

Onconova Therapeutics, Inc.
Form 424B4
July 08, 2016

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PROSPECTUS

Onconova Therapeutics, Inc.

Subscription Rights to Purchase Up to 4,256,186 Units
Consisting of an Aggregate of Up to 4,256,186 Shares of Common Stock
and Warrants to Purchase Up to 3,192,140 Shares of Common Stock
at a Subscription Price of \$4.90 Per Unit

We are distributing to holders of our common stock and to holders of certain of our outstanding warrants who are entitled to participate in this offering, at no charge, non-transferable subscription rights to purchase units. Each unit, which we refer to as a Unit, consists of one share of common stock and 0.75 of a tradable warrant representing the right to purchase one share of common stock, which we refer to as the Warrants. We refer to the offering that is the subject of this prospectus as the Rights Offering.

In the Rights Offering, you will receive 1.5 subscription rights for each share of common stock or each share of common stock underlying our participating warrants owned at 5:00 PM Eastern Time, on July 7, 2016, the record date of the Rights Offering, or the Record Date. The common stock and the Warrants comprising the Units will separate upon the effectiveness of the exercise of the rights and will be issued as separate securities, and the Units will not trade as a separate security. The subscription rights will not be tradable.

Each subscription right will entitle you to purchase one Unit, which we refer to as the Basic Subscription Right, at a subscription price per Unit of \$4.90, which we refer to as the Subscription Price. The Warrants entitle the holder to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price, from the date of issuance through its expiration five years after the date of issuance. If you exercise your Basic Subscription Rights in full, and other shareholders or participating warrant holders do not, you will be entitled to an over-subscription privilege to purchase a portion of the unsubscribed Units at the Subscription Price, subject to proration, which we refer to as the Over-Subscription Privilege. Each subscription right consists of a Basic Subscription Right and an Over-Subscription Privilege, which we refer to as the Subscription Right.

For certain investors whose subscriptions may result in the purchaser beneficially owning more than 4.99% of our outstanding common stock, such investors may elect to receive in the Rights Offering, in lieu of shares of common stock, certain pre-funded warrants (which we refer to as the Pre-Funded Warrants) to purchase the same amount of shares of common stock. If you do not wish to exceed the ownership threshold, you may elect to receive a Pre-Funded Warrant in lieu of any share of common stock underlying the Units for which you have subscribed. You will not be eligible to elect to receive Pre-Funded Warrants, except to the extent that your beneficial ownership could exceed 4.99% of the shares of common stock outstanding following the consummation of the Rights Offering. Each Pre-Funded Warrant will have an exercise price of \$0.01, and the subscription price per Unit for any such electing investors will be reduced to \$4.89 (which equals the Subscription Price for the other Units sold in the Rights Offering, less the \$0.01 exercise price for each Pre-Funded Warrant). The Pre-Funded Warrants do not confer upon the holder any voting or any other rights of a shareholder of the Company.

This prospectus also relates to the offering of the shares of common stock issuable upon exercise of these Pre-Funded Warrants.

The Subscription Rights will expire if they are not exercised by 5:00 PM Eastern Time, on July 26, 2016. We may extend the Rights Offering for additional periods in our sole discretion. Once made, all exercises of Subscription Rights are irrevocable.

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The Rights Offering is being conducted on a best-efforts basis. There is no minimum amount of proceeds necessary in order for us to close the Rights Offering. While none of our directors or executive officers has entered into any binding commitment or agreement to exercise Subscription Rights received in the Rights Offering, our directors and executive officers have indicated interests in subscribing for up to an aggregate of \$3.0 million in the Rights Offering, subject to potential proration.

We have engaged Maxim Group LLC to act as dealer-manager in the Rights Offering.

Investing in our securities involves a high degree of risk. See the section entitled "Risk Factors" beginning on page 20 of this prospectus. You should carefully consider these risk factors, as well as the information contained in this prospectus, before you invest.

Wells Fargo Bank, N.A. will serve as the Subscription Agent for the Rights Offering. The Subscription Agent will hold the funds we receive from subscribers until we complete, abandon or terminate the Rights Offering. If you want to participate in this Rights Offering and you are the record holder of your shares or participating warrants, we recommend that you submit your subscription documents to the Subscription Agent well before the deadline. If you want to participate in this Rights Offering and you hold shares through your broker, dealer, bank, or other nominee, you should promptly contact your broker, dealer, bank, or other nominee and submit your subscription documents in accordance with the instructions and within the time period provided by your broker, dealer, bank, or other nominee. For a more detailed discussion, see "The Rights Offering The Subscription Rights."

Our board of directors reserves the right to terminate the Rights Offering for any reason any time before the completion of the Rights Offering. If we terminate the Rights Offering, all subscription payments received will be returned as soon as practicable, without interest or penalty.

Our common stock is listed on the NASDAQ Capital Market, or NASDAQ, under the symbol "ONTX." On July 7, 2016, the last reported sale price of our common stock was \$4.99. We have applied to list the Warrants on NASDAQ following their issuance under the symbol "ONTXW." The Subscription Rights are non-transferrable and will not be listed for trading on NASDAQ or any other stock exchange or market. You are urged to obtain a current price quote for our common stock before exercising your Subscription Rights.

| | Per Unit | Total(2) |
|-------------------------------------|----------|--------------|
| Subscription price | \$4.900 | \$20,855,311 |
| Dealer-Manager fees and expenses(1) | \$0.415 | \$1,768,425 |
| Proceeds to us, before expenses | \$4.485 | \$19,086,886 |

(1) In connection with this Rights Offering, we have agreed to pay to the dealer-manager a cash fee equal to (a) 4.5% of the dollar amount of the Units sold to any holders of Subscription Rights who were beneficial owners of shares of our common stock prior to July 30, 2013, and (b) 8.0% of the dollar amount of the Units sold to any other holders of Subscription Rights. We will provide to the dealer-manager upon completion of the Rights Offering a non-accountable expense allowance equal to the lesser of \$100,000 or 3% of the gross proceeds of the Rights Offering for expenses incurred in connection with the Rights Offering. We advanced \$30,000 against out-of-pocket accountable expenses to Maxim Group LLC upon its engagement as a dealer-manager; provided that Maxim Group LLC will promptly reimburse to us (i) any portion of the advance not used for actual out-of-pocket expenses, if the Rights Offering is not completed, and (ii) the full amount of the advance, if the Rights Offering is completed. See "Plan of Distribution."

(2) Assumes the Rights Offering is fully subscribed, but excludes proceeds from the exercise of Warrants included within the Units.

Our board of directors is making no recommendation regarding your exercise of the Subscription Rights. You should carefully consider whether to exercise your Subscription Rights before the expiration date. You may not revoke or revise any exercises of Subscription Rights once made unless we terminate the Rights Offering.

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.

Dealer-Manager

Maxim Group LLC

The date of this Prospectus is July 7, 2016

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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 the common stock. 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. We have not 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.

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QUESTIONS AND ANSWERS RELATING TO THE RIGHTS OFFERING

The following are examples of what we anticipate will be common questions about the Rights Offering. The answers are based on selected information included elsewhere in this prospectus. The following questions and answers do not contain all of the information that may be important to you and may not address all of the questions that you may have about the Rights Offering. This prospectus and the documents incorporated by reference into this prospectus contain more detailed descriptions of the terms and conditions of the Rights Offering and provide additional information about us and our business, including potential risks related to the Rights Offering, the Units offered hereby, and our business. We urge you to read this entire prospectus and the documents incorporated by reference into this prospectus.

Why are we conducting the Rights Offering?

We are conducting the Rights Offering to raise additional capital:

to continue funding INSPIRE, our ongoing Phase 3 clinical trial of rigosertib IV in a population of patients with higher-risk myelodysplastic syndromes, or MDS, after failure of hypomethylating agent, or HMA, therapy, and

for general corporate purposes, including working capital, research and development, business development and operational purposes.

What is the Rights Offering?

We are distributing, at no charge, to record holders of our common stock and to holders of certain of our outstanding warrants who are entitled to participate in this Rights Offering pursuant to the terms of such warrants, non-transferable Subscription Rights to purchase Units at a price per Unit of \$4.90, referred to as the Subscription Price. The Subscription Rights will not be tradable. Each Unit consists of one share of common stock and 0.75 of a Warrant representing the right to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price. Upon the effectiveness of the exercise of the Subscription Rights, the common stock and Warrants will immediately separate and will be issued as separate securities. We have applied to list the Warrants on NASDAQ under the symbol "ONTXW." You will receive 1.5 Subscription Rights for each share of common stock or each share of common stock underlying the participating warrants that you owned as of 5:00 PM Eastern Time, on the Record Date. Each Subscription Right entitles the record holder or holder of a participating warrant to a Basic Subscription Right and an Over-Subscription Privilege.

What are the Basic Subscription Rights?

For each whole share you owned or whole share underlying the participating warrants you owned as of the Record Date, you will receive 1.5 Basic Subscription Rights, each of which gives you the opportunity to purchase one share of our common stock and to receive 0.75 of a Warrant to purchase one additional share of our common stock for a price of \$4.90 per Unit. For example, if you owned 100 shares of common stock as of the Record Date, you will receive 150 Subscription Rights and will have the right to purchase 150 shares of our common stock and 112 Warrants to purchase one additional share of our common stock for \$4.90 per whole Unit (or a total payment of \$735.00). You may exercise all or a portion of your Basic Subscription Rights or you may choose not to exercise any Basic Subscription Rights at all.

If you are a record holder or a holder of participating warrants, the number of shares you may purchase pursuant to your Basic Subscription Rights is indicated on the enclosed Subscription Rights Statement. If you hold your shares in the name of a broker, dealer, bank, or other nominee who uses the services of the Depository Trust Company, or DTC, you will not receive a Subscription Rights Statement. Instead, DTC will issue 1.5 Subscription Rights to your nominee record holder for each

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share of our common stock that you own as of the Record Date. If you are not contacted by your nominee, you should contact your nominee as soon as possible.

What is the Over-Subscription Privilege?

If you exercise your Basic Subscription Rights in full, you may also choose to exercise your Over-Subscription Privilege to purchase a portion of any Units that the other record holders and participating warrant holders do not purchase through the exercise of their Basic Subscription Rights. You should indicate on your Subscription Rights Statement, or the form provided by your nominee if your shares are held in the name of a nominee, how many additional Units you would like to purchase pursuant to your Over-Subscription Privilege.

If sufficient Units are available, we will seek to honor your Over-Subscription request in full. If Over-Subscription requests exceed the number of Units available, however, we will allocate the available Units pro-rata among the record holders and participating warrant holders exercising the Over-Subscription Privilege in proportion to the number of shares of our common stock each of those record holders owned and the number of shares of our common stock underlying the participating warrants held by each of those warrant holders on the Record Date, relative to the number of shares owned and the number of shares underlying participating warrants held on the Record Date by all record holders and warrant holders exercising the Over-Subscription Privilege. If this pro-rata allocation results in any record holders or warrant holders receiving a greater number of Units than the record holder or warrant holder subscribed for pursuant to the exercise of the Over-Subscription Privilege, then such record holder or warrant holder will be allocated only that number of Units for which the record holder or warrant holder oversubscribed, and the remaining Units will be allocated among all other record holders and warrant holders exercising the Over-Subscription Privilege on the same pro rata basis described above. The proration process will be repeated until all Units have been allocated. See "The Rights Offering Limitation on the Purchase of Units" for a description of certain limitations on purchase.

To properly exercise your Over-Subscription Privilege, you must deliver to the Subscription Agent the subscription payment related to your Over-Subscription Privilege before the Rights Offering expires. See "The Rights Offering The Subscription Rights Over-Subscription Privilege." To the extent you properly exercise your Over-Subscription Privilege for an amount of Units that exceeds the number of unsubscribed Units available to you, any excess subscription payments will be returned to you as soon as practicable after the expiration of the Rights Offering, without interest or penalty.

Wells Fargo Bank, N.A., our Subscription Agent for the Rights Offering, will determine the Over-Subscription allocation based on the formula described above.

What are the terms of the Warrants?

Each Warrant entitles the holder to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price, from the date of issuance through its expiration five years after the date of issuance. The Warrants will be exercisable by paying the exercise price in cash, or, solely during any period when a registration statement for the exercise of the Warrants is not in effect, exercisable on a cashless basis. After the one-year anniversary of issuance, we may redeem the Warrants for \$0.001 per Warrant if the volume weighted average price of our common stock is above \$14.70 per share, 250% of the exercise price, for each of 10 consecutive trading days. Subject to certain exceptions, a holder may not exercise any portion of the Warrant to the extent that the holder would beneficially own more than 4.99% of the outstanding common stock after exercise.

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What are the terms of the Pre-Funded Warrants?

The Pre-Funded Warrants will only be issued to certain investors whose subscriptions for Units in the Rights Offering may result in the purchaser beneficially owning more than 4.99% of our outstanding common stock following the consummation of the Rights Offering, and who elect to receive Pre-Funded Warrants in lieu of shares of common stock underlying the Units for which the investors have subscribed. You will not be eligible to elect to receive Pre-Funded Warrants, except to the extent that your beneficial ownership could exceed 4.99% of the shares of common stock outstanding following the consummation of the Rights Offering.

Each Pre-Funded Warrant entitles the holder to purchase one share of common stock at an exercise price of \$0.01 per share, and the subscription price per Unit for any such electing investors will be reduced to \$4.89 (which equals the Subscription Price for the other Units sold in the Rights Offering, less the \$0.01 exercise price for each Pre-Funded Warrant). Each Pre-Funded Warrant will be exercisable from the date of issuance through its expiration seven years after the date of issuance. The Pre-Funded Warrants will be exercisable by paying the exercise price in cash or on a cashless basis in accordance with the terms of the Pre-Funded Warrants. The Pre-Funded Warrants will not be listed for trading on any stock exchange or market. The Pre-Funded Warrants do not confer upon the holder any voting or any other rights of a shareholder of the Company.

Will fractional shares be issued upon exercise of Subscription Rights or upon the exercise of Warrants?

No. We will not issue fractional shares of common stock in the Rights Offering. Rights holders will only be entitled to purchase a number of Units representing a whole number of shares of common stock, rounded down to the nearest whole number of Units a holder would otherwise be entitled to purchase. Any excess subscription payments received by the Subscription Agent will be returned as soon as practicable after expiration of the Rights Offering, without interest or penalty. Similarly, no fractional shares of common stock will be issued in connection with the exercise of a Warrant. If, upon exercise of a Warrant, the holder thereof would be entitled to receive a fractional share of common stock, upon exercise, the holder will only be entitled to receive a whole number of shares of common stock, rounded down to the nearest whole number.

What effect will the Rights Offering have on our outstanding common stock?

On July 7, 2016, 2,740,615 shares of our common stock were outstanding, along with participating warrants to purchase 96,842 shares of common stock. Based on the foregoing, and assuming no other transactions by us involving our common stock prior to the expiration of the Rights Offering, if the Rights Offering is fully subscribed, approximately 6,996,801 shares of our common stock will be issued and outstanding and Warrants to purchase approximately 3,192,140 additional shares of our common stock will be outstanding (excluding the currently outstanding warrants). The exact number of shares and Warrants that we will issue in this Rights Offering will depend on the number of Units that are subscribed for in the Rights Offering.

How was the Subscription Price determined?

In determining the Subscription Price, the pricing committee of our board of directors considered, among other things, the following factors:

the current and historical trading prices of our common stock;

the price at which shareholders might be willing to participate in the Rights Offering;

the value of the Warrant being issued as a component of the Unit;

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our need for additional capital and liquidity;

the cost of capital from other sources; and

comparable precedent transactions, including the percentage of shares offered, the terms of the subscription rights being offered, the subscription price and the discount that the subscription price represented to the immediately prevailing closing prices for those offerings.

