stock is EQ Shareowner Services.

Listing

Our Common Stock is listed on the Nasdaq Capital Market under the symbol "ONTX."

DESCRIPTION OF SECURITIES WE ARE OFFERING

We are offering (i) up to 28,571,429 Units, each Unit consisting of one share of Common Stock and one Warrant to purchase one share of Common Stock, and (ii) up to 28,571,429 Pre-Funded Units, each Pre-Funded Unit consisting of one Pre-Funded Warrant to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock. For each Pre-Funded Unit we sell, the number of Units we are offering will be decreased on a one-for-one basis. The share of Common Stock and accompanying Warrant included in each Unit will be issued separately, and the Pre-Funded Warrant to purchase one share of Common Stock and the accompanying Warrant included in each Pre-Funded Unit will be issued separately. Units or Pre-Funded Units will not be issued or certificated. We are also registering the shares of Common Stock included in the Units and the shares of Common Stock issuable from time to time upon exercise of the Pre-Funded Warrants included in Pre-Funded Units, the Warrants included in the Units and the Pre-Funded Units offered hereby, the Pre-Funded Warrants included in the Pre-Funded Units, and shares of Common Stock issuable upon the exercise of the Warrants.

Common Stock

The material terms and provisions of Common Stock and each other class of our securities which qualifies or limits Common Stock are described under the caption "Description of Capital Stock" in this prospectus.

The Warrants

The following is a summary of all material terms and provisions of the Warrants that are being offered hereby, the form of which has been filed as an exhibit to the registration statement of which this prospectus is a part. Prospective investors should carefully review the terms and provisions of the form of Warrant for a complete description of the terms and conditions of the Warrants.

Duration and Exercise Price

Each Warrant offered hereby will have an exercise price equal to \$ per one share of Common Stock. The Warrants will be immediately exercisable and may be exercised until the fifth anniversary of the issuance date, at which time they will be automatically exercised on a cashless basis. The exercise price and number of shares of Common Stock issuable upon exercise is subject to appropriate adjustment in the event of stock dividends, stock splits, reorganizations or similar events affecting Common Stock and the exercise price. The Warrants will be issued separately from the Common Stock or Pre-Funded Warrants sold as part of the Units or Pre-Funded Units, respectively, and may be transferred separately immediately thereafter. Warrants will be issued in certificated form only.

Exercisability

The Warrants will be exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of Common Stock purchased upon such exercise (except in the case of a cashless exercise as discussed below).

Cashless Exercise

If, at the time a holder exercises its Warrants, a registration statement registering the issuance of the shares of Common Stock underlying the Warrants under the Securities Act is not then effective or available for the issuance of such shares, then in lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares of Common Stock determined according to a formula set forth in the Warrant. The Warrants will be automatically exercised on a cashless basis on the expiration date.

Fundamental Transactions

In the event of any fundamental transaction, as described in the Warrants and generally including any merger with or into another entity, sale of all or substantially all of our assets, tender offer or exchange offer, or reclassification of Common Stock, then upon any subsequent exercise of a Warrant, the holder will have the right to receive as alternative consideration, for each share of Common Stock that the holder would have received upon such holder's exercise of the Warrant into shares of Common Stock (without giving effect to any limitation as a result of the Beneficial Ownership Limitation) immediately prior to the occurrence of such fundamental transaction, the number of shares of common stock of the successor or acquiring corporation or of our company, if it is the surviving corporation, and any additional consideration receivable upon or as a result of such transaction by a holder of the number of shares of Common Stock for which the holder would have received upon such holder's exercise of the Warrant into shares of Common Stock (without giving effect to any limitation as a result of the Beneficial Ownership Limitation) immediately prior to the occurrence of such fundamental transaction. In addition, in certain circumstances, upon a fundamental transaction, the holder will have the right to require us to repurchase their warrants at their fair value using the Black Scholes option pricing formula.

Transferability

Subject to applicable laws and a standard legend with regard to restriction on transfer only in compliance with a public offering or an available exemption therefrom, the Warrant may be transferred at the option of the holder upon surrender of the Warrant to us together with the appropriate instruments of transfer.

No Listing

There is no established trading market for the Warrants, and we do not expect an active trading market to develop. We do not intend to apply to list the Warrants on any securities exchange or other trading market. Without a trading market, the liquidity of the Warrants will be extremely limited.

Right as a Stockholder

Except as otherwise provided in the Warrants or by virtue of the holder's ownership of shares of Common Stock, such holder of Warrants does not have the rights or privileges of a holder of a Common Stock, including any voting rights, until such holder exercises such holder's Warrants.

Waivers and Amendments

No term of the Warrants may be amended or waived without the written consent of the holder of such warrant.

Pre-Funded Warrants

The following is a summary of all material terms and provisions of the Pre-Funded Warrants that are being offered hereby, the form of which has been filed as an exhibit to the registration statement of which this prospectus is a part. Prospective investors should carefully review the terms and provisions of the form of Pre-Funded Warrant for a complete description of the terms and conditions of the Pre-Funded Warrants.

Pre-funded warrants provide any purchaser in this offering with the ability to purchase Pre-Funded Units (each Pre-Funded Unit consisting of one Pre-Funded Warrant to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock) in lieu of Units that would otherwise result in the purchaser's beneficial ownership exceeding 4.99% of our outstanding Common Stock (or, at the election of the purchaser, 9.99%). This is accomplished through purchasing Pre-Funded Warrants at a price equal to the purchase price for Units, less \$0.01, which \$0.01 is the exercise price for the Pre-Funded Warrants. Each Pre-Funded Warrant is exercisable into one share of Common Stock as offered hereunder. Thus, the purchaser is paying essentially the purchase price for a Unit at closing of the offering but is not deemed to beneficially own the shares of Common Stock included in the Units until the purchaser exercises the Pre-Funded Warrant. Once purchased, the purchase price of the Pre-Funded Warrants is not refundable. While the Pre-Funded Warrants permit waiver of provisions by us and the holder of the Pre-Funded Warrants, this would not affect the pre-funding as that is the purchase price of the instrument which is paid at the time of closing and becomes part of our proceeds received from this offering. In addition, the Pre-Funded Warrants are perpetual and do not have an expiration date.

Duration and Exercise Price

Each Pre-Funded Warrant will have an outstanding exercise price per share equal to \$0.01. The Pre-Funded Warrants will be immediately exercisable and may be exercised at any time until the Pre-Funded Warrants are exercised in full. The exercise price and number of shares of Common Stock issuable upon exercise is subject to appropriate adjustment in the event of stock dividends, stock splits, reorganizations or similar events affecting Common Stock and the exercise price. The Pre-Funded Warrants will be issued separately from the accompanying Warrants included in the Pre-Funded Units, and may be transferred separately immediately thereafter.

Exercisability

The Pre-Funded Warrants will be exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of Common Stock purchased upon such exercise (except in the case of a cashless exercise as discussed below). A holder (together with its affiliates) may not exercise any portion of the Pre-Funded Warrant to the extent that the holder would own more than 4.99% of the outstanding Common Stock immediately after exercise, except that upon at least 61 days' prior notice from the holder to us, the holder may increase the amount of ownership of outstanding Common Stock after exercising the holder's Pre-Funded Warrants up to 9.99% of the number of shares of Common Stock outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Pre-Funded Warrants. Purchasers of Pre-Funded Units in this offering may also elect prior to the issuance of the Pre-Funded Warrants to have the initial exercise limitation set at 9.99% of our outstanding Common Stock.

Cashless Exercise

If, at the time a holder exercises its Pre-Funded Warrants, there is no effective registration statement registering, or the prospectus contained therein is not available for an issuance of the shares of Common Stock underlying the Pre-Funded Warrants to the holder, then in lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price, the holder may elect instead to exercise its Pre-Funded Warrants on a cashless basis and receive upon such exercise (either in whole or in part) the net number of shares of Common Stock determined according to a formula set forth in the Pre-Funded Warrant.

Fundamental Transactions

In the event of any fundamental transaction, as described in the Pre-Funded Warrants and generally including any merger with or into another entity, sale of all or substantially all of our assets, tender offer or exchange offer, or reclassification of Common Stock, then upon any subsequent exercise of a Pre-Funded Warrant, the holder will have the right to receive as alternative consideration, for each share of Common Stock that would have been issuable upon such exercise immediately prior to the occurrence of such fundamental transaction, the number of shares of Common Stock of the successor or acquiring corporation or of our company, if it is the surviving corporation, and any additional consideration receivable upon or as a result of such transaction by a holder of the number of shares of Common Stock for which the Pre-Funded Warrant is exercisable immediately prior to such event.

Transferability

Subject to applicable laws, a Pre-Funded Warrant may be transferred at the option of the holder upon surrender of the Pre-Funded Warrant to us together with the appropriate instruments of transfer.

Fractional Shares

No fractional shares of Common Stock will be issued upon the exercise of the Pre-Funded Warrants. Rather, the number of shares of Common Stock to be issued will be rounded up to the nearest whole number.

Trading Market

There is no established trading market for the Pre-Funded Warrants on any securities exchange or nationally recognized trading system, and we do not expect an active trading market to develop. We do not intend to list the Pre-Funded Warrants on any securities exchange or other trading market. Without a trading market, the liquidity of the Pre-Funded Warrants will be extremely limited.

Right as a Stockholder

Except as otherwise provided in the Pre-Funded Warrants or by virtue of the holder's ownership of shares of Common Stock, such holder of Pre-Funded Warrants does not have the rights or privileges of a holder of Common Stock, including any voting rights, until such holder exercises such holder's Pre-Funded Warrants.

UNDERWRITING

We have entered into an underwriting agreement dated , 2019, with H.C. Wainwright & Co., LLC as the sole book-running manager of this offering. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriter and the underwriter has agreed to purchase from us, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus. The public offering price shown on the cover page of this prospectus was determined by negotiation between us and the underwriter at the time of pricing, and may be at a discount to the current market price.

A copy of the underwriting agreement has been filed as an exhibit to the registration statement of which this prospectus is a part. The shares we are offering are being offered by the underwriter subject to certain conditions specified in the underwriting agreement.

We have been advised by the underwriter that it proposes to offer the shares directly to the public at the public offering price set forth on the cover page of this prospectus. Any shares sold by the underwriter to securities dealers will be sold at the public offering price less a selling concession not in excess of \$ per share.

The underwriting agreement provides that the underwriter's obligation to purchase the securities we are offering is subject to conditions contained in the underwriting agreement. The underwriter is obligated to purchase and pay for all of the securities offered by this prospectus.

No action has been taken by us or the underwriter that would permit a public offering of our securities in any jurisdiction where action for that purpose is required. None of the securities included in this offering may be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sales of any of the securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons who receive this prospectus are advised to inform themselves about and to observe any restrictions relating to this offering of the securities and the distribution of this prospectus. This prospectus is neither an offer to sell nor a solicitation of any offer to buy the securities in any jurisdiction where that would not be permitted or legal.

The underwriter has advised us that it does not intend to confirm sales to any accounts over which it exercises discretionary authority.

Underwriting Discounts, Commissions and Expenses

We have agreed to pay an underwriter discount equal to 7% of the aggregate gross proceeds raised in this offering, provided that the underwriting discount is subject to reduction for gross proceeds, if any, raised from certain investors, including our executive officers, directors and other investors.

The following table shows the public offering price, underwriting discounts and commissions and proceeds, before expenses to us. These amounts are shown assuming both no exercise and full exercise of the underwriter's option to purchase additional securities.

	Per Unit	Per Pre-Funded Unit	Total	
			Without Option Exercise	With Full Option Exercise
Public offering price				
Underwriting discounts and commissions(1)				
Proceeds, before expenses, to us				

(1) The underwriting discount is subject to reduction for certain investors.

We estimate the total expenses payable by us for this offering to be approximately \$1.3 million (\$1.5 million if the underwriter’s option to purchase additional securities is exercised in full), which amount includes (i) assumed underwriting discounts and commissions of \$0.96 million (\$1.1 million if the underwriter’s option to purchase additional securities is exercised in full) based upon the assumed public offering price per Unit of \$0.42 (the last reported sale price of Common Stock on the Nasdaq Capital Market on November 11, 2019), (ii) an assumed management fee in the amount of \$120,000 (\$138,000 if the underwriter’s option to purchase additional securities is exercised in full) which represents 1% of the assumed aggregate offering price, (iii) \$50,000 non-accountable expense allowance payable to the underwriter, (iv) reimbursement of the accountable expenses of the underwriter equal to \$110,000 (none of which has been paid in advance), including the legal fees of the underwriter being paid by us, and (v) other estimated expenses of approximately \$180,000 which include legal, accounting, printing costs and various fees associated with the registration and listing of our shares.

Underwriter Warrants

We have agreed to issue to the underwriter warrants to purchase a number of shares of Common Stock equal to 5% of the number of shares of Common Stock (i) included within the Units placed in this offering, (ii) issuable upon the exercise of the Pre-Funded Warrants included within the Pre-Funded Units placed in this offering, if any, and (iii) issued pursuant to the underwriter’s exercise of its over-allotment option (excluding any shares of Common Stock underlying the Warrants included in the Units and the Pre-Funded Units sold in this offering and excluding with respect to any securities placed to certain investors). The underwriter warrants will have substantially the same terms as the terms of the Warrants offered pursuant to this prospectus, except that the exercise price per share is equal to 125% of the public offering price per Unit in this offering (\$ per share of Common Stock), and the exercise period of the underwriter warrants shall be subject to the limitation on exercise set forth in FINRA Rule 5110 (f)(2)(G)(i). Pursuant to FINRA Rule 5110(g), the underwriter warrants and any shares issued upon exercise of the underwriter warrants shall not be sold, transferred, assigned, pledged, or hypothecated, or be the subject of any hedging, short sale, derivative, put or call transaction that would result in the effective economic disposition of the securities by any person for a period of 180 days immediately following the date of effectiveness or commencement of sales of this offering, except the transfer of any security: (i) by operation of law or by reason of our reorganization; (ii) to any FINRA member firm participating in the offering and the officers or partners thereof, if all securities so transferred remain subject to the lock-up restriction set forth above for the remainder of the time period; (iii) if the aggregate amount of our securities held by the underwriter or related persons do not exceed 1% of the securities being offered; (iv) that is beneficially owned on a pro rata basis by all equity owners of an investment fund, provided that no participating member manages or otherwise directs investments by the fund and the participating members in the aggregate do not own more than 10% of the equity in the fund; or (v) the exercise or conversion of any security, if all securities remain subject to the lock-up restriction set forth above for the remainder of the time period.

Right of First Refusal

We have also granted the underwriter, for a period of six months from the closing date of this offering, a right of first refusal to act as sole book-running manager for each and every future public or private equity or debt offering by us or any of our successors or subsidiaries. We have also agreed to a tail fee equal to the cash and warrant compensation in this offering if any investor to which the underwriter introduced us with respect to this offering during the term of its engagement provides us with further capital in a public or private offering or capital raising transaction, with certain exceptions, during the 6-month period following termination of our engagement of the underwriter.

Option to Purchase Additional Securities

We have granted the underwriter the option to purchase up to 4,285,714 additional shares of Common Stock at a purchase price of \$ per share and/or Warrants to purchase up to an aggregate of 4,285,714 shares of Common Stock at a purchase price of \$0.01 per Warrant with an exercise price of \$ per share of Common Stock, less the underwriting discounts and commissions. The underwriter

may exercise its option at any time and from time to time within 30 days from the date of this prospectus. If any additional securities are purchased pursuant to the option, the underwriter will offer these securities on the same terms as those on which the other securities are being offered hereby.

Listing

Common Stock is currently traded on the Nasdaq Capital Market under the symbol "ONTX." On November 11, 2019, the last reported sale price of Common Stock was \$0.42 per share. We do not intend to apply for listing of the Pre-Funded Warrants or Warrants on any securities exchange or other nationally recognized trading system. There is no established public trading market for the Pre-Funded Warrants or Warrants, and we do not expect a market to develop.

Lock-up Agreements

Our officers and directors and certain of our stockholders have agreed with the underwriter to be subject to a lock-up period of 90 days following the date of this prospectus. This means that, during the applicable lock-up period, such persons may not offer for sale, contract to sell, sell, distribute, grant any option, right or warrant to purchase, pledge, hypothecate or otherwise dispose of, directly or indirectly, any shares of Common Stock or any securities convertible into, or exercisable or exchangeable for, shares of Common Stock. Certain limited transfers are permitted during the lock-up period if the transferee agrees to these lock-up restrictions. We have also agreed in the underwriting agreement, subject to certain exceptions, to similar lock-up restrictions on the issuance and sale of our securities for 90 days following the closing of this offering. The underwriter may, in its sole discretion and without notice, waive the terms of any of these lock-up agreements.

Insider Participation

While none of our directors or executive officers has entered into any binding commitment or agreement to purchase Units sold in this offering, our directors and executive officers have indicated interests in subscribing for up to an aggregate of approximately one percent (1%) of the total offering price of the Units, subject to potential proration.

Stabilization, Short Positions and Penalty Bids

The underwriter may engage in syndicate covering transactions, stabilizing transactions and penalty bids or purchases for the purpose of pegging, fixing or maintaining the price of Common Stock:

- Syndicate covering transactions involve purchases of securities in the open market after the distribution has been completed in order to cover syndicate short positions. Such a naked short position would be closed out by buying securities in the open market. A naked short position is more likely to be created if the underwriter is concerned that there could be downward pressure on the price of the securities in the open market after pricing that could adversely affect investors who purchase in the offering.
- Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specific maximum.
- Penalty bids permit the underwriter to reclaim a selling concession from a syndicate member when the securities originally sold by the syndicate member are purchased in a stabilizing or syndicate covering transaction to cover syndicate short positions.

These syndicate covering transactions, stabilizing transactions and penalty bids may have the effect of raising or maintaining the market prices of our securities or preventing or retarding a decline in the market prices of our securities. As a result, the price of Common Stock may be higher than the price that might otherwise exist in the open market. Neither we nor the underwriter make any representation or prediction as to the effect that the transactions described above may have on the price of Common Stock. These transactions may be effected on the Nasdaq Capital Market, in the over-the-counter market or on any other trading market and, if commenced, may be discontinued at any time.

In connection with this offering, the underwriter also may engage in passive market making transactions in Common Stock in accordance with Regulation M during a period before the commencement of offers or sales of shares of Common Stock in this offering and extending through the completion of the distribution. In general, a passive market maker must display its bid at a price not in excess of the highest independent bid for that security. However, if all independent bids are lowered below the passive market maker's bid that bid must then be lowered when specific purchase limits are exceeded. Passive market making may stabilize the

market price of the securities at a level above that which might otherwise prevail in the open market and, if commenced, may be discontinued at any time.

Neither we nor the underwriter make any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the prices of our securities. In addition, neither we nor the underwriter make any representation that the underwriter will engage in these transactions or that any transactions, once commenced, will not be discontinued without notice.

Indemnification

We have agreed to indemnify the underwriter against certain liabilities, including certain liabilities arising under the Securities Act, or to contribute to payments that the underwriter may be required to make for these liabilities.

Other Relationships

The underwriter and its respective affiliates have engaged in, and may in the future engage in, investment banking and other commercial dealings in the ordinary course of business with us or our affiliates. The underwriter has received, or may in the future receive, customary fees and commissions for these transactions. The underwriter of this offering also acted as placement agent in our offering consummated on September 25, 2019, for which it received compensation.

EXPERTS

The consolidated financial statements of Onconova Therapeutics, Inc. at December 31, 2018 and 2017, and for the years then ended, appearing in our [Annual Report \(Form 10-K\) for the year ended December 31, 2018](#) have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon (which contains an explanatory paragraph describing conditions that raise substantial doubt about the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements) included therein and incorporated herein by reference. Such financial statements are incorporated herein by reference in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

LEGAL MATTERS

The validity of the securities being offered by this prospectus will be passed upon by Morgan, Lewis & Bockius LLP, Philadelphia, Pennsylvania. The underwriter is being represented in connection with this offering by Lowenstein Sandler LLP, New York, New York.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy and information statements and other information with the SEC. Our SEC filings, including the registration statement, are available to the public from the SEC's website at www.sec.gov. To receive copies of public records not posted to the SEC's website at prescribed rates, you may complete an online form at www.sec.gov, send a fax to (202) 772-9337 or submit a written request to the SEC, Office of FOIA/PA Operations, 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information.

We also make available free of charge on our website, www.onconova.com, all materials that we file electronically with the SEC, including our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, Section 16 reports and amendments to those reports as soon as reasonably practicable after such materials are electronically filed with, or furnished to, the SEC. Information contained on our website or any other website is not incorporated by reference into this prospectus and does not constitute a part of this prospectus.

INCORPORATION BY REFERENCE

The SEC allows us to "incorporate by reference" the information we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus, and information that we file later with the SEC will automatically update and supersede this information. We incorporate by reference the documents listed below:

- [Our Annual Report on Form 10-K for the fiscal year ended December 31, 2018, which we filed with the SEC on April 1, 2019;](#)
- [Our Definitive Proxy Statement on Schedule 14A for our 2019 Annual Meeting of Stockholders held June 17, 2019, which we filed with the SEC on April 29, 2019;](#)

- Our Quarterly Reports on Form 10-Q for the fiscal periods ended March 31, 2019, June 30, 2019 and September 30, 2019, which we filed with the SEC on [May 15, 2019](#), [August 14, 2019](#) and November 12, 2019, respectively;
- Our current reports on Form 8-K filed with the SEC on [January 15, 2019](#), [March 26, 2019](#), [May 14, 2019](#), [May 16, 2019](#), [May 17, 2019](#), [May 24, 2019](#), [June 19, 2019](#), [July 29, 2019](#), [September 13, 2019](#), [September 25, 2019](#) and [October 24, 2019](#);
- [The description of our common stock contained in our registration statement on Form 8-A filed on July 23, 2013 \(Registration no. 001-36020\) with the SEC, including any amendment or report filed for the purpose of updating such description](#);
- All documents filed by us with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, after the date of the initial filing of the registration statement of which this prospectus is a part and prior to the effectiveness of such registration statement; and
- All documents filed by us with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act on or after the date of this prospectus and before we stop offering the securities under this prospectus.

We will provide without charge to each person, including any beneficial owner, to whom this prospectus is delivered, upon his or her written or oral request, a copy of any or all documents referred to above which have been or may be incorporated by reference into this prospectus but not delivered with this prospectus excluding exhibits to those documents unless they are specifically incorporated by reference into those documents. You can request those documents from us, at no cost, by writing or telephoning us at: Onconova Therapeutics, Inc., 375 Pheasant Run, Newtown, Pennsylvania, 18940, (267) 759-3680, Attention: Suzanne Hutchinson.

The most recent information that we file with the SEC automatically updates and supersedes older information. The information contained in any such filing will be deemed to be a part of this prospectus, commencing on the date on which the filing is made.

Information furnished under Items 2.02 or 7.01 (or corresponding information furnished under Item 9.01 or included as an exhibit) in any past or future [Current Report on Form 8-K](#) that we file with the SEC, unless otherwise specified in such report, is not incorporated by reference in this prospectus.



Onconova Therapeutics, Inc.

Up to 28,571,429 Units (each Unit contains one share of Common Stock and one Warrant to purchase one share of Common Stock)

Up to 28,571,429 Pre-Funded Units (each Pre-Funded Unit contains one Pre-Funded Warrant to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock)

(Up to 28,571,429 shares of Common Stock Underlying the Pre-Funded Warrants) and

(Up to 28,571,429 shares of Common Stock Underlying the Warrants)

PROSPECTUS

Sole Book-Running Manager

H.C. Wainwright & Co.

, 2019

PART II**Information Not Required In Prospectus****Item 13. Other Expenses of Issuance and Distribution.**

The following is a statement of estimated expenses in connection with the issuance and distribution of the securities being registered, excluding dealer-manager fees. All expenses incurred with respect to the registration of the Common Stock will be borne by us. All amounts are estimates except the SEC registration fee, the FINRA filing fee and the Nasdaq listing of additional shares notification fee.

	Amount to be Paid
SEC Registration Fee	\$ 3,694.44
FINRA Filing Fee	500.00
NASDAQ Fee	1,000.00
Printing Expenses	5,000.00
Legal Fees and Expenses	125,000
Accounting Fees and Expenses	55,000.00
Transfer Agent Fees and Expenses	5,000.00
Miscellaneous Expenses	9,805.56
	\$ 205,000

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 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 have entered into indemnification agreements with our directors and executive officers. These agreements, among other things, 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.

Item 15. Recent Sales of Unregistered Securities.

On September 25, 2019, the Company issued warrants to H.C. Wainwright & Co., LLC as additional compensation in connection with a registered direct offering of securities of the Company. These warrants are exercisable for up to 109,585 shares of common stock and have an exercise price of \$2.00 per share of common stock. The sale of such securities to H.C. Wainwright & Co., LLC was not registered under the Securities Act because it was made in a transaction exempt from registration under Section 4(a)(2) of the Securities Act and/or Rule 506 promulgated thereunder.

On May 10, 2019, the Company sold 103,520 shares of common stock to Abundant New Investments Ltd. (“Abundant”), an affiliate of HanX, for approximately \$500,000 in connection with the Company’s License and Collaboration Agreement with HanX and the related Securities Purchase Agreements with each of HanX and Abundant. The sale of such shares was not registered under the Securities Act because it was made in a transaction exempt from registration under Section 4(a)(2) of the Securities Act and/or Rule 506 promulgated thereunder.

On February 12, 2018, the Company issued warrants to H.C. Wainwright & Co., LLC as additional underwriter compensation in connection with an underwritten offering of securities of the Company. These warrants are exercisable for shares of Series A Preferred Stock, which are convertible into 33,158 shares of common stock subject to the terms of the Series A Preferred Stock. These warrants had an exercise price of \$18.9375 per share of common stock, on an as converted basis. The sale of such securities to HCW was not registered under the Securities Act because it was made in a transaction exempt from registration under Section 4(a)(2) of the Securities Act and/or Rule 506 promulgated thereunder. On September 24, 2018, in exchange for HCW agreement to provide shareholder advisory services to the Company for a period of three months starting on September 24, 2018, the Company repriced these warrants to an exercise price per share equal to \$7.96875 per share of common stock, on an as converted basis.

On April 4, 2018, the Company sold 816,945 shares of common stock to Pint for \$1,250,000 in connection with the Company’s License, Development and Commercialization Agreement with Pint and the related Securities Purchase Agreement with Pint. The sale of such shares was not registered under the Securities Act because it was made in a transaction exempt from registration under Section 4(a)(2) of the Securities Act and/or Rule 506 promulgated thereunder.

On March 26, 2018, the Company agreed to issue to World Wide Holdings, LLC d/b/a Invictus Resources (“Invictus”), in connection with that certain Master Services Agreement between the Company and Invictus, warrants for Common Stock. The warrants issuable as of March 26, 2018 are exercisable for (i) 75,000 shares of common stock at a price of \$0.94 per share of Common Stock and (ii) 125,000 shares of common stock at a price of \$1.41 per share of common stock. On June 13, 2018, in consideration of an extension of services by Invictus, the Company issued additional warrants to Invictus, exercisable for 225,000 shares of common stock at a price of \$0.52 per share. The sale of such securities to Invictus was not registered under the Securities Act because it was made in a transaction exempt from registration under Section 4(a)(2) of the Securities Act and/or Rule 506 promulgated thereunder.

On February 12, 2018, the Company issued warrants to HCW as additional underwriter compensation in connection with an underwritten offering of securities of the Company. These warrants are exercisable for 49,737.5 shares of Series A Preferred Stock, which are convertible into 497,375 shares of common stock subject to the terms of the Series A Preferred Stock. These warrants have an exercise price of \$1.2625 per 0.1 share of Series A Preferred Stock. The sale of such securities to HCW was not registered under the Securities Act because it was made in a transaction exempt from registration under Section 4(a)(2) of the Securities Act and/or Rule 506 promulgated thereunder.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits

The exhibits to the registration statement are listed in the Exhibit Index to this registration statement and are incorporated herein by reference.

(b) Financial statement schedules

All schedules have been omitted because either they are not required, are not applicable or the information is otherwise set forth in the financial statements and related notes thereto.

Item 17. Undertakings.

The undersigned registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933 (the “Act”);

(ii) To reflect in the prospectus any facts or events arising after the effective date of this registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that

which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and

(iii) To include any material information with respect to the plan of distribution not previously disclosed in this registration statement or any material change to such information in this registration statement.

Provided, however, that Paragraphs (1)(i), (1)(ii) and (1)(iii) of this section do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the registrant pursuant to section 13 or section 15(d) of the Exchange Act that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of the registration statement.

(2) That, for the purpose of determining any liability under the Act, each such post-effective amendment 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.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(4) That, for the purpose of determining liability of the registrant under the Securities Act of 1933 to any purchaser in the initial distribution of the securities, the undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser:

(i) Any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424 (§230.424 of this chapter);

(ii) Any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant;

(iii) The portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and

(iv) Any other communication that is an offer in the offering made by the undersigned registrant to the purchaser.

The undersigned registrant hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the registrant's annual report pursuant to section 13(a) or section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement 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.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 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 Securities and Exchange Commission such indemnification is against public policy as expressed in the 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 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 of 1933, 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 of 1933, 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.

EXHIBIT INDEX

Exhibit Number	Exhibit Description
1.1	<u>Form of Underwriting Agreement</u>
3.1	<u>Tenth Amended and Restated Certificate of Incorporation of Onconova Therapeutics, Inc. (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on July 25, 2013).</u>
3.2	<u>Amended and Restated Bylaws of Onconova Therapeutics, Inc. (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on July 25, 2013).</u>
3.3	<u>Certificate of Amendment to Tenth Amended and Restated Certificate of Incorporation of Onconova Therapeutics, Inc. (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on May 31, 2016).</u>
3.4	<u>Certificate of Amendment to Tenth Amended and Restated Certificate of Incorporation of Onconova Therapeutics, Inc., as amended (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on March 22, 2018)</u>
3.5	<u>Certificate of Amendment to Tenth Amended and Restated Certificate of Incorporation of Onconova Therapeutics, Inc., as amended (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on June 8, 2018)</u>
3.6	<u>Certificate of Amendment to Tenth Amended and Restated Certificate of Incorporation of Onconova Therapeutics, Inc., as amended (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on September 25, 2018)</u>
4.1	<u>Form of Certificate of Common Stock (Incorporated by reference to Exhibit 4.1 to Pre-Effective Amendment No. 1 the Company's Registration Statement on Form S-1 filed on July 11, 2013.)</u>
4.2	<u>Eighth Amended and Restated Stockholders' Agreement, effective as of July 27, 2012, by and among Onconova Therapeutics, Inc. and certain stockholders named therein (Incorporated by reference to Exhibit 4.2 to Pre-Effective Amendment No. 1 to the Company's Registration Statement on Form S-1 filed on July 11, 2013).</u>
4.3	<u>Amendment No. 1 to Eighth Amended and Restated Stockholders' Agreement, effective as of July 9, 2013 (Incorporated by reference to Exhibit 4.2 to Pre-Effective Amendment No. 1 the Company's Registration Statement on Form S-1 filed on July 11, 2013).</u>
4.4	<u>Form of Warrant Certificate issued pursuant to Warrant Agreement, dated as of July 27, 2016, by and between Onconova Therapeutics, Inc. and Wells Fargo Bank, N.A., as Warrant Agent (Incorporated by reference to Exhibit 4.1 to the Company's Quarterly Report on Form 10-Q filed on August 15, 2016)</u>
4.5	<u>Warrant Agreement, dated as of July 27, 2016, by and between Onconova Therapeutics, Inc. and Wells Fargo Bank, N.A., as Warrant Agent (Incorporated by reference to Exhibit 4.2 to the Company's Quarterly Report on Form 10-Q filed on August 15, 2016)</u>
4.6	<u>Form of Pre-Funded Warrants issued as of July 27, 2016 (Incorporated by reference to Exhibit 4.3 to the Company's Quarterly Report on Form 10-Q filed on August 15, 2016)</u>
4.7	<u>Certificate of Designation of Series A Convertible Preferred Stock (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on February 8, 2018)</u>
4.8	<u>Form of Underwriter Warrant issued as of February 12, 2018 ((Incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on February 8, 2018)</u>

Table of Contents

<u>Exhibit Number</u>	<u>Exhibit Description</u>
4.9	<u>Form of Preferred Stock Warrant issued as of February 12, 2018 (Incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed on February 8, 2018)</u>
4.10	<u>Form of Pre-Funded Warrant issued as of February 12, 2018 (Incorporated by reference to Exhibit 4.3 to the Company's Current Report on Form 8-K filed on February 8, 2018)</u>
4.11	<u>Certificate of Designation of Series B Convertible Preferred Stock (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on April 30, 2018)</u>
4.12	<u>Form of Preferred Stock Warrant issued as of May 1, 2018 (Incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on April 30, 2018)</u>
4.13	<u>Form of Pre-Funded Warrant issued as of May 1, 2018 (Incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed on April 30, 2018)</u>
4.14	<u>First Amendment to Underwriter Series A Convertible Preferred Stock Purchase Warrant, dated as of September 24, 2018 (Incorporated by reference to Exhibit 4.1 to the Company's Quarterly Report on Form 10-Q filed on November 14, 2018)</u>
4.15	<u>Form of Placement Agent Warrant (Incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on September 25, 2019)</u>
4.16	<u>Form of Warrant Amendment (Incorporated by reference to Exhibit 4.1 to the Company's Quarterly Report on Form 10-Q filed on November 12, 2019)</u>
4.17	<u>Form of Warrant</u>
4.18	<u>Form of Pre-Funded Warrant</u>
4.19	<u>Form of Underwriter Warrant</u>
5.1	<u>Opinion of Morgan, Lewis & Bockius LLP</u>
10.1*	<u>Development and License Agreement, effective as of September 19, 2012, by and between Onconova Therapeutics, Inc. and Baxter Healthcare SA (Incorporated by reference to Exhibit 10.1 to Pre-Effective Amendment No. 2 the Company's Registration Statement on Form S-1 filed on July 18, 2013).</u>
10.2*	<u>License Agreement, effective as of July 5, 2011, by and between Onconova Therapeutics, Inc. and SymBio Pharmaceuticals Limited (Incorporated by reference to Exhibit 10.2 to Pre-Effective Amendment No. 2 the Company's Registration Statement on Form S-1 filed on July 18, 2013).</u>
10.3*	<u>First Amendment to License Agreement, effective as of September 2, 2011, by and between Onconova Therapeutics, Inc. and SymBio Pharmaceuticals Limited (Incorporated by reference to Exhibit 10.3 to the Company's Registration Statement on Form S-1 filed on June 14, 2013).</u>
10.4*	<u>License Agreement, effective as of January 1, 1999, by and between Onconova Therapeutics, Inc. and Temple University—Of The Commonwealth System of Higher Education (Incorporated by reference to Exhibit 10.4 to the Company's Registration Statement on Form S-1 filed on June 14, 2013).</u>
10.5*	<u>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. (Incorporated by reference to Exhibit 10.5 to the Company's Registration Statement on Form S-1 filed on June 14, 2013).</u>
10.6*	<u>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. (Incorporated by reference to Exhibit 10.6 to the Company's Registration Statement on Form S-1 filed on June 14, 2013).</u>
10.7*	<u>Limited Liability Company Agreement of GBO, LLC, dated as of December 12, 2012, by and between Onconova Therapeutics, Inc. and GVK Biosciences Private Limited (Incorporated by reference to Exhibit 10.12 to the Company's Registration Statement on Form S-1 filed on June 14, 2013).</u>

Table of Contents

<u>Exhibit Number</u>	<u>Exhibit Description</u>
10.8+	<u>Onconova Therapeutics, Inc. 2007 Equity Compensation Plan, and forms of agreement thereunder(Incorporated by reference to Exhibit 10.13 to Pre-Effective Amendment No. 1 the Company's Registration Statement on Form S-1 filed on July 11, 2013).</u>
10.9+	<u>Employment Agreement, effective as of July 1, 2015, by and between Onconova Therapeutics, Inc. and Ramesh Kumar, Ph.D.(Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on July 8, 2015).</u>
10.10+	<u>Letter Agreement, effective as of January 1, 2016, by and between Onconova Therapeutics, Inc. and Ramesh Kumar, Ph.D.(Incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed on February 17, 2016).</u>
10.11+	<u>Amended and Restated Employment Agreement, effective as of July 1, 2015, by and between Onconova Therapeutics, Inc. and Thomas McKearn, M.D., Ph.D.(Incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed on July 8, 2015).</u>
10.12+	<u>Amended and Restated Employment Agreement, effective as of July 1, 2015, by and between Onconova Therapeutics, Inc. and Ajay Bansal.(Incorporated by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K filed on July 8, 2015).</u>
10.13+	<u>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(Incorporated by reference to Exhibit 10.23 to the Company's Registration Statement on Form S-1 filed on June 14, 2013).</u>
10.14+	<u>Form of Indemnification Agreement entered into by and between Onconova Therapeutics, Inc. and each director and executive officer(Incorporated by reference to Exhibit 10.24 to Pre-Effective Amendment No. 1 the Company's Registration Statement on Form S-1 filed on July 11, 2013).</u>
10.15+	<u>Onconova Therapeutics, Inc. 2013 Equity Compensation Plan, and forms of agreement thereunder(Incorporated by reference to Exhibit 10.25 to Pre-Effective Amendment No. 1 the Company's Registration Statement on Form S-1 filed on July 11, 2013).</u>
10.16+	<u>Onconova Therapeutics, Inc. 2013 Performance Bonus Plan(Incorporated by reference to Exhibit 10.26 to Pre-Effective Amendment No. 1 the Company's Registration Statement on Form S-1 filed on July 11, 2013).</u>
10.17+	<u>Employment Agreement, effective as of July 1, 2015, by and between Onconova Therapeutics, Inc. and Dr.Manoj Manair.(Incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed on July 8, 2015).</u>
10.18+	<u>Employment Agreement, effective as of July 1, 2015, by and between Onconova Therapeutics, Inc. and Mark Guerin.(Incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed on February 17, 2016).</u>
10.19+	<u>Amended and Restated Employment Agreement, effective as of July 1, 2015, by and between Onconova Therapeutics, Inc. and Steven M. Fruchtmann, M.D.(Incorporated by reference to Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q filed on August 13, 2015).</u>
10.20	<u>Dealer-Manager Agreement dated July 7, 2016, between Onconova Therapeutics, Inc. and Maxim Group LLC ((Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on July 13, 2016)</u>
10.21	<u>At Market Issuance Sales Agreement, dated December 5, 2016, between Onconova Therapeutics, Inc. and FBR Capital Markets & Co. (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on December 5, 2016)</u>
10.22+	<u>Letter Agreement, effective as of January 1, 2017, by and between Onconova Therapeutics, Inc. and Ramesh Kumar, Ph.D.(Incorporated by reference to Exhibit 10.27 to the Company's Annual Report on Form 10-K filed on March 29, 2017).</u>

Table of Contents

<u>Exhibit Number</u>	<u>Exhibit Description</u>
10.23*	<u>License, Development and Commercialization Agreement, dated as of March 2, 2018, by and between Onconova Therapeutics, Inc. and Pint International SA (Incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on May 15, 2018)</u>
10.24	<u>Securities Purchase Agreement, dated as of March 2, 2018, by and between Onconova Therapeutics, Inc. and Pint Pharma GmbH (Incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on May 15, 2018).</u>
10.25	<u>Form of Lock-Up Waiver Agreement, dated as of April 16, 2018, by and among the Company, H.C. Wainwright & Co., LLC and each of the warrant holders identified on the signature pages thereto (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on April 30, 2018).</u>
10.26+	<u>Amended and Restated Employment Agreement, effective as of June 19, 2018, by and between the Company and Steven M. Fruchtman, M.D. (Incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on August 14, 2018)</u>
10.27+	<u>Onconova Therapeutics, Inc. 2018 Omnibus Incentive Compensation Plan, as approved by the stockholders (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on June 29, 2018)</u>
10.28+	<u>Form of Nonqualified Stock Option Award Agreement under the Onconova Therapeutics, Inc. 2018 Omnibus Incentive Compensation Plan (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on July 30, 2018).</u>
10.29+	<u>Employment Agreement, effective as of November 5, 2018, by and between the Company and Richard C. Woodman, M.D. (Incorporated by reference to Exhibit 4.1 to the Company's Quarterly Report on Form 10-Q filed on November 14, 2018)</u>
10.30+	<u>Separation and Release Agreement, effective as of January 15, 2019, by and between the Company and Ramesh Kumar, Ph.D. (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on January 15, 2019)</u>
10.31*	<u>License and Collaboration Agreement, effective as of May 10, 2019, by and between the Company and HanX Biopharmaceuticals, Inc. (Incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on August 14, 2019)</u>
10.32	<u>Securities Purchase Agreement, dated as of May 10, 2019, by and between Onconova Therapeutics, Inc. and HanX Biopharmaceuticals, Inc. (Incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on August 14, 2019)</u>
10.33	<u>Securities Purchase Agreement, dated as of May 10, 2019, by and between Onconova Therapeutics, Inc. and Abundant New Investments Ltd. (Incorporated by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q filed on August 14, 2019)</u>
10.34	<u>Form of Securities Purchase Agreement, dated as of September 23, 2019, among Onconova Therapeutics, Inc. and the Purchasers named therein (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on September 25, 2019)</u>
21.1	<u>Subsidiaries of Onconova Therapeutics, Inc. (Incorporated by reference to Exhibit 21.1 to the Company's Annual Report on Form 10-K filed on March 28, 2016).</u>
23.1	<u>Consent of Ernst & Young, LLP</u>
23.2	<u>Consent of Morgan, Lewis & Bockius LLP (included in Exhibit 5.1)</u>
24.1**	<u>Power of Attorney (included on signature page)</u>

+ Indicates management contract or compensatory plan.

*Portions of the exhibit have been omitted.

** Previously filed

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-1 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in Newtown, Pennsylvania on November 12, 2019.

Onconova Therapeutics, Inc.

By: /s/ STEVEN M. FRUCHTMAN, M.D.

Name: Steven M. Fruchtman, M.D.

Title: *President and Chief Executive Officer*

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities indicated on November 12, 2019.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ STEVEN M. FRUCHTMAN, M.D.</u> Steven M. Fruchtman, M.D.	Director, President and Chief Executive Officer (Principal Executive Officer and Principal Operating Officer)	November 12, 2019
<u>/s/ MARK GUERIN</u> Mark Guerin	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	November 12, 2019
<u>*</u> Michael B. Hoffman	Chairman, Board of Directors	November 12, 2019
<u>*</u> Jerome E. Groopman, M.D.	Director	November 12, 2019

[Table of Contents](#)

*

James J. Marino

Director

November 12, 2019

*

Viren Mehta, Ph.D.

Director

November 12, 2019

*

E. Premkumar Reddy, Ph.D.

Director

November 12, 2019

*

Jack E. Stover

Director

November 12, 2019

By: /s/ STEVEN M. FRUCHTMAN, M.D.

Name: Steven M. Fruchtman, M.D., Attorney-in-Fact

[] Shares of Common Stock
 Pre-Funded Warrants to Purchase [] Shares of Common Stock
 and
 Warrants to Purchase [] Shares of Common Stock

Onconova Therapeutics, Inc.

UNDERWRITING AGREEMENT

[], 2019

H.C. Wainwright & Co., LLC
 430 Park Avenue, 4th Floor
 New York, New York 10022
 Ladies and Gentlemen:

Onconova Therapeutics, Inc. a Delaware corporation (the "Company"), proposes to issue and sell to H.C. Wainwright & Co., LLC (the "Underwriter") an aggregate of [] Units (as defined below) and [] Pre-Funded Units (as defined below) representing (i) an aggregate of (a) [] shares (the "Firm Shares") of the common stock, par value \$0.01 per share, of the Company ("Common Stock") and (b) pre-funded warrants to purchase [] shares of Common Stock at an exercise price of \$0.0001 per share (the "Pre-Funded Warrants"); and (ii) warrants (the "Firm Warrants" and, collectively with the Firm Shares and the Pre-Funded Warrants, the "Firm Securities") to purchase an aggregate of [] shares Common Stock. The amount and form of the Firm Securities to be purchased by the Underwriter is set forth opposite its name on **Schedule I** hereto. The Company also proposes to sell to the Underwriter, at the option of the Underwriter, up to an additional [] shares of Common Stock (the "Option Shares") and/or warrants to purchase up to an aggregate of [] shares of Common Stock (the "Option Warrants" and, together with the Option Shares, the "Option Securities"). The Firm Shares and the Option Shares are hereinafter referred to collectively as the "Shares"; the Firm Warrants and the Option Warrants are collectively referred to herein as the "Warrants"; the shares of Common Stock issuable upon exercise of the Warrants and the shares of Common Stock issuable upon exercise of the Pre-Funded Warrants are collectively referred to herein as the "Warrant Shares"; the Underwriter's Warrants (as defined in Section 4 of this Agreement) and the shares of Common Stock issuable upon exercise of the Underwriter's Warrants (the "Underwriter Warrant Shares") are collectively referred to herein as the "Underwriter's Securities"; and the Firm Securities, the Option Securities, the Warrant Shares and the Underwriter's Securities are hereinafter referred to collectively as the "Securities". The Shares and/or Pre-Funded Warrants and the Warrants shall be sold together as a fixed combination, each consisting of (i) one share of Common Stock or one Pre-Funded Warrant, and (ii) one Warrant to purchase one share of Common Stock, with each combination consisting of one share of Common Stock and one Warrant to purchase one share of Common Stock being referred to herein as a "Unit" and each combination consisting of one Pre-Funded Warrant to purchase one share of Common Stock and one Warrant to purchase one share of Common Stock being referred to herein as a "Pre-Funded Unit." The Shares and/or Pre-Funded Warrants and the Warrants in each of the Units or Pre-Funded Units, as applicable, shall be immediately separable and transferable upon issuance. The terms of the Warrants are set forth in the form of Warrant attached hereto as **Exhibit 1** and the terms of the Pre-Funded Warrants are set forth in the form of Pre-Funded Warrant attached hereto as **Exhibit 2**. Units and the Pre-Funded Units will not be issued or certificated. The shares of Common Stock or Pre-Funded Warrants, as the case may be, and the Warrants can only be purchased together but the securities contained in the Units or Pre-Funded units will be issued separately.

The Company confirms as follows its agreements with the Underwriter.