In conjunction with the review of these factors, our pricing committee will also review our history and prospects, including our past and present earnings and cash requirements, our prospects for the future, the outlook for our industry and our current financial condition. Our pricing committee believes that the Subscription Price should be designed to provide an incentive to our current shareholders and holders of the participating warrants to participate in the Rights Offering and exercise their Basic Subscription Right and their Over-Subscription Privilege.

The Subscription Price does not necessarily bear any relationship to any established criteria for value. You should not consider the Subscription Price as an indication of actual value of our company or our common stock. We cannot assure you that the market price of our common stock will not decline during or after the Rights Offering. You should obtain a current price quote for our common stock before exercising your Subscription Rights and make your own assessment of our business and financial condition, our prospects for the future, and the terms of this Rights Offering. Once made, all exercises of Subscription Rights are irrevocable.

Am I required to exercise all of the Basic Subscription Rights I receive in the Rights Offering?

No. You may exercise any number of your Basic Subscription Rights, or you may choose not to exercise any Basic Subscription Rights. If you do not exercise any Basic Subscription Rights, the number of shares of our common stock or number of shares underlying our warrants you own will not change. However, if you choose to not exercise your Basic Subscription Rights in full, your proportionate ownership interest in our company will decrease. If you do not exercise your Basic Subscription Rights in full, you will not be entitled to exercise your Over-Subscription Privilege.

How soon must I act to exercise my Subscription Rights?

If you received a Subscription Rights Statement and elect to exercise any or all of your Subscription Rights, the Subscription Agent must receive your completed and signed Subscription Rights Statement and payment for both your Basic Subscription Rights and any Over-Subscription Privilege you elect to exercise, including final clearance of any uncertified check, before the Rights Offering expires on July 26, 2016, at 5:00 PM Eastern Time. If you hold your shares in the name of a broker, dealer, custodian bank, or other nominee, your nominee may establish a deadline before the expiration of the Rights Offering by which you must provide it with your instructions to exercise your Subscription Rights, along with the required subscription payment.

May I transfer my Subscription Rights?

No. The Subscription Rights may be exercised only by the shareholders or participating warrant holders to whom they are distributed, and they may not be sold, transferred, assigned or given away to anyone else, other than by operation of law. As a result, a Subscription Rights Statement may be completed only by the shareholder or participating warrant holder who receives the statement. The Subscription Rights will not be listed for trading on any stock exchange or market.

Will our directors and executive officers participate in the Rights Offering?

To the extent they hold common stock as of the Record Date, our directors and executive officers will be entitled to participate in the Rights Offering on the same terms and conditions applicable to

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other Rights holders. While none of our directors or executive officers has entered into any binding commitment or agreement to exercise Subscription Rights received in the Rights Offering, our directors and executive officers have indicated interests in subscribing for up to an aggregate of \$3.0 million in the Rights Offering, subject to potential proration.

Has the board of directors made a recommendation to shareholders and warrant holders regarding the Rights Offering?

No. Our board of directors is not making a recommendation regarding your exercise of the Subscription Rights. Stockholders and holders of the participating warrants who exercise Subscription Rights will incur investment risk on new money invested. We cannot predict the price at which our shares of common stock will trade after the Rights Offering. On July 7, 2016, the closing price of our common stock was \$4.99 per share. The market price for our common stock may be above the Subscription Price or may be below the Subscription Price. If you exercise your Subscription Rights, you may not be able to sell the underlying shares of our common stock or Warrants in the future at the same price or a higher price. You should make your decision based on your assessment of our business and financial condition, our prospects for the future, the terms of the Rights Offering and the information contained in this prospectus. See "Risk Factors" for discussion of some of the risks involved in investing in our securities.

How do I exercise my Subscription Rights?

If you are a shareholder of record (meaning you hold your shares of our common stock in your name and not through a broker, dealer, bank, or other nominee) or a holder of the participating warrants and you wish to participate in the Rights Offering, you must deliver a properly completed and signed Subscription Rights Statement, together with payment of the Subscription Price for both your Basic Subscription Rights and any Over-Subscription Privilege you elect to exercise, to the Subscription Agent before 5:00 PM Eastern Time, on July 26, 2016. If you are exercising your Subscription Rights through your broker, dealer, bank, or other nominee, you should promptly contact your broker, dealer, bank, or other nominee and submit your subscription documents and payment for the Units subscribed for in accordance with the instructions and within the time period provided by your broker, dealer, bank or other nominee.

What if my shares are held in "street name"?

If you hold your shares of our common stock in the name of a broker, dealer, bank, or other nominee, then your broker, dealer, bank, or other nominee is the record holder of the shares you own. The record holder must exercise the Subscription Rights on your behalf. Therefore, you will need to have your record holder act for you.

If you wish to participate in this Rights Offering and purchase Units, please promptly contact the record holder of your shares. We will ask the record holder of your shares, who may be your broker, dealer, bank, or other nominee, to notify you of this Rights Offering.

What form of payment is required?

You must timely pay the full Subscription Price for the full number of Units you wish to acquire pursuant to the exercise of Subscription Rights by delivering to the Subscription Agent a:

cashier's check drawn on a U.S. bank; or

wire transfer.

If you send a payment that is insufficient to purchase the number of Units you requested, or if the number of Units you requested is not specified in the forms, the payment received will be applied to

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exercise your Subscription Rights to the fullest extent possible based on the amount of the payment received.

When will I receive my new shares of common stock and Warrants?

The Subscription Agent will arrange for the issuance of the common stock and Warrants as soon as practicable after the expiration of the Rights Offering, payment for the Units subscribed for has cleared, and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected. All shares and Warrants that you purchase in the Rights Offering will be issued in book-entry, or uncertificated, form meaning that you will receive a direct registration (DRS) account statement from our transfer agent reflecting ownership of these securities if you are a holder of record of shares or warrants. If you hold your shares in the name of a broker, dealer, bank, or other nominee, DTC will credit your account with your nominee with the securities you purchase in the Rights Offering.

When will I receive my Pre-Funded Warrants?

If you elect to receive any Pre-Funded Warrants, the Subscription Agent will arrange for the issuance of the Pre-Funded Warrants as soon as practicable after the expiration of the Rights Offering, payment for the Units subscribed for has cleared, and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected. All Pre-Funded Warrants will be issued in physical form.

After I send in my payment and Subscription Rights Statement to the Subscription Agent, may I cancel my exercise of Subscription Rights?

No. Exercises of Subscription Rights are irrevocable unless the Rights Offering is terminated, even if you later learn information that you consider to be unfavorable to the exercise of your Subscription Rights. You should not exercise your Subscription Rights unless you are certain that you wish to purchase Units at the Subscription Price.

How much will our company receive from the Rights Offering?

Assuming that all 4,256,186 Units are sold in the Rights Offering, we estimate that the net proceeds from the Rights Offering will be approximately \$18.7 million, based on the Subscription Price of \$4.90 per Unit, after deducting fees and expenses payable to the dealer-manager, and after deducting other expenses payable by us and excluding any proceeds received upon exercise of any Warrants issued in the Rights Offering.

Are there risks in exercising my Subscription Rights?

Yes. The exercise of your Subscription Rights involves risks. Exercising your Subscription Rights involves the purchase of additional shares of our common stock and Warrants to purchase common stock and you should consider this investment as carefully as you would consider any other investment. We cannot assure you that the market price of our common stock will exceed the Subscription Price, nor can we assure you that the market price of our common stock will not further decline during or after the Rights Offering. We also cannot assure you that you will be able to sell shares of our common stock or Warrants purchased in the Rights Offering at a price equal to or greater than the Subscription Price. In addition, you should carefully consider the risks described under the heading "Risk Factors" for discussion of some of the risks involved in investing in our securities.

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Can the board of directors terminate or extend the Rights Offering?

Yes. Our board of directors may decide to terminate the Rights Offering at any time and for any reason before the expiration of the Rights Offering. We also have the right to extend the Rights Offering for additional periods in our sole discretion. We do not presently intend to extend the Rights Offering. We will notify shareholders and warrant holders if the Rights Offering is terminated or extended by issuing a press release.

If the Rights Offering is not completed or is terminated, will my subscription payment be refunded to me?

Yes. The Subscription Agent will hold all funds it receives in a segregated bank account until completion of the Rights Offering. If we do not complete the Rights Offering, all subscription payments received by the Subscription Agent will be returned as soon as practicable after the termination or expiration of the Rights Offering, without interest or penalty. If you own shares in "street name," it may take longer for you to receive your subscription payment because the Subscription Agent will return payments through the record holder of your shares.

How do I exercise my Rights if I live outside the United States?

The Subscription Agent will hold Subscription Rights Statements for shareholders having addresses outside the United States. To exercise Subscription Rights, foreign shareholders must notify the Subscription Agent and timely follow other procedures described in the section entitled "The Rights Offering Foreign Shareholders."

What fees or charges apply if I purchase shares in the Rights Offering?

We are not charging any fee or sales commission to issue Subscription Rights to you or to issue shares or Warrants to you if you exercise your Subscription Rights. If you exercise your Subscription Rights through a broker, dealer, custodian bank, or other nominee, you are responsible for paying any fees your broker, dealer, bank, or other nominee may charge you.

What are the U.S. federal income tax consequences of exercising my Subscription Rights?

For U.S. federal income tax purposes, we do not believe you should recognize income or loss in connection with the receipt or exercise of Subscription Rights in the Rights Offering. You should consult your tax advisor as to the tax consequences of the Rights Offering in light of your particular circumstances. For a more detailed discussion, see "Material U.S. Federal Income Tax Consequences."

To whom should I send my forms and payment?

If your shares are held in the name of a broker, dealer, bank, or other nominee, then you should send your subscription documents and subscription payment to that broker, dealer, bank, or other nominee. If you are the record holder or a holder of participating warrants, then you should send your Subscription Rights Statement and payment of your subscription price to the Subscription Agent hand delivery, first class mail or courier service to:

By Mail:
Wells Fargo Bank, N.A.
Shareowner Services
Voluntary Corporate Actions
P.O. Box 64858
St. Paul, Minnesota 55164-0858

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By Hand or Overnight Courier:
Wells Fargo Bank, N.A.
Shareowner Services
Voluntary Corporate Actions
1110 Centre Pointe Curve, Suite 101
Mendota Heights, Minnesota 55120

You or, if applicable, your nominee are solely responsible for completing delivery to the Subscription Agent of your subscription documents, Subscription Rights Statement and payment. You should allow sufficient time for delivery of your subscription materials to the Subscription Agent before the expiration of the Rights Offering at 5:00 PM Eastern Time on July 26, 2016.

Whom should I contact if I have other questions?

If you have other questions or need assistance, please contact the dealer-manager for the Rights Offering:

Maxim Group LLC
405 Lexington Avenue
New York, New York 10174
Attention Syndicate Department
Email: syndicate@maximgrp.com
Telephone: (212) 895-3745

Who is the dealer-manager?

Maxim Group LLC will act as dealer-manager for the Rights Offering. Under the terms and subject to the conditions contained in the dealer-manager agreement, the dealer-manager will use its best efforts to solicit the exercise of Subscription Rights. We have agreed to pay the dealer-manager certain fees for acting as dealer-manager and to reimburse the dealer-manager for certain out-of-pocket expenses incurred in connection with this offering. The dealer-manager is not underwriting or placing any of the Subscription Rights or the Units, shares of common stock or Warrants being issued in this offering, and does not make any recommendation with respect to such Subscription Rights (including with respect to the exercise or expiration of such Subscription Rights), Units, shares of common stock or Warrants. See "Plan of Distribution" for a discussion of the fees and expenses to be paid to the dealer-manager in connection with this Rights Offering.

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PROSPECTUS SUMMARY

The items in the following summary are described in more detail later in this prospectus and in the documents we incorporate by reference. This summary provides an overview of selected information and does not contain all of the information you should consider. Before investing in our common stock, you should read the entire prospectus carefully, including the information set forth under the headings "Risk Factors "and the consolidated financial statements and related notes and additional information included or incorporated by reference in this prospectus.

OUR COMPANY

Our Business

Onconova Therapeutics, Inc., sometimes referred to as "we" or the "Company," is a clinical-stage biopharmaceutical company focused on discovering and developing novel small molecule drug candidates to treat cancer. Using our proprietary chemistry platform, we have created an extensive library of targeted anti-cancer agents designed to work against cellular pathways important to cancer cells. We believe that the drug 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 is being developed 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 is being tested in both intravenous and oral formulations as a single agent, and the oral formulation is also being tested in combination with azacitidine, in clinical trials for patients with myelodysplastic syndromes, or MDS, and related cancers.

In December 2015, we enrolled the first patient in a randomized controlled Phase 3 clinical trial of rigosertib IV in a population of patients with higher-risk MDS after failure of hypomethylating agent, or HMA, therapy. The trial, which we refer to as INSPIRE, is expected to enroll approximately 225 patients at more than 100 sites globally. The primary endpoint of INSPIRE is overall survival, and an interim analysis is anticipated. We anticipate reporting topline data from the INSPIRE trial in 2018.

In the first quarter of 2016, we took significant actions to conserve cash, including reduction in personnel and expenditures. While we will continue to take cash conservation actions where appropriate, our costs will increase in subsequent quarters as more INSPIRE sites open and more patients enroll in the INSPIRE trial. We believe that our cash and cash equivalents, prior to our receipt of any proceeds from this Rights Offering, together with anticipated contractual cost-sharing payments from Baxalta GmbH, or Baxalta, for a portion of the INSPIRE trial costs, will be sufficient to fund our ongoing trials and operations into the first quarter of 2017.

We are exploring various sources of funding for continued development of rigosertib in MDS and acute myelogenous leukemia, or AML, as well as our ongoing operations. Completion of the Rights Offering is not subject to us raising a minimum offering amount and therefore the net proceeds from the Rights Offering may be insufficient to meet our objectives. Even if we sell all of the Units subject to the Rights Offering, we will need to obtain additional financing in the future in order to fully fund rigosertib or any other product candidates through the regulatory approval process.

Due to our ongoing losses and our accumulated deficit in combination with other factors, the opinion of our independent registered public accounting firm on our audited consolidated financial statements for our fiscal year ended December 31, 2015 contains an explanatory paragraph regarding substantial doubt about our ability to continue as a going concern. Even if we sell all of the Units subject to the Rights Offering, if we are unable to obtain sufficient additional funding, through future financings or through strategic and collaborative transactions and arrangements, we may not have sufficient resources to complete our INSPIRE trial and we may continue to delay, scale-back or

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eliminate certain of our planned research, drug discovery and development activities and certain other aspects of our operations, or we may not be able to continue as a going concern.

Rigosertib

Rigosertib is a small molecule that inhibits cellular signaling by acting as a Ras mimetic. This is believed to be mediated by the binding of rigosertib to the Ras-binding domain, or RBD, found in many Ras effector proteins, including the Raf and PI3K kinases. This mechanism of action provides a new approach to block the interactions between Ras and its targets containing RBD sites. Rigosertib is being tested as a single agent and in combination with azacitidine, in clinical trials of patients with MDS and related cancers. We have enrolled more than 1,200 patients in rigosertib clinical trials. We are a party to a license and development agreement with Baxalta, which granted Baxalta certain rights to commercialize rigosertib in Europe. The Baxalta agreement is scheduled to terminate August 30, 2016, at which time the European rights will revert to us at no cost. We are also party to a collaboration agreement with SymBio Pharmaceuticals Limited, or SymBio, which grants SymBio certain rights to commercialize rigosertib in Japan and Korea. We have retained development and commercialization rights to rigosertib in the rest of the world, including in the United States, although we will consider licensing commercialization rights to other territories as a source of additional funding.

Rigosertib IV for higher-risk MDS

In early 2014, we announced topline survival results from our "ONTIME" trial, a multi-center Phase 3 clinical trial of rigosertib IV as a single agent. The ONTIME trial did not meet its primary endpoint in the intent-to-treat population, although improvements in median overall survival were observed in various pre-specified and exploratory subgroups of higher-risk MDS patients.