1. (a) The Company represents and warrants to, and agrees with, the Underwriter that, as of the date hereof and as of the Closing Date and each Option Closing Date, if any:

(i) A registration statement of the Company on Form S-1 (File No. 333-234360) in respect of the Securities and one or more pre-effective amendments thereto (collectively, the "Initial Registration Statement") have been filed with the Securities and Exchange Commission (the "Commission"); the Initial Registration Statement and any post-effective amendment thereto, each in the form heretofore delivered to you, have been declared effective by the Commission in such form; other than a registration statement, if any, increasing the size of the offering (a "Rule 462(b) Registration Statement"), filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended (the "Securities Act"), which became effective upon filing, no other document with respect to the Initial Registration Statement has heretofore been filed with the Commission; no stop order suspending the effectiveness of the Initial Registration Statement, any post-effective amendment thereto or the Rule 462(b) Registration Statement, if any, has been issued, no proceeding for that purpose has

been initiated or, to the Company's knowledge, threatened by the Commission and any request on the part of the Commission for additional information from the Company has been satisfied in all material respects; any preliminary prospectus included in the Initial Registration Statement, as originally filed or as part of any amendment thereto, or filed with the Commission pursuant to Rule 424(a) of the rules and regulations of the Commission under the Securities Act is hereinafter called a "Preliminary Prospectus"; the various parts of the Initial Registration Statement and the Rule 462(b) Registration Statement, if any, including (i) all documents incorporated or deemed to be incorporated by reference therein, (ii) all schedules and exhibits thereto and (iii) the information contained in the form of final prospectus filed with the Commission pursuant to Rule 424(b) under the Securities Act and deemed by virtue of Rule 430A under the Securities Act to be part of the Initial Registration Statement at the time it was declared effective or such part of the Rule 462(b) Registration Statement, if any, became or hereafter becomes effective, each as amended at the time such part of the Initial Registration Statement became effective, are hereinafter collectively called the "Registration Statement"; the Preliminary Prospectus relating to the Securities that was included in the Registration Statement immediately prior to the Applicable Time (as defined in Section 1(a)(iii) hereof) is hereinafter called the "Pricing Prospectus"; such final prospectus, in the form first filed pursuant to Rule 424(b) under the Securities Act, is hereinafter called the "Prospectus"; and any "issuer free writing prospectus" as defined in Rule 433 under the Securities Act relating to the Securities is hereinafter called an "Issuer Free Writing Prospectus"; and all references to the Registration Statement, any Preliminary Prospectus, the Pricing Prospectus, the Prospectus, any Issuer Free Writing Prospectus or any amendment or supplement to any of the foregoing shall be deemed to include the copy filed with the Commission pursuant to its Electronic Data Gathering, Analysis and Retrieval system ("EDGAR"). Any reference to "amend", "amendment" or "supplement" with respect to the Registration Statement, the Rule 462 Registration Statement, any Preliminary Prospectus, the Pricing Prospectus, the Initial Registration Statement, the Pricing Disclosure Package (as defined below) or the Prospectus shall be deemed to refer to and include any documents filed after the effective date of the Initial Registration Statement, the Registration Statement or the Rule 462 Registration Statement or the date of such Preliminary Prospectus, the Pricing Prospectus, the Pricing Disclosure Package or the Prospectus, as the case may be under the Securities Exchange Act of 1934, as amended, and the rules and regulations of the Commission thereunder (collectively, the "Exchange Act") that are deemed to be incorporated by reference therein. "Testing-the-Waters Communication" means any oral or written communication with potential investors undertaken in reliance on Section 5(d) of the Securities Act;

(ii) (1) at the respective times the Initial Registration Statement, any Rule 462(b) Registration Statement and any post-effective amendments thereto became effective and at the Closing Date (as defined herein) (and, if any Option Securities are purchased, at each Option Closing Date) (as defined herein), the Initial Registration Statement, any Rule 462(b) Registration Statement and any amendments and supplements thereto complied and will comply in all material respects with the requirements of the Securities Act and the rules and regulations of the Commission thereunder (the "Rules and Regulations") and did not and will not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading, and (2) at the time the Prospectus or any amendments or supplements thereto were issued and at the Closing Date (and, if any Option Securities are purchased, at each Option Closing Date), neither the Prospectus nor any amendment or supplement thereto included or will include an untrue statement of a material fact or omitted or will omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided that the representations and warranties in clauses (1) and (2) above shall not apply to statements in or omissions from the Registration Statement or the Prospectus made in reliance upon and in strict conformity with information furnished to the Company in writing by the Underwriter expressly for use in the Registration Statement or the Prospectus or any amendment or supplement thereto, it being understood and agreed that the only such information provided by the Underwriter is that described as such in Section 9(b) hereof. No order preventing or suspending the use of any Preliminary Prospectus, the Pricing Prospectus or any Issuer Free Writing Prospectus has been issued by the Commission;

Each Preliminary Prospectus, Pricing Prospectus, Issuer Free Writing Prospectus and the Prospectus filed as part of the Initial Registration Statement as originally filed or as part of any amendment thereto, or filed pursuant to Rule 424 under the Securities Act, complied when so filed in all material respects with the requirements of the Securities Act and the Rules and Regulations and each Preliminary Prospectus, Pricing Prospectus, Issuer Free Writing Prospectus and the Prospectus delivered to the Underwriter for use in connection with this offering was identical to the electronically transmitted copies thereof filed with the Commission pursuant to EDGAR, except to the extent permitted by Regulation S-T;

(iii) For the purposes of this Agreement, the "Applicable Time" is [] a.m. (Eastern time) on the date of this Agreement; the Pricing Prospectus as supplemented by the Issuer Free Writing Prospectuses, if any, issued at or prior to the Applicable Time and by the Written Testing-the-Waters Communications (as hereinafter defined), together with the information and documents set forth or incorporated by reference in Schedule I hereto, taken together (collectively, the "Pricing Disclosure Package") as of the Applicable Time, did not include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; and each Issuer Free Writing Prospectus, if any, and/or Written Testing-the-Waters

Communication listed on Schedule II hereto does not conflict with the information contained in the Registration Statement, the Pricing Prospectus or the Prospectus and each such Issuer Free Writing Prospectus and/or Written Testing-the-Waters Communication, as supplemented by and taken together with the Pricing Disclosure Package as of the Applicable Time, did not include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that this representation and warranty shall not apply to statements or omissions made in an Issuer Free Writing Prospectus or Written Testing-the-Waters Communication in reliance upon and in conformity with the information furnished in writing to the Company by the Underwriter expressly for use therein;

(iv) The Company has filed a registration statement pursuant to the Exchange Act, to register the Common Stock, and such registration statement has been declared effective; the Company is not, and at the time of filing the Initial Registration Statement, was not an “ineligible issuer,” as defined under Rule 405 under the Securities Act;

(v) Each of the Company and its subsidiaries (each a “Subsidiary”) has been duly incorporated and is validly existing as a corporation or other entity in good standing under the laws of its jurisdiction or organization, with power and authority (corporate and other) to own its properties and conduct its business as currently being carried on and as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, and, in the case of the Company, to enter into and perform its obligations under this Agreement, the Warrants, the Pre-Funded Warrants and the Underwriter’s Warrants, and have been duly qualified as a foreign corporation or other entity for the transaction of business and is in good standing under the laws of each other jurisdiction in which it owns or leases properties or conducts any business so as to require such qualification, except where the failure to so qualify or be in good standing would not have a material adverse effect on the general affairs, business, prospects, management, properties, operations, condition (financial or otherwise) or results of operations of the Company and its Subsidiaries, taken as a whole (a “Material Adverse Effect”);

(vi) The Company has an authorized capitalization as set forth in the Pricing Prospectus, and all of the issued and outstanding shares of capital stock of the Company have been duly authorized and validly issued, are fully paid and non-assessable and conform to the descriptions thereof contained in the Pricing Prospectus; and none of the issued and outstanding shares of capital stock of the Company are subject to any preemptive or similar rights;

(vii) The Shares which may be issued and sold by the Company to the Underwriter hereunder have been duly authorized and, when issued, delivered and paid for by the Underwriter in accordance with the terms of this Agreement will be validly issued and fully paid and non-assessable and will conform to the descriptions thereof contained in the Prospectus; and, except as otherwise stated in the Registration Statement, in the Pricing Disclosure Package and in the Prospectus, the issuance of such Shares is not subject to any preemptive or similar rights; the Warrant Shares and the Underwriter Warrant Shares, when issued, paid for and delivered upon due exercise of the Warrants, the Pre-Funded Warrants or the Underwriter’s Warrants, as applicable, will be duly authorized and validly issued, fully paid and non-assessable, free and clear from any preemptive or similar rights, and will be issued in compliance with all applicable securities laws. The Warrant Shares and the Underwriter Warrant Shares have been reserved for issuance. The Securities, when issued, will conform in all material respects to the descriptions thereof set forth in the Registration Statement, in the Pricing Disclosure Package and in the Prospectus;

(viii) This Agreement, the Warrants, the Pre-Funded Warrants and the Underwriter’s Warrants, as applicable, have been duly authorized, executed and delivered by the Company. This Agreement constitutes the legal, valid and binding obligation of the Company and is enforceable against the Company in accordance with its terms, except as enforceability may be limited by applicable bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors’ rights generally or subject to general principles of equity (regardless of whether such enforceability is considered in a proceeding in equity or at law), and except as enforceability of any indemnification or contribution provision may be limited under foreign, federal or state securities laws. When issued, the Warrants, the Pre-Funded Warrants and the Underwriter’s Warrants will constitute the legal, valid and binding obligations of the Company, including to issue and sell, upon exercise thereof and payment of the respective exercise prices therefor, the number and type of securities of the Company called for thereby in accordance with the terms thereof, and such Warrants, Pre-Funded Warrants and Underwriter’s Warrants are enforceable against the Company in accordance with their respective terms, except as enforceability may be limited by applicable bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors’ rights generally or subject to general principles of equity (regardless of whether such enforceability is considered in a proceeding in equity or at law), and except as enforceability of any indemnification or contribution provision may be limited under foreign, federal or state securities laws;

(ix) The issue and sale of the Securities to be sold by the Company hereunder and under the Warrants, the Pre-Funded Warrants and the Underwriter’s Warrants, as applicable, the execution hereof and thereof by the Company and the compliance by the Company with all of the provisions hereof and thereof and the consummation of the

transactions herein and therein contemplated will not (1) conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company or any of the Subsidiaries is a party or by which the Company or any of the Subsidiaries is bound or to which any of the material property or assets of the Company or any of the Subsidiaries is subject, (2) result in any violation of the provisions of the certificate or articles of incorporation or by-laws (or other organization documents) of the Company or any of the Subsidiaries or any statute or any order, rule or regulation of any court or governmental agency or body having jurisdiction over the Company or any of the Subsidiaries or any of their material properties or (3) require the consent, approval, authorization, order, registration or qualification of or with any such court or governmental agency or body for the issue and sale of the Securities to be sold by the Company hereunder and under the Warrants, the Pre-Funded Warrants and the Underwriter's Warrants, as applicable, or the consummation by the Company of the transactions contemplated hereby and thereby, except the registration under the Securities Act of the Securities and such consents, approvals, authorizations, registrations or qualifications as may be required under state securities, Blue Sky laws or the rules and regulations of the Nasdaq Stock Market, LLC or the Financial Industry Regulatory Authority in connection with the purchase and distribution of the Securities by the Underwriter;

(x) Ernst & Young, LLP, who have certified certain financial statements of the Company, are independent public accountants as required by the Securities Act and the Rules and Regulations. The financial statements, together with related schedules and notes, incorporated in the Registration Statement and the Pricing Prospectus comply in all material respects with the requirements of the Securities Act and present fairly the consolidated financial position, results of operations and changes in financial position of the Company on the basis stated in the Registration Statement at the respective dates or for the respective periods to which they apply; such statements and related notes have been prepared in accordance with United States generally accepted accounting principles ("GAAP") consistently applied throughout the periods involved, except as disclosed therein; and the selected financial data and the summary financial data included in the Pricing Prospectus present fairly the information shown therein and have been compiled on a basis consistent with that of the financial statements incorporated in the Registration Statement. The pro forma financial statements of the Company and the related notes thereto incorporated in the Registration Statement and the Pricing Prospectus present fairly the information shown therein, have been prepared in accordance with the Commission's rules and guidelines with respect to pro forma financial statements and have been properly compiled on the bases described therein, and the assumptions used in the preparation thereof are reasonable and the adjustments used therein are appropriate to give effect to the transactions and circumstances referred to therein. The interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement fairly presents the information called for in all material respects and has been prepared in accordance with the Commission's rules and guidelines applicable thereto;

(xi) Neither the Company nor any Subsidiary has sustained since the date of the latest audited financial statements included in the Pricing Prospectus any material loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree, otherwise than as set forth or contemplated in the Pricing Prospectus; and, since the respective dates as of which information is given in the Registration Statement and the Pricing Prospectus, (1) there has not been any change in the capital stock (other than the issuance of shares of Common Stock upon the exercise or conversion of securities, or the grant of options, restricted stock or other equity-based awards under the Company's existing equity compensation plans) or long-term debt of the Company or any of the Subsidiaries, (2) there has not been any Material Adverse Effect, or any development that would reasonably be expected to result in a Material Adverse Effect, in or affecting the general affairs, business, prospects, management, financial position, shareholders' equity or results of operations of the Company and the Subsidiaries, taken as a whole, (3) there have been no transactions entered into by, and no obligations or liabilities, contingent or otherwise, incurred by the Company or any of the Subsidiaries, whether or not in the ordinary course of business, which are material to the Company and the Subsidiaries, taken as a whole or (4) there has been no dividend or distribution of any kind declared, paid or made by the Company on any class of its capital stock, in each case, otherwise than as set forth or contemplated in the Pricing Prospectus;

(xii) Neither the Company nor any of the Subsidiaries is (1) in violation of its certificate or articles of incorporation or bylaws (or other organization documents) or (2) in violation of any law, ordinance, administrative or governmental rule or regulation applicable to the Company or any of the Subsidiaries, or (3) in violation of any decree of any court or governmental agency or body having jurisdiction over the Company or any of the Subsidiaries, or (4) in default in the performance of any obligation, agreement or condition contained in any bond, debenture, note or any other evidence of indebtedness or in any agreement, indenture, lease or other instrument to which the Company or any of the Subsidiaries is a party or by which any of them or any of their respective properties may be bound, except, in the case of clauses (2), (3) and (4), where any such violation or default, individually or in the aggregate, would not have a Material Adverse Effect;

(xiii) Each of the Company and each Subsidiary has good and marketable title to all real and

tangible property described in the Pricing Prospectus as being owned by it, in each case free and clear of all liens, encumbrances and defects except such as are described in the Pricing Prospectus or are not material to the business of the Company or any Subsidiary; and any real property and buildings described in the Pricing Prospectus as being held under lease by the Company or any Subsidiary are held under valid, subsisting and enforceable leases with such exceptions as are not material and do not materially interfere with the use made and proposed to be made of such property and buildings by the Company or any Subsidiary;

(xiv) Other than as set forth in the Pricing Disclosure Package, there are no legal or governmental proceedings pending to which the Company or any of the Subsidiaries is a party or of which any property of the Company or any of the Subsidiaries is the subject which, if determined adversely to the Company or the Subsidiary, individually or in the aggregate, would have or may reasonably be expected to have a Material Adverse Effect, or would prevent or impair the consummation of the transactions contemplated by this Agreement and by the Warrants, the Pre-Funded Warrants and the Underwriter's Warrants, or which are required to be described in the Registration Statement or the Pricing Prospectus; and, to the Company's knowledge, no such proceedings are threatened or contemplated by governmental authorities or others;

(xv) The Company and the Subsidiaries possess all permits, licenses, approvals, consents and other authorizations (collectively, "Permits") issued by the appropriate federal, state, local or foreign regulatory agencies or bodies necessary to conduct the businesses now operated by them; the Company and the Subsidiaries are in compliance with the terms and conditions of all such Permits and all of the Permits are valid and in full force and effect, except, in each case, where the failure so to comply or where the invalidity of such Permits or the failure of such Permits to be in full force and effect, individually or in the aggregate, would not have a Material Adverse Effect; and neither the Company nor any Subsidiary has received any notice of proceedings relating to the revocation or material modification of any such Permits;

(xvi) No material labor dispute with the employees of the Company or the Subsidiaries exists, or, to the knowledge of the Company, is imminent. The Company is not aware of any existing or imminent labor disturbance by the employees of any of its or any Subsidiary's principal suppliers, manufacturers, customers or contractors, which, individually or in the aggregate, may reasonably be expected to result in a Material Adverse Effect;

(xvii) The Company and the Subsidiaries are insured by insurers of recognized financial responsibility against such losses and risks and in such amounts as are prudent and customary in the businesses in which they are engaged; neither the Company nor any Subsidiary has been refused any insurance coverage sought or applied for; and the Company has no reason to believe that either it or any Subsidiary will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage from similar insurers as may be necessary to continue its business at a cost that would not have a Material Adverse Effect;

(xviii) The Company and each of its Subsidiaries have made and keep books, records and accounts, which, in reasonable detail, accurately and fairly reflect in all material respects the transactions and dispositions of the assets of the Company and its Subsidiaries. The Company maintains a system of internal accounting controls sufficient to provide reasonable assurance that (1) transactions are executed in accordance with management's general or specific authorizations; (2) transactions are recorded as necessary to permit preparation of financial statements in conformity with GAAP and to maintain accountability for assets; (3) access to assets is permitted only in accordance with management's general or specific authorization; (4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences; and (5) the interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement is in conformity with GAAP and is updated as necessary to comply in all material respects with the requirements of the Securities Act and the Commission's rules and guidelines applicable thereto and present fairly the consolidated financial position, results of operations and changes in financial position of the Company and the Subsidiaries on the basis stated in the Registration Statement at the respective dates or for the respective periods to which they apply;

(xix) Other than as set forth in the Pricing Disclosure Package, since the date of the latest audited financial statements included in the Pricing Prospectus, (a) the Company has not been advised of (1) any significant deficiencies in the design or operation of internal controls that could adversely affect the ability of the Company and each of its Subsidiaries to record, process, summarize and report financial data, or any material weaknesses in internal controls and (2) any fraud, whether or not material, that involves management or other employees who have a significant role in the internal controls of the Company and each of its Subsidiaries, and (b) since that date, there has been no change in the Company's internal control over financial reporting that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting;

(xx) The Company maintains disclosure controls and procedures (as such term is defined in Rule

13a-15 (e) of the Exchange Act) that comply with the requirements of the Exchange Act; such disclosure controls and procedures are effective in all material respects to perform the functions for which they were established;

(xxi) All U.S. federal income tax returns of the Company and the Subsidiaries required by law to be filed have been filed and all taxes shown by such returns or otherwise assessed, which are due and payable, have been paid, except assessments against which appeals have been or will be promptly taken and as to which adequate reserves have been provided. The Company and the Subsidiaries have filed all other tax returns that are required to have been filed by them pursuant to applicable foreign, state, local or other law, except insofar as the failure to file such returns, individually or in the aggregate, would not result in a Material Adverse Effect, and have paid all taxes due pursuant to such returns or pursuant to any assessment received by the Company or any Subsidiary except for such taxes, if any, as are being contested in good faith and as to which adequate reserves have been provided. The charges, accruals and reserves on the books of the Company and the Subsidiaries in respect of any income and corporation tax liability for any years not finally determined are adequate in all material respects to meet any assessments or re-assessments for additional income tax for any years not finally determined;

(xxii) There are no statutes, regulations, documents or contracts of a character required to be described in the Registration Statement or the Pricing Prospectus or to be filed as an exhibit to the Registration Statement which are not described or filed as required;

(xxiii) Neither the Company nor any of the Subsidiaries is in violation of any statute or any rule, regulation, decision or order of any governmental agency or body or any court, domestic or foreign, relating to the use, production, disposal or release of hazardous or toxic substances or relating to the protection or restoration of the environment or human exposure to hazardous or toxic substances (collectively, "environmental laws"), owns or operates any real property contaminated with any substance that is subject to any environmental laws, is liable for any off-site disposal or contamination pursuant to any environmental laws, or is subject to any claim relating to any environmental laws, which violation, contamination, liability or claim, individually or in the aggregate, would have a Material Adverse Effect; and the Company is not aware of any pending investigation which would reasonably be expected to lead to such a claim;

(xxiv) Each employee benefit plan, within the meaning of Section 3(3) of the Employee Retirement Income Security Act of 1974, as amended ("ERISA"), that is maintained, administered or contributed to by the Company or any Subsidiary for employees or former employees of the Company and its affiliates has been maintained in compliance with its terms and the requirements of any applicable statutes, orders, rules and regulations, including but not limited to ERISA and the Internal Revenue Code of 1986, as amended (the "Code"), except to the extent that failure to so comply, individually or in the aggregate, would not have a Material Adverse Effect. No prohibited transaction, within the meaning of Section 406 of ERISA or Section 4975 of the Code has occurred with respect to any such plan excluding transactions effected pursuant to a statutory or administrative exemption;

(xxv) Neither the Company nor any of its Subsidiaries, or any director, officer, nor, to the Company's knowledge, agent, employee or other person associated with or acting on behalf of the Company or any of its Subsidiaries, has (i) used any corporate funds for any unlawful contribution, gift, entertainment or other unlawful expense relating to political activity; (ii) made any direct or indirect unlawful payment to any foreign or domestic government official or employee from corporate funds, (iii) violated or is in violation of any provision of the Foreign Corrupt Practices Act of 1977, as amended, or (iv) made any bribe, unlawful rebate, payoff, influence payment, kickback or other unlawful payment;

(xxvi) Solely to the extent that the Sarbanes-Oxley Act of 2002, as amended, and the rules and regulations promulgated in connection therewith (the "Sarbanes-Oxley Act"), including Section 402 related to loans and Sections 302 and 906 related to certifications, are or have been applicable to the Company, there is and has been no failure on the part of the Company or any of the Company's directors or officers, in their capacities as such, to comply in all material respects with any applicable provisions of the Sarbanes-Oxley Act;

(xxvii) Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, the Company owns or has valid, binding and enforceable licenses or other rights under the patents, patent applications, licenses, inventions, copyrights, know how (including trade secrets and other unpatented and/or unpatentable proprietary or confidential information, systems or procedures), trademarks, service marks, trade names or other intellectual property necessary for, or used in the conduct, or the proposed conduct, of the business of the Company in the manner described in the Registration Statement, the Pricing Disclosure Package and the Prospectus (collectively, the "Intellectual Property"); the patents, trademarks, and copyrights, if any, included within the Intellectual Property are valid, enforceable, and subsisting; other than as disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus, (A) the Company is not obligated to pay a material royalty, grant a license to, or provide other material consideration to any third party in connection with the Intellectual Property, (B) the Company has not received any notice of any claim of infringement,

misappropriation or conflict with any asserted rights of others with respect to any of the Company's drug candidates, services, conduct of the business, processes or Intellectual Property, (C) to the knowledge of the Company, neither the conduct of the business, sale nor use of any of the discoveries, inventions, drug candidates, services or processes of the Company referred to in the Registration Statement, the Pricing Disclosure Package or the Prospectus do or will infringe, misappropriate or violate any right or valid patent claim of any third party, (D) none of the technology employed by the Company has been obtained or is being used by the Company in material violation of any contractual obligation binding on the Company or, to the Company's knowledge, upon any of its officers, directors or employees or otherwise in violation of the rights of any persons, (E) to the knowledge of the Company, no third party has any ownership right in or to any Intellectual Property that is owned by the Company, other than any co-owner of any patent constituting Intellectual Property who is listed on the records of the U.S. Patent and Trademark Office (the "USPTO") and any co-owner of any patent application constituting Intellectual Property who is named in such patent application, and, to the knowledge of the Company, no third party has any ownership right in or to any Intellectual Property in any field of use that is exclusively licensed to the Company, other than any licensor to the Company of such Intellectual Property, (F) there is no infringement by third parties of any Intellectual Property, (G) there is no pending or, to the Company's knowledge, threatened action, suit, proceeding or claim by others challenging the Company's rights in or to any Intellectual Property, and (H) there is no pending or, to the Company's knowledge, threatened action, suit, proceeding or claim by others challenging the validity or scope of any Intellectual Property. The Company is in material compliance with the terms of each agreement pursuant to which Intellectual Property has been licensed to the Company, and all such agreements are in full force and effect;

(xxviii) All patents and patent applications owned by or licensed to the Company or under which the Company has rights have, to the knowledge of the Company, been duly and properly filed and maintained; to the knowledge of the Company, the parties prosecuting such patent applications have complied with their duty of candor and disclosure to the USPTO in connection with such applications; and the Company is not aware of any facts required to be disclosed to the USPTO that were not disclosed to the USPTO and which would preclude the grant of a patent in connection with any such application or would reasonably be expected to form the basis of a finding of invalidity with respect to any patents that have issued with respect to such applications. To the Company's knowledge, all patents and patent applications owned by the Company and filed with the USPTO or any foreign or international patent authority (the "Company Patent Rights") and all patents and patent applications in-licensed by the Company and filed with the USPTO or any foreign or international patent authority (the "In-licensed Patent Rights") have been duly and properly filed; the Company believes it has complied with its duty of candor and disclosure to the USPTO for the Company Patent Rights and, to the Company's knowledge, the licensors of the In-licensed Patent Rights have complied with their duty of candor and disclosure to the USPTO for the In-licensed Patent Rights;

(xxix) Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, the Company: (A) is and at all times has been in material compliance with all statutes, rules and regulations of the FDA and other comparable Governmental Entities applicable to the ownership, testing (including clinical trials and pre-clinical studies), development, manufacture, packaging, processing, use, distribution, marketing, labeling, promotion, sale, offer for sale, storage, import, export or disposal of any product under development, manufactured, sold or distributed by the Company ("Applicable Laws"); (B) has not received any FDA Form 483, notice of adverse finding, warning letter, untitled letter or other correspondence or notice from the FDA or any Governmental Authority alleging or asserting material noncompliance with any Applicable Laws or any licenses, certificates, approvals, clearances, exemptions, authorizations, permits and supplements or amendments thereto required by any such Applicable Laws ("Authorizations"); (C) possesses all material Authorizations and such Authorizations are valid and in full force and effect and the Company is not in material violation of any term of any such Authorizations; (D) has not received notice of any claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or other action from the FDA or any Governmental Authority or third party alleging that any product operation or activity is in material violation of any Applicable Laws or Authorizations and has no knowledge that the FDA, Health Canada or any Governmental Authority or third party is considering any such claim, litigation, arbitration, action, suit, investigation or proceeding; (E) has not received notice that the FDA, Health Canada or any Governmental Authority has taken, is taking or intends to take action to materially limit, suspend, modify or revoke any material Authorizations and has no knowledge that the FDA, Health Canada or any Governmental Authority is considering such action; and (F) has filed, obtained, maintained or submitted all material reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments as required by any Applicable Laws or Authorizations and that all such reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments were materially complete and correct on the date filed (or were corrected or supplemented by a subsequent submission);

(xxx) To the extent applicable, the Company has operated and currently is in compliance with all applicable health care laws, rules and regulations (except where such failure to operate or non-compliance would not, singly or in the aggregate, result in a Material Adverse Effect), including, without limitation, (i) the Federal, Food, Drug and Cosmetic Act (21 U.S.C. §§ 301 et seq.) and the rules and regulations promulgated thereunder (collectively, "FFDCA"); (ii)

all applicable federal, state, and local and all applicable similar foreign healthcare laws, including, without limitation, the federal Anti-kickback Statute (42 U.S.C. § 1320a-7b(b)), the U.S. Physician Payments Sunshine Act (42 U.S.C. § 1320a-7h), the civil False Claims Act (31 U.S.C. §§ 3729 et seq.), the criminal False Claims Law (42 U.S.C. § 1320a-7b(a)), all criminal laws relating to healthcare fraud and abuse, including but not limited to 18 U.S.C. Sections 286 and 287, the healthcare fraud criminal provisions under the U.S. Health Insurance Portability and Accountability Act of 1996 (“HIPAA”) (42 U.S.C. Section 1320d et seq.); (iii) HIPAA, as amended by the Health Information Technology for Economic Clinical Health Act (42 U.S.C. Sections 17921 - 17931); ; (iv) the regulations promulgated pursuant to such laws; and (vii) any other similar local, state, federal, or foreign laws (collectively, the “Health Care Laws”). The Company has not received written notice or other communication of any claim, action, suit, audit, survey, proceeding, hearing, enforcement, investigation, arbitration or other action (“Action”) from any court or arbitrator or Governmental Authority or regulatory authority or third party alleging that any product operation or activity is in violation of any Health Care Laws, and, to the Company’s knowledge, no such Action is threatened. The Company is not a party to and does not have any ongoing reporting obligations pursuant to any corporate integrity agreement, deferred prosecution agreement, monitoring agreement, consent decree, settlement order, plan of correction or similar agreement imposed by any governmental or regulatory authority. Additionally, neither the Company, nor to the Company’s actual knowledge, any of its employees, officers or directors, has been excluded, suspended or debarred from participation in any U.S. state or federal health care program or human clinical research pursuant to 42 U.S.C. § 1320a-7, 21 U.S.C. § 335a, or similar laws, or, to the knowledge of the Company, is subject to a governmental inquiry, investigation, proceeding, or other similar action that could reasonably be expected to result in debarment, suspension, or exclusion;

(xxxii) The non-clinical studies and clinical trials conducted by or, to the Company’s knowledge, on behalf of the Company were and, if still ongoing, are being conducted in all material respects in accordance with applicable experimental protocols, procedures and controls pursuant to accepted professional scientific standards, current good clinical practices and current good laboratory practices as required under applicable Laws and all Authorizations and Applicable Laws, including, without limitation, the FDCA, and the International Conference on Harmonization Guidelines; the descriptions of the results of such studies and clinical trials contained in the Registration Statement, the Pricing Disclosure Package and the Prospectus are, to the Company’s knowledge, accurate and complete in all material respects and fairly present the material data derived from such studies and clinical trials; except to the extent disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus, the Company is not aware of any studies or clinical trials, the results of which the Company believes reasonably call into question the study or trial results described or referred to in the Registration Statement, the Pricing Disclosure Package and the Prospectus when viewed in the context in which such results are described and the clinical state of development; and, except to the extent disclosed in the Registration Statement, the Pricing Disclosure Package or the Prospectus, the Company has not received any notices or correspondence from the FDA or any Governmental Entity requiring the termination or suspension of any studies or clinical trials conducted by or on behalf of the Company, other than ordinary course communications with respect to modifications in connection with the design and implementation of such clinical trials;

(xxxiii) Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, or as otherwise disclosed to the Underwriter, there are no persons with registration rights or other similar rights to have securities registered pursuant to the Registration Statement or otherwise registered by the Company under the Securities Act;

(xxxiii) The Company is not and, after giving effect to the offering and sale of the Securities as contemplated herein and the application of the net proceeds therefrom, including the proceeds received upon the exercise of the Warrants, the Pre-Funded Warrants and the Underwriter’s Warrants, as described in the Pricing Prospectus, will not be an “investment company”, as such term is defined in the Investment Company Act of 1940, as amended (the “Investment Company Act”);

(xxxiv) The Company has not distributed and, prior to the later to occur of the Closing Date (as defined in Section 4 hereof) and completion of distribution of the Securities, will not distribute any offering materials in connection with the offering and sale of the Securities, other than the Pricing Prospectus, the Prospectus and, subject to compliance with Section 6 hereof, any Issuer Free Writing Prospectus; and the Company has not taken and will not take, directly or indirectly, any action designed to cause or result in, or which constitutes or might reasonably be expected to constitute, the stabilization or manipulation of the price of any security of the Company to facilitate the sale of the Securities. The Company (a) has not alone engaged in any Testing-the-Waters Communication and (b) has not authorized anyone other than the Underwriter to engage in Testing-the-Waters Communications. The Company reconfirms that the Underwriter has been authorized to act on its behalf in undertaking Testing-the-Waters Communications. The Company has not distributed any Written Testing-the-Waters Communications. “Written Testing-the-Waters Communication” means any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Securities Act;

(xxxv) The statistical and market and industry-related data included in the Pricing Prospectus and the Prospectus are based on or derived from sources which the Company believes to be reliable and accurate or represent the Company's good faith estimates that are made on the basis of data derived from such sources, and the Company has obtained the written consent to the use of such data from sources to the extent required;

(xxxvi) Any certificate signed by any officer of the Company delivered to the Underwriter or to counsel for the Underwriter shall be deemed a representation and warranty by the Company to the Underwriter as to the matters covered thereby.

2. Subject to the terms and conditions herein set forth, (a) the Company agrees to sell to the Underwriter and the Underwriter agrees to purchase from the Company, at a purchase price of \$[] per Share, \$[] per Pre-Funded Warrant and \$[](1) per Warrant (the "Purchase Price"), the Firm Securities and (b) in the event and to the extent that the Underwriter shall exercise the election to purchase Option Shares and/or Option Warrants as provided below, the Company agrees to sell to the Underwriter, and the Underwriter agrees to purchase from the Company, at the Purchase Price, the Option Shares and/or Option Warrants. Notwithstanding the foregoing, (A) the Purchase Price for any Shares, Pre-Funded Warrants or Warrants to be distributed to the persons listed on Schedule III hereto (collectively, "Schedule III Investors") or to any of the Company's current executive officers or directors (collectively, "Insiders") shall be at a purchase price of \$[] per Share, \$[] per Pre-Funded Warrant and \$[](2) per Warrant (the "Schedule III Purchase Price") and (B) the Purchase Price for any Shares, Pre-Funded Warrants or Warrants to be distributed to the persons listed on Schedule IV hereto (collectively, "Schedule IV Investors") shall be at a purchase price of \$[] per Share, \$[] per Pre-Funded Warrant and \$[](3) per Warrant (the "Schedule IV Purchase Price").

The Company hereby grants to the Underwriter the right to purchase at its election up to [] Option Shares at the Purchase Price, Schedule III Purchase Price or Schedule IV Purchase Price, as applicable, and/or Option Warrants to purchase up to [] shares of Common Stock at the Purchase Price, Schedule III Purchase Price or Schedule IV Purchase Price, as applicable. The Underwriter may exercise its option to acquire Option Shares and/or Option Warrants in whole or in part from time to time only by written notice from the Underwriter to the Company, given within a period of thirty (30) calendar days after the date of this Agreement and setting forth the number of Option Shares and/or Option Warrants to be purchased and the date on which such Option Shares and/or Option Warrants are to be delivered, as determined by the Underwriter but in no event earlier than the Closing Date or, unless the Underwriter and the Company otherwise agree in writing, earlier than two or later than ten business days after the date of such notice.

3. It is understood that the Underwriter proposes to offer the Firm Shares, Firm Warrants and Pre-Funded Warrants for sale to the public upon the terms and conditions set forth in the Prospectus.

4. The Company will deliver the Firm Shares to the Underwriter through the facilities of the Depository Trust Company ("DTC") for the account of the Underwriter, against payment of the purchase price therefor in Federal (same day) funds by official bank check or checks or wire transfer drawn to the order of the Company at the office of Lowenstein Sandler LLP, 1251 Avenue of the Americas, New York, NY 10020, at [10:00] A.M., New York time, on [], 2019, or at such other time not later than seven full business days thereafter as the Underwriter and the Company determine, such time being herein referred to as the "Closing Date". The Company will deliver the certificates for the Pre-Funded Warrants and the Firm Warrants, as applicable, against payment of the purchase price therefor (a) in the case of any Pre-Funded Warrants and the Firm Warrants included as part of the Pre-Funded Units, by the purchasers thereof and (b) in the case of the Firm Warrants included as part of the Units, by the Underwriter, in definitive form, in such denominations and registered in such names as the Underwriter or its designees request, to the purchasers thereof on the Closing Date. For purposes of Rule 15c6-1 under the Exchange Act, the Closing Date (if later than the otherwise applicable settlement date) shall be the settlement date for payment of funds and delivery of the Securities. In the event that a purchaser delivers a Notice of Exercise (as defined in the Pre-Funded Warrants) on or prior to 12:00 P.M., New York time on the Closing Date, to exercise any Pre-Funded Warrants between the date hereof and the Closing Date, the Company shall deliver Warrant Shares with respect to such Pre-Funded Warrants to such purchaser on the Closing Date in connection with such Notice of Exercise. The Firm Shares and/or Pre-Funded Warrants and the Firm Warrants will be issued separately and may be transferred separately immediately upon issuance.

Each time for the delivery of and payment for the Option Shares and Option Warrants, being herein

-
- (1) To represent a 7% discount.
 - (2) To represent a 3.5% discount.
 - (3) To represent a 0% discount.
-

referred to as an “Option Closing Date”, which may be the Closing Date, shall be determined by the Underwriter as provided above. The Company will deliver the Option Shares being purchased on each Option Closing Date to the Underwriter through the facilities of DTC for the account of the Underwriter, against payment of the purchase price therefor in Federal (same day) funds by official bank check or checks or wire transfer drawn to the order of the Company at the above office of Lowenstein Sandler LLP, 1251 Avenue of the Americas, New York, NY 10020, at 10:00 A.M., New York time on the applicable Option Closing Date. The Company will deliver the certificates for the Option Warrants being purchased on each Option Closing Date against payment of the purchase price therefor by the Underwriter, in definitive form, in such denominations and registered in such names as the Underwriter or its designees request, to the purchasers thereof on such Option Closing Date. The Option Shares and the Option Warrants, if any, will be issued separately and may be transferred separately immediately upon issuance.

The Company hereby agrees to issue to the Underwriter (and/or its designees) on the Closing Date and each Option Closing Date, as the case may be, warrants to purchase a number of shares of Common Stock equal to five percent (5%) of the aggregate number of Shares and/or shares of Common Stock underlying Pre-Funded Warrants issued on such date, excluding any Shares and/or Pre-Funded Warrants to be distributed to any Insiders, Schedule III Investors or Schedule IV Investors (the “Underwriter’s Warrants”). The Underwriter’s Warrants shall be in form and substance previously agreed upon by the Underwriter and the Company and shall be exercisable, in whole or in part, immediately, expiring on the five-year anniversary of the effective date of the Registration Statement, at an initial exercise price of \$[] per share of Common Stock, which is equal to one hundred and twenty-five percent (125%) of the public offering price per Unit. The Company shall deliver the certificates for the Underwriter’s Warrants in definitive form, in such denominations and registered in such names as the Underwriter or its designees request, to the Underwriter or its designees on the Closing Date and each Option Closing Date, as the case may be.

The Company hereby grants the Underwriter (or any affiliate designated by the Underwriter) the right of first refusal for a period of six (6) months from the Closing Date to act, in the case the Company or any Subsidiary decides to raise funds by means of a public offering or a private placement of equity or debt securities using an underwriter or placement agent, as sole book-running manager, sole underwriter or sole placement agent for such financing.

At the Closing Date and any Option Closing Date, the Company shall pay the Underwriter a management fee equal to 1.0% of the gross proceeds raised at the Closing Date and each Option Closing Date, excluding any gross proceeds raised from Schedule III Investors on such date.

5. The Company covenants and agrees with the Underwriter as follows:

(a) The Company, subject to Section 5(b), will comply with the requirements of Rule 430A under the Securities Act, and will notify the Underwriter promptly (and in any event with 24 hours), and confirm the notice in writing, (i) when any post-effective amendment to the Registration Statement shall become effective, or any supplement to the Prospectus or any amended prospectus shall have been filed, to furnish the Underwriter with copies thereof, and to file promptly all material required to be filed by the Company with the Commission pursuant to Rule 433(d) under the Securities Act, (ii) of the receipt of any comments from the Commission, (iii) of any request by the Commission for any amendment to the Registration Statement or any amendment or supplement to the Prospectus or for additional information, and (iv) of the issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement or of any order preventing or suspending the use of any Preliminary Prospectus, or of the suspension of the qualification of the Securities for offering or sale in any jurisdiction, or of the initiation or, to the Company’s knowledge, the threatening of any proceedings for any of such purposes. The Company will promptly effect the filings necessary pursuant to Rule 424(b) under the Securities Act and will take such steps as it deems necessary to ascertain promptly whether the form of prospectus transmitted for filing under Rule 424(b) was received for filing by the Commission and, in the event that it was not, it will promptly file such prospectus. The Company will make every reasonable effort to prevent the issuance of any stop order and, if any stop order is issued, to obtain the lifting thereof at the earliest possible moment.

(b) The Company will give the Underwriter notice of its intention to file or prepare any amendment to the Registration Statement (including any filing under Rule 462(b) under the Securities Act), or any amendment, supplement or revision to the Prospectus, or any Issuer Free Writing Prospectus, will furnish the Underwriter with copies of any such documents a reasonable amount of time prior to such proposed filing or use, as the case may be, and will not file or use any such document to which the Underwriter or counsel for the Underwriter shall reasonably object.

(c) The Company will use its reasonable best efforts to qualify the Securities for offering and sale under the securities laws of such jurisdictions as you may reasonably request and to comply with such laws in all material respects so as to permit the continuance of sales and dealings therein in such jurisdictions for as long as may be necessary to complete

the distribution of the Securities, provided that nothing in this Section 5(c) shall require the Company to qualify as a foreign corporation in any jurisdiction in which it is not already so qualified, to file a general consent to service of process in any jurisdiction, or subject itself to taxation in any jurisdiction if it is not otherwise so subject.

(d) The Company has furnished or, upon written request, will deliver to the Underwriter, without charge, four signed copies of the Initial Registration Statement as originally filed, any Rule 462(b) Registration Statement and of each amendment to each (including exhibits filed therewith or incorporated by reference therein) and signed copies of all consents and certificates of experts, and will also, upon your written request, deliver to the Underwriter, without charge, a conformed copy of the Registration Statement as originally filed and of each amendment thereto (without exhibits) the Underwriter. The copies of the Registration Statement and each amendment thereto furnished to the Underwriter will be identical to the electronically transmitted copies thereof filed with the Commission pursuant to EDGAR, except to the extent permitted by Regulation S-T.

(e) The Company has delivered to the Underwriter, without charge, as many written and electronic copies of each Preliminary Prospectus as the Underwriter reasonably requested, and the Company hereby consents to the use of such copies for purposes permitted by the Securities Act. The Company will furnish to the Underwriter, without charge, prior to 5:00 P.M. New York time on the business day next succeeding the date of this Agreement and from time to time thereafter during the period when the Prospectus is required to be delivered in connection with sales of the Securities under the Securities Act or the Exchange Act or in lieu thereof, the notice referred to in Rule 173(a) under the Securities Act, such number of written and electronic copies of the Prospectus (as amended or supplemented) as the Underwriter may reasonably request. The Prospectus and any amendments or supplements thereto furnished to the Underwriter will be identical to the electronically transmitted copies thereof filed with the Commission pursuant to EDGAR, except to the extent permitted by Regulation S-T.

(f) The Company will comply with the Securities Act and the Rules and Regulations so as to permit the completion of the distribution of the Securities as contemplated in this Agreement and in the Prospectus. If at any time when, in the reasonable opinion of counsel for the Underwriter, a prospectus is required to be delivered in connection with sales of the Securities under the Securities Act or the Exchange Act (or in lieu thereof, the notice referred to in Rule 173(a) under the Securities Act), any event shall occur or condition shall exist as a result of which it is necessary, in the reasonable opinion of counsel for the Underwriter or for the Company, to amend the Registration Statement or amend or supplement the Prospectus in order that the Prospectus will not include any untrue statements of a material fact or omit to state a material fact necessary in order to make the statements therein not misleading in the light of the circumstances existing at the time it (or in lieu thereof, the notice referred to in Rule 173(a) under the Securities Act) is delivered to a purchaser, or if it shall be necessary, in the reasonable opinion of either such counsel, at any such time to amend the Registration Statement or amend or supplement the Prospectus in order to comply with the requirements of the Securities Act or the Rules and Regulations, the Company will promptly prepare and file with the Commission, subject to Section 5(b), such amendment or supplement as may be necessary to correct such statement or omission or to make the Registration Statement or the Prospectus comply with such requirements, and the Company will furnish to the Underwriter such number of written and electronic copies of such amendment or supplement as the Underwriter may reasonably request. The Company will provide the Underwriter with notice of the occurrence of any event during the period specified above that may give rise to the need to amend or supplement the Registration Statement or the Prospectus as provided in the preceding sentence promptly after the occurrence of such event. If at any time following the distribution of any Written Testing-the-Waters Communication there occurred or occurs an event or development as a result of which such Written Testing-the-Waters Communication included or would include an untrue statement of a material fact or omitted or would omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances existing at that subsequent time, not misleading, the Company will promptly notify the Underwriter and will promptly amend or supplement, at its own expense, such Written Testing-the-Waters Communication to eliminate or correct such untrue statement or omission.

(g) The Company will make generally available (within the meaning of Section 11(a) of the Securities Act) to its security holders and to the Underwriter as soon as practicable, but not later than 45 days after the end of its fiscal quarter in which the first anniversary date of the effective date of the Registration Statement occurs, an earnings statement (in form complying with the provisions of Rule 158 under the Securities Act) covering a period of at least twelve consecutive months beginning after the effective date of the Registration Statement.

(h) The Company will use the net proceeds received by it from the sale of the Securities in the manner specified in the Pricing Disclosure Package under the heading "Use of Proceeds".

(i) The Company will use its reasonable best efforts to maintain the listing for quotation of the Common Stock (including the Shares, the Warrant Shares and the Underwriter Warrant Shares) on the Nasdaq Capital Market. As of

the Closing Date, the Shares, the Warrant Shares and the Underwriter Warrant Shares will have been duly authorized for listing on the Nasdaq Capital Market subject to official notice of issuance.

(j) During a period of ninety (90) days from the date of the Prospectus, the Company will not, without the prior written consent of the Underwriter, (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend or otherwise transfer or dispose of, directly or indirectly, or announce the issuance or proposed issuance of, any Common Stock or any securities convertible into or exercisable or exchangeable for Common Stock or (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of Common Stock, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Common Stock or such other securities, in cash or otherwise, other than (1) the Securities to be sold hereunder, (2) the issuance of equity-based awards granted pursuant to the Company's benefit plans existing on the date hereof that are referred to in the Prospectus, as such plans may be amended, (3) the issuance of shares of Common Stock upon the exercise of any such equity-based awards or (4) the issuance of equity-based securities in connection with collaborations, partnerships or other strategic transactions approved by a majority of the disinterested directors of the Company, provided that any such transaction shall only be with an operating company or an owner of an asset in a business synergistic with the business of the Company and shall provide to the Company additional benefits in addition to the investment of funds, but shall not include a transaction in which the Company is issuing securities primarily for the purpose of raising capital or to an entity whose primary business is investing in securities; provided that such securities are issued as "restricted securities" (as defined in Rule 144) and carry no registration rights that require or permit the filing of any registration statement in connection therewith during the prohibition period in this Section 5(j).

(k) The Company, during the period when the Prospectus is required to be delivered in connection with sales of the Securities under the Securities Act or the Exchange Act (or in lieu thereof, the notice referred to in Rule 173(a) under the Securities Act), will file all documents required to be filed with the Commission pursuant to the Exchange Act within the time periods required by the Exchange Act and the rules and regulations of the Commission thereunder.

(l) The Company will file with the Commission such information on Form 10-Q or Form 10-K as may be required pursuant to Rule 463 under the Securities Act.

(m) During a period of ten months from the effective date of the Registration Statement, the Company will furnish to you copies of all reports or other communications (financial or other) furnished to shareholders generally, and to deliver to you (i) as soon as they are available, copies of any reports and financial statements furnished to or filed with the Commission or any national securities exchange on which any class of securities of the Company is listed; provided that the Company will be deemed to have furnished such reports and financial statements to the extent they are filed on EDGAR.

(n) If the Company elects to rely upon Rule 462(b) under the Securities Act, the Company will file a Rule 462(b) Registration Statement with the Commission in compliance with Rule 462(b) by 10:00 P.M., Washington, D.C. time, on the date of this Agreement, and at the time of filing either to pay to the Commission the filing fee for the Rule 462(b) Registration Statement or to give irrevocable instructions for the payment of such fee pursuant to Rule 111(b) under the Securities Act.

(o) If so requested by the Underwriter, the Company shall cause to be prepared and delivered, at its expense, within one business day from the effective date of this Agreement, to the Underwriter an "electronic Prospectus" to be used by the Underwriter in connection with the offering and sale of the Securities. As used herein, the term "electronic Prospectus" means a form of the most recent Preliminary Prospectus, any Issuer Free Writing Prospectus or the Prospectus, and any amendment or supplement thereto, that meets each of the following conditions: (i) it shall be encoded in an electronic format, reasonably satisfactory to the Underwriter, that may be transmitted electronically by the Underwriter to offerees and purchasers of the Securities, (ii) it shall disclose the same information as such paper Preliminary Prospectus, Issuer Free Writing Prospectus or the Prospectus, as the case may be; and (iii) it shall be in or convertible into a paper format or an electronic format, reasonably satisfactory to the Underwriter, that will allow investors to store and have continuously ready access to such Preliminary Prospectus, Issuer Free Writing Prospectus or the Prospectus at any future time, without charge to investors (other than any fee charged for subscription to the Internet generally). The Company hereby confirms that, if so requested by the Underwriter, it has included or will include in the Prospectus filed with the Commission an undertaking that, upon receipt of a request by an investor or his or her representative, the Company shall transmit or cause to be transmitted promptly, without charge, a paper copy of such paper Preliminary Prospectus, Issuer Free Writing Prospectus or the Prospectus to such investor or representative.