During 2014 and 2015, we held meetings with the U.S. Food and Drug Administration, or FDA, European Medicines Agency, or EMA, and several European national regulatory authorities to discuss and seek guidance on a path for approval of rigosertib IV in higher-risk MDS patients whose disease had failed HMA therapy. After discussions with the FDA and EMA, we refined our patient eligibility criteria by defining a more homogenous patient population. After regulatory feedback, input from key opinion leaders in the U.S. and Europe and based on learnings from the ONTIME study, we designed a new randomized controlled Phase 3 trial, referred to as INSPIRE, with overall survival as a primary endpoint. The INSPIRE trial is enrolling higher-risk MDS patients under 80 years of age who have progressed on, or failed to respond to, previous treatment with HMAs within the first nine months after initiation of HMA therapy, and had their last dose of HMA within six months prior to enrollment in the trial. The primary endpoint of this study is overall survival, and an interim analysis is anticipated. This randomized trial of approximately 225 patients is expected to be conducted at more than 100 sites globally. In August 2015, we submitted an updated investigational new drug application, or IND, to the FDA, and in August 2015 we submitted Clinical Trial Applications, or CTAs, with the United Kingdom, German and Austrian regulatory authorities for IV rigosertib as a treatment for higher-risk MDS after failure of HMA therapy. The first CTA has been cleared by the Medicines and Healthcare products Regulatory Agency. The first patient in the INSPIRE trial was enrolled at the MD Anderson Cancer Center in December 2015 and, as of May 18, 2016, 59 clinical sites are open (43 in the U.S. and Europe and 16 in Japan) and can recruit patients. The first patient in Europe was enrolled on March 18, 2016.

Rigosertib oral in combination with azacitidine for MDS and AML

We have completed enrollment in the Phase 2 portion of an open label Phase 1/2 clinical trial testing rigosertib oral in combination with the approved dose of injectable azacitidine for patients with higher-risk MDS and AML. This study is based on our published preclinical data demonstrating synergistic activity of this combination. The Phase 2 portion of the trial was designed to assess whether

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treatment with rigosertib, in combination with the approved dose of injectable azacitidine, reduces the number of bone marrow blasts, improves peripheral blood counts and can resensitize the marrow blast cells to azacitidine for patients who were previously exposed to azacitidine. Patient enrollment in the Phase 2 portion of this trial was completed in the fourth quarter of 2015 and interim data were summarized by way of an oral presentation at the ASH Annual Meeting in December 2015.

The Phase 2 trial included both front-line MDS patients (that is, patients not previously treated with HMAs) and MDS patients whose disease had failed prior HMA therapy (second-line patients). The presentation at ASH included results from a total of 37 MDS patients treated with the recommended Phase 2 dose of oral rigosertib (560 mg AM/280 mg PM) plus the full standard dose of injectable azacitidine. The combination of oral rigosertib and azacitidine was generally well tolerated, with a median duration of treatment of four months (range 1 to 27 months).

At the time of the presentation, 30 MDS patients were evaluable for efficacy assessment per 2006 IWG, criteria. Twenty-three of 30 patients (77%) responded to the combination therapy, including six patients who had complete remissions. Hematologic improvement was observed in 13 of 26 patients that were evaluable for this part of the analysis. Notably, 16 of 19 (84%) HMA-naïve patients had a response to the combination therapy and 7 of 11 (64%) patients whose disease had previously failed HMAs responded. As of December 2015, the median duration of these responses had not yet been reached. Additional data collection for efficacy and safety continues for the patients remaining on study and may impact the final results of the trial. Updated data from the Phase 2 Trial is expected to be presented at the European Hematology Association Meeting in June 2016.

Rigosertib oral for lower-risk MDS

Higher-risk MDS patients suffer from a shortfall in normal circulating blood cells, or cytopenias, as well as elevated levels of cancer cells, or blasts in their bone marrow and peripheral blood, whereas lower-risk MDS patients suffer mainly from cytopenias, that is low levels of red blood cells, white blood cells and/or platelets. Thus, lower-risk MDS patients depend on transfusions and growth factors or other therapies to improve their low blood counts.

We have explored single agent rigosertib oral as a treatment for lower-risk MDS in two Phase 2 clinical trials, 09-05 and 09-07. In December 2013, we presented data at the Annual ASH Meeting from the 09-05 Phase 2 trial. To date, Phase 2 clinical data have shown encouraging signs of efficacy of single agent oral rigosertib in transfusion-dependent, lower-risk MDS patients. Rigosertib has been generally well tolerated, except for urinary side effects at higher dose levels. Additional clinical testing will be needed to evaluate dosing and schedule modifications and their impact on efficacy and toxicity of oral rigosertib in lower-risk MDS patients.

Data presented from the 09-05 trial also suggested the potential of a genomic methylation assessment of bone marrow cells to prospectively identify lower-risk MDS patients likely to respond to oral rigosertib. We therefore expanded the 09-05 trial by adding an additional cohort of 20 patients to advance the development of this genomic methylation test. Enrollment in this expansion cohort has been completed. We are working with academic collaborators to refine this genomic methylation test.

Other Programs

The vast majority of the Company's efforts are now devoted to the advanced stage development of rigosertib for unmet medical needs of MDS patients. Other programs are either paused, inactive or require only minimal internal resources and efforts.

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Briciclib

Briciclib, another of our product candidates, is a small molecule targeting an important intracellular regulatory protein, cyclin D1, which is often found at elevated levels in cancer cells. Cyclin D1 expression is regulated through a process termed cap-dependent translation, which requires the function of eukaryotic initiation factor 4E protein, or eIF4E. In vitro evidence indicates briciclib binds to eIF4E, blocking cap-dependent translation of cyclin D1 and other cancer proteins, such as c-MYC, leading to tumor cell death. We have been conducting a Phase 1 multisite dose-escalation trial of briciclib in patients with advanced solid tumors refractory to current therapies. Safety and efficacy assessments are complete in six of the seven dose-escalation cohorts of patients in this trial. As of December 2015, the briciclib IND is on full clinical hold following a drug product lot testing failure. If we elect to continue development of briciclib, we would be required to undertake appropriate remedial actions prior to re-initiating the clinical trial and completing the final dose-escalation cohort.

Recilisib

Recilisib is a product candidate being developed in collaboration with the U.S. Department of Defense for acute radiation syndromes. We have completed four Phase 1 trials to evaluate the safety and pharmacokinetics of recilisib in healthy human adult subjects using both subcutaneous and oral formulations. We have also conducted animal studies and clinical trials of recilisib under the FDA's Animal Efficacy Rule, which permits marketing approval for new medical countermeasures for which conventional human efficacy studies are not feasible or ethical, by relying on evidence from studies in appropriate animal models to support efficacy in humans. Ongoing studies of recilisib, focusing on animal models and biomarker development to assess the efficacy of recilisib are being conducted by third parties with government funding. We anticipate that any future development of recilisib beyond these ongoing studies would be conducted solely with government funding or by collaboration.

Preclinical Product Candidates

In addition to our three clinical-stage product candidates, we have several product candidates that target kinases, cellular metabolism or cell division in preclinical development. We may explore additional collaborations to further the development of these product candidates as we focus internally on our more advanced programs. We presented data related to ON 0123300, our novel inhibitor of ARK5 and CDK4/6 at the American Association of Cancer Research (AACR) conference in April, 2016.

Recent Developments

We effected a one-for-ten reverse stock split of our common stock as of 5:00 PM Eastern Time on May 31, 2016. All share and per share data has been restated to reflect the one-for-ten reverse stock split.

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.

Implications of Being an Emerging Growth Company

We qualify as an "emerging growth company" as defined in the Jumpstart our Business Startups Act of 2012, or the JOBS Act. An emerging growth company may take advantage of specified reduced

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reporting requirements and is relieved of certain other significant requirements that are otherwise generally applicable to public companies. As an emerging growth company,

we may present only two years of audited financial statements and only two years of related Management's Discussion & Analysis of Financial Condition and Results of Operations;

we are exempt from the requirement to obtain an attestation and report from our auditors on the assessment of our internal control over financial reporting pursuant to the Sarbanes-Oxley Act of 2002;

we are permitted to provide less extensive disclosure about our executive compensation arrangements;

we are not required to give our stockholders non-binding advisory votes on executive compensation or golden parachute arrangements; and

we have elected to use an extended transition period for complying with new or revised accounting standards.

We may take advantage of these provisions until July 24, 2018. However, if certain events occur prior to such date, including if we become a "large accelerated filer," our annual gross revenues exceed \$1.0 billion or we issue more than \$1.0 billion of non-convertible debt in any three-year period, we will cease to be an emerging growth company.

Table of Contents**SUMMARY CONSOLIDATED FINANCIAL DATA**

The following summary consolidated statements of operations data for the years ended December 31, 2015 and 2014 and the consolidated balance sheet data as of December 31, 2015, have been derived from our audited consolidated financial statements that are included in the documents incorporated by reference into this prospectus. The summary historical financial information as of and for the three months ended March 31, 2016 has been derived from our unaudited consolidated financial statements that are included in the documents incorporated by reference into this prospectus. The unaudited financial information as of and for the three months ended March 31, 2016 has been prepared on the same basis as our audited financial statements and includes, in the opinion of management, all adjustments, consisting of only normal recurring adjustments, necessary to fairly present the data for such periods. All share and per share data has been restated to reflect our one-for-ten reverse stock split effective May 31, 2016. The historical financial data presented below is not necessarily indicative of our financial results in future periods. You should read the summary consolidated financial data in conjunction with those financial statements and the accompanying notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations" in the documents incorporated by reference into this prospectus. Our consolidated financial statements are prepared and presented in accordance with United States generally accepted accounting principles, or U.S. GAAP.

Condensed Consolidated Statements of Operations Data:

| | For the Years ended December 31, | | For the three months ended |
|---|-------------------------------------|--------------|-------------------------------|
| | 2015 | 2014 | March 31, 2016 |
| Revenue | \$ 11,456,000 | \$ 800,000 | \$ 1,474,000 |
| Operating expenses: | | | |
| General and administrative | 9,533,000 | 15,119,000 | 3,172,000 |
| Research and development | 25,895,000 | 49,425,000 | 5,822,000 |
| Total operating expenses | 35,428,000 | 64,544,000 | 8,994,000 |
| Loss from operations | (23,972,000) | (63,744,000) | (7,520,000) |
| Change in fair value of warrant liability | | 20,000 | 271,000 |
| Other income (expense), net | (35,000) | (52,000) | 9,000 |
| Net loss before income taxes | (24,007,000) | (63,776,000) | (7,240,000) |
| Income taxes | 16,000 | 19,000 | |
| Net loss | (24,023,000) | (63,795,000) | (7,240,000) |
| Net loss attributable to non-controlling interest | 44,000 | 113,000 | |
| Net loss attributable to Onconova Therapeutics, Inc | (23,979,000) | (63,682,000) | \$ (7,240,000) |
| Net loss per share of common stock, basic and diluted | \$ (10.54) | \$ (29.41) | \$ (2.65) |
| Basic and diluted weighted average shares outstanding | 2,273,976 | 2,165,354 | 2,731,590 |

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(Stockholders' equity has been restated to reflect the one-for-ten reverse stock split and decrease in authorized common shares from 75,000,000 to 25,000,000)

| | December 31, 2015 | March 31, 2016 |
|--|----------------------|----------------------|
| Assets | | |
| Current assets: | | |
| Cash and cash equivalents | \$ 19,799,000 | \$ 16,835,000 |
| Receivables | 1,504,000 | 1,368,000 |
| Prepaid expenses and other current assets | 1,832,000 | 1,153,000 |
| Restricted cash | 50,000 | 50,000 |
| Total current assets | 23,185,000 | 19,406,000 |
| Property and equipment, net | 248,000 | 224,000 |
| Other non-current assets | 12,000 | 12,000 |
| Total assets | \$ 23,445,000 | \$ 19,642,000 |
| Liabilities and stockholders' equity | | |
| Current liabilities: | | |
| Accounts payable | \$ 3,421,000 | \$ 3,296,000 |
| Accrued expenses and other current liabilities | 3,729,000 | 3,891,000 |
| Deferred revenue | 455,000 | 455,000 |
| Total current liabilities | 7,605,000 | 7,642,000 |
| Warrant liability | | 295,000 |
| Deferred revenue, non-current | 5,000,000 | 4,886,000 |
| Total liabilities | 12,605,000 | 12,823,000 |
| Commitments and contingencies | | |
| Stockholders' equity: | | |
| Preferred stock, \$0.01 par value, 5,000,000 authorized at December 31, 2015 and March 31, 2016, none issued and outstanding at March 31, 2016 and December 31, 2015 | | |
| Common stock, \$0.01 par value, 25,000,000 authorized at December 31, 2015 and March 31, 2016, 2,546,419 and 2,740,212 shares issued and outstanding at December 31, 2015 and March 31, 2016 | 25,000 | 27,000 |
| Additional paid-in capital | 328,564,000 | 331,775,000 |
| Accumulated other comprehensive loss | (22,000) | (16,000) |
| Accumulated deficit | (318,557,000) | (325,797,000) |
| Total Onconova Therapeutics, Inc. stockholders' equity | 10,010,000 | 5,989,000 |
| Non-controlling interest | 830,000 | 830,000 |
| Total stockholders' equity | 10,840,000 | 6,819,000 |
| Total liabilities and stockholders' equity | \$ 23,445,000 | \$ 19,642,000 |

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SUMMARY OF THE RIGHTS OFFERING

Securities to be offered

We are distributing to you, at no charge, 1.5 non-transferable Subscription Rights to purchase one Unit for every share of our common stock that you owned on the Record Date, either as a holder of record or, in the case of shares held of record by brokers, banks, or other nominees, on your behalf, as a beneficial owner of such shares. Each Unit consists of one share of common stock and 0.75 of a Warrant representing the right to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price.

For certain investors whose subscriptions may result in the purchaser beneficially owning more than 4.99% of our outstanding common stock, such investors may elect to receive in the Rights Offering, in lieu of shares of common stock, certain pre-funded warrants (which we refer to as the Pre-Funded Warrants) to purchase the same amount of shares of common stock. If you do not wish to exceed the ownership threshold, you may elect to receive a Pre-Funded Warrant in lieu of any share of common stock underlying the Units for which you have subscribed. You will not be eligible to elect to receive Pre-Funded Warrants, except to the extent that your beneficial ownership could exceed 4.99% of the shares of common stock outstanding following the consummation of the Rights Offering. Each Pre-Funded Warrant will have an exercise price of \$0.01, and the subscription price per Unit for any such electing investors will be reduced to \$4.89 (which equals the Subscription Price for the other Units sold in the Rights Offering, less the \$0.01 exercise price for each Pre-Funded Warrant). The Pre-Funded Warrants do not confer upon the holder any voting or any other rights of a shareholder of the Company.

Holders of our currently outstanding participating warrants will also be entitled, pursuant to the terms of such warrants, to receive 1.5 Subscription Rights to purchase one Unit for every share of common stock as if each of such participating warrants had been exercised immediately prior to the record date for the Rights Offering.

Size of offering

4,256,186 Units, each consisting of one share of common stock and 0.75 of a Warrant representing the right to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price.

**Subscription Price
Warrants**

\$4.90 per Unit.