6. (a) The Company represents and agrees that, without the prior consent of the Underwriter, it has not made and will not make any offer relating to the Securities that would constitute a "free writing prospectus" as defined in Rule 405 under

the Securities Act; the Underwriter represents and agrees that, without the prior consent of the Company, it has not made and will not make any offer relating to the Securities that would constitute a free writing prospectus; any such free writing prospectus the use of which has been consented to by the Company and the Underwriter is listed on Schedule II hereto;

(b) The Company has complied and will comply with the requirements of Rule 433 under the Securities Act applicable to any Issuer Free Writing Prospectus, including timely filing with the Commission or retention where required and legending; the Company represents that it has satisfied and agrees that it will satisfy the conditions under Rule 433 under the Securities Act to avoid a requirement to file with the Commission any electronic road show;

(c) The Company agrees that if at any time following issuance of an Issuer Free Writing Prospectus any event occurred or occurs as a result of which such Issuer Free Writing Prospectus would conflict with the information in the Registration Statement, the Pricing Prospectus or the Prospectus or, when considered together with the information in the Pricing Prospectus and other Issuer Free Writing Prospectuses, would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in light of the circumstances then prevailing, not misleading, the Company will give prompt notice thereof to the Underwriter and, if requested by the Underwriter, will prepare and furnish without charge to the Underwriter an Issuer Free Writing Prospectus or other document which will correct such conflict, statement or omission; provided, however, that this covenant shall not apply to any statements or omissions in an Issuer Free Writing Prospectus made in reliance upon and in strict conformity with information furnished in writing to the Company by an Underwriter through the Underwriter expressly for use therein.

7. Subject to Section 10 hereof, the Company covenants and agrees with the Underwriter that, whether or not the transactions contemplated by this Agreement are consummated, (a) the Company will pay or cause to be paid (i) \$50,000 for non-accountable expenses, (ii) up to \$100,000 for reasonable, documented fees and expenses of legal counsel and other reasonable, out-of-pocket expenses, and (iii) for the services of an escrow agent and any actual out-of-pocket cost of such clearing agent settlement and financing, so long as the cost does not exceed \$10,000; provided, however, that such reimbursement amount in no way shall limit the indemnification and contribution provisions of this Agreement.

8. The obligation of the Underwriter hereunder to purchase the Securities on the Closing Date or each Option Closing Date, as the case may be, are subject to the performance by the Company of its obligations hereunder and to the following additional conditions:

(a) The Prospectus shall have been filed with the Commission pursuant to Rule 424(b) under the Securities Act within the applicable time period prescribed for such filing by the Rules and Regulations and in accordance with Section 5(a); all material required to be filed by the Company pursuant to Rule 433(d) under the Securities Act shall have been filed with the Commission within the applicable time period prescribed for such filing by Rule 433 under the Securities Act; if the Company has elected to rely upon Rule 462(b) under the Securities Act, the Rule 462(b) Registration Statement shall have become effective by 10:00 P.M., Washington, D.C. time, on the date of this Agreement; no stop order suspending the effectiveness of the Registration Statement or any part thereof or the Prospectus or any part thereof or any Issuer Free Writing Prospectus shall have been issued and no proceeding for that purpose shall have been initiated or, to the knowledge of the Company, threatened by the Commission or any state securities commission; and all requests for additional information on the part of the Commission shall have been complied with to the reasonable satisfaction of the staff of the Commission.

(b) The representations and warranties of the Company contained herein and in the Warrants, the Pre-Funded Warrants and the Underwriter's Warrants, as applicable, are true and correct on and as of the Closing Date or the Option Closing Date, as the case may be, as if made on and as of the Closing Date or the Option Closing Date, as the case may be, and the Company shall have complied with all agreements and all conditions on its part to be performed or satisfied hereunder at or prior to the Closing Date or the Option Closing Date, as the case may be.

(c) Subsequent to the execution and delivery of this Agreement and prior to the Closing Date or the Option Closing Date, as the case may be, there shall not have occurred any downgrading, nor shall any notice have been given of (i) any downgrading, (ii) any intended or potential downgrading or (iii) any review or possible change that does not indicate an improvement, in the rating accorded any securities of or guaranteed by the Company or any Subsidiary by any "nationally recognized statistical rating organization", as such term is defined for purposes of Rule 436(g)(2) under the Securities Act.

(d) (i) Neither the Company nor any Subsidiary shall have sustained since the date of the latest audited financial statements included in the Pricing Prospectus any material loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree, otherwise than as set forth or contemplated in the Pricing Prospectus and except as described in the

Registration Statement and the Pricing Disclosure Package, and (ii) since the respective dates as of which information is given in the Registration Statement and the Prospectus, (1) there shall not have been any change in the capital stock or long-term debt of the Company or any Subsidiary or (2) there shall not have been any Material Adverse Effect, or any development involving a prospective Material Adverse Effect, in or affecting the general affairs, business, prospects, management, financial position, shareholders' equity or results of operations of the Company and the Subsidiaries, considered as one enterprise, the effect of which, in any such case described in clause (i) or (ii), is in the judgment of the Underwriter so material and adverse as to make it impracticable or inadvisable to proceed with the public offering or the delivery of the Securities being delivered at such Closing Date or Option Closing Date, as the case may be, on the terms and in the manner contemplated in the Pricing Prospectus.

(e) The Underwriter shall have received on and as of the Closing Date or the Option Closing Date, as the case may be, a certificate of an executive officer of the Company, reasonably satisfactory to the Underwriter, to the effect (1) set forth in Sections 8(b) (with respect to the respective representations, warranties, agreements and conditions of the Company) and 8(c), (2) that none of the situations set forth in clause (i) or (ii) of Section 8(d) shall have occurred and (3) that no stop order suspending the effectiveness of the Registration Statement has been issued and to the knowledge of the Company, no proceedings for that purpose have been instituted or are pending or contemplated by the Commission.

(f) On the Closing Date or Option Closing Date, as the case may be, Morgan, Lewis & Bockius LLP, counsel for the Company, shall have furnished to the Underwriter their favorable written opinion, dated the Closing Date or the Option Closing Date, as the case may be, in form and substance satisfactory to counsel for the Underwriter.

(g) On the effective date of the Registration Statement and, if applicable, the effective date of the most recently filed post-effective amendment to the Registration Statement, Ernst & Young, LLP shall have furnished to the Underwriter a letter, dated the date of delivery thereof, in form and substance satisfactory to the Underwriter, containing statements and information of the type customarily included in accountants' "comfort letters" to underwriters with respect to the financial statements and certain financial information contained in the Registration Statement and the Prospectus.

(h) On the Closing Date or Option Closing Date, as the case may be, the Underwriter shall have received from Ernst & Young, LLP a letter, dated the Closing Date or such Option Closing Date, as the case may be, to the effect that they reaffirm the statements made in the letter or letters furnished pursuant to Section 8(g), except that the specified date referred to shall be a date not more than three business days prior to the Closing Date or such Option Closing Date, as the case may be.

(i) On the Closing Date or Option Closing Date, as the case may be, Lowenstein Sandler LLP, counsel for the Underwriter, shall have furnished to the Underwriter their favorable opinion dated the Closing Date or the Option Closing Date, as the case may be, with respect to the due authorization and valid issuance of the Securities, the Registration Statement, the Prospectus and other related matters as the Underwriter may reasonably request, and such counsel shall have received such papers and information as they may reasonably request to enable them to pass upon such matters.

(j) The Shares, the Warrant Shares and the Underwriter Warrant Shares to be delivered on the Closing Date or Option Closing Date, as the case may be, shall have been approved for listing on the Nasdaq Capital Market, subject to official notice of issuance.

(k) FINRA shall have confirmed that it has not raised any objection with respect to the fairness and reasonableness of the underwriting terms and conditions.

(l) The Underwriter shall have received "lock-up" agreements, each substantially in the form of Exhibit A hereto, from each executive officer and director of the Company, and such agreements shall be in full force and effect on the Closing Date or Option Closing Date, as the case may be.

(m) On the Closing Date or Option Closing Date, as the case may be, Khalilian Sira LLC, intellectual property counsel for the Company, shall have furnished to the Underwriter their favorable written opinion, dated the Closing Date or the Option Closing Date, as the case may be, in form and substance satisfactory to counsel for the Underwriter.

(n) On or prior to the Closing Date or Option Closing Date, as the case may be, the Company shall have furnished to the Underwriter such further information, certificates and documents as the Underwriter shall reasonably request.

(o) On or after the Applicable Time there shall not have occurred any of the following: (i) a suspension or material limitation in trading in securities generally on the Nasdaq Capital Market; (ii) a suspension or material limitation in

trading in the Company's securities on the Nasdaq Capital Market; (iii) a general moratorium on commercial banking activities declared by any of Federal or New York State authorities or a material disruption in commercial banking or securities settlement or clearance services in the U.S.; (iv) the outbreak or escalation of hostilities involving the U.S. or the declaration by the U.S. of a national emergency or war or (v) the occurrence of any other calamity or crisis or any change in financial, political or economic conditions in the U.S. or elsewhere, if the effect of any such event specified in clause (iv) or (v) in the judgment of the Underwriter makes it impracticable or inadvisable to proceed with the public offering or the delivery of the Securities being delivered at such Closing Date or Option Closing Date, as the case may be, on the terms and in the manner contemplated in the Prospectus.

(p) The Company shall have delivered executed copies of the Warrants and the Pre-Funded Warrants, as applicable, to the public purchasers thereof and shall have delivered executed copies of the Underwriter's Warrants to the Underwriter.

If any condition specified in this Section 8 shall not have been fulfilled when and as required to be fulfilled, this Agreement may be terminated, subject to the provisions of Section 12, by the Underwriter by notice to the Company at any time at or prior to the Closing Date or Option Closing Date, as the case may be, and such termination shall be without liability of any party to any other party, except as provided in Section 12.

9. (a) The Company agrees to indemnify and hold harmless the Underwriter and each person, if any, who controls the Underwriter within the meaning of Section 15 of the Securities Act or Section 20(a) of the Exchange Act against any and all losses, liabilities, claims, damages and expenses whatsoever as incurred (including without limitation, reasonable attorneys' fees and any and all reasonable expenses whatsoever incurred in investigating, preparing or defending against any litigation, commenced or threatened, or any claim whatsoever, and any and all amounts paid in settlement of any claim or litigation), joint or several, to which they or any of them may become subject under the Securities Act, the Exchange Act or otherwise, insofar as such losses, liabilities, claims, damages or expenses (or actions in respect thereof) arise out of or are based upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any post-effective amendment thereof, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or in any supplement thereto or amendment thereof, any Issuer Free Writing Prospectus, any Written Testing-the-Waters Communication, or any "issuer information" filed or required to be filed pursuant to Rule 433(d) under the Securities Act, or arise out of or are based upon 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; provided, however, that the Company will not be liable in any such case to the extent that any such loss, liability, claim, damage or expense arises out of or is based upon any such untrue statement or alleged untrue statement or omission or alleged omission made in the Registration Statement, or any post-effective amendment thereof, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or in any supplement thereto or amendment thereof, any Issuer Free Writing Prospectus, or any Written Testing-the-Waters Communication in reliance upon and in strict conformity with written information furnished to the Company by or on behalf of the Underwriter expressly for use therein, it being understood and agreed that the only such information furnished by the Underwriter is the information described as such in Section 9(b) below.

(b) The Underwriter agrees to indemnify and hold harmless the Company, each of the directors of the Company, each of the officers of the Company who shall have signed the Registration Statement, and each other person, if any, who controls the Company within the meaning of Section 15 of the Securities Act or Section 20(a) of the Exchange Act, against any losses, liabilities, claims, damages and expenses whatsoever as incurred (including without limitation, reasonable attorneys' fees and any and all reasonable expenses whatsoever incurred in investigating, preparing or defending against any litigation, commenced or threatened, or any claim whatsoever, and any and all amounts paid in settlement of any claim or litigation), joint or several, to which they or any of them may become subject under the Act, the Exchange Act or otherwise, insofar as such losses, liabilities, claims, damages or expenses (or actions in respect thereof) arise out of or are based upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any post-effective amendment thereof, or any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or in any supplement thereto or amendment thereof, any Issuer Free Writing Prospectus or any Written Testing-the-Waters Communication, or arise out of or are based upon the omission or alleged omission to state therein a material fact necessary to make the statements therein not misleading, in each case to the extent, but only to the extent, that any such loss, liability, claim, damage or expense arises out of or is based upon any such untrue statement or alleged untrue statement or omission or alleged omission made therein in reliance upon and in strict conformity with written information furnished to the Company by or on behalf of the Underwriter, it being understood and agreed that the only such information furnished by the Underwriter consists of the following information in the Prospectus furnished on behalf of the Underwriter: the last paragraph at the bottom of the cover page concerning the timing of the delivery of the shares, the concession and reallowance figures appearing in the third paragraph under the caption "Underwriting" and the information contained in the first and third paragraphs in the section entitled Stabilization, Short Positions and Penalty Bids under the caption "Underwriting".

(c) Promptly after receipt by an indemnified party under Section 9(a) or 9(b) of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party under such Section, notify each party against whom indemnification is to be sought in writing of the commencement thereof (but the failure so to notify an indemnifying party shall not relieve it from any liability which it may have under this Section 9). In case any such action is brought against any indemnified party, and it notifies an indemnifying party of the commencement thereof, the indemnifying party will be entitled to participate therein, and jointly with any other indemnifying party similarly notified, to the extent it may elect by written notice delivered to the indemnified party promptly after receiving the aforesaid notice from such indemnified party, to assume the defense thereof with counsel reasonably satisfactory to such indemnified party (who shall not, except with the consent of the indemnified party, be counsel to the indemnified party). Notwithstanding the foregoing, the indemnified party or parties shall have the right to employ its or their own counsel in any such case, but the fees and expenses of such counsel shall be at the expense of such indemnified party or parties unless (i) the employment of such counsel shall have been authorized in writing by one of the indemnifying parties in connection with the defense of such action, (ii) the indemnifying parties shall not have employed counsel to have charge of the defense of such action within a reasonable time after notice of commencement of the action, or (iii) such indemnified party or parties shall have reasonably concluded based on advice from outside counsel that there may be defenses available to it or them which are different from or additional to those available to one or all of the indemnifying parties (in which case the indemnifying parties shall not have the right to direct the defense of such action on behalf of the indemnified party or parties), in any of which events the reasonable fees and expenses of such counsel shall be borne by the indemnifying parties. In no event shall the indemnifying parties be liable for fees and expenses of more than one counsel (in addition to any local counsel) separate from their own counsel for all indemnified parties in connection with any one action or separate but similar or related actions in the same jurisdiction arising out of the same general allegations or circumstances, which counsel, in the event of indemnified parties under Section 9(a), shall be selected by the Underwriter. No indemnifying party shall, without the written consent of the indemnified party, effect the settlement or compromise of, or consent to the entry of any judgment with respect to, any pending or threatened action or claim in respect of which indemnification or contribution may be sought hereunder (whether or not the indemnified party is an actual or potential party to such action or claim) unless such settlement, compromise or judgment (i) includes an unconditional release of the indemnified party from all liability arising out of such action or claim and (ii) does not include a statement as to or an admission of fault, culpability or a failure to act, by or on behalf of any indemnified party. An indemnifying party shall not be liable for any settlement of any action or claim effected without its written consent (which consent will not be unreasonably withheld, conditioned or delayed).

(d) If the indemnification provided for in this Section 9 is unavailable to or insufficient to hold harmless an indemnified party under Section 9(a) or Section 9(b) in respect of any losses, liabilities, claims, damages or expenses (or actions in respect thereof) referred to therein, then each indemnifying party shall contribute to the amount paid or payable by such indemnified party as a result of such losses, liabilities, claims, damages or expenses (or actions in respect thereof) in such proportion as is appropriate to reflect the relative benefits received by the Company on the one hand and the Underwriter on the other from the offering of the Securities. If, however, the allocation provided by the immediately preceding sentence is not permitted by applicable law, then each indemnifying party shall contribute to such amount paid or payable by such indemnified party in such proportion as is appropriate to reflect not only such relative benefits but also the relative fault of the Company on the one hand and the Underwriter on the other in connection with the statements or omissions which resulted in such losses, liabilities, claims, damages or expenses (or actions in respect thereof), as well as any other relevant equitable considerations. The relative benefits received by the Company on the one hand and the Underwriter on the other from the offering of the Securities shall be deemed to be in the same proportion as the total net proceeds from the offering (before deducting expenses) received by the Company bear to the total underwriting discounts and commissions received by the Underwriter, in each case as set forth in the table on the cover page of the Prospectus. The relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company on the one hand or the Underwriter on the other and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

The Company and the Underwriter agree that it would not be just and equitable if contributions pursuant to this Section 9(d) were determined by pro rata allocation (even if the Underwriter were treated as one entity for such purpose) or by any other method of allocation which does not take account of the equitable considerations referred to above in this Section 9(d). The amount paid or payable by an indemnified party as a result of the losses, liabilities, claims, damages or expenses (or actions in respect thereof) referred to above in this Section 9(d) shall be deemed to include any legal or other expenses reasonably incurred by such indemnified party in connection with investigating or defending any such action or claim. Notwithstanding the provisions of this Section 9(d), the Underwriter shall not be required to contribute any amount in excess of the amount by which the total price at which the Shares underwritten by it and distributed to the public were offered to the public exceeds the amount of any damages which the Underwriter has otherwise been required to pay by reason of such

untrue or alleged untrue statement or omission or alleged omission.

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. The Underwriter's obligations in this Section 9(d) to contribute are several in proportion to their respective underwriting obligations and not joint.

(e) The obligations of the parties to this Agreement contained in this Section 9 are not exclusive and shall not limit any rights or remedies which may otherwise be available to any indemnified party at law or in equity.

10. If the Underwriter shall default in its obligations to purchase the Securities hereunder on the Closing Date or the Option Closing Date, as the case may be, and arrangements satisfactory to the Underwriter and the Company for the purchase of such shares of Common Stock by other persons are not made within forty-eight (48) hours after such default, this Agreement shall terminate; provided, in the event of any termination of this Agreement pursuant to this Section 10, the Company shall not be obligated to reimburse the Underwriter on account of any expenses, including expenses to be paid or reimbursed by it pursuant to Section 7.

11. Notwithstanding anything herein contained, this Agreement (or the obligations of the Underwriter with respect to any Option Shares and Option Warrants which have yet to be purchased) may be terminated, subject to the provisions of Section 12, in the absolute discretion of the Underwriter, by notice given to the Company, if after the execution and delivery of this Agreement and prior to the Closing Date or the Option Closing Date, as the case may be, (a) trading generally on the NYSE American or the New York Stock Exchange or on the Nasdaq Global Select Market, the Nasdaq Global Market or the Nasdaq Capital Market shall have been suspended or materially limited, or minimum or maximum prices for trading have been fixed, or maximum ranges for prices have been required, by any of said exchanges or by such system or by order of the Commission, FINRA or any other governmental or regulatory authority, (b) trading of any securities of or guaranteed by the Company or any Subsidiary shall have been suspended on any exchange or in any over-the-counter market, (c) a general moratorium on commercial banking activities in New York shall have been declared by Federal, New York State or Pennsylvania State authorities or a new restriction materially adversely affecting the distribution of the Firm Securities or the Option Securities, as the case may be, shall have become effective, or (d) there has occurred any material adverse change in the financial markets in the U.S. or the international financial markets, any outbreak of hostilities or escalation thereof or other calamity or crisis or any change or development involving a prospective change in national or international political, financial or economic conditions, in each case the effect of which is such as to make it, in the judgment of the Underwriter, impracticable to market the Securities to be delivered on the Closing Date or Option Closing Date, as the case may be, or to enforce contracts for the sale of the Securities.

If this Agreement is terminated pursuant to this Section 11, such termination will be without liability of any party to any other party except as provided in Section 12 hereof.

12. The respective indemnities, agreements, representations, warranties and other statements of the Company or its officers and of the Underwriter set forth in or made pursuant to this Agreement will remain in full force and effect, regardless of any investigation, or statement as to the results thereof, made by or on behalf of the Underwriter, the Company or any of their respective representatives, officers or directors or any controlling person, and will survive delivery of and payment for the Securities. If this Agreement is terminated pursuant to Section 8 or 11 or if for any reason the purchase of any of the Securities by the Underwriter is not consummated, the Company shall remain responsible for the actual, out-of-pocket expenses incurred by the Underwriter pursuant to Section 7, the respective obligations of the Company and the Underwriter pursuant to Section 9 and the provisions of Sections 12, 13 and 16 shall remain in effect and, if any Securities have been purchased hereunder the representations and warranties in Section 1 and all obligations under Section 5, and Section 6 shall also remain in effect. If this Agreement shall be terminated by the Underwriter under Section 8 or otherwise because of any failure or refusal on the part of the Company to comply with the terms or to fulfill any of the conditions of this Agreement (other than solely by reason of the failure of the Underwriter to perform its obligations hereunder), or if for any reason the Company shall be unable to perform its obligations under this Agreement (other than solely by reason of the failure of the Underwriter to perform its obligations hereunder) or any condition of the Underwriter's obligations cannot be fulfilled, the Company agrees to reimburse the Underwriter for all out-of-pocket expenses (including the fees and expenses of its counsel) reasonably incurred by the Underwriter in connection with this Agreement or the offering contemplated hereunder.

13. This Agreement shall inure to the benefit of and be binding upon the Company and the Underwriter, the officers and directors of the Company referred to herein, any controlling persons referred to herein and their respective successors and assigns. Nothing expressed or mentioned in this Agreement is intended or shall be construed to give any other person, firm or corporation any legal or equitable right, remedy or claim under or in respect of this Agreement or any provision herein

contained. No purchaser of Securities from the Underwriter shall be deemed to be a successor or assign by reason merely of such purchase.

14. All notices and other communications hereunder shall be in writing and shall be deemed to have been duly given upon receipt thereof by the recipient if mailed or transmitted by any standard form of telecommunication. Notices to the Underwriter shall be given to the Underwriter, c/o H.C. Wainwright & Co., LLC, Attention: Head of Investment Banking, Fax: 212-214-0803 with a copy to Lowenstein Sandler LLP, 1251 Avenue of the Americas, New York, NY 10020, fax: (973) 597-2476, Attention: Steven M. Skolnick. Notices to the Company shall be given to it at Onconova Therapeutics, Inc., 375 Pheasant Run, Newton, PA 18954 (fax no.: 484-713-6001); Attention: CEO; with a copy to Morgan Lewis & Bockius LLP, 1701 Market Street, Philadelphia, PA 19103 Attention Joanne R. Soslow (fax no.: 215-963-5001).

15. This Agreement may be signed in counterparts, each of which shall be an original and all of which together shall constitute one and the same instrument.

16. THIS AGREEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK, WITHOUT REGARD TO SUCH STATE'S PRINCIPLES OF CONFLICTS OF LAWS.

17. The parties hereby submit to the jurisdiction of and venue in the federal courts located in the City of New York, New York in connection with any dispute related to this Agreement, any transaction contemplated hereby, or any other matter contemplated hereby.

18. The Company acknowledges and agrees that (i) the purchase and sale of the Securities pursuant to this Agreement, including the determination of the public offering price of the Securities and any related discounts and commissions, is an arm's-length commercial transaction between the Company on the one hand, and the Underwriter, on the other, (ii) in connection therewith and with the process leading to such transaction the Underwriter is acting solely as a principal and not the agent or fiduciary of the Company or its stockholders, creditors, employees or any other party, (iii) no Underwriter has assumed an advisory or fiduciary responsibility in favor of the Company with respect to the offering contemplated hereby or the process leading thereto (irrespective of whether the Underwriter has advised or is currently advising the Company on other matters) or any other obligation to the Company except the obligations expressly set forth in this Agreement, and (iv) the Company has consulted its own legal and financial advisors to the extent it deemed appropriate. The Company agrees that it will not claim that the Underwriter has rendered advisory services of any nature or respect, or owes a fiduciary or similar duty to the Company, in connection with such transaction or the process leading thereto.