Each Warrant entitles the holder to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price, from the date of issuance through its expiration five years after the date of issuance. The Warrants will be exercisable by paying the exercise price in cash, or,

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| Pre-Funded Warrants | <p>solely during any period when a registration statement for the exercise of the Warrants is not in effect, exercisable on a cashless basis. We have applied to list the Warrants on NASDAQ under the symbol "ONTXW," although there is no assurance that a sufficient number of Subscription Rights will be exercised so that the Warrants will meet the minimum listing criteria to be accepted for listing on NASDAQ. After the one-year anniversary of issuance, we may redeem the Warrants for \$0.001 per Warrant if the volume weighted average price of our common stock is above \$14.70 per share, 250% of the exercise price, for each of 10 consecutive trading days. Each Pre-Funded Warrant entitles the holder to purchase one share of common stock at an exercise price of \$0.01 per share, and the subscription price per Unit for any such electing investors will be reduced to \$4.89 (which equals the Subscription Price for the other Units sold in the Rights Offering, less the \$0.01 exercise price for each Pre-Funded Warrant). Each Pre-Funded Warrant will be exercisable from the date of issuance through its expiration seven years after the date of issuance. The Pre-Funded Warrants will be exercisable by paying the exercise price in cash or on a cashless basis. The Pre-Funded Warrants will not be listed for trading on any stock exchange or market. The Pre-Funded Warrants do not confer upon the holder any voting or any other rights of a shareholder of the Company. See "Description of Securities Pre-Funded Warrants Issuable in the Rights Offering."</p> |
| Record Date | 5:00 PM Eastern Time, July 7, 2016. |
| Subscription Right | Each Subscription Right consists of a Basic Subscription Right and an Over-Subscription Privilege. |
| Basic Subscription Rights | Basic Subscription Right will entitle you to purchase one Unit at the Subscription Price. |
| Over-Subscription Privilege | If you exercise your Basic Subscription Rights in full, you may also choose to purchase a portion of any Units that are not purchased by our other shareholders or holders of participating warrants through the exercise of their Basic Subscription Rights. You may subscribe for additional Units pursuant to this Over-Subscription Privilege, subject to proration described elsewhere. |
| Expiration date | The Subscription Rights will expire at 5:00 PM Eastern Time, on July 26, 2016. We reserve the right to extend the expiration date in our sole discretion. |
| Procedure for exercising Subscription Rights | To exercise your Subscription Rights, you must take the following steps: If you are a record holder of our common stock or a holder of participating warrants, you must deliver payment and a properly completed Subscription Rights Statement to the |

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| | <p>Subscription Agent to be received before 5:00 PM Eastern Time, on July 26, 2016. You may deliver the documents and payments by first class mail or courier service. If you use first class mail for this purpose, we recommend using registered mail, properly insured, with return receipt requested.</p> <p>If you are a beneficial owner of shares that are registered in the name of a broker, dealer, custodian bank, or other nominee, you should instruct your broker, dealer, custodian bank, or other nominee to exercise your Subscription Rights on your behalf. Please follow the instructions of your nominee, who may require that you meet a deadline earlier than 5:00 PM Eastern Time, on July 26, 2016. As soon as practicable after the expiration of the Rights Offering, the Subscription Agent will arrange for the issuance of the shares of common stock and Warrants purchased pursuant to the Rights Offering. All shares and Warrants that are purchased in the Rights Offering will be issued in book-entry, or uncertificated, form meaning that you will receive a direct registration (DRS) account statement from our transfer agent reflecting ownership of these securities if you are a holder of record of shares or warrants. If you hold your shares in the name of a custodian bank, broker, dealer, or other nominee, DTC will credit your account with your nominee with the securities you purchased in the Rights Offering.</p> |
| Delivery of shares and Warrants | <p>The Subscription Rights may not be sold, transferred, assigned or given away to anyone. The Subscription Rights will not be listed for trading on any stock exchange or market.</p> |
| Non-transferability of Subscription Rights | <p>The Warrants will be separately transferable following their issuance and through their expiration five years from the issuance date.</p> |
| Transferability of Warrants | <p>Our board of directors is not making a recommendation regarding your exercise of the Subscription Rights. You are urged to make your decision to invest based on your own assessment of our business and the Rights Offering. Please see "Risk Factors" for a discussion of some of the risks involved in investing in our securities.</p> |
| No board recommendation | <p>While none of our directors or executive officers has entered into any binding commitment or agreement to exercise Subscription Rights received in the Rights Offering, our directors and executive officers have indicated interests in subscribing for up to an aggregate of \$3.0 million in the Rights Offering, subject to potential proration.</p> |
| Directors and Officers | <p>All exercises of Subscription Rights are irrevocable, even if you later learn of information that you consider to be unfavorable to the exercise of your Subscription Rights.</p> |
| No revocation | <p>We intend to use the net proceeds from this Rights Offering to continue funding INSPIRE, our ongoing Phase 3 clinical trial of rigosertib IV in a population of patients with</p> |
| Use of proceeds | |

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| | higher-risk MDS after failure of HMA therapy, and, to a lesser extent, for other development of our clinical and preclinical programs, other research and development activities, business development and general corporate purposes, which may include capital expenditures and funding our working capital needs. See "Use of Proceeds." |
| Material U.S. federal income tax consequences | For U.S. federal income tax purposes, we do not believe you should recognize income or loss upon receipt or exercise of a Subscription Right. You should consult your own tax advisor as to the tax consequences of the Rights Offering in light of your particular circumstances. See "Material U.S. Federal Income Tax Consequences." |
| Extension and termination | Although we do not presently intend to do so, we may extend the Rights Offering for additional time in our sole discretion. Our board of directors may for any reason terminate the Rights Offering at any time before the completion of the Rights Offering. |
| Subscription Agent Questions | Wells Fargo Bank, N.A. If you have any questions about the Rights Offering, please contact the dealer-manager, Maxim Group LLC, at 405 Lexington Avenue, New York, New York 10174, Attention Syndicate Department, email: syndicate@maximgrp.com or telephone: (212) 895-3745. |
| Market for common stock | Our common stock is listed on NASDAQ under the symbol "ONTX." See "Market Price of our Common Stock and Related Stockholder Matters." |
| Risk factors | Before you exercise your Subscription Rights to purchase Units, you should be aware that there are risks associated with your investment, and you should carefully read and consider risks described in the section captioned "Risk Factors" together with all of the other information included in this prospectus. |
| Dealer-Manager Distribution arrangements | Maxim Group LLC. Under the terms and subject to the conditions contained in the dealer-manager agreement, the dealer-manager will use its best efforts to solicit the exercise of Subscription Rights. We have agreed to pay the dealer-manager certain fees for acting as dealer-manager and to reimburse the dealer-manager for certain out-of-pocket expenses incurred in connection with this offering. The dealer-manager is not underwriting or placing any of the Subscription Rights or the Units, shares of common stock or Warrants being issued in this offering, and does not make any recommendation with respect to such Subscription Rights (including with respect to the exercise or expiration of such Subscription Rights), Units, shares of common stock or Warrants. See "Plan of Distribution" for a discussion of the fees and expenses to be paid to the dealer-manager. |

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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 most recent Annual Report on Form 10-K, filed with the Commission on March 28, 2016, as revised or supplemented by our Quarterly Reports on Form 10-Q filed with the SEC since the filing of our most recent Annual Report on Form 10-K, each of which is incorporated by reference into this prospectus, 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 our 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 Related to the Rights Offering

We will incur substantial expenses in connection with the Rights Offering, which may not return adequate value if the Rights Offering is ultimately not consummated or successful.

The estimated expenses for the Rights Offering are approximately \$448,964, excluding fees and expenses of the dealer-manager that we have engaged to assist us with the Rights Offering. If the registration statement of which this prospectus is a part is not declared effective, the Rights Offering is not commenced or the Rights Offering is not ultimately consummated or successful, we will incur these expenses nonetheless. We will provide to the dealer-manager upon completion of the Rights Offering a non-accountable expense allowance equal to the lesser of \$100,000 or 3% of the gross proceeds of the Rights Offering for expenses incurred in connection with the Rights Offering. We advanced \$30,000 against out-of-pocket accountable expenses to Maxim Group LLC upon its engagement as a dealer-manager; provided that Maxim Group LLC will promptly reimburse to us (i) any portion of the advance not used for actual out-of-pocket expenses, if the Rights Offering is not completed, and (ii) the full amount of the advance, if the Rights Offering is completed. See "Plan of Distribution."

Your interest in our company may be diluted as a result of this Rights Offering.

Shareholders who do not fully exercise their Subscription Rights should expect that they will, at the completion of this offering, own a smaller proportional interest in our company than would otherwise be the case had they fully exercised their Basic Subscription Right and Over-Subscription Privilege. Further, the shares issuable upon the exercise of the Warrants to be issued pursuant to the Rights Offering will dilute the ownership interest of shareholders not participating in this offering or holders of Warrants issued pursuant to this offering who have not exercised them.

Further, because the price per Unit being offered may be substantially higher than the net tangible book value per share of our common stock, you may suffer substantial dilution in the net tangible book value of the common stock you purchase in this offering. If you purchase Units in this offering at the Subscription Price, you may suffer immediate and substantial dilution in the net tangible book value of the common stock. See "Dilution" in this prospectus for a more detailed discussion of the dilution which may incur in connection with this offering.

Completion of the Rights Offering is not subject to us raising a minimum offering amount and we will still need additional funding to carry out our proposed operating activities, including our INSPIRE trial, after the Rights Offering.

Completion of the Rights Offering is not subject to us raising a minimum offering amount and therefore the net proceeds from the Rights Offering may be insufficient to meet our objectives, thereby

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increasing the risk to investors in this offering, including investing in a company that continues to require capital. Even if we sell all of the Units subject to the Rights Offering, we will need to obtain additional financing in the future in order to fully fund rigosertib or any other product candidates through the regulatory approval process.

Due to our ongoing losses and our accumulated deficit in combination with other factors, the opinion of our independent registered public accounting firm on our audited consolidated financial statements for our fiscal year ended December 31, 2015 contains an explanatory paragraph regarding substantial doubt about our ability to continue as a going concern. Even if we sell all of the Units subject to the Rights Offering, if we are unable to obtain sufficient additional funding, through future financings or through strategic and collaborative transactions and arrangements, we may not have sufficient resources to complete our INSPIRE trial and we may continue to delay, scale-back or eliminate certain of our planned research, drug discovery and development activities and certain other aspects of our operations, or we may not be able to continue as a going concern.

This Rights Offering may cause the trading price of our common stock to decrease.

The Subscription Price, together with the number of shares of common stock we propose to issue and ultimately will issue if this Rights Offering is completed, may result in an immediate decrease in the market price of our common stock. This decrease may continue after the completion of this Rights Offering. If that occurs, you may have committed to buy shares of common stock in the Rights Offering at a price greater than the prevailing market price. We cannot predict the effect, if any, that the availability of shares for future sale represented by the Warrants issued in connection with the Rights Offering, or the ability to trade the Warrants themselves, will have on the market price of our common stock from time to time. Further, if a substantial number of Subscription Rights are exercised and the holders of the shares received upon exercise of those Subscription Rights or the related Warrants choose to sell some or all of the shares underlying the Subscription Rights or the related Warrants, the resulting sales could depress the market price of our common stock. Following the exercise of your Subscription Rights you may not be able to sell your common stock at a price equal to or greater than the Subscription Price.

Because the exercise of your Subscription Rights is not revocable, you could be committed to buying shares of common stock above the prevailing market price.

Once you exercise your Subscription Rights, you may not revoke such exercise even if you later learn information that you consider to be unfavorable to the exercise of your Subscription Rights. The market price of our shares of common stock may decline prior to the expiration of this offering or a Subscribing Rights holder may not be able to sell shares of common stock purchased in this offering at a price equal to or greater than the Subscription Price. Until shares of our common stock are delivered upon expiration of the Rights Offering, you will not be able to sell or transfer the shares of our common stock that you purchase in the Rights Offering. Any such delivery will occur as soon as practicable after the Rights Offering has expired, payment for the shares of common stock and attached Warrants subscribed for has cleared, and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected.

If we terminate this offering for any reason, we will have no obligation other than to return subscription monies as soon as practicable.

We may decide, in our sole discretion and for any reason, to cancel or terminate the Rights Offering at any time prior to the expiration date. If this offering is cancelled or terminated, we will have no obligation with respect to Subscription Rights that have been exercised except to return as soon as practicable, without interest, the subscription payments deposited with the Subscription Agent.

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If we terminate this offering and you have not exercised any Subscription Rights, such Subscription Rights will expire worthless.

Our common stock price may be volatile as a result of this Rights Offering.

The trading price of our common stock may fluctuate substantially. The price of the common stock that will prevail in the market after this offering may be higher or lower than the Subscription Price depending on many factors, some of which are beyond our control and may not be directly related to our operating performance. These factors include, but are not limited to, the following:

results of clinical trials of our product candidates or those of our competitors;

regulatory actions with respect to our products or our competitors' products;

actual or anticipated changes in our growth rate relative to our competitors;

announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations or capital commitments;

the success of competitive products or technologies;

regulatory or legal developments in the United States and other countries;

developments or disputes concerning patent applications, issued patents or other proprietary rights;

the recruitment or departure of key personnel;

the level of expenses related to any of our product candidates or clinical development programs;

the results of our efforts to in-license or acquire additional product candidates or products;

actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;

variations in our financial results or those of companies that are perceived to be similar to us;

fluctuations in the valuation of companies perceived by investors to be comparable to us;

share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;

announcement or expectation of additional financing efforts;

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sales of our common stock by us, our insiders or our other stockholders;

changes in the structure of healthcare payment systems;

market conditions in the pharmaceutical and biotechnology sectors; and

general economic, industry and market conditions.

Additionally, the stock market historically has experienced significant price and volume fluctuations. These fluctuations are often unrelated to the operating performance of particular companies. These broad market fluctuations may cause declines in the trading price and market value of our common stock.

We cannot assure you that the trading price of our common stock will not decline after you elect to exercise your Subscription Rights. If that occurs, you may have committed to buy shares of common stock in the Rights Offering at a price greater than the prevailing market price and could have an immediate unrealized loss. Moreover, we cannot assure you that, following the exercise of your Subscription Rights, you will be able to sell your common stock at a price equal to or greater than the

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Subscription Price, and you may lose all or part of your investment in our common stock. Until shares are delivered upon expiration of the Rights Offering, you will not be able to sell the shares of our common stock that you purchase in the Rights Offering. Shares of our common stock purchased will be issued as soon as practicable after the Rights Offering has expired, payment for the shares of common stock and attached Warrants subscribed for has cleared, and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected. We will not pay you interest on funds delivered to the Subscription Agent pursuant to your exercise of Subscription Rights.

Because we do not have any formal commitments from any of our shareholders to participate in the Rights Offering, the net proceeds we receive from the Rights Offering may be lower than we currently anticipate.

We do not have any formal commitments from any of our shareholders to participate in the Rights Offering, and we cannot assure you that any of our shareholders or warrant holders will exercise all or any part of their Basic Subscription Rights or their Over-Subscription Privilege. If our shareholders or participating warrant holders subscribe for fewer shares of our common stock than we currently anticipate, the net proceeds we receive from the Rights Offering could be significantly lower than we currently expect.

The Subscription Price determined for this offering is not an indication of the fair value of our common stock.

In determining the Subscription Price, the pricing committee of our board of directors considered a number of factors, including, but not limited to, the price at which our stockholders might be willing to participate in the Rights Offering, the value of the Warrant being issued as a component of the Unit, historical and current trading prices for our common stock, the amount of proceeds desired, the potential need for liquidity and capital, potential market conditions, and the desire to provide an opportunity to our shareholders to participate in the Rights Offering. In conjunction with its review of these factors, our pricing committee also reviewed a range of discounts to market value represented by the subscription prices in various prior Rights Offerings by other public companies. The Subscription Price does not necessarily bear any relationship to the book value of our assets, results of operations, cash flows, losses, financial condition or any other established criteria for value. You should not consider the Subscription Price as an indication of the fair value of our common stock. After the date of this prospectus, our common stock may trade at prices above or below the Subscription Price.

If you do not act on a timely basis and follow subscription instructions, your exercise of Subscription Rights may be rejected.