19. The Company acknowledges that the Underwriter's research analysts and research departments are required to be independent from their respective investment banking divisions and are subject to certain regulations and internal policies, and that the Underwriter's research analysts may hold views and make statements or investment recommendations and/or publish research reports with respect to the Company and/or the offering that differ from the views of their respective investment banking divisions. The Company hereby waives and releases, to the fullest extent permitted by law, any claims that the Company may have against the Underwriter with respect to any conflict of interest that may arise from the fact that the views expressed by their independent research analysts and research departments may be different from or inconsistent with the views or advice communicated to the Company by the Underwriter's investment banking divisions. The Company acknowledges that the Underwriter is a full service securities firm and as such from time to time, subject to applicable securities laws, may effect transaction for its own account or the account of its customers and hold long or short positions in debt or equity securities of the companies that may be the subject of the transactions contemplated by this Agreement.

20. Notwithstanding anything herein to the contrary, the Company is authorized to disclose to any persons the U.S. federal and state income tax treatment and tax structure of the potential transaction and all materials of any kind (including tax opinions and other tax analyses) provided to the Company relating to that treatment and structure, without the Underwriter imposing any limitation of any kind. However, any information relating to the tax treatment and tax structure shall remain confidential (and the foregoing sentence shall not apply) to the extent necessary to enable any person to comply with securities laws. For this purpose, "tax structure" is limited to any facts that may be relevant to that treatment.

21. This Agreement (together with the other agreements and documents being delivered pursuant to or in connection with this Agreement) constitutes the entire agreement of the parties hereto with respect to the subject matter hereof and thereof, and supersedes all prior agreements and understandings of the parties, oral and written, with respect to the subject matter hereof. Except as otherwise contemplated herein, it is understood and agreed by the parties hereto that all other binding terms and conditions of that certain engagement letter between the Company and H.C. Wainwright & Co., LLC,

dated September 20, 2019, shall remain valid and binding on, and enforceable against, the Company and in full force and effect in accordance with the terms thereof.

22. The Company and the Underwriter hereby irrevocably waives, to the fullest extent permitted by applicable law, any and all right to trial by jury in any legal proceeding arising out of or relating to this Agreement or the transactions contemplated hereby.

[Signature page follows.]

If the foregoing is in accordance with your understanding of our agreement, please sign and return to the Company a counterpart hereof, whereupon this instrument will become a binding agreement among the Company and the Underwriter.

Very truly yours,

ONCONOVA THERAPEUTICS, INC.

By: _____
Name:
Title:

Accepted as of the date hereof:

H.C. WAINWRIGHT & CO., LLC

By: _____
Name:
Title:

SCHEDULE I

	Number of Firm Shares and Pre-Funded Warrants to be Purchased from the Company	Number of Firm Warrants to be Purchased from the Company	Number of Option Shares to be Purchased if the Option to Purchase additional Shares and/or Warrants is Fully Exercised	Number of Option Warrants to be Purchased if the Option to Purchase additional Shares and/or Warrants is Fully Exercised
H.C. Wainwright & Co., LLC				

Number of Shares of Firm Shares: []
 Number of Pre-Funded Warrants: []
 Number of Firm Warrants: []
 Number of Shares of Firm Shares sold to Insiders: []
 Number of Pre-Funded Warrants sold to Insiders: []
 Number of Firm Warrants Sold to Insiders: []
 Number of Shares of Firm Shares sold to Schedule III Investors: []
 Number of Pre-Funded Warrants sold to Schedule III Investors: []
 Number of Firm Warrants Sold to Schedule III Investors: []
 Number of Shares of Firm Shares sold to Schedule IV Investors: []
 Number of Pre-Funded Warrants sold to Schedule IV Investors: []
 Number of Firm Warrants Sold to Schedule IV Investors: []
 Number of Option Shares: []
 Number of Option Warrants: []
 Public Offering Price per Share: \$[]
 Public Offering Price per Pre-Funded Warrant: \$[]
 Public Offering Price per Warrant: \$[]
 Pre-Funded Warrant Exercise Price: \$0.0001
 Warrant Exercise Price: \$[]
 Underwriting Discount per Share (other than Shares sold to Insiders, Schedule III Investors or Schedule IV Investors): \$[]
 Underwriting Discount per Pre-Funded Warrant (other than Pre-Funded Warrants sold to Insiders, Schedule III Investors or Schedule IV Investors): \$[]
 Underwriting Discount per Warrant (other than Warrants sold to Insiders, Schedule III Investors or Schedule IV Investors): \$[]
 Underwriting Discount per Share sold to Insiders and Schedule III Investors: \$[]
 Underwriting Discount per Pre-Funded Warrant sold to Insiders and Schedule III Investors: \$[]
 Underwriting Discount per Warrant sold to Insiders and Schedule III Investors: \$[]
 Underwriting Discount per Share sold to Schedule IV Investors: \$0
 Underwriting Discount per Pre-Funded Warrant sold to Schedule IV Investors: \$0
 Underwriting Discount per Warrant sold to Schedule IV Investors: \$0
 Underwriter's Warrant Exercise Price: \$[]

The terms of the Warrants set forth on Exhibit 1 and the Pre-Funded Warrants set forth on Exhibit 2 are incorporated by reference herein.

SCHEDULE II

Free Writing Prospectuses and/or Testing-the-Water Communications

[]

LOCK-UP AGREEMENT

, 2019

H.C. Wainwright & Co., LLC
430 Park Avenue, 4th Floor
New York, New York 10022

Ladies and Gentlemen:

The undersigned refers to the proposed Underwriting Agreement (the “Underwriting Agreement”) among Onconova Therapeutics, Inc., a Delaware corporation (the “Company”), and the several underwriters named therein (the “Underwriters”). As an inducement to the Underwriters to execute the Underwriting Agreement in connection with the proposed public offering (the “Offering”) of securities of the Company pursuant to a Registration Statement on Form S-1, the undersigned hereby agrees that from the date hereof and until 90 days after the public offering date set forth on the final prospectus used for the Offering (the “Public Offering Date”) pursuant to the Underwriting Agreement (such 90 day period being referred to herein as the “Lock-Up Period”), the undersigned will not (and will cause any immediate family member, any partnership, corporation or other entity within the undersigned’s control, and any trustee of any trust that holds shares of common stock, par value \$0.01 per share (“Common Stock”) of the Company or other securities of the Company for the benefit of the undersigned or such immediate family member not to) offer, sell, contract to sell (including any short sale), pledge, hypothecate, establish an open “put equivalent position” within the meaning of Rule 16a-1(h) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), grant any option, right or warrant for the sale of, purchase any option or contract to sell, sell any option or contract to purchase, or otherwise encumber, dispose of or transfer, or grant any rights with respect to, directly or indirectly, any shares of Common Stock or securities convertible into or exchangeable or exercisable for any shares of Common Stock, enter into a transaction which would have the same effect, or enter into any swap, hedge or other arrangement that transfers, in whole or in part, any of the economic consequences of ownership of the Common Stock, whether any such aforementioned transaction is to be settled by delivery of the Common Stock or such other securities, in cash or otherwise, or publicly disclose the intention to make any such offer, sale, pledge or disposition, or to enter into any such transaction, swap, hedge or other arrangement, without, in each case, the prior written consent of H.C. Wainwright & Co., LLC (“HCW”), which consent may be withheld in HCW’s sole discretion. For purposes of this Lock-Up Agreement (the “Agreement”), “immediate family member” shall mean (i) the spouse of the undersigned and (ii) any lineal descendent, stepchild, parent, stepparent, grandparent, sibling, stepsibling, son-in-law, daughter-in-law, brother-in-law, sister-in-law, nephew or niece, including any such relationship by fact of legal adoption, of the undersigned or such spouse, in each case living in the undersigned’s household or whose principal residence is the undersigned’s household (regardless of whether such immediate family member may at the time be living elsewhere due to educational activities, health care treatment, military service, temporary internship or employment or otherwise).

The foregoing restrictions shall not apply to *bona fide* gifts by the undersigned, provided that (a) each resulting transferee of the Company’s securities executes and delivers to HCW an agreement satisfactory to HCW certifying that such transferee is bound by the terms of this Agreement and has been in compliance with the terms hereof since the date first above written as if it had been an original party hereto and (b) to the extent any interest in the Company’s securities is retained by the undersigned (or an immediate family member), such securities shall remain subject to the restrictions contained in this Agreement.

In addition, the undersigned agrees that, during the Lock-Up Period, without the prior written consent of HCW (which consent may be withheld in its sole discretion): (a) the undersigned will not request, make any demand for or exercise any right with respect to, the registration of any Common Stock or any security convertible into or exercisable or exchangeable for Common Stock and (b) the undersigned waives any and all notice requirements and rights with respect to the registration of any such security pursuant to any agreement, understanding or otherwise to which the undersigned is a party.

Any Common Stock received upon exercise of options granted to the undersigned will also be subject to this Agreement. Any acquisition of Common Stock by the undersigned in the open market on or after the Public Offering Date (but not the disposition of such Common Stock) will not be subject to this Agreement. A transfer of Common Stock or other securities of the Company may be made (i) to an immediate family member, (ii) to a trust for the benefit of the undersigned or an immediate family member, (iii) by will or intestate succession upon the death of the undersigned, (iv) pursuant to operation of law, including pursuant to a domestic order or negotiated divorce settlement, and (v) if the undersigned is a corporation, limited liability company, partnership, trust, or other business entity, as part of a distribution, transfer or distribution by the undersigned to its stockholders, members, partners, beneficiaries or other equity holders, provided in each case (i) through (v) that the transferee agrees in writing prior to such transfer to be bound by the terms of this Agreement as if

it were a party hereto and further provided that no filing under Section 16(a) of the Exchange Act reporting a reduction in beneficial ownership of shares of Common Stock shall be required or shall be voluntarily made during the Lock-Up Period.

The undersigned may also (a) transfer securities of the Company (i) to the Company in connection with the “cashless” exercise of options to purchase shares of Common Stock pursuant to employee benefit plans existing as of the date hereof and disclosed or incorporated by reference in the final prospectus relating to the Offering (provided that the restrictions on transfer set forth in this Agreement shall apply to shares of Common Stock issued upon such exercise, and provided further that no voluntary filing under Section 16(a) of the Exchange Act reporting such transfer shall be made during the Lock-Up Period and that if such filing is required to be made that the filing clearly indicate that such transfer or disposition is related to cashless net exercise) and (ii) pursuant to a bona fide third party tender offer, merger, consolidation or other similar transaction made to all holders of the Company’s capital stock involving a change of control of the Company (provided that in the event that the tender offer, merger, consolidation or other similar transaction is not completed, the undersigned’s Common Stock shall remain subject to the restrictions contained in this Agreement), (b) exercise any option to purchase Common Stock of the Company granted under any equity incentive plan or stock purchase plan of the Company existing as of the date hereof and disclosed or incorporated by reference in the final prospectus relating to the Offering (provided that the restrictions on transfer set forth in this Agreement shall apply to shares of Common Stock issued upon such exercise, and provided further that no filing under Section 16(a) of the Exchange Act reporting such exercise shall be made during the Lock-Up Period, and that if such a filing is required to be made that the filing clearly indicate that it is related to such exercise) and (c) enter into a written plan meeting the requirements of Rule 10b5-1 under the Exchange Act relating to the sale or other disposition of securities of the Company (provided that the securities subject to such plan may not be sold or otherwise disposed of until after the expiration of the Lock-Up Period, and that the entry into such plan is not publicly disclosed, including in any filing under the Exchange Act).

In furtherance of the foregoing, the Company and its transfer agent and registrar are hereby authorized to (a) decline to make any transfer of shares of Common Stock if such transfer would constitute a violation or breach of this Agreement and (b) place legends and stop transfer instructions on any such shares of Common Stock owned or beneficially owned by the undersigned.

[Signature page follows]

This Agreement is irrevocable and shall be binding on the undersigned and the successors, heirs, personal representatives and assigns of the undersigned. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to choice of law rules. This Agreement shall lapse and become null and void if the Public Offering Date shall not have occurred on or before November 30, 2019.

Very truly yours,

(Name - Please Print)

(Signature)

(Name of Signatory, in the case of entities - Please Print)

(Title of Signatory, in the case of entities - Please Print)

Address:

Accepted and Agreed:

Onconova Therapeutics, Inc.

By: _____

Name:

Title:

Exhibit 1

[]

Exhibit 2

[]

COMMON STOCK PURCHASE WARRANT

ONCONOVA THERAPEUTICS, INC.

Warrant Shares:

Issue Date: , 2019

Initial Exercise Date: , 2019

THIS COMMON STOCK PURCHASE WARRANT (the "Warrant") certifies that, for value received, or its assigns (the "Holder") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after the date set forth above (the "Initial Exercise Date") and on or prior to 5:00 p.m. (New York City time) on (1) (the "Termination Date") but not thereafter, to subscribe for and purchase from Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), up to shares (as subject to adjustment hereunder, the "Warrant Shares") of the Company's Common Stock. The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price, as defined in Section 2(b).

Section 1. Definitions. In addition to the terms defined elsewhere in this Warrant, the following terms have the meanings indicated in this Section 1:

"Affiliate" means any Person that, directly or indirectly through one or more intermediaries, controls or is controlled by or is under common control with a Person, as such terms are used in and construed under Rule 405 under the Securities Act.

"Bid Price" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if OTCQB or OTCQX is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then listed or quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"Board of Directors" means the board of directors of the Company.

(1) The date that is the fifth year anniversary of the Initial Exercise Date, provided that, if such date is not a Trading Day, insert the immediately following Trading Day.

“Commission” means the United States Securities and Exchange Commission.

“Common Stock” means the common stock of the Company, par value \$0.01 per share, and any other class of securities into which such securities may hereafter be reclassified or changed.

“Common Stock Equivalents” means any securities of the Company or its subsidiaries which would entitle the holder thereof to acquire at any time shares of Common Stock, including, without limitation, any debt, preferred stock, right, option, warrant or other instrument that is at any time convertible into or exercisable or exchangeable for, or otherwise entitles the holder thereof to receive, Common Stock.

“Exchange Act” means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

“Person” means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

“Registration Statement” means the Company’s registration statement on Form S-1 (File No. 333-234360), including the final prospectus filed in connection with the transaction contemplated by the Underwriting Agreement.

“Securities Act” means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

“Trading Day” means a day on which the Common Stock is traded on a Trading Market.

“Trading Market” means any of the following markets or exchanges on which the Common Stock is listed or quoted for trading on the date in question: the NYSE American, the Nasdaq Capital Market, the Nasdaq Global Market, the Nasdaq Global Select Market or the New York Stock Exchange (or any successors to any of the foregoing).

“Transfer Agent” means EQ Shareowner Services, the current transfer agent of the Company, with a mailing address of P.O. Box 64945, St. Paul, MN 55164-0945 and any successor transfer agent of the Company.

“Underwriting Agreement” means that certain Underwriting Agreement, dated as of [], 2019, by and among the Company and H.C. Wainwright & Co., LLC.

“VWAP” means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if OTCQB or OTCQX is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding

date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then listed or quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

“Warrants” means this Warrant and other Common Stock purchase warrants issued by the Company pursuant to the Underwriting Agreement and the Registration Statement.

Section 2. Exercise.

a) Exercise of Warrant. Exercise of the purchase rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form annexed hereto (the “Notice of Exercise”). Within the earlier of (i) two (2) Trading Days and (ii) the number of Trading Days comprising the Standard Settlement Period (as defined in Section 2(d) (i) herein) following the date of exercise as aforesaid, the Holder shall deliver the aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer or cashier’s check drawn on a United States bank unless the cashless exercise procedure specified in Section 2(c) below is specified in the applicable Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within three (3) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

b) Exercise Price. The exercise price per share of Common Stock under this Warrant shall be \$[], subject to adjustment hereunder (the “Exercise Price”).

c) Cashless Exercise. If at the time of exercise hereof there is no effective registration statement registering, or the prospectus contained therein is not available for the issuance or resale of the Warrant Shares to or by the Holder, then this Warrant may also be exercised, in whole or in part, at such time by means of a “cashless exercise” in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

(A) = as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to Section 2(a) hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to Section 2(a) hereof on a Trading Day prior to the opening of “regular trading hours” (as defined in Rule 600(b)(68) of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) at the option of the Holder, either (y) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (z) the Bid Price of the Common Stock on the principal Trading Market as reported by Bloomberg L.P. as of the time of the Holder’s execution of the applicable Notice of Exercise if such Notice of Exercise is executed during “regular trading hours” on a Trading Day and is delivered within two (2) hours thereafter (including until two (2) hours after the close of “regular trading hours” on a Trading Day) pursuant to Section 2(a) hereof or (iii) the VWAP on the date of the applicable Notice of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to Section 2(a) hereof after the close of “regular trading hours” on such Trading Day;

(B) = the Exercise Price of this Warrant, as adjusted hereunder; and

(X) = the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with Section 3(a)(9) of the Securities Act, the Warrant Shares shall take on the registered characteristics of the Warrants being exercised. The Company agrees not to take any position contrary to this Section 2(c).

Notwithstanding anything herein to the contrary, on the Termination Date, this Warrant shall be automatically exercised via cashless exercise pursuant to this Section 2(c).

d) Mechanics of Exercise.

i. Delivery of Warrant Shares Upon Exercise. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Transfer Agent to the Holder by crediting the account of the Holder’s or its

designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system ("DWAC") if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance of the Warrant Shares to or resale of the Warrant Shares by the Holder or (B) this Warrant is being exercised via cashless exercise, and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the earlier of (A) the earlier of (i) two (2) Trading Days and (ii) the number of days comprising the Standard Settlement Period, in each case after the delivery to the Company of the Notice of Exercise and (B) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "Warrant Share Delivery Date"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. If the Company fails for any reason to deliver to the Holder the Warrant Shares subject to a Notice of Exercise by the Warrant Share Delivery Date, the Company shall pay to the Holder, in cash, as liquidated damages and not as a penalty, for each \$1,000 of Warrant Shares subject to such exercise (based on the VWAP of the Common Stock on the date of the applicable Notice of Exercise), \$10 per Trading Day (increasing to \$20 per Trading Day on the fifth Trading Day after such liquidated damages begin to accrue) for each Trading Day after such Warrant Share Delivery Date until such Warrant Shares are delivered or Holder rescinds such exercise. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "Standard Settlement Period" means the standard settlement period, expressed in a number of Trading Days, on the Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise.

ii. Delivery of New Warrants Upon Exercise. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. Rescission Rights. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to Section

2(d)(i) by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise.

iv. Compensation for Buy-In on Failure to Timely Deliver Warrant Shares Upon Exercise. In addition to any other rights available to the Holder, if the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares in accordance with the provisions of Section 2(d)(i) above pursuant to an exercise on or before the Warrant Share Delivery Date, and if after such date the Holder is required by its broker to purchase (in an open market transaction or otherwise) or the Holder's brokerage firm otherwise purchases, shares of Common Stock to deliver in satisfaction of a sale by the Holder of the Warrant Shares which the Holder anticipated receiving upon such exercise (a "Buy-In"), then the Company shall (A) pay in cash to the Holder the amount, if any, by which (x) the Holder's total purchase price (including brokerage commissions, if any) for the shares of Common Stock so purchased exceeds (y) the amount obtained by multiplying (1) the number of Warrant Shares that the Company was required to deliver to the Holder in connection with the exercise at issue times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the Holder, either reinstate the portion of the Warrant and equivalent number of Warrant Shares for which such exercise was not honored (in which case such exercise shall be deemed rescinded) or deliver to the Holder the number of shares of Common Stock that would have been issued had the Company timely complied with its exercise and delivery obligations hereunder. For example, if the Holder purchases Common Stock having a total purchase price of \$11,000 to cover a Buy-In with respect to an attempted exercise of shares of Common Stock with an aggregate sale price giving rise to such purchase obligation of \$10,000, under clause (A) of the immediately preceding sentence the Company shall be required to pay the Holder \$1,000. The Holder shall provide the Company written notice indicating the amounts payable to the Holder in respect of the Buy-In and, upon request of the Company, evidence of the amount of such loss. Nothing herein shall limit a Holder's right to pursue any other remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver shares of Common Stock upon exercise of the Warrant as required pursuant to the terms hereof.

v. No Fractional Shares or Scrip. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall round up to the next whole share.

vi. Charges, Taxes and Expenses. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or

other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; provided, however, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form attached hereto duly executed by the Holder and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

vii. Closing of Books. The Company will not close its stockholder books or records in any manner which prevents the timely exercise of this Warrant, pursuant to the terms hereof.

e) Holder's Exercise Limitations. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to Section 2 or otherwise, to the extent that after giving effect to such issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's Affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's Affiliates (such Persons, "Attribution Parties")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its Affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its Affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its Affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this Section 2(e), beneficial ownership shall be calculated in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with Section 13(d) of the Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this Section 2(e) applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's

determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination. In addition, a determination as to any group status as contemplated above shall be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder. For purposes of this Section 2(e), in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written or oral request of a Holder, the Company shall within one (1) Trading Day confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its Affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "Beneficial Ownership Limitation" shall be [4.99%/9.99%] of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon notice to the Company, may increase or decrease the Beneficial Ownership Limitation provisions of this Section 2(e), provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this Section 2(e) shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the 61st day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this Section 2(e) to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant.

Section 3. Certain Adjustments.

a) Stock Dividends and Splits. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each

case the Exercise Price shall be multiplied by a fraction of which the numerator shall be the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this Section 3(a) shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) Subsequent Rights Offerings. In addition to any adjustments pursuant to Section 3(a) above, if at any time the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to the record holders of any class of shares of Common Stock (the "Purchase Rights"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (provided, however, that to the extent that the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) Pro Rata Distributions. During such time as this Warrant is outstanding, if the Company shall declare or make any dividend or other distribution of its assets (or rights to acquire its assets) to holders of shares of Common Stock, by way of return of capital or otherwise (including, without limitation, any distribution of cash, stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement, scheme of arrangement or other similar transaction) (a "Distribution"), at any time after the issuance of this Warrant, then, in each such case, the Holder shall be entitled to participate in such Distribution to the same extent that the Holder would have participated therein if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date of which a record is taken for such Distribution, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the participation in such Distribution (provided, however, that to the extent that the Holder's right to participate in any such Distribution would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be

entitled to participate in such Distribution to such extent (or in the beneficial ownership of any shares of Common Stock as a result of such Distribution to such extent) and the portion of such Distribution shall be held in abeyance for the benefit of the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

d) Fundamental Transaction. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company, directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the outstanding shares of Common Stock (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "Fundamental Transaction"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in Section 2(e) on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "Alternate Consideration") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in Section 2(e) on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Fundamental Transaction.