Holders of Subscription Rights who desire to purchase shares of our common stock and attached Warrants in this offering must act on a timely basis to ensure that all required forms and payments are actually received by the Subscription Agent prior to 5:00 PM Eastern Time, on the expiration date, unless extended. If you are a beneficial owner of shares of common stock and you wish to exercise your Subscription Rights, you must act promptly to ensure that your broker, dealer, custodian bank, trustee or other nominee acts for you and that all required forms and payments are actually received by your broker, dealer, custodian bank, trustee or other nominee in sufficient time to deliver such forms and payments to the Subscription Agent to exercise the Subscription Rights granted in this offering that you beneficially own prior to 5:00 PM Eastern Time on the expiration date, as may be extended. We will not be responsible if your broker, dealer, custodian bank, trustee or other nominee fails to ensure that all required forms and payments are actually received by the Subscription Agent prior to 5:00 PM Eastern Time, on the expiration date.

If you fail to complete and sign the required subscription forms, send an incorrect payment amount, or otherwise fail to follow the subscription procedures that apply to your exercise in this Rights Offering, the Subscription Agent may, depending on the circumstances, reject your subscription

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or accept it only to the extent of the payment received. Neither we nor the Subscription Agent undertakes to contact you concerning an incomplete or incorrect subscription form or payment, nor are we under any obligation to correct such forms or payment. We have the sole discretion to determine whether a subscription exercise properly follows the subscription procedures.

You may not receive all of the Units for which you over-subscribe.

Holders who fully exercise their Basic Subscription Rights will be entitled to subscribe for an additional number of Units. Over-Subscription Privileges will be allocated pro rata among Rights holders who over-subscribed, based on the number of over-subscription Units to which they have subscribed. We cannot guarantee that you will receive any or the entire amount of Units for which you over-subscribed. If the prorated amount of Units allocated to you in connection with your Over-Subscription Privilege is less than your Over-Subscription Request, then the excess funds held by the Subscription Agent on your behalf will be returned to you, without interest, as soon as practicable after the Rights Offering has expired and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected, and we will have no further obligations to you.

The receipt of Subscription Rights may be treated as a taxable distribution to you.

We believe the distribution of the Subscription Rights in this Rights Offering should be a non-taxable distribution to holders of shares of common stock and the participating warrants under Section 305(a) of the Internal Revenue Code of 1986, as amended, or the "Code." Please see the discussion on the "Material U.S. Federal Income Tax Consequences" below. This position is not binding on the IRS, or the courts, however. If this Rights Offering is deemed to be part of a "disproportionate distribution" under Section 305 of the Code, your receipt of Subscription Rights in this offering may be treated as the receipt of a taxable distribution to you equal to the fair market value of the Subscription Rights. Any such distribution would be treated as dividend income to the extent of our current and accumulated earnings and profits, if any, with any excess being treated as a return of capital to the extent thereof and then as capital gain. Each holder of shares of common stock and each holder of a participating warrant is urged to consult his, her or its own tax advisor with respect to the particular tax consequences of this Rights Offering.

The Subscription Rights are not transferable, and there is no market for the Subscription Rights.

You may not sell, transfer, assign or give away your Subscription Rights. Because the Subscription Rights are non-transferable, there is no market or other means for you to directly realize any value associated with the Subscription Rights. You must exercise the Subscription Rights to realize any potential value from your Subscription Rights.

Absence of a public trading market for the Warrants may limit your ability to resell the Warrants.

There is no established trading market for the Warrants to be issued pursuant to this offering, and the Warrants may not be widely distributed. We have applied to list the Warrants for trading on NASDAQ under the symbol "ONTXW," but there can be no assurance that a sufficient number of Subscription Rights will be exercised so that the Warrants will meet minimum listing criteria to be accepted for listing on NASDAQ or that a market will develop for the Warrants. Even if a market for the Warrants does develop, the price of the Warrants may fluctuate and liquidity may be limited. If the Warrants are not accepted for listing on NASDAQ or if a market for the Warrants does not develop, then purchasers of the Warrants may be unable to resell the Warrants or sell them only at an unfavorable price for an extended period of time, if at all. Future trading prices of the Warrants will depend on many factors, including:

our operating performance and financial condition;

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our ability to continue the effectiveness of the registration statement, of which this prospectus is a part, covering the Warrants and the common stock issuable upon exercise of the Warrants;

the interest of securities dealers in making a market; and

the market for similar securities.

There is no market for the Pre-Funded Warrants.

There is no established trading market for the Pre-Funded Warrants to be issued pursuant to this offering, if any, and the Pre-Funded Warrants will not be listed for trading on any stock exchange or market.

The market price of our common stock may never exceed the exercise price of the Warrants issued in connection with this offering.

The Warrants being issued in connection with this offering become exercisable upon issuance and will expire five years after issuance. We cannot provide you any assurance that the market price of our common stock will ever exceed the exercise price of the Warrants prior to their date of expiration. Any Warrants not exercised by their date of expiration will expire worthless and we will be under no further obligation to the Warrant holder.

The Warrants may be redeemed on short notice. This may have an adverse impact on their price.

After the one-year anniversary of issuance, we may redeem the Warrants for \$0.001 per Warrant once the closing price of our common stock has equaled or exceeded \$14.70 per share, 250% of the exercise price, subject to adjustment, for 10 consecutive trading days. If we give notice of redemption, you will be forced to sell or exercise your Warrants or accept the redemption price. The notice of redemption could come at a time when it is not advisable or possible for you to exercise the Warrants. As a result, you would be unable to benefit from owning the Warrants being redeemed.

The dealer-manager is not underwriting, nor acting as placement agent of, the Subscription Rights or the securities underlying the Subscription Rights.

Maxim Group LLC is acting as dealer-manager for this Rights Offering. Under the terms and subject to the conditions contained in the dealer-manager agreement, the dealer-manager will provide marketing assistance in connection with this offering. The dealer-manager is not underwriting or placing any of the Subscription Rights or the Units, shares of common stock or Warrants being issued in this offering, and does not make any recommendation with respect to such Subscription Rights (including with respect to the exercise or expiration of such Subscription Rights), Units, shares of common stock or Warrants. The dealer-manager will not be subject to any liability to us in rendering the services contemplated by the dealer-manager agreement except for any act of bad faith or gross negligence by the dealer-manager. The services of the dealer-manager to us in connection with this offering cannot be construed as any assurance that this offering will be successful.

Since the Warrants and Pre-Funded Warrants are executory contracts, they may have no value in a bankruptcy or reorganization proceeding.

In the event a bankruptcy or reorganization proceeding is commenced by or against us, a bankruptcy court may hold that any unexercised Warrants and Pre-Funded Warrants are executory contracts that are subject to rejection by us with the approval of the bankruptcy court. As a result, holders of the Warrants and Pre-Funded Warrants may, even if we have sufficient funds, not be entitled to receive any consideration for their Warrants and Pre-Funded Warrants or may receive an amount less than they would be entitled to if they had exercised their Warrants and Pre-Funded Warrants prior to the commencement of any such bankruptcy or reorganization proceeding.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus includes forward-looking statements. We may, in some cases, use terms such as "believes," "estimates," "anticipates," "expects," "plans," "intends," "may," "could," "might," "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 report 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 report, 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 report. In addition, even if our results of operations, financial condition and liquidity, and events in the industry in which we operate are consistent with the forward-looking statements contained in this report, they may not be predictive of results or developments in future periods.

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

our 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 drug 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;

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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 become available;

our ability to maintain the listing of our common stock on a national securities exchange;

the potential for third party disputes and litigation; and

the performance of third parties, including contract research organizations, or CROs and third-party manufacturers.

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

You should also read carefully the factors described in the "Risk Factors" in our annual report on Form 10-K filed with the SEC on March 28, 2016, to better understand significant risks and uncertainties inherent in our business and underlying any forward-looking statements. As a result of these factors, actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements in this report and you should not place undue reliance on any forward-looking statements.

USE OF PROCEEDS

Assuming that all 4,256,186 Units are sold in the Rights Offering and no elections to receive Pre-Funded Warrants are made, we estimate that the net proceeds from the Rights Offering will be approximately \$18.7 million, based on the Subscription Price of \$4.90 per Unit, after deducting fees and expenses payable to the dealer-manager, and after deducting other expenses payable by us and excluding any proceeds received upon exercise of any Warrants issued in the Rights Offering.

We intend to use the net proceeds from this Rights Offering primarily to continue funding our ongoing Phase 3 clinical trial of rigosertib IV in a population of patients with higher-risk MDS after failure of HMA therapy, which we refer to as "INSPIRE," and, to a lesser extent, for other development of our clinical and preclinical programs, for other research and development activities, business development and for general corporate purposes, which may include capital expenditures and funding our working capital needs.

Our management will have broad discretion in the application of the net proceeds from this offering, and investors will be relying on the judgment of our management with regard to the use of these net proceeds. Pending the use of the net proceeds from this offering as described above, we intend to hold the net proceeds in cash or invest in short-term, investment-grade, interest-bearing instruments.

Table of Contents**CAPITALIZATION**

The following table presents our cash, cash equivalents and capitalization, as of March 31, 2016:

on an actual basis; and

on a pro forma as adjusted basis to give further effect to the sale by us in this Rights Offering of maximum of 4,256,186 Units (consisting of 4,256,186 shares of our common stock (assuming no Pre-Funded Warrants) and Warrants to purchase an aggregate of 3,192,140 shares of common stock upon exercise), at the Subscription Price of \$4.90 per Unit, and our receipt of the net proceeds from that sale after deducting estimated offering expenses.

The table below does not reflect the exercise of Warrants issued in connection with the Rights Offering. The pro forma as adjusted information set forth below assumes equity accounting for the Warrants, is illustrative only and will be adjusted based on the Units sold. You should read this information in conjunction with our consolidated financial statements and notes thereto incorporated by reference into this prospectus.

| | March 31, 2016 (unaudited) | |
|---|-----------------------------------|----------------------------------|
| | Actual | Pro Forma as Adjusted |
| Cash and cash equivalents | \$ 16,835,000 | \$ 35,573,000 |
| Long-term liabilities | 5,181,000 | 5,181,000 |
| Stockholders' equity*: | | |
| Preferred stock, \$0.01 par value, 5,000,000 authorized at March 31, 2016 and March 31, 2016 Pro Forma, none issued and outstanding at March 31, 2016 | | |
| Common stock, \$0.01 par value, 25,000,000 authorized at March 31, 2016 and March 31, 2016 Pro Forma as Adjusted, 2,740,212 shares issued and outstanding at March 31, 2016 and 6,996,186 shares issued and outstanding at March 31, 2016 Pro Forma as Adjusted | 27,000 | 70,000 |
| Additional paid-in capital | 331,775,000 | 350,470,000 |
| Accumulated other comprehensive loss | (16,000) | (16,000) |
| Accumulated deficit | (325,797,000) | (325,797,000) |
| Total Onconova Therapeutics, Inc. stockholders' equity | 5,989,000 | 24,727,000 |
| Non-controlling interest | 830,000 | 830,000 |
| Total stockholders' equity | 6,819,000 | 25,557,000 |

*

Stockholders' equity has been restated to reflect the one-for-ten reverse stock split and decrease in authorized common shares from 75,000,000 to 25,000,000.

The information above is as of March 31, 2016 and excludes:

567,122 shares of common stock issuable upon the exercise of stock options outstanding at March 31, 2016 with a weighted average exercise price of \$72.60 per share;

97,424 shares of common stock issuable upon the exercise of outstanding warrants at March 31, 2016 with a weighted average exercise price of \$12.05 per share;

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185,909 shares of common stock reserved for future issuance under our 2013 Equity Compensation Plan at March 31, 2016;
and

any additional shares of common stock that we may issue to Lincoln Park Capital Fund, LLC, or Lincoln Park, pursuant to a purchase agreement we entered into on October 8, 2015, which

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provides that, upon the terms and subject to the conditions and limitation set forth therein, Lincoln Park is committed to purchase up to an aggregate of an additional \$15 million of shares of our common stock over the term of the purchase agreement, should we elect to sell shares to Lincoln Park.

All share and per share data has been restated to reflect our one-for-ten reverse stock split effective May 31, 2016, subject to final adjustments for treatment of fractional share interests.

DILUTION

Purchasers of our common stock in the Rights Offering (and upon exercise of the Warrants issued pursuant to this Rights Offering) will experience an immediate dilution of the net tangible book value per share of our common stock. Our net tangible book value as of March 31, 2016 was approximately \$6,819,000, or \$2.49 per share of our common stock (based upon 2,740,212 shares of our common stock outstanding after giving effect to the one-for-ten reverse stock split on May 31, 2016). Net tangible book value per share is equal to our total net tangible book value, which is our total tangible assets less our total liabilities, divided by the number of shares of our outstanding common stock. Dilution per share equals the difference between the amount per share paid by purchasers of shares of common stock in the Rights Offering and the net tangible book value per share of our common stock immediately after the Rights Offering.

Based on the sale by us in this Rights Offering of a maximum of 4,256,186 Units (consisting of 4,256,186 shares of our common stock (assuming no Pre-Funded Warrants) and Warrants to purchase an aggregate of 3,192,140 shares of common stock upon exercise), at the Subscription Price of \$4.90 per Unit, and after deducting estimated offering expenses and dealer-manager fees and expenses payable by us of \$2.1 million, and the application of the estimated \$18.7 million of net proceeds from the Rights Offering, assuming equity accounting for the Warrants, our pro forma net tangible book value as of March 31, 2016 would have been approximately \$25.6 million, or \$3.65 per share. This represents an immediate increase in pro forma net tangible book value to existing shareholders of \$1.16 per share and an immediate dilution to purchasers in the Rights Offering of \$1.25 per share.

The following table illustrates this per-share dilution on a pro forma basis, assuming a fully subscribed for Rights Offering of 4,256,186 Units at the Subscription Price of \$4.90 per Unit (assuming no Pre-Funded Warrants and excluding any issuance of shares of common stock upon exercise of Warrants):

| | |
|--|---------|
| Subscription Price | \$ 4.90 |
| Net tangible book value per share as of March 31, 2016, before Rights Offering | \$ 2.49 |
| Increase in net tangible book value per share attributable to Rights Offering | \$ 1.16 |
| Pro forma net tangible book value per share as of March 31, 2016, after giving effect to Rights Offering | \$ 3.65 |
| Dilution in net tangible book value per share to purchasers | \$ 1.25 |

The information above is as of March 31, 2016 and excludes:

567,122 shares of common stock issuable upon the exercise of stock options outstanding at March 31, 2016 with a weighted average exercise price of \$72.60 per share;

97,424 shares of common stock issuable upon the exercise of outstanding warrants at March 31, 2016 with a weighted average exercise price of \$12.05 per share;

185,909 shares of common stock reserved for future issuance under our 2013 Equity Compensation Plan at March 31, 2016; and

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any additional shares of common stock that we may issue to Lincoln Park Capital Fund, LLC, or Lincoln Park, pursuant to a purchase agreement we entered into on October 8, 2015, which provides that, upon the terms and subject to the conditions and limitation set forth therein, Lincoln Park is committed to purchase up to an aggregate of an additional \$15 million of shares of our common stock over the term of the purchase agreement, should we elect to sell shares to Lincoln Park.

All share and per share data has been restated to reflect our one-for-ten reverse stock split effective May 31, 2016.

To the extent that outstanding options or warrants are exercised, the investor purchasing our common stock in this offering will experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations. To the extent that additional capital is raised through the sale of securities, the issuance of those securities could result in further dilution to our stockholders.

MARKET PRICE OF OUR COMMON STOCK AND RELATED STOCKHOLDER MATTERS

Our common stock began trading on the NASDAQ Global Select Market on July 25, 2013 under the symbol "ONTX." Prior to that time, there was no public market for our common stock. On February 5, 2016, we transferred the listing of our shares to the NASDAQ Capital Market. The following table sets forth for the periods indicated the high and low intra-day sale prices per share of our common stock as reported on the NASDAQ Global Market or NASDAQ Capital Market, as adjusted to give effect to our one-for-ten reverse stock split effective May 31, 2016:

| | High | Low |
|---|-----------|----------|
| <i>Year Ending December 31, 2016</i> | | |
| First Quarter | \$ 10.28 | \$ 3.23 |
| Second Quarter | 8.17 | 3.80 |
| Third Quarter (through July 7, 2016) | 5.93 | 4.55 |
| <i>Year Ended December 31, 2015</i> | | |
| First Quarter | \$ 44.30 | \$ 21.50 |
| Second Quarter | 30.20 | 22.60 |
| Third Quarter | 40.00 | 13.20 |
| Fourth Quarter | 18.90 | 9.20 |
| <i>Year Ended December 31, 2014</i> | | |
| First Quarter | \$ 162.20 | 60.50 |
| Second Quarter | 64.90 | 41.00 |
| Third Quarter | 57.80 | 42.40 |
| Fourth Quarter | 50.00 | 32.40 |

On July 7, 2016, the last reported sale price of our common stock on the NASDAQ Capital Market was \$4.99 per share. As of July 6, 2016, we had 167 holders of record of our common stock. The actual number of holders of common stock is greater than these numbers of record holders and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and nominees. The number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

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DIVIDEND POLICY

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

THE RIGHTS OFFERING

The Subscription Rights

We are distributing to the record holders and to holders of certain outstanding warrants who are entitled to participate in this offering pursuant to the terms of such warrants, at no charge, 4,256,186 non-transferable Subscription Rights to purchase one Unit at a subscription price per Unit of \$4.90, referred to as the Subscription Price. Each Basic Subscription Right will entitle you to purchase one share of our common stock and 0.75 of a Warrant for the purchase of one additional share of our common stock at an exercise price of \$5.88 per share, 120% of the per Unit price, from the date of issuance through its expiration five years after the date of issuance. Each record holder will receive 1.5 Subscription Rights for each whole share of our common stock owned by such record holder as of the Record Date, rounded down to the nearest whole number of Subscription Rights. Each holder of an outstanding participating warrant will receive 1.5 Subscription Rights for each whole share of our common stock as if each of such participating warrants had been exercised immediately prior to the record date for the Rights Offering, rounded down to the nearest whole number of Subscription Rights. Each Subscription Right entitles the record holder or holder of a participating warrant to a Basic Subscription Right and an Over-Subscription Privilege.

Basic Subscription Rights

Your Basic Subscription Rights will entitle you to purchase one share of our common stock and 0.75 of a Warrant to purchase one share of our common stock at the exercise price described elsewhere in this prospectus. For example, if you owned 100 shares of common stock as of the Record Date, you will receive 150 Subscription Rights and will have the right to purchase 150 shares of our common stock and Warrants to purchase 112 shares of our common stock for \$4.90 per whole Unit, or a total payment of \$735.00. You may exercise all or a portion of your Basic Subscription Rights, or you may choose not to exercise any of your Basic Subscription Rights. If you do not exercise your Basic Subscription Rights in full, you will not be entitled to exercise your Over-Subscription Privilege.

Over-Subscription Privilege

If you exercise your Basic Subscription Rights in full, you may also choose to exercise your Over-Subscription Privilege. Subject to proration, if applicable, we will seek to honor the Over-Subscription Privilege requests in full. If Over-Subscription Privilege requests exceed the number of Units available, however, we will allocate the available Units pro rata among the record holders and participating warrant holders exercising the Over-Subscription Privilege in proportion to the number of shares of our common stock each of those record holders owned or the number of shares underlying participating warrants held by each of those warrant holders on the Record Date, relative to the number of shares owned or underlying participating warrants on the Record Date by all record holders and warrant holders exercising the Over-Subscription Privilege. If this pro rata allocation results in any record holder or warrant holder receiving a greater number of Units than the record holder or warrant holder subscribed for pursuant to the exercise of the Over-Subscription Privilege, then such record holder or warrant holder will be allocated only that number of Units for which the record holder or warrant holder oversubscribed, and the remaining Units will be allocated among all other record holders and warrant holders exercising the Over-Subscription Privilege on the same pro rata basis described above. The proration process will be repeated until all Units have been allocated.

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Wells Fargo Bank, N.A., the Subscription Agent for the Rights Offering, will determine the over-subscription allocation based on the formula described above.

To the extent the aggregate subscription payment of the actual number of unsubscribed Units available to you pursuant to the Over-Subscription Privilege is less than the amount you actually paid in connection with the exercise of the Over-Subscription Privilege, you will be allocated only the number of unsubscribed Units available to you, and any excess subscription payments will be returned to you, without interest or penalty, as soon as practicable after expiration of the Rights Offering.

We can provide no assurances that you will actually be entitled to purchase the number of Units issuable upon the exercise of your Over-Subscription Privilege in full at the expiration of the Rights Offering. We will not be able to satisfy any requests for Units pursuant to the Over-Subscription Privilege if all of our shareholders and participating warrant holders exercise their Basic Subscription Rights in full, and we will only honor an Over-Subscription Privilege to the extent sufficient Units are available following the exercise of Basic Subscription Rights.

Pre-Funded Warrants

If your subscription for Units in the Rights Offering may result in the your beneficial ownership of more than 4.99% of our outstanding common stock following the consummation of the Rights Offering, and you do not wish to exceed that ownership threshold, you may elect to receive a Pre-Funded Warrant to purchase one share of common stock in lieu of any share of common stock underlying the Units for which you have subscribed in excess of such threshold.

You may make an election to receive Pre-Funded Warrants in lieu of common stock, to the extent that your beneficial ownership would otherwise be above the ownership threshold. If you intend to do so, in addition to making your election on your Subscription Rights Statement, we ask that you contact the dealer-manager for the Rights Offering as follows:

**Maxim Group LLC
405 Lexington Avenue
New York, New York 10174
Attention Syndicate Department
Email: syndicate@maximgrp.com
Telephone: (212) 895-3745**

If you make an election to receive Pre-Funded Warrants but fail to timely provide the required holder information for the issuance of any Pre-Funded Warrants, you may receive the shares of common stock underlying all of your subscribed Units.

Our Participating Warrant Holders

On January 11, 2016, we issued common stock purchase 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-ten reverse stock split effective May 31, 2016. These warrants, referred to as our "participating warrants," entitle the holders to participate in this Rights Offering as if each of such participating warrants had been exercised immediately prior to the record date for the Rights Offering. As a result, holders of our participating warrants are receiving Subscription Rights for an aggregate of approximately 96,842 Units in connection with this Rights Offering; provided, however, to the extent that any warrant holder's right to participate in this Rights Offering would result in the holder exceeding the beneficial ownership limitation set forth in the participating warrants, then the holder will not be entitled to participate in this Rights Offering to such extent and the portion of this Rights Offering will 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 applicable beneficial ownership limitation.

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None of our other currently outstanding warrants is entitled to receive Subscription Rights in this offering.

Limitation on the Purchase of Units

You may only purchase the number of whole Units purchasable upon exercise of the number of Basic Subscription Rights distributed to you in the Rights Offering, plus the Over-Subscription Privilege, if any. Accordingly, the number of Units that you may purchase in the Rights Offering is limited by the number of shares of our common stock you held on the Record Date or the number of shares underlying your outstanding participating warrants and by the extent to which other shareholders and participating warrant holders exercise their Basic Subscription Rights and Over-Subscription Privileges, which we cannot determine prior to completion of the Rights Offering.

Subscription Price

The Subscription Price per Unit is 4.90. The Subscription Price does not necessarily bear any relationship to our past or expected future results of operations, cash flows, current financial condition, or any other established criteria for value. No change will be made to the Subscription Price by reason of changes in the trading price of our common stock or other factor prior to the expiration of this Rights Offering.

Determination of Subscription Price

In the determining the Subscription Price, the board of directors or pricing committee may consider a variety of factors including those listed below:

our need to raise capital in the near term to continue our operations;

the current and historical trading prices of our common stock;

a price that would increase the likelihood of participation in the Rights Offering;

the cost of capital from other sources;

the value of the Warrant being issued as a component of the Unit;

comparable precedent transactions, including the percentage of shares offered, the terms of the subscription rights being offered, the subscription price and the discount that the subscription price represents to the immediately prevailing closing prices for these offerings;

an analysis of stock price trading multiples for companies similar to us that, among other things, did not need to raise capital in the near-term; and

our most recently forecasted revenue relative to our peer group.

The Subscription Price does not necessarily bear any relationship to any established criteria for value. No valuation consultant or investment banker has opined upon the fairness or adequacy of the Subscription Price. You should not consider the Subscription Price as an indication of actual value of our company or our common stock. You should not assume or expect that, after the Rights Offering, our shares of common stock will trade at or above the Subscription Price in any given time period. The market price of our common stock may decline during or after the Rights Offering. We cannot assure you that you will be able to sell the shares of our common stock purchased during the Rights Offering at a price equal to or greater than the Subscription Price. You should obtain a current price quote for our common stock before exercising your Subscription Rights and make your own assessment of our business and financial condition, our prospects for the future, and the terms of this Rights Offering. Once made, all exercises of Subscription Rights are irrevocable.

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No Recombination

The common stock and Warrants comprising the Units will separate upon the effectiveness of the exercise of the Subscription Rights and will be issued as separate securities, and the Units will not trade as a separate security. Holders may not recombine shares of common stock and Warrants to receive a Unit.

Non-Transferability of Subscription Rights

The Subscription Rights are non-transferable (other than by operation of law) and, therefore, you may not sell, transfer, assign or give away your Subscription Rights to anyone. The Subscription Rights will not be listed for trading on any stock exchange or market.

Expiration Date; Extension

The subscription period, during which you may exercise your Subscription Rights, expires at 5:00 PM Eastern Time, on July 26, 2016, which is the expiration of the Rights Offering. If you do not exercise your Subscription Rights before that time, your Subscription Rights will expire and will no longer be exercisable. We will not be required to issue shares to you if the Subscription Agent receives your Subscription Rights Statement or your subscription payment after that time. We have the option to extend the Rights Offering in our sole discretion, although we do not presently intend to do so. We may extend the Rights Offering by giving oral or written notice to the Subscription Agent before the Rights Offering expires. If we elect to extend the Rights Offering, we will issue a press release announcing the extension no later than 9:00 AM Eastern Time, on the next business day after the most recently announced expiration date of the Rights Offering.

If you hold your shares of common stock in the name of a broker, dealer, custodian bank or other nominee, the nominee will exercise the Subscription Rights on your behalf in accordance with your instructions. Please note that the nominee may establish a deadline that may be before 5:00 PM Eastern Time, on July 26, 2016, which is the expiration date that we have established for the Rights Offering.

Termination

We may terminate the Rights Offering at any time and for any reason prior to the completion of the Rights Offering. If we terminate the Rights Offering, we will issue a press release notifying shareholders, warrant holders and the public of the termination.

Return of Funds upon Completion or Termination

The Subscription Agent will hold funds received in payment for shares in a segregated account pending completion of the Rights Offering. The Subscription Agent will hold this money until the Rights Offering is completed or is terminated. To the extent you properly exercise your Over-Subscription Privilege for an amount of Units that exceeds the number of unsubscribed Units available to you, any excess subscription payments will be returned to you as soon as practicable after the expiration of the Rights Offering, without interest or penalty. If the Rights Offering is terminated for any reason, all subscription payments received by the Subscription Agent will be returned as soon as practicable, without interest or penalty.

Shares of Our Common Stock Outstanding After the Rights Offering

On July 7, 2016, 2,740,615 shares of our common stock were outstanding, along with participating warrants to purchase 96,842 shares of common stock. Based on the foregoing, and assuming no other transactions by us involving our common stock prior to the expiration of the Rights Offering, and that

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no Pre-Funded Warrants are issued in lieu of common stock, if the Rights Offering is fully subscribed approximately 6,996,801 shares of our common stock will be issued and outstanding and Warrants to purchase approximately 3,192,140 additional shares of our common stock will be outstanding (excluding the currently outstanding warrants). The exact number of shares of common stock, Warrants and Pre-Funded Warrants that we will issue in this Rights Offering will depend on the number of Units that are subscribed for in the Rights Offering and the elections of eligible investors to receive Pre-Funded Warrants.

Methods for Exercising Subscription Rights

The exercise of Subscription Rights is irrevocable and may not be cancelled or modified. You may exercise your Subscription Rights as follows:

Subscription by Record Holders

If you are a shareholder of record or a holder of participating warrants, the number of Units you may purchase pursuant to your Subscription Rights is indicated on the enclosed Subscription Rights Statement. You may exercise your Subscription Rights by properly completing and executing the Subscription Rights Statement and forwarding it, together with your full payment, to the Subscription Agent at the address given below under "Subscription Agent," to be received before 5:00 PM Eastern Time, on July 26, 2016.

Subscription by Beneficial Owners

If you are a beneficial owner of shares of our common stock that are registered in the name of a broker, dealer, custodian bank, or other nominee, you will not receive a Subscription Rights Statement. Instead, we will issue one Subscription Right to such nominee record holder for all shares of our common stock held by such nominee at the Record Date. If you are not contacted by your nominee, you should promptly contact your nominee in order to subscribe for shares in the Rights Offering and follow the instructions provided by your nominee.

To properly exercise your Over-Subscription Privilege, you must deliver the subscription payment related to your Over-Subscription Privilege before the Rights Offering expires. Because we will not know the total number of unsubscribed Units before the Rights Offering expires, if you wish to maximize the number of shares you purchase pursuant to your Over-Subscription Privilege, you will need to deliver payment in an amount equal to the aggregate subscription payment for the maximum number of Units that you wish to purchase.

Payment Method

Payments must be made in full in U.S. currency by cashier's check or by wire transfer, and payable to "Wells Fargo Shareowner Services, as Subscription Agent for Onconova Therapeutics, Inc." You must timely pay the full subscription payment, including payment for the Over-Subscription Privilege, for the full number of Units of our common stock and Warrants you wish to acquire pursuant to the exercise of Subscription Rights by delivering a:

cashier's check, drawn on a U.S. bank payable to "Wells Fargo Shareowner Services, as Subscription Agent for Onconova Therapeutics, Inc."; or

wire transfer of immediately available funds directly to the account maintained by Wells Fargo Shareowner Services, as Subscription Agent, for purposes of accepting subscriptions in this Rights Offering at Wells Fargo Bank, N.A., ABA# 121000248, Credit: Stock Transfer Clearing Account # 000-10-67-899, for further credit to Onconova Therapeutics, Inc., and name of the Subscription Rights holder.

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You should read the instruction letter accompanying the Subscription Rights Statement carefully and strictly follow it. **DO NOT SEND SUBSCRIPTION RIGHTS STATEMENTS OR PAYMENTS DIRECTLY TO US.** We will not consider your subscription received until the Subscription Agent has received delivery of a properly completed and duly executed Subscription Rights Statement and payment of the full subscription payment.

The method of delivery of Subscription Rights Statements and payment of the subscription payment to the Subscription Agent will be at the risk of the holders of Subscription Rights. If sent by mail, we recommend that you send those statements and payments by registered mail, properly insured, with return receipt requested, or by overnight courier, and that you allow a sufficient number of days to ensure delivery to the Subscription Agent before the Rights Offering expires.

Missing or Incomplete Subscription Forms or Payment

If you fail to complete and sign the Subscription Rights Statement or otherwise fail to follow the subscription procedures that apply to the exercise of your Subscription Rights before the Rights Offering expires, the Subscription Agent will reject your subscription or accept it to the extent of the payment received. Neither we nor our Subscription Agent undertakes any responsibility or action to contact you concerning an incomplete or incorrect subscription form, nor are we under any obligation to correct such forms. We have the sole discretion to determine whether a subscription exercise properly complies with the subscription procedures.

If you send a payment that is insufficient to purchase the number of shares you requested, or if the number of shares you requested is not specified in the forms, the payment received will be applied to exercise your Subscription Rights to the fullest extent possible based on the amount of the payment received. Any excess subscription payments received by the Subscription Agent will be returned, without interest or penalty, as soon as practicable following the expiration of the Rights Offering.