Notwithstanding anything to the contrary, in the event of a Fundamental Transaction, the Company or any Successor Entity (as defined below) shall, at the Holder's option, exercisable at any time concurrently with, or within 30 days after, the consummation of the Fundamental Transaction (or, if later, the date of the public announcement of the applicable Fundamental Transaction), purchase this Warrant from the Holder by paying to the Holder an amount of cash equal to the Black Scholes Value (as defined below) of the remaining unexercised portion of this Warrant on the date of the consummation of such Fundamental Transaction; provided, however, if the Fundamental Transaction is not within the Company's control, including not approved by the Company's Board of Directors, Holder shall only be entitled to receive from the Company or any Successor Entity, as of the date of consummation of such Fundamental Transaction, the same type or form of consideration (and in the same proportion), at the Black Scholes Value (as defined below) of the unexercised portion of this Warrant, that is being offered and paid to the holders of Common Stock of the Company in connection with the Fundamental Transaction, whether that consideration be in the form of cash, stock or any combination thereof, or whether the holders of Common Stock are given the choice to receive from among alternative forms of consideration in connection with the Fundamental Transaction. "Black Scholes Value" means the value of this Warrant based on the Black-Scholes Option Pricing Model obtained from the "OV" function on Bloomberg L.P. ("Bloomberg") determined as of the day immediately following the first public announcement of the applicable Fundamental Transaction, or, if the Fundamental Transaction is not publicly announced, the date the Fundamental Transaction is consummated, for pricing purposes and reflecting (i) a risk-free interest rate corresponding to the U.S. Treasury rate for a period equal to the remaining term of this Warrant as of such date of request, (ii) an expected volatility equal to the remaining term of this Warrant obtained from the HVT function on Bloomberg as of the Trading Day immediately prior to the public announcement of the applicable Fundamental Transaction or, if the Fundamental Transaction is not publicly announced, the date the Fundamental Transaction is consummated, (iii) the underlying price per share used in such calculation shall be the greater of (A) the sum of the price per share being offered in cash, if any, plus the per share value of any non-cash consideration, if any, being offered in such Fundamental Transaction and (B) the greater of (x) the last Weighted Average Price immediately prior to the public announcement of such Fundamental Transaction and (y) the last Weighted Average Price immediately prior to the consummation of such Fundamental Transaction, (iv) a zero cost of borrow and (v) a 360 day annualization. The payment of the Black Scholes Value will be made by wire transfer of immediately available funds within five (5) Trading Days of the Holder's election (or, if later, on the effective date of the Fundamental Transaction). The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "Successor Entity") to assume in writing all of the obligations of the Company under this Warrant in accordance with the provisions of this Section 3(e) pursuant to written agreements in form and substance reasonably satisfactory to the Holder and approved by the Holder (without unreasonable delay) prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of

Common Stock acquirable and receivable upon exercise of this Warrant (without regard to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant referring to the "Company" shall refer instead to the Successor Entity), and may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant with the same effect as if such Successor Entity had been named as the Company herein.

e) Calculations. All calculations under this Section 3 shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this Section 3, the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

f) Notice to Holder.

i. Adjustment to Exercise Price. Whenever the Exercise Price is adjusted pursuant to any provision of this Section 3, the Company shall promptly deliver to the Holder by facsimile or email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment.

ii. Notice to Allow Exercise by Holder. If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the Common Stock, (B) the Company shall declare a special nonrecurring cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs of the Company, then, in each case, the Company shall cause to be delivered by facsimile or email to the Holder at its last facsimile number or email address as it shall appear upon the Warrant

Register of the Company, at least 20 calendar days prior to the applicable record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, non-public information regarding the Company or any of its subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

g) Voluntary Adjustment By Company. Subject to the rules and regulations of the Trading Market, the Company may at any time during the term of this Warrant, subject to the prior written consent of the Holder, reduce the then current Exercise Price to any amount and for any period of time deemed appropriate by the Board of Directors of the Company.(3)

Section 4. Transfer of Warrant.

a) Transferability. This Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new Warrant or Warrants in the name of the assignee or assignees, as applicable, and in the denomination or denominations specified in such instrument of assignment, and shall issue to the assignor a new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder

(3) NTD: Subject to accounting review.

delivers an assignment form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued.

b) New Warrants. This Warrant may be divided or combined with other Warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new Warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with Section 4(a), as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new Warrant or Warrants in exchange for the Warrant or Warrants to be divided or combined in accordance with such notice. All Warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) Warrant Register. The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the “Warrant Register”), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

Section 5. Miscellaneous.

a) No Rights as Stockholder Until Exercise; No Settlement in Cash. This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a stockholder of the Company prior to the exercise hereof as set forth in Section 2(d)(i), except as expressly set forth in Section 3. Without limiting the rights of a Holder to receive Warrant Shares on a “cashless exercise,” in no event will the Company be required to net cash settle an exercise of this Warrant.

b) Loss, Theft, Destruction or Mutilation of Warrant. The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, of indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) Saturdays, Sundays, Holidays, etc. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) Authorized Shares.

The Company covenants that, during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any purchase rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the purchase rights under this Warrant. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the purchase rights represented by this Warrant will, upon exercise of the purchase rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued, fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to protect the rights of Holder as set forth in this Warrant against impairment. Without limiting the generality of the foregoing, the Company will (i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) Governing Law. All questions concerning the construction, validity, enforcement and interpretation of this Warrant shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflicts of law thereof. Each party agrees that all legal proceedings concerning the interpretations, enforcement and defense of the transactions contemplated

by this Warrant (whether brought against a party hereto or their respective affiliates, directors, officers, shareholders, partners, members, employees or agents) shall be commenced exclusively in the state and federal courts sitting in the City of New York. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the City of New York, Borough of Manhattan for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is improper or is an inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Warrant and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law. If either party shall commence an action, suit or proceeding to enforce any provisions of this Warrant, the prevailing party in such action, suit or proceeding shall be reimbursed by the other party for their reasonable attorneys' fees and other costs and expenses incurred with the investigation, preparation and prosecution of such action or proceeding.

f) Restrictions. The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

g) Nonwaiver and Expenses. No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

h) Notices. Any and all notices or other communications or deliveries to be provided by the holders hereunder including, without limitation, any Notice of Exercise, shall be in writing and delivered personally, by facsimile or e-mail, or sent by a nationally recognized overnight courier service, addressed to the Company, at [], Attention: [], email address: [], facsimile: [], or such other facsimile number, email address or address as the Company may specify for such purposes by notice to the Holders. Any and all notices or other communications or deliveries to be provided by the Company hereunder shall be in writing and delivered personally, by facsimile or e-mail, or sent by a nationally recognized overnight courier service addressed to each Holder at

the facsimile number, e-mail address or address of such Holder appearing on the books of the Company. Any notice or other communication or deliveries hereunder shall be deemed given and effective on the earliest of (i) the time of transmission, if such notice or communication is delivered via facsimile at the facsimile number or via e-mail at the e-mail address set forth in this Section prior to 5:30 p.m. (New York City time) on any date, (ii) the next Trading Day after the date of transmission, if such notice or communication is delivered via facsimile at the facsimile number or via e-mail at the e-mail address set forth in this Section on a day that is not a Trading Day or later than 5:30 p.m. (New York City time) on any Trading Day, (iii) the second Trading Day following the date of mailing, if sent by U.S. nationally recognized overnight courier service, or (iv) upon actual receipt by the party to whom such notice is required to be given.

i) Limitation of Liability. No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of the Company, whether such liability is asserted by the Company or by creditors of the Company.

j) Remedies. The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

k) Successors and Assigns. Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

l) Amendment. This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company and the Holder.

m) Severability. Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

n) Headings. The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

(Signature Page Follows)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

ONCONOVA THERAPEUTICS, INC.

By: _____
Name:
Title:

NOTICE OF EXERCISE

TO: **ONCONOVA THERAPEUTICS, INC.**

- (1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.
- (2) Payment shall take the form of (check applicable box):
 - in lawful money of the United States; or
 - if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in subsection 2(c), to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in subsection 2(c).
- (3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:
- (4) The time of day this Notice of Exercise is being executed is:

The Warrant Shares shall be delivered to the following DWAC Account Number:

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____
Signature of Authorized Signatory of Investing Entity: _____
Name of Authorized Signatory: _____
Title of Authorized Signatory: _____
Date: _____

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____,

Holder's Signature: _____

Holder's Address: _____

PRE-FUNDED COMMON STOCK PURCHASE WARRANT

ONCONOVA THERAPEUTICS, INC.

Warrant Shares:

Issue Date: , 2019

Initial Exercise Date: , 2019

THIS PRE-FUNDED COMMON STOCK PURCHASE WARRANT (the "Warrant") certifies that, for value received, or its assigns (the "Holder") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after the date set forth above (the "Initial Exercise Date") and until this Warrant is exercised in full (the "Termination Date") but not thereafter, to subscribe for and purchase from Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), up to shares (as subject to adjustment hereunder, the "Warrant Shares") of the Company's Common Stock. The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price, as defined in Section 2(b).

Section 1. Definitions. In addition to the terms defined elsewhere in this Warrant, the following terms have the meanings indicated in this Section 1:

"Affiliate" means any Person that, directly or indirectly through one or more intermediaries, controls or is controlled by or is under common control with a Person, as such terms are used in and construed under Rule 405 under the Securities Act.

"Bid Price" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if OTCQB or OTCQX is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then listed or quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"Board of Directors" means the board of directors of the Company.

"Commission" means the United States Securities and Exchange Commission.

“Common Stock” means the common stock of the Company, par value \$0.01 per share, and any other class of securities into which such securities may hereafter be reclassified or changed.

“Common Stock Equivalents” means any securities of the Company or its subsidiaries which would entitle the holder thereof to acquire at any time shares of Common Stock, including, without limitation, any debt, preferred stock, right, option, warrant or other instrument that is at any time convertible into or exercisable or exchangeable for, or otherwise entitles the holder thereof to receive, Common Stock.

“Exchange Act” means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

“Person” means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

“Registration Statement” means the Company’s registration statement on Form S-1 (File No. 333-234360), including the final prospectus filed in connection with the transaction contemplated by the Underwriting Agreement.

“Securities Act” means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

“Trading Day” means a day on which the Common Stock is traded on a Trading Market.

“Trading Market” means any of the following markets or exchanges on which the Common Stock is listed or quoted for trading on the date in question: the NYSE American, the Nasdaq Capital Market, the Nasdaq Global Market, the Nasdaq Global Select Market or the New York Stock Exchange (or any successors to any of the foregoing).

“Transfer Agent” means EQ Shareowner Services, the current transfer agent of the Company, with a mailing address of P.O. Box 64945, St. Paul, MN 55164-0945 and any successor transfer agent of the Company.

“Underwriting Agreement” means that certain Underwriting Agreement, dated as of [], 2019, by and among the Company and H.C. Wainwright & Co., LLC.

“VWAP” means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if OTCQB or OTCQX is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then listed or quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The

Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

“Warrants” means this Warrant and other Common Stock purchase warrants issued by the Company pursuant to the Underwriting Agreement and the Registration Statement.

Section 2. Exercise.

a) Exercise of Warrant. Exercise of the purchase rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form annexed hereto (the “Notice of Exercise”). Within the earlier of (i) two (2) Trading Days and (ii) the number of Trading Days comprising the Standard Settlement Period (as defined in Section 2(d) (i) herein) following the date of exercise as aforesaid, the Holder shall deliver the aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer or cashier’s check drawn on a United States bank unless the cashless exercise procedure specified in Section 2(c) below is specified in the applicable Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within three (3) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

b) Exercise Price. The aggregate exercise price of this Warrant, except for a nominal exercise price of \$0.0001 per Warrant Share, was pre-funded to the Company on or prior to the Initial Exercise Date and, consequently, no additional consideration (other than the nominal exercise price of \$0.0001 per Warrant Share) shall be required to be paid by the Holder to any Person to effect any exercise of this Warrant. The Holder shall

not be entitled to the return or refund of all, or any portion, of such pre-paid aggregate exercise price under any circumstance or for any reason whatsoever, including in the event this Warrant shall not have been exercised prior to the Termination Date. The remaining unpaid exercise price per share of Common Stock under this Warrant shall be \$0.0001, subject to adjustment hereunder (the "Exercise Price").

c) Cashless Exercise. This Warrant may also be exercised, in whole or in part, at any time by means of a "cashless exercise" in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

(A) = as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to Section 2(a) hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to Section 2(a) hereof on a Trading Day prior to the opening of "regular trading hours" (as defined in Rule 600(b)(68) of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) at the option of the Holder, either (y) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (z) the Bid Price of the Common Stock on the principal Trading Market as reported by Bloomberg L.P. as of the time of the Holder's execution of the applicable Notice of Exercise if such Notice of Exercise is executed during "regular trading hours" on a Trading Day and is delivered within two (2) hours thereafter (including until two (2) hours after the close of "regular trading hours" on a Trading Day) pursuant to Section 2(a) hereof or (iii) the VWAP on the date of the applicable Notice of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to Section 2(a) hereof after the close of "regular trading hours" on such Trading Day;

(B) = the Exercise Price of this Warrant, as adjusted hereunder; and

(X) = the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with Section 3(a)(9) of the Securities Act, the Warrant Shares shall take on the registered characteristics of the Warrants being exercised. The Company agrees not to take any position contrary to this Section 2(c).

d) Mechanics of Exercise.

i. Delivery of Warrant Shares Upon Exercise. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Transfer Agent to the Holder by crediting the account of the Holder's or its

designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system ("DWAC") if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance of the Warrant Shares to or resale of the Warrant Shares by the Holder or (B) this Warrant is being exercised via cashless exercise, and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the earlier of (A) the earlier of (i) two (2) Trading Days and (ii) the number of days comprising the Standard Settlement Period, in each case after the delivery to the Company of the Notice of Exercise and (B) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "Warrant Share Delivery Date"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. If the Company fails for any reason to deliver to the Holder the Warrant Shares subject to a Notice of Exercise by the Warrant Share Delivery Date, the Company shall pay to the Holder, in cash, as liquidated damages and not as a penalty, for each \$1,000 of Warrant Shares subject to such exercise (based on the VWAP of the Common Stock on the date of the applicable Notice of Exercise), \$10 per Trading Day (increasing to \$20 per Trading Day on the fifth Trading Day after such liquidated damages begin to accrue) for each Trading Day after such Warrant Share Delivery Date until such Warrant Shares are delivered or Holder rescinds such exercise. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "Standard Settlement Period" means the standard settlement period, expressed in a number of Trading Days, on the Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise. Notwithstanding the foregoing, with respect to any Notice(s) of Exercise delivered on or prior to 12:00 p.m. (New York City time) on the Initial Exercise Date, which may be delivered at any time after the time of execution of the Underwriting Agreement, the Company agrees to deliver the Warrant Shares subject to such notice(s) by 4:00 p.m. (New York City time) on the Initial Exercise Date and the Initial Exercise Date shall be the Warrant Share Delivery Date for purposes hereunder.

ii. Delivery of New Warrants Upon Exercise. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant

evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. Rescission Rights. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to Section 2(d)(i) by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise.

iv. Compensation for Buy-In on Failure to Timely Deliver Warrant Shares Upon Exercise. In addition to any other rights available to the Holder, if the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares in accordance with the provisions of Section 2(d)(i) above pursuant to an exercise on or before the Warrant Share Delivery Date, and if after such date the Holder is required by its broker to purchase (in an open market transaction or otherwise) or the Holder's brokerage firm otherwise purchases, shares of Common Stock to deliver in satisfaction of a sale by the Holder of the Warrant Shares which the Holder anticipated receiving upon such exercise (a "Buy-In"), then the Company shall (A) pay in cash to the Holder the amount, if any, by which (x) the Holder's total purchase price (including brokerage commissions, if any) for the shares of Common Stock so purchased exceeds (y) the amount obtained by multiplying (1) the number of Warrant Shares that the Company was required to deliver to the Holder in connection with the exercise at issue times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the Holder, either reinstate the portion of the Warrant and equivalent number of Warrant Shares for which such exercise was not honored (in which case such exercise shall be deemed rescinded) or deliver to the Holder the number of shares of Common Stock that would have been issued had the Company timely complied with its exercise and delivery obligations hereunder. For example, if the Holder purchases Common Stock having a total purchase price of \$11,000 to cover a Buy-In with respect to an attempted exercise of shares of Common Stock with an aggregate sale price giving rise to such purchase obligation of \$10,000, under clause (A) of the immediately preceding sentence the Company shall be required to pay the Holder \$1,000. The Holder shall provide the Company written notice indicating the amounts payable to the Holder in respect of the Buy-In and, upon request of the Company, evidence of the amount of such loss. Nothing herein shall limit a Holder's right to pursue any other remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver shares of Common Stock upon exercise of the Warrant as required pursuant to the terms hereof.

v. No Fractional Shares or Scrip. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this

Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall round up to the next whole share.

vi. Charges, Taxes and Expenses. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; provided, however, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form attached hereto duly executed by the Holder and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

vii. Closing of Books. The Company will not close its stockholder books or records in any manner which prevents the timely exercise of this Warrant, pursuant to the terms hereof.

e) Holder's Exercise Limitations. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to Section 2 or otherwise, to the extent that after giving effect to such issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's Affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's Affiliates (such Persons, "Attribution Parties")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its Affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its Affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its Affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this Section 2(e), beneficial ownership shall be calculated in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with Section 13(d) of the

Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this Section 2(e) applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination. In addition, a determination as to any group status as contemplated above shall be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder. For purposes of this Section 2(e), in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written or oral request of a Holder, the Company shall within one (1) Trading Day confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its Affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "Beneficial Ownership Limitation" shall be [4.99%/9.99%] of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon notice to the Company, may increase or decrease the Beneficial Ownership Limitation provisions of this Section 2(e), provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this Section 2(e) shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the 61st day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this Section 2(e) to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant.

Section 3. Certain Adjustments.

a) Stock Dividends and Splits. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent

securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each case the Exercise Price shall be multiplied by a fraction of which the numerator shall be the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this Section 3(a) shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) Subsequent Rights Offerings. In addition to any adjustments pursuant to Section 3(a) above, if at any time the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to the record holders of any class of shares of Common Stock (the "Purchase Rights"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (provided, however, that to the extent that the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) Pro Rata Distributions. During such time as this Warrant is outstanding, if the Company shall declare or make any dividend or other distribution of its assets (or rights to acquire its assets) to holders of shares of Common Stock, by way of return of capital or otherwise (including, without limitation, any distribution of cash, stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement, scheme of arrangement or other similar transaction) (a "Distribution"), at any time after the issuance of this Warrant, then, in each such case, the Holder shall be entitled to participate in such Distribution to the same extent that the Holder would have participated therein if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on

exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date of which a record is taken for such Distribution, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the participation in such Distribution (provided, however, that to the extent that the Holder's right to participate in any such Distribution would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Distribution to such extent (or in the beneficial ownership of any shares of Common Stock as a result of such Distribution to such extent) and the portion of such Distribution shall be held in abeyance for the benefit of the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

d) Fundamental Transaction. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company, directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the outstanding shares of Common Stock (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "Fundamental Transaction"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in Section 2(e) on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "Alternate Consideration") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in Section 2(e) on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a

reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Fundamental Transaction. The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the “Successor Entity”) to assume in writing all of the obligations of the Company under this Warrant in accordance with the provisions of this Section 3(e) pursuant to written agreements in form and substance reasonably satisfactory to the Holder and approved by the Holder (without unreasonable delay) prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of Common Stock acquirable and receivable upon exercise of this Warrant (without regard to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant referring to the “Company” shall refer instead to the Successor Entity), and may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant with the same effect as if such Successor Entity had been named as the Company herein.

e) Calculations. All calculations under this Section 3 shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this Section 3, the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

f) Notice to Holder.

i. Adjustment to Exercise Price. Whenever the Exercise Price is adjusted pursuant to any provision of this Section 3, the Company shall promptly deliver to the Holder by facsimile or email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment.

ii. Notice to Allow Exercise by Holder. If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the

Common Stock, (B) the Company shall declare a special nonrecurring cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs of the Company, then, in each case, the Company shall cause to be delivered by facsimile or email to the Holder at its last facsimile number or email address as it shall appear upon the Warrant Register of the Company, at least 20 calendar days prior to the applicable record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, non-public information regarding the Company or any of its subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

Section 4. Transfer of Warrant.

a) Transferability. This Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new Warrant or Warrants in the name of the assignee or assignees, as applicable, and in the denomination or

denominations specified in such instrument of assignment, and shall issue to the assignor a new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder delivers an assignment form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued.

b) New Warrants. This Warrant may be divided or combined with other Warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new Warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with Section 4(a), as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new Warrant or Warrants in exchange for the Warrant or Warrants to be divided or combined in accordance with such notice. All Warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) Warrant Register. The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the “Warrant Register”), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

Section 5. Miscellaneous.

a) No Rights as Stockholder Until Exercise; No Settlement in Cash. This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a stockholder of the Company prior to the exercise hereof as set forth in Section 2(d)(i), except as expressly set forth in Section 3. Without limiting the rights of a Holder to receive Warrant Shares on a “cashless exercise,” in no event will the Company be required to net cash settle an exercise of this Warrant.

b) Loss, Theft, Destruction or Mutilation of Warrant. The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, of indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) Saturdays, Sundays, Holidays, etc. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) Authorized Shares.

The Company covenants that, during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any purchase rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the purchase rights under this Warrant. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the purchase rights represented by this Warrant will, upon exercise of the purchase rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued, fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to protect the rights of Holder as set forth in this Warrant against impairment. Without limiting the generality of the foregoing, the Company will (i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or

consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) Governing Law. All questions concerning the construction, validity, enforcement and interpretation of this Warrant shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflicts of law thereof. Each party agrees that all legal proceedings concerning the interpretations, enforcement and defense of the transactions contemplated by this Warrant (whether brought against a party hereto or their respective affiliates, directors, officers, shareholders, partners, members, employees or agents) shall be commenced exclusively in the state and federal courts sitting in the City of New York. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the City of New York, Borough of Manhattan for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is improper or is an inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Warrant and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law. If either party shall commence an action, suit or proceeding to enforce any provisions of this Warrant, the prevailing party in such action, suit or proceeding shall be reimbursed by the other party for their reasonable attorneys' fees and other costs and expenses incurred with the investigation, preparation and prosecution of such action or proceeding.

f) Restrictions. The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

g) Nonwaiver and Expenses. No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

h) Notices. Any and all notices or other communications or deliveries to be provided by the holders hereunder including, without limitation, any Notice of Exercise, shall be in writing and delivered personally, by facsimile or e-mail, or sent by a nationally recognized overnight courier service, addressed to the Company, at [], Attention: [], email address: [], facsimile: [], or such other facsimile number, email address or address as the Company may specify for such purposes by notice to the Holders. Any and all notices or other communications or deliveries to be provided by the Company hereunder shall be in writing and delivered personally, by facsimile or e-mail, or sent by a nationally recognized overnight courier service addressed to each Holder at the facsimile number, e-mail address or address of such Holder appearing on the books of the Company. Any notice or other communication or deliveries hereunder shall be deemed given and effective on the earliest of (i) the time of transmission, if such notice or communication is delivered via facsimile at the facsimile number or via e-mail at the e-mail address set forth in this Section prior to 5:30 p.m. (New York City time) on any date, (ii) the next Trading Day after the date of transmission, if such notice or communication is delivered via facsimile at the facsimile number or via e-mail at the e-mail address set forth in this Section on a day that is not a Trading Day or later than 5:30 p.m. (New York City time) on any Trading Day, (iii) the second Trading Day following the date of mailing, if sent by U.S. nationally recognized overnight courier service, or (iv) upon actual receipt by the party to whom such notice is required to be given.

i) Limitation of Liability. No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of the Company, whether such liability is asserted by the Company or by creditors of the Company.

j) Remedies. The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

k) Successors and Assigns. Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

l) Amendment. This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company and the Holder.

m) Severability. Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any

provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

n) Headings. The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

(Signature Page Follows)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

ONCONOVA THERAPEUTICS, INC.

By: _____
Name:
Title:

NOTICE OF EXERCISE

TO: **ONCONOVA THERAPEUTICS, INC.**

- (1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.
- (2) Payment shall take the form of (check applicable box):
 - in lawful money of the United States; or
 - if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in subsection 2(c), to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in subsection 2(c).
- (3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:
- (4) The time of day this Notice of Exercise is being executed is:

The Warrant Shares shall be delivered to the following DWAC Account Number:

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____
Signature of Authorized Signatory of Investing Entity: _____
Name of Authorized Signatory: _____
Title of Authorized Signatory: _____
Date: _____

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____,

Holder's Signature: _____

Holder's Address: _____

UNDERWRITER COMMON STOCK PURCHASE WARRANT

ONCONOVA THERAPEUTICS, INC.

Warrant Shares:

Issue Date: , 2019

Initial Exercise Date: , 2019

THIS UNDERWRITER COMMON STOCK PURCHASE WARRANT (the "Warrant") certifies that, for value received, or its assigns (the "Holder") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after the date set forth above (the "Initial Exercise Date") and on or prior to 5:00 p.m. (New York City time) on (1) (the "Termination Date") but not thereafter, to subscribe for and purchase from Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), up to shares (as subject to adjustment hereunder, the "Warrant Shares") of the Company's Common Stock. The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price, as defined in Section 2(b). This Warrant is issued pursuant to the Underwriting Agreement.