Issuance of common stock and Warrants

The shares of common stock and Warrants that are purchased in the Rights Offering as part of the Units will be issued in book-entry, or uncertificated, form meaning that you will receive a direct registration (DRS) account statement from our transfer agent reflecting ownership of these securities if you are a holder of record of shares or warrants. If you hold your shares of common stock in the name of a custodian bank, broker, dealer, or other nominee, DTC will credit your account with your nominee with the securities you purchased in the Rights Offering.

Any Pre-Funded Warrants that are purchased in the Rights Offering will be issued in physical form.

Subscription Agent

The Subscription Agent for the Rights Offering is Wells Fargo Bank, N.A. The address to which Subscription Rights Statements and payments should be mailed or delivered by overnight courier is provided below. If sent by mail, we recommend that you send documents and payments by registered mail, properly insured, with return receipt requested, and that you allow a sufficient number of days to

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ensure delivery to the Subscription Agent before the Rights Offering expires. Do not send or deliver these materials to us.

By Mail:

**Wells Fargo Bank, N.A.
Shareowner Services
Voluntary Corporate Actions
P.O. Box 64858
St. Paul, Minnesota 55164-0858**

By Hand or Overnight Courier:

**Wells Fargo Bank, N.A.
Shareowner Services
Voluntary Corporate Actions
1110 Centre Pointe Curve, Suite 101
Mendota Heights, Minnesota 55120**

If you deliver the Subscription Rights Statements in a manner different than that described in this prospectus, we may not honor the exercise of your Subscription Rights.

Dealer-Manager

You should direct any questions or requests for assistance concerning the method of subscribing for the shares of our common stock or for additional copies of this prospectus to the dealer-manager for the Rights Offering as follows:

**Maxim Group LLC
405 Lexington Avenue
New York, New York 10174
Attention Syndicate Department
Email: syndicate@maximgrp.com
Telephone: (212) 895-3745**

No Fractional Shares

We will not issue fractional shares of common stock in the Rights Offering. Rights holders will only be entitled to purchase a number of Units representing a whole number of shares of common stock, rounded down to the nearest whole number of Units a holder would otherwise be entitled to purchase. Any excess subscription payments received by the Subscription Agent will be returned as soon as practicable after expiration of the Rights Offering, without interest or penalty. Similarly, no fractional shares of common stock will be issued in connection with the exercise of a Warrant or Pre-Funded Warrant. If, upon exercise of a Warrant, the holder thereof would be entitled to receive a fractional share of common stock, upon exercise, the holder will only be entitled to receive a whole number of shares of common stock, rounded down to the nearest whole number.

Notice to Brokers and Nominees

If you are a broker, dealer, bank, or other nominee holder that holds shares of our common stock for the account of others on the Record Date, you should notify the beneficial owners of the shares for whom you are the nominee of the Rights Offering as soon as possible to learn their intentions with respect to exercising their Subscription Rights. If a beneficial owner of our common stock so instructs, you should complete the Subscription Rights Statement and submit it to the Subscription Agent with the proper subscription payment by the expiration date. You may exercise the number of Subscription

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Rights to which all beneficial owners in the aggregate otherwise would have been entitled had they been direct holders of our common stock on the Record Date, provided that you, as a nominee record holder, make a proper showing to the Subscription Agent by submitting the form entitled "Nominee Holder Certification," which is provided with your Rights Offering materials. If you did not receive this form, you should contact our Subscription Agent to request a copy.

Validity of Subscriptions

We will resolve all questions regarding the validity and form of the exercise of your Subscription Rights, including time of receipt and eligibility to participate in the Rights Offering. Our determination will be final and binding. Once made, subscriptions are irrevocable; we will not accept any alternative, conditional, or contingent subscriptions. We reserve the absolute right to reject any subscriptions not properly submitted or the acceptance of which would be unlawful. You must resolve any irregularities in connection with your subscriptions before the expiration date of the Rights Offering, unless we waive them in our sole discretion. Neither we nor the Subscription Agent is under any duty to notify you or your representative of defects in your subscriptions. A subscription will be considered accepted, subject to our right to withdraw or terminate the Rights Offering, only when the Subscription Agent receives a properly completed and duly executed Subscription Rights Statement and any other required documents and the full subscription payment. Our interpretations of the terms and conditions of the Rights Offering will be final and binding.

Stockholder Rights

You will have no rights as a holder of the shares of our common stock you purchase in the Rights Offering until shares are issued in book-entry form or your account at your broker, dealer, bank, or other nominee is credited with the shares of our common stock purchased in the Rights Offering. Holders of Warrants issued in connection with the Rights Offering will not have rights as holders of our common stock until such Warrants are exercised and the shares of common stock underlying the Warrants are issued to the holder.

Foreign Shareholders

We will not mail this prospectus or Subscription Rights Statements to shareholders with addresses that are outside the United States or that have an army post office or foreign post office address. The Subscription Agent will hold these Subscription Rights Statements for their account. To exercise Subscription Rights, our foreign shareholders must notify the Subscription Agent prior 5:00 PM Eastern Time, on July 26, 2016, the third business day prior to the expiration date, of your exercise of Subscription Rights and provide evidence satisfactory to us, such as a legal opinion from local counsel, that the exercise of such Subscription Rights does not violate the laws of the jurisdiction in which such shareholder resides and payment by a U.S. bank in U.S. dollars before the expiration of the offer. If no notice is received by such time or the evidence presented is not satisfactory to us, the Subscription Rights represented thereby will expire.

No Revocation or Change

Once you submit the Subscription Rights Statement or have instructed your nominee of your subscription request, you are not allowed to revoke or change the exercise or request a refund of monies paid. All exercises of Subscription Rights are irrevocable, even if you learn information about us that you consider to be unfavorable. You should not exercise your Subscription Rights unless you are certain that you wish to purchase shares at the Subscription Price.

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U.S. Federal Income Tax Treatment of Rights Distribution

For U.S. federal income tax purposes, we do not believe holders of shares of our common stock or warrants should recognize income or loss upon receipt or exercise of a Subscription Right. See "Material U.S. Federal Income Tax Consequences."

No Recommendation to Rights Holders

Our board of directors is not making a recommendation regarding your exercise of the Subscription Rights. Stockholders who exercise Subscription Rights risk investment loss on money invested. We cannot assure you that the market price of our common stock will reach or exceed the Subscription Price, and even if it does so, that it will not decline during or after the Rights Offering. We also cannot assure you that you will be able to sell shares of our common stock or Warrants purchased in the Rights Offering at a price equal to or greater than the Subscription Price. You should make your investment decision based on your assessment of our business and financial condition, our prospects for the future and the terms of this Rights Offering. Please see "Risk Factors" for a discussion of some of the risks involved in investing in our common stock.

Fees and Expenses

We will pay all fees charged by the Subscription Agent and by the dealer-manager. You are responsible for paying any other commissions, fees, taxes or other expenses incurred in connection with the exercise of your Subscription Rights.

Listing

The Subscription Rights may not be sold, transferred, assigned or given away to anyone, and will not be listed for trading on any stock exchange or market. We have applied to have the Warrants listed for trading on NASDAQ under the symbol "ONTXW," however, there is no assurance that a sufficient number of Subscription Rights will be exercised so that the Warrants will meet the minimum listing criteria to be accepted for listing on NASDAQ. The shares of our common stock, including the shares to be issued in the Rights Offering and the shares underlying the Warrants and any Pre-Funded Warrants to be issued in the Rights Offering, are traded on NASDAQ under the symbol "ONTX." The Pre-Funded Warrants will not be listed for trading on any stock exchange or market.

Important

Do not send Subscription Rights Statements directly to us. You are responsible for choosing the payment and delivery method for your Subscription Rights Statement and you bear the risks associated with such delivery. If you choose to deliver your Subscription Rights Statement and payment by mail, we recommend that you use registered mail, properly insured, with return receipt requested. We also recommend that you allow a sufficient number of days to ensure delivery to the Subscription Agent prior to the expiration time.

Distribution Arrangements

Maxim Group LLC is the dealer-manager for the Rights Offering. The dealer-manager will provide marketing assistance and advice to us in connection with the Rights Offering and will use its best efforts to solicit the exercise of Subscription Rights and participation in the Over-Subscription Privilege. The dealer-manager is not underwriting or placing any of the Subscription Rights or the Units, shares of common stock or Warrants to be issued in the Rights Offering, and does not make any recommendation with respect to such Subscription Rights (including with respect to the exercise or expiration of such Subscription Rights), Units, shares of common stock or Warrants. We have agreed to pay the dealer-manager certain fees and to reimburse the dealer-manager for certain out-of-pocket expenses incurred in connection with this offering. See "Plan of Distribution" for a discussion of the fees and expenses to be paid to the dealer-manager in connection with this Rights Offering.

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MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES

The following discussion is a summary of material U.S. federal income tax consequences relating to the receipt and exercise (or expiration) of the Subscription Rights acquired through the Rights Offering and the ownership and disposition of shares of our common stock and Warrants received upon exercise of the Subscription Rights, Pre-Funded Warrants or Warrants.

This summary deals only with Subscription Rights acquired through the Rights Offering, shares of our common stock, Pre-Funded Warrants and Warrants acquired upon exercise of Subscription Rights and shares of our common stock acquired upon exercise of the Pre-Funded Warrants or Warrants, in each case, that are held as capital assets by a beneficial owner. This discussion does not address all aspects of U.S. federal income taxation that may be relevant to such a beneficial owner in light of their personal circumstances, including the alternative minimum tax and the Medicare contribution tax on investment income. This discussion also does not address tax consequences to holders that may be subject to special tax rules, including, without limitation, insurance companies, real estate investment trusts, regulated investment companies, grantor trusts, tax-exempt organizations, employee stock purchase plans, partnerships and other pass-through entities, persons holding Subscription Rights, shares of our common stock, participating warrants, Pre-Funded Warrants or Warrants as part of a hedging, integrated, conversion or constructive sale transaction or a straddle, financial institutions, brokers, dealers in securities or currencies, traders that elect to mark-to-market their securities, persons that acquired Subscription Rights, shares of our common stock, participating warrants, Pre-Funded Warrants or Warrants in connection with employment or other performance of services, U.S. Holders (as defined below) that have a functional currency other than the U.S. dollar, U.S. expatriates, and certain former citizens or residents of the United States. In addition, the discussion does not describe any tax consequences arising out of the tax laws of any state, local or foreign jurisdiction, or any U.S. federal tax considerations other than income taxation (such as estate, generation skipping or gift taxation).

The discussion below is based upon the provisions of the Internal Revenue Code of 1986, as amended, or the Code, the United States Treasury regulations promulgated thereunder, rulings and judicial decisions, as of the date hereof, and such authorities may be repealed, revoked or modified, perhaps retroactively. We have not sought, and will not seek, any rulings from the Internal Revenue Service, or the IRS, regarding the matters discussed below. There can be no assurance that the IRS or a court (if the matter were contested) will not take positions concerning the tax consequences of the receipt of Subscription Rights acquired through the Rights Offering by persons holding shares of our common stock or participating warrants, the exercise (or expiration) of the Subscription Rights, the acquisition, ownership and disposition of shares of our common stock and the acquisition, ownership and disposition (or expiration) of Pre-Funded Warrants or Warrants acquired upon exercise of the Subscription Rights that are different from those discussed below.

As used herein, a "U.S. Holder" means a beneficial owner of shares of our common stock, participating warrants, Subscription Rights, shares of our common stock, Pre-Funded Warrants and Warrants acquired upon exercise of Subscription Rights or shares of our common stock acquired upon exercise of Pre-Funded Warrants or Warrants, as the case may be, that is for U.S. federal income tax purposes: (1) an individual who is a citizen or resident of the United States; (2) a corporation (or other entity treated as a corporation for U.S. federal income tax purposes) created or organized in or under the laws of the United States or any state thereof or the District of Columbia; (3) an estate the income of which is subject to U.S. federal income taxation regardless of its source; or (4) a trust (a) the administration of which is subject to the primary supervision of a court within the United States and one or more United States persons as described in Section 7701(a)(30) of the Code have authority to control all substantial decisions of the trust or (b) that has a valid election under the Treasury Regulations in effect to be treated as a United States person. A "Non-U.S. Holder" is such a beneficial

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owner (other than an entity or arrangement that is treated as a partnership for U.S. federal income tax purposes) that is not a U.S. Holder.

If any entity or arrangement that is treated as a partnership for U.S. federal income tax purposes is the record owner, the U.S. federal income tax treatment of a partner generally will depend upon the status of the partner and the activities of the partnership. Holders that are partnerships (and partners in such partnerships) are urged to consult their own tax advisors.

HOLDERS OF SHARES OF OUR COMMON STOCK AND PARTICIPATING WARRANTS SHOULD CONSULT THEIR OWN TAX ADVISORS REGARDING THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO THEIR PARTICULAR SITUATIONS AND THE CONSEQUENCES UNDER FEDERAL ESTATE AND GIFT TAX LAWS, FOREIGN, STATE AND LOCAL LAWS AND TAX TREATIES OF THE RECEIPT, OWNERSHIP AND EXERCISE OF SUBSCRIPTION RIGHTS AND THE ACQUISITION, OWNERSHIP AND DISPOSITION OF SHARES OF OUR COMMON STOCK, PRE-FUNDED WARRANTS AND WARRANTS ACQUIRED UPON EXERCISE OF SUBSCRIPTION RIGHTS AND SHARES OF OUR COMMON STOCK ACQUIRED UPON EXERCISE OF PRE-FUNDED WARRANTS OR WARRANTS.

Tax Treatment of Pre-Funded Warrants

Any person that elects to receive Pre-Funded Warrants in lieu of our common stock upon the exercise of Subscription Rights should consult their own tax advisor regarding the application of the U.S. federal income tax laws to their particular situation.

Tax Consequences to U.S. Holders

Taxation of Subscription Rights

Receipt of Subscription Rights

Although the authorities governing transactions such as this Rights Offering are complex and do not speak directly to the consequences of certain aspects of this Rights Offering, including the inclusion of the right to purchase Pre-Funded Warrants and Warrants in the Subscription Rights (rather than the right to purchase only shares of our common stock), the distribution of Subscription Rights to participating warrant holders and the effects of the Over-Subscription Privilege, we do not believe your receipt of Subscription Rights pursuant to the Rights Offering should be treated as a taxable distribution with respect to your existing shares of common stock or participating warrants for U.S. federal income tax purposes. Pursuant to Section 305(a) of the Code, in general, the receipt by a shareholder or a participating warrant holder of a right to acquire stock or warrants should not be included in the taxable income of the recipient. The general rule of non-recognition in Section 305(a) is subject to exceptions in Section 305(b), which include "disproportionate distributions." A disproportionate distribution is a distribution or a series of distributions, including deemed distributions, that has the effect of the receipt of cash or other property by some shareholders and an increase in the proportionate interest of other shareholders in a corporation's assets or earnings and profits. During the last 36 months, we have not made any distributions of cash or non-stock property with respect to: (i) our common stock or (ii) our options or warrants to acquire common stock. Currently we do not intend to make any future distributions of cash or non-stock property with respect to: (i) our common stock or (ii) our options or warrants to acquire common stock; however, there is no guarantee that we will not make such distributions in the future.

Our position regarding the tax-free treatment of the Subscription Rights distribution is not binding on the IRS or the courts. If this position is finally determined by the IRS or a court to be incorrect, whether on the basis that the issuance of the Subscription Rights is a "disproportionate distribution" or

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otherwise, the fair market value of the Subscription Rights would be taxable to holders of our common stock as a dividend to the extent of the holder's pro rata share of our current and accumulated earnings and profits, if any, with any excess being treated as a return of capital to the extent thereof and then as capital gain. Although no assurance can be given, it is anticipated that we will not have current and accumulated earnings and profits through the end of 2016. Further, if our position is incorrect, the treatment of holders of participating warrants may differ from the treatment of the Subscription Rights distribution to the holders of our common stock. The participating warrant holders may be treated in a manner similar to holders of our common stock but it is possible that they may be subject to different and adverse U.S. federal income tax consequences.

The following discussion is based upon the treatment of the Subscription Rights issuance as a non-taxable distribution with respect to your existing shares of common stock or participating warrants for U.S. federal income tax purposes.

Tax Basis in the Subscription Rights

If the fair market value of the Subscription Rights you receive is less than 15% of the fair market value of your existing shares of common stock or participating warrants (with respect to which the Subscription Rights are distributed) on the date you receive the Subscription Rights, the Subscription Rights will be allocated a zero dollar basis for U.S. federal income tax purposes, unless you elect to allocate your basis in your existing shares of common stock or participating warrants between your existing shares of common stock or participating warrants and the Subscription Rights in proportion to the relative fair market values of the existing shares of common stock or participating warrants and the Subscription Rights, determined on the date of receipt of the Subscription Rights. If you choose to allocate basis between your existing common shares or participating warrants and the Subscription Rights, you must make this election on a statement included with your timely filed tax return (including extensions) for the taxable year in which you receive the Subscription Rights. Such an election is irrevocable.

However, if the fair market value of the Subscription Rights you receive is 15% or more of the fair market value of your existing shares of common stock or participating warrants on the date you receive the Subscription Rights, then you must allocate your basis in your existing shares of common stock or participating warrants between those shares or participating warrants and the Subscription Rights you receive in proportion to their fair market values determined on the date you receive the Subscription Rights.

The fair market value of the Subscription Rights on the date that the Subscription Rights are distributed is uncertain, and we have not obtained, and do not intend to obtain, an appraisal of the fair market value of the Subscription Rights on that date. In determining the fair market value of the Subscription Rights, you should consider all relevant facts and circumstances, including any difference between the Subscription Price of the Subscription Rights and the trading price of our shares of common stock on the date that the Subscription Rights are distributed, the exercise price of the Warrants, the length of the period during which the Subscription Rights may be exercised and the fact that the Subscription Rights are non-transferable.

Exercise of Subscription Rights

Generally, you will not recognize gain or loss upon the effectiveness of the exercise of a Subscription Right in the Rights Offering. Your adjusted tax basis, if any, in the Subscription Right plus the Subscription Price should be allocated between the new common stock and Warrant acquired upon exercise of the Subscription Right. The basis in the stock or participating warrants upon which the Subscriptions Rights were issued which is allocated to the Subscription Rights under the prior section entitled "Tax Basis in the Subscription Rights" would be further allocated between the new common

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stock and the Warrant acquired upon exercise of the Subscription Right in proportion to their relative fair market values on the date the Subscription Rights were distributed. The Subscription Price should be allocated between the new common stock and Warrant acquired upon exercise of the Subscription Right in proportion to their relative fair market values on the exercise date. These allocations will establish your initial tax basis for U.S. federal income tax purposes in your new common stock and Warrants. The holding period of shares of common stock or a Warrant acquired upon exercise of a Subscription Right in the Rights Offering will begin on the date of exercise.

If you exercise a Subscription Right received in the Rights Offering after disposing of the shares of our common stock or participating warrants with respect to which such Subscription Right is received, then certain aspects of the tax treatment of the exercise of the Subscription Right are unclear, including (1) the allocation of the tax basis between the shares of common stock or participating warrants previously sold and the Subscription Right, (2) the impact of such allocation on the amount and timing of gain or loss recognized with respect to the shares of our common stock or participating warrants previously sold and (3) the impact of such allocation on the tax basis of the shares of our common stock and Warrants acquired upon exercise of the Subscription Right. If you exercise a Subscription Right received in the Rights Offering after disposing of shares of our common stock or participating warrants with respect to which the Subscription Right is received, you should consult with your own tax advisor.

Expiration of Subscription Rights

If you allow Subscription Rights received in the Rights Offering to expire, you should not recognize any gain or loss for U.S. federal income tax purposes, and you should re-allocate any portion of the tax basis in your existing common stock or participating warrants previously allocated to the Subscription Rights that have expired to the existing common stock or participating warrants.

Taxation of Warrants

Sale, Exchange, Redemption or other Taxable Disposition of Warrants

Upon the sale, exchange, redemption or other taxable disposition of a Warrant, in general, you will recognize taxable gain or loss measured by the difference, if any, between (i) the amount of cash and the fair market value of any property received upon such taxable disposition and (ii) your adjusted tax basis in the Warrant as determined pursuant to the rules discussed above. Your gain or loss generally will be capital gain or loss and generally will be long-term capital gain or loss if, at the time of the sale or other disposition, your holding period for the Warrant is more than one year. The deductibility of capital losses is subject to limitations.

Exercise of Warrants

Upon the exercise of a Warrant by paying the exercise price in cash, in general, you will not recognize gain or loss for U.S. federal income tax purposes, except to the extent you receive a cash payment for any such fractional share that would otherwise have been issuable upon exercise of the Warrant. Your initial tax basis in common stock received will equal your adjusted tax basis in the Warrant exercised (as determined pursuant to the rules discussed above), increased by the amount of cash paid to exercise the Warrant and decreased by the adjusted tax basis allocable to any fractional share that would otherwise have been issuable upon exercise of the Warrant. Your holding period for the shares of our common stock received on exercise generally will commence on the day of exercise.

In certain circumstances, namely during any period when a registration statement for the exercise of the Warrants is not in effect, the Warrants will be exercisable on a cashless basis. The tax consequences of a cashless exercise are not clear and could differ from the consequences described

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above, including the possibility that a cashless exercise could be a taxable event. You should consult your own tax advisor regarding the tax consequences of a cashless exercise of a Warrant.

Expiration of Warrants

If you allow a Warrant to expire, you will generally recognize a loss for U.S. federal income tax purposes equal to your adjusted tax basis in the Warrant. In general, such a loss will be a capital loss and will be a short-term or long-term capital loss depending on your holding period for the Warrant.

Certain Adjustments to the Warrants

Under Section 305 of the Code, an adjustment to the number of common shares that will be issued on the exercise of the Warrants, or an adjustment to the exercise price of the Warrants, may be treated as a constructive distribution to you if, and to the extent that, such adjustment has the effect of increasing your proportionate interest in our earnings and profits or assets, depending on the circumstances of such adjustment (for example, if such adjustment is to compensate for a distribution of cash or other property to our shareholders). Adjustments to the exercise price of Warrants made pursuant to a bona fide reasonable adjustment formula that has the effect of preventing dilution of the interest of the holders of the Warrants should generally not be considered to result in a constructive distribution. Any such constructive distribution would be taxable whether or not there is an actual distribution of cash or other property. See the more detailed discussion of the rules applicable to distributions made by us under the heading "Taxation of Common Stock Distributions" below.

Taxation of Common Stock

Distributions

Distributions with respect to shares of our common stock acquired upon exercise of Subscription Rights or upon exercise of Warrants will be taxable as dividend income when actually or constructively received to the extent of our current or accumulated earnings and profits as determined for U.S. federal income tax purposes.

Dividend income received by certain non-corporate U.S. Holders with respect to shares of our common stock generally will be "qualified dividends" subject to preferential rates of U.S. federal income tax, provided that the U.S. Holder meets applicable holding period and other requirements. Subject to similar exceptions for short-term and hedged positions, dividend income on our shares of common stock paid to U.S. Holders that are domestic corporations generally will qualify for the dividends-received deduction. To the extent that the amount of a distribution exceeds our current and accumulated earnings and profits, such distribution will be treated first as a tax-free return of capital to the extent of your adjusted tax basis in such shares of our common stock and thereafter as capital gain.

Dispositions

If you sell or otherwise dispose of shares of common stock acquired upon exercise of Subscription Rights or upon exercise of Warrants in a taxable transaction, you will generally recognize capital gain or loss equal to the difference between the amount realized and your adjusted tax basis in the shares. Such capital gain or loss will be long-term capital gain or loss if your holding period for such shares is more than one year at the time of disposition. Long-term capital gain of a non-corporate U.S. Holder is generally taxed at preferential rates of U.S. federal income tax. The deductibility of capital losses is subject to limitations.

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Information Reporting and Backup Withholding

You may be subject to information reporting and/or backup withholding with respect to the gross proceeds from the disposition of Warrants, shares of our common stock acquired through the exercise of Subscription Rights or through the exercise of Warrants, or dividend payments. Backup withholding (currently at the rate of 28%) may apply under certain circumstances if you (1) fail to furnish your social security or other taxpayer identification number, or TIN, (2) furnish an incorrect TIN, (3) fail to report interest or dividends properly or (4) fail to provide a certified statement, signed under penalty of perjury, that the TIN provided is correct, that you are not subject to backup withholding and that you are a U.S. person for U.S. federal income tax purposes on IRS Form W-9. Any amount withheld from a payment under the backup withholding rules is allowable as a credit against (and may entitle you to a refund with respect to) your U.S. federal income tax liability, provided that the required information is timely furnished to the IRS. Certain persons are exempt from information reporting and backup withholding, including corporations and certain financial institutions, provided that they demonstrate this fact, if requested. You are urged to consult your own tax advisor as to your qualification for exemption from backup withholding and the procedure for obtaining such exemption.

Tax Consequences to Non-U.S. Holders

Taxation of the Subscription Rights

Receipt, Exercise and Expiration of the Subscription Rights

The discussion assumes that the receipt of Subscription Rights will be treated as a non-taxable distribution. See "Tax Consequences to U.S. Holders Taxation of Subscription Rights Receipt of Subscription Rights" above.

Exercise and Expiration of Warrants and Certain Adjustments to Warrants

Exercise of Warrants

In general, a Non-U.S. Holder will not recognize gain or loss for U.S. federal income tax purposes upon exercise of a Warrant, except to the extent the Non-U.S. Holder receives a cash payment for any such fractional share that would otherwise have been issuable upon exercise of the Warrant, which will be treated as a sale subject to the rules described under "Sale or Other Disposition of Common Stock or Warrants" below.

Expiration of Warrants

In general, a Non-U.S. Holder will not be able to utilize a loss recognized upon expiration of a Warrant against the Non-U.S. Holder's U.S. federal income tax liability unless the loss is effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if an income tax treaty so provides, is attributable to a permanent establishment in the United States) or is treated as a U.S.-source loss and the Non-U.S. Holder is present 183 days or more in the taxable year of disposition and certain other conditions are met.

Certain Adjustments to the Warrants

Under Section 305 of the Code, an adjustment to the number of common shares that will be issued on the exercise of the Warrants, or an adjustment to the exercise price of the Warrants, may be treated as a constructive distribution to a Non-U.S. Holder of the Warrants if, and to the extent that, such adjustment has the effect of increasing such Non-U.S. Holder's proportionate interest in our "earnings and profits" or assets, depending on the circumstances of such adjustment (for example, if such adjustment is to compensate for a distribution of cash or other property to our shareholders). Adjustments to the exercise price of Warrants made pursuant to a bona fide reasonable adjustment

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formula that has the effect of preventing dilution of the interest of the holders of the Warrants should generally not be considered to result in a constructive distribution. Any such constructive distribution would be taxable whether or not there is an actual distribution of cash or other property. See the more detailed discussion of the rules applicable to distributions made by us under the heading " Taxation of Distributions on Common Stock" below.

Taxation of Distributions on Common Stock

Any distributions of cash or property (including any adjustments to the Warrants described in the immediately preceding paragraph) made with respect to our common stock generally will be subject to withholding tax to the extent paid out of our current or accumulated earnings and profits as determined for U.S. federal income tax purposes, if any, at a rate of 30% (or a lower rate prescribed by an applicable income tax treaty). In order to obtain a reduced withholding tax rate, if applicable, you will be required to provide a properly completed IRS Form W-8BEN or IRS Form W-8BEN-E, as applicable, certifying your entitlement to benefits under a treaty. In addition, you will not be subject to withholding tax if you provide an IRS Form W-8ECI certifying that the distributions are effectively connected with your conduct of a trade or business within the United States (and, if an applicable income tax treaty so provides, are attributable to a permanent establishment within the United States); instead, you generally will be subject to U.S. federal income tax, net of certain deductions, with respect to such income at the same rates applicable to U.S. persons. If you are a corporation, a "branch profits tax" of 30% (or a lower rate prescribed by an applicable income tax treaty) also may apply to such effectively connected income.

Non-U.S. Holders may be required to periodically update their IRS Forms W-8.

Any distribution will also be subject to the discussion below under the heading "FATCA."

Sale or Other Disposition of Our Common Stock or Warrants

Subject to the discussion below regarding backup withholding and FATCA, you generally will not be subject to U.S. federal income tax on any gain realized on a sale or other disposition of shares of our common stock or Warrants unless:

the gain is effectively connected with your conduct of a trade or business within the United States (and, if an applicable income tax treaty so provides, is attributable to a permanent establishment in the United States);

you are an individual, you hold your Subscription Rights, shares of common stock or Warrants as capital assets, you are present in the United States for 183 days or more in the taxable year of disposition and certain other conditions are met (in which case you will be subject to a 30% tax, or such lower rate as may be specified by an applicable income tax treaty, on the net gain derived from the disposition, which may be offset by your U.S.-source capital losses, if any); or

we are or have been a "United States real property holding corporation," or USRPHC, for U.S. federal income tax purposes unless an exception for 5% or less shareholders applies.

Gain that is effectively connected with your conduct of a trade or business within the United States (and, if an applicable income tax treaty so provides, is attributable to a permanent establishment within the United States) generally will be subject to U.S. federal income tax, net of certain deductions, at the same rates applicable to U.S. persons. If you are a corporation, a "branch profits tax" of 30% (or a lower rate prescribed in an applicable income tax treaty) also may apply to such effectively connected gain.

A domestic corporation is treated as a USRPHC if the fair market value of its United States real property interests equals or exceeds 50% of the sum of (1) the fair market value of its United States

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real property interests, (2) the fair market value of its non-United States real property interests and (3) the fair market value of any other of its assets which are used or held for use in a trade or business. We believe that we are not currently, and have not been within the relevant testing period, a USRPHC. However, no assurance can be given that we will not become a USRPHC in the future. If we are a USRPHC or become a USRPHC in the future, a Non-U.S. Holder may still not be subject to U.S. federal income tax on a sale or other disposition if an exception for 5% or less shareholders applies. You are urged to consult your own tax advisor regarding the U.S. federal income tax considerations that could result if we are, or become, a USRPHC and with respect to the exception for 5% or less shareholders.

Information Reporting and Backup Withholding

Distributions on our common stock and the amount of tax withheld, if any, with respect to such distributions will generally be subject to information reporting. If you comply with certification procedures to establish that you are not a United States person, additional information reporting and backup withholding should not generally apply to distributions on our common stock and information reporting and backup withholding should not generally apply to the proceeds from a sale or other disposition of Warrants or shares of our common stock. Generally, a Non-U.S. Holder will comply with such procedures if it provides a properly executed IRS Form W-8BEN or W-8BEN-E, as applicable, (or other applicable IRS Form W-8) or otherwise meets documentary evidence requirements for establishing that it is a Non-U.S. Holder, or otherwise establishes an exemption. The amount of any backup withholding will generally be allowed as a refund or credit against your U.S. federal income tax liability, provided that the required information is timely furnished to the IRS.

FATCA

Payments of dividends on our common stock to a Non-U.S. Holder will be subject to a 30% withholding tax if the Non-U.S. Holder fails to provide the withholding agent with documentation sufficient to show that it is compliant with FATCA. Generally such documentation is provided on an executed and properly completed IRS Form W-8BEN or IRS Form W-8BEN-E, as applicable. If dividends are subject to the 30% withholding tax under FATCA, they will not be subject to the 30% withholding tax described above under "Tax Consequences to