Section 1. Definitions. In addition to the terms defined elsewhere in this Warrant, the following terms have the meanings indicated in this Section 1:

"Affiliate" means any Person that, directly or indirectly through one or more intermediaries, controls or is controlled by or is under common control with a Person, as such terms are used in and construed under Rule 405 under the Securities Act.

"Bid Price" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if OTCQB or OTCQX is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then listed or quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"Board of Directors" means the board of directors of the Company.

(1) The date that is the fifth year anniversary of the effective date of the registration statement.

“Commission” means the United States Securities and Exchange Commission.

“Common Stock” means the common stock of the Company, par value \$0.01 per share, and any other class of securities into which such securities may hereafter be reclassified or changed.

“Common Stock Equivalents” means any securities of the Company or its subsidiaries which would entitle the holder thereof to acquire at any time shares of Common Stock, including, without limitation, any debt, preferred stock, right, option, warrant or other instrument that is at any time convertible into or exercisable or exchangeable for, or otherwise entitles the holder thereof to receive, Common Stock.

“Exchange Act” means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

“Person” means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

“Registration Statement” means the Company’s registration statement on Form S-1 (File No. 333-234360), including the final prospectus filed in connection with the transaction contemplated by the Underwriting Agreement.

“Securities Act” means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

“Trading Day” means a day on which the Common Stock is traded on a Trading Market.

“Trading Market” means any of the following markets or exchanges on which the Common Stock is listed or quoted for trading on the date in question: the NYSE American, the Nasdaq Capital Market, the Nasdaq Global Market, the Nasdaq Global Select Market or the New York Stock Exchange (or any successors to any of the foregoing).

“Transfer Agent” means EQ Shareowner Services, the current transfer agent of the Company, with a mailing address of P.O. Box 64945, St. Paul, MN 55164-0945 and any successor transfer agent of the Company.

“Underwriting Agreement” means that certain Underwriting Agreement, dated as of [], 2019, by and among the Company and H.C. Wainwright & Co., LLC.

“VWAP” means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if OTCQB or OTCQX is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding

date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then listed or quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

“Warrants” means this Warrant and other Underwriter Common Stock purchase warrants issued by the Company pursuant to the Underwriting Agreement.

Section 2. Exercise.

a) Exercise of Warrant. Exercise of the purchase rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form annexed hereto (the “Notice of Exercise”). Within the earlier of (i) two (2) Trading Days and (ii) the number of Trading Days comprising the Standard Settlement Period (as defined in Section 2(d) (i) herein) following the date of exercise as aforesaid, the Holder shall deliver the aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer or cashier’s check drawn on a United States bank unless the cashless exercise procedure specified in Section 2(c) below is specified in the applicable Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within three (3) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

b) Exercise Price. The exercise price per share of Common Stock under this Warrant shall be \$[], subject to adjustment hereunder (the “Exercise Price”).

c) Cashless Exercise. If at the time of exercise hereof there is no effective registration statement registering, or the prospectus contained therein is not available for the issuance or resale of the Warrant Shares to or by the Holder, then this Warrant may also be exercised, in whole or in part, at such time by means of a “cashless exercise” in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

(A) = as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to Section 2(a) hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to Section 2(a) hereof on a Trading Day prior to the opening of “regular trading hours” (as defined in Rule 600(b)(68) of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) at the option of the Holder, either (y) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (z) the Bid Price of the Common Stock on the principal Trading Market as reported by Bloomberg L.P. as of the time of the Holder’s execution of the applicable Notice of Exercise if such Notice of Exercise is executed during “regular trading hours” on a Trading Day and is delivered within two (2) hours thereafter (including until two (2) hours after the close of “regular trading hours” on a Trading Day) pursuant to Section 2(a) hereof or (iii) the VWAP on the date of the applicable Notice of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to Section 2(a) hereof after the close of “regular trading hours” on such Trading Day;

(B) = the Exercise Price of this Warrant, as adjusted hereunder; and

(X) = the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with Section 3(a)(9) of the Securities Act, the Warrant Shares shall take on the registered characteristics of the Warrants being exercised. The Company agrees not to take any position contrary to this Section 2(c).

Notwithstanding anything herein to the contrary, on the Termination Date, this Warrant shall be automatically exercised via cashless exercise pursuant to this Section 2(c).

d) Mechanics of Exercise.

i. Delivery of Warrant Shares Upon Exercise. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Transfer Agent to the Holder by crediting the account of the Holder’s or its

designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system ("DWAC") if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance of the Warrant Shares to or resale of the Warrant Shares by the Holder or (B) this Warrant is being exercised via cashless exercise, and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the earlier of (A) the earlier of (i) two (2) Trading Days and (ii) the number of days comprising the Standard Settlement Period, in each case after the delivery to the Company of the Notice of Exercise and (B) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "Warrant Share Delivery Date"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. If the Company fails for any reason to deliver to the Holder the Warrant Shares subject to a Notice of Exercise by the Warrant Share Delivery Date, the Company shall pay to the Holder, in cash, as liquidated damages and not as a penalty, for each \$1,000 of Warrant Shares subject to such exercise (based on the VWAP of the Common Stock on the date of the applicable Notice of Exercise), \$10 per Trading Day (increasing to \$20 per Trading Day on the fifth Trading Day after such liquidated damages begin to accrue) for each Trading Day after such Warrant Share Delivery Date until such Warrant Shares are delivered or Holder rescinds such exercise. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "Standard Settlement Period" means the standard settlement period, expressed in a number of Trading Days, on the Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise.

ii. Delivery of New Warrants Upon Exercise. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. Rescission Rights. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to Section

2(d)(i) by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise.

iv. Compensation for Buy-In on Failure to Timely Deliver Warrant Shares Upon Exercise. In addition to any other rights available to the Holder, if the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares in accordance with the provisions of Section 2(d)(i) above pursuant to an exercise on or before the Warrant Share Delivery Date, and if after such date the Holder is required by its broker to purchase (in an open market transaction or otherwise) or the Holder's brokerage firm otherwise purchases, shares of Common Stock to deliver in satisfaction of a sale by the Holder of the Warrant Shares which the Holder anticipated receiving upon such exercise (a "Buy-In"), then the Company shall (A) pay in cash to the Holder the amount, if any, by which (x) the Holder's total purchase price (including brokerage commissions, if any) for the shares of Common Stock so purchased exceeds (y) the amount obtained by multiplying (1) the number of Warrant Shares that the Company was required to deliver to the Holder in connection with the exercise at issue times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the Holder, either reinstate the portion of the Warrant and equivalent number of Warrant Shares for which such exercise was not honored (in which case such exercise shall be deemed rescinded) or deliver to the Holder the number of shares of Common Stock that would have been issued had the Company timely complied with its exercise and delivery obligations hereunder. For example, if the Holder purchases Common Stock having a total purchase price of \$11,000 to cover a Buy-In with respect to an attempted exercise of shares of Common Stock with an aggregate sale price giving rise to such purchase obligation of \$10,000, under clause (A) of the immediately preceding sentence the Company shall be required to pay the Holder \$1,000. The Holder shall provide the Company written notice indicating the amounts payable to the Holder in respect of the Buy-In and, upon request of the Company, evidence of the amount of such loss. Nothing herein shall limit a Holder's right to pursue any other remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver shares of Common Stock upon exercise of the Warrant as required pursuant to the terms hereof.

v. No Fractional Shares or Scrip. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall round up to the next whole share.

vi. Charges, Taxes and Expenses. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or

other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; provided, however, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form attached hereto duly executed by the Holder and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

vii. Closing of Books. The Company will not close its stockholder books or records in any manner which prevents the timely exercise of this Warrant, pursuant to the terms hereof.

e) Holder's Exercise Limitations. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to Section 2 or otherwise, to the extent that after giving effect to such issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's Affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's Affiliates (such Persons, "Attribution Parties")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its Affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its Affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its Affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this Section 2(e), beneficial ownership shall be calculated in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with Section 13(d) of the Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this Section 2(e) applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's

determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination. In addition, a determination as to any group status as contemplated above shall be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder. For purposes of this Section 2(e), in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written or oral request of a Holder, the Company shall within one (1) Trading Day confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its Affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "Beneficial Ownership Limitation" shall be 4.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon notice to the Company, may increase or decrease the Beneficial Ownership Limitation provisions of this Section 2(e), provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this Section 2(e) shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the 61st day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this Section 2(e) to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant.

Section 3. Certain Adjustments.

a) Stock Dividends and Splits. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each case the Exercise Price shall be multiplied by a fraction of which the numerator shall be

the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this Section 3(a) shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) Subsequent Rights Offerings. In addition to any adjustments pursuant to Section 3(a) above, if at any time the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to the record holders of any class of shares of Common Stock (the "Purchase Rights"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (provided, however, that to the extent that the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) Pro Rata Distributions. During such time as this Warrant is outstanding, if the Company shall declare or make any dividend or other distribution (other than cash) of its assets (or rights to acquire its assets) to holders of shares of Common Stock, by way of return of capital or otherwise (including, without limitation, any distribution of stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement, scheme of arrangement or other similar transaction) (a "Distribution"), at any time after the issuance of this Warrant, then, in each such case, the Holder shall be entitled to participate in such Distribution to the same extent that the Holder would have participated therein if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date of which a record is taken for such Distribution, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the participation in such Distribution (provided, however, that to the extent that the Holder's right to participate in any such Distribution would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Distribution to such extent (or in the

beneficial ownership of any shares of Common Stock as a result of such Distribution to such extent) and the portion of such Distribution shall be held in abeyance for the benefit of the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

d) Fundamental Transaction. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company, directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the outstanding shares of Common Stock (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "Fundamental Transaction"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in Section 2(e) on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "Alternate Consideration") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in Section 2(e) on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Fundamental Transaction.

Notwithstanding anything to the contrary, in the event of a Fundamental Transaction, the Company or any Successor Entity (as defined below) shall, at the Holder's option, exercisable at any time concurrently with, or within 30 days after, the consummation of the Fundamental Transaction (or, if later, the date of the public announcement of the applicable Fundamental Transaction), purchase this Warrant from the Holder by paying to the Holder an amount of cash equal to the Black Scholes Value (as defined below) of the remaining unexercised portion of this Warrant on the date of the consummation of such Fundamental Transaction; provided, however, if the Fundamental Transaction is not within the Company's control, including not approved by the Company's Board of Directors, Holder shall only be entitled to receive from the Company or any Successor Entity, as of the date of consummation of such Fundamental Transaction, the same type or form of consideration (and in the same proportion), at the Black Scholes Value (as defined below) of the unexercised portion of this Warrant, that is being offered and paid to the holders of Common Stock of the Company in connection with the Fundamental Transaction, whether that consideration be in the form of cash, stock or any combination thereof, or whether the holders of Common Stock are given the choice to receive from among alternative forms of consideration in connection with the Fundamental Transaction. "Black Scholes Value" means the value of this Warrant based on the Black-Scholes Option Pricing Model obtained from the "OV" function on Bloomberg L.P. ("Bloomberg") determined as of the day immediately following the first public announcement of the applicable Fundamental Transaction, or, if the Fundamental Transaction is not publicly announced, the date the Fundamental Transaction is consummated, for pricing purposes and reflecting (i) a risk-free interest rate corresponding to the U.S. Treasury rate for a period equal to the remaining term of this Warrant as of such date of request, (ii) an expected volatility equal to the remaining term of this Warrant obtained from the HVT function on Bloomberg as of the Trading Day immediately prior to the public announcement of the applicable Fundamental Transaction or, if the Fundamental Transaction is not publicly announced, the date the Fundamental Transaction is consummated, (iii) the underlying price per share used in such calculation shall be the greater of (A) the sum of the price per share being offered in cash, if any, plus the per share value of any non-cash consideration, if any, being offered in such Fundamental Transaction and (B) the greater of (x) the last Weighted Average Price immediately prior to the public announcement of such Fundamental Transaction and (y) the last Weighted Average Price immediately prior to the consummation of such Fundamental Transaction, (iv) a zero cost of borrow and (v) a 360 day annualization. The payment of the Black Scholes Value will be made by wire transfer of immediately available funds within five (5) Trading Days of the Holder's election (or, if later, on the effective date of the Fundamental Transaction). The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "Successor Entity") to assume in writing all of the obligations of the Company under this Warrant in accordance with the provisions of this Section 3(e) pursuant to written agreements in form and substance reasonably satisfactory to the Holder and approved by the Holder (without unreasonable delay) prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of Common Stock acquirable and receivable upon exercise of this Warrant (without regard

to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant referring to the "Company" shall refer instead to the Successor Entity), and may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant with the same effect as if such Successor Entity had been named as the Company herein.

e) Calculations. All calculations under this Section 3 shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this Section 3, the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

f) Notice to Holder.

i. Adjustment to Exercise Price. Whenever the Exercise Price is adjusted pursuant to any provision of this Section 3, the Company shall promptly deliver to the Holder by facsimile or email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment.

ii. Notice to Allow Exercise by Holder. If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the Common Stock, (B) the Company shall declare a special nonrecurring cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs of the Company, then, in each case, the Company shall cause to be delivered by facsimile or email to the Holder at its last facsimile number or email address as it shall appear upon the Warrant Register of the Company, at least 20 calendar days prior to the applicable

record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, non-public information regarding the Company or any of its subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

Section 4. Transfer of Warrant.

a) Transferability. Pursuant to FINRA Rule 5110(g)(1), neither this Warrant nor any Warrant Shares issued upon exercise of this Warrant shall be sold, transferred, assigned, pledged or hypothecated, or be the subject of any hedging, short sale, derivative, put or call transaction that would result in the effective economic disposition of the securities by any person for a period of 180 days immediately following the date of effectiveness or commencement of sales of the offering pursuant to which this Warrant is being issued, except the transfer of any security:

- i. by operation of law or by reason of reorganization of the Company;
- ii. to any FINRA member firm participating in the offering and the officers and partners thereof, if all securities so transferred remain subject to the lock-up restriction in this Section 4(a) for the remainder of the time period;
- iii. if the aggregate amount of securities of the Company held by the Holder or related person do not exceed 1% of the securities being offered;
- iv. that is beneficially owned on a pro-rata basis by all equity owners of an investment fund, provided that no participating member manages or otherwise directs investments by the fund, and participating members in the aggregate do not own more than 10% of the equity in the fund; or

- v. the exercise or conversion of any security, if all securities received remain subject to the lock-up restriction in this Section 4(a) for the remainder of the time period.

Subject to the foregoing restriction, this Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new Warrant or Warrants in the name of the assignee or assignees, as applicable, and in the denomination or denominations specified in such instrument of assignment, and shall issue to the assignor a new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder delivers an assignment form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued.

b) New Warrants. This Warrant may be divided or combined with other Warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new Warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with Section 4(a), as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new Warrant or Warrants in exchange for the Warrant or Warrants to be divided or combined in accordance with such notice. All Warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) Warrant Register. The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the "Warrant Register"), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

Section 5. Miscellaneous.

a) No Rights as Stockholder Until Exercise; No Settlement in Cash. This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a stockholder of the Company prior to the exercise hereof as set forth in Section 2(d)(i), except as expressly set forth in Section 3. Without limiting the rights of a Holder to

receive Warrant Shares on a “cashless exercise,” in no event will the Company be required to net cash settle an exercise of this Warrant.

b) Loss, Theft, Destruction or Mutilation of Warrant. The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, of indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) Saturdays, Sundays, Holidays, etc. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) Authorized Shares.

The Company covenants that, during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any purchase rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the purchase rights under this Warrant. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the purchase rights represented by this Warrant will, upon exercise of the purchase rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued, fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to protect the rights of Holder as set forth in this Warrant against impairment. Without limiting the generality of the foregoing, the Company will

(i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) Governing Law. All questions concerning the construction, validity, enforcement and interpretation of this Warrant shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflicts of law thereof. Each party agrees that all legal proceedings concerning the interpretations, enforcement and defense of the transactions contemplated by this Warrant (whether brought against a party hereto or their respective affiliates, directors, officers, shareholders, partners, members, employees or agents) shall be commenced exclusively in the state and federal courts sitting in the City of New York. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the City of New York, Borough of Manhattan for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is improper or is an inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Warrant and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law. If either party shall commence an action, suit or proceeding to enforce any provisions of this Warrant, the prevailing party in such action, suit or proceeding shall be reimbursed by the other party for their reasonable attorneys' fees and other costs and expenses incurred with the investigation, preparation and prosecution of such action or proceeding.

f) Restrictions. The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

g) Nonwaiver and Expenses. No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

h) Notices. Any and all notices or other communications or deliveries to be provided by the holders hereunder including, without limitation, any Notice of Exercise, shall be in writing and delivered personally, by facsimile or e-mail, or sent by a nationally recognized overnight courier service, addressed to the Company, at [], Attention: [], email address: [], facsimile: [], or such other facsimile number, email address or address as the Company may specify for such purposes by notice to the Holders. Any and all notices or other communications or deliveries to be provided by the Company hereunder shall be in writing and delivered personally, by facsimile or e-mail, or sent by a nationally recognized overnight courier service addressed to each Holder at the facsimile number, e-mail address or address of such Holder appearing on the books of the Company. Any notice or other communication or deliveries hereunder shall be deemed given and effective on the earliest of (i) the time of transmission, if such notice or communication is delivered via facsimile at the facsimile number or via e-mail at the e-mail address set forth in this Section prior to 5:30 p.m. (New York City time) on any date, (ii) the next Trading Day after the date of transmission, if such notice or communication is delivered via facsimile at the facsimile number or via e-mail at the e-mail address set forth in this Section on a day that is not a Trading Day or later than 5:30 p.m. (New York City time) on any Trading Day, (iii) the second Trading Day following the date of mailing, if sent by U.S. nationally recognized overnight courier service, or (iv) upon actual receipt by the party to whom such notice is required to be given.

i) Limitation of Liability. No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of the Company, whether such liability is asserted by the Company or by creditors of the Company.

j) Remedies. The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

k) Successors and Assigns. Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

l) Amendment. This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company and the Holder.

m) Severability. Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

n) Headings. The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

(Signature Page Follows)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

ONCONOVA THERAPEUTICS, INC.

By: _____
Name:
Title:

NOTICE OF EXERCISE

TO: **ONCONOVA THERAPEUTICS, INC.**

- (1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.
- (2) Payment shall take the form of (check applicable box):
 - in lawful money of the United States; or
 - if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in subsection 2(c), to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in subsection 2(c).
- (3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:
- (4) The time of day this Notice of Exercise is being executed is:

The Warrant Shares shall be delivered to the following DWAC Account Number:

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____
Signature of Authorized Signatory of Investing Entity: _____
Name of Authorized Signatory: _____
Title of Authorized Signatory: _____
Date: _____

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____,

Holder's Signature: _____

Holder's Address: _____

Morgan Lewis

November 12, 2019

Onconova Therapeutics, Inc.
375 Pheasant Run
Newtown, PA 18940

Re: Onconova Therapeutics, Inc., Registration Statement on Form S-1

Ladies and Gentlemen:

We have acted as counsel to Onconova Therapeutics, Inc., a Delaware corporation (the "Company"), in connection with its filing of a Registration Statement on Form S-1, Commission File No. 333-234360 (the "Initial Registration Statement") under the Securities Act of 1933, as amended (the "Act"), with the Securities and Exchange Commission (the "Commission") on October 29, 2019, as amended by Amendment No. 1 to the Initial Registration Statement ("Amendment No. 1" and the Initial Registration Statement, as amended by Amendment No. 1, the "Registration Statement") the Company filed with the Commission on the date hereof. The Registration Statement relates to the proposed offering and sale of up to \$13,800,000 worth of securities consisting of (A) units (the "Units") each consisting of a share of the common stock of the Company, par value \$0.01 (the "Common Stock") and a warrant (each, a "Warrant" and, collectively, the "Warrants") to purchase one share of Common Stock; and (B) pre-funded units (the "Pre-Funded Units"), each consisting of a pre-funded warrant to purchase one share of Common Stock (each, a "Pre-Funded Warrant" and collectively, the "Pre-Funded Warrants") and one Warrant. The Company is also issuing warrants to HCW (as defined below) for \$862,500 worth of Common Stock (the "Underwriter Warrants") that are being registered pursuant to the Registration Statement. The shares of Common Stock, which include the shares of Common Stock being issued as part of the Units, the shares of Common Stock issuable from time to time upon the exercise of the Warrants, the shares of Common Stock issuable from time to time upon the exercise of the Underwriter Warrants, and the shares of Common Stock issuable from time to time upon the exercise of the Pre-Funded Warrants (collectively, the "Shares") are being registered pursuant to the Registration Statement. The Units, Warrants, Underwriter Warrants, Pre-Funded Units, Pre-Funded Warrants, and the Shares are collectively referred to herein as the "Securities"). This opinion letter is furnished to you at your request to enable you to fulfill the requirements of Item 601(b)(5) of Regulation S-K, 17 C.F.R. § 229.601(b)(5), in connection with the Registration Statement.

In connection with this opinion letter, we have examined the Registration Statement and originals, or copies certified or otherwise identified to our satisfaction, of the Company's Tenth Amended and Restated Certificate of Incorporation, as amended, and the Company's Amended and Restated Bylaws and such other documents, records and instruments as we have deemed appropriate for purposes of the opinion set forth herein.

We have assumed the genuineness of all signatures, the legal capacity of all natural persons, the authenticity of the documents submitted to us as originals, the conformity with the originals of all documents submitted to us as certified, facsimile, or photostatic copies and the authenticity of the originals of all documents submitted to us as copies.

Based upon, subject to and limited by the foregoing, we are of the opinion that following (i) execution and delivery by the Company of the Underwriting Agreement (the "Agreement"), with H.C. Wainwright Co., LLC ("HCW"), (ii) effectiveness of the Registration Statement, (iii) issuance of the Securities pursuant to the terms of the Agreement, and (iv) receipt by the Company of the consideration for the Securities, as

applicable, and assuming that appropriate resolutions have been adopted by the board of directors (or an appropriate committee thereof) of the Company:

- (a) The Securities will be duly authorized for issuance and, when issued, delivered and paid for in accordance with the terms of the Agreement, will be validly issued, fully paid and nonassessable;
- (b) The Warrants, the Underwriter Warrants, and the Pre-Funded Warrants will be duly authorized for issuance and, when issued and sold in accordance with the Agreement and duly executed and delivered by the Company to the purchasers thereof against payment therefor, will constitute valid and legally binding obligations of the Company enforceable against the Company in accordance with their terms; and
- (c) The Shares will be duly authorized and when issued and paid for in accordance with the provisions of the Units, Warrants, Underwriter Warrants and Pre-Funded Warrants, as applicable, will be validly issued and be fully paid and nonassessable.

The opinion expressed in paragraph (b) above with respect to the valid and legally binding nature of obligations may be limited by bankruptcy, insolvency, reorganization, receivership, moratorium or other laws affecting creditors' rights (including, without limitation, the effect of statutory and other law regarding fraudulent conveyances, fraudulent transfers and preferential transfers) and by the exercise of judicial discretion and the application of principles of equity, good faith, fair dealing, reasonableness, conscionability and materiality (regardless of whether the Warrants, the Underwriter Warrants and Pre-Funded Warrants, as applicable, are considered in a proceeding in equity or at law).

The opinions expressed herein are limited to Delaware General Corporation Law and the laws of the State of New York.

We hereby consent to the use of this opinion as Exhibit 5.1 to the Registration Statement and any post-effective amendment to the Registration Statement, and to the reference to us under the caption "Legal Matters" in the prospectus included in the Registration Statement. In giving such consent, we do not hereby admit that we are acting within the category of persons whose consent is required under Section 7 of the Act or the rules or regulations of the Commission thereunder.

Very truly yours,

/s/ Morgan, Lewis & Bockius LLP

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption “Experts” in Amendment No. 1 to the Registration Statement (Form S-1 No. 333-234360) and related Prospectus of Onconova Therapeutics, Inc. for the registration of up to \$28.5 million of securities, and to the incorporation by reference therein of our report dated April 1, 2019, with respect to the consolidated financial statements of Onconova Therapeutics, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2018, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Philadelphia, Pennsylvania
November 12, 2019
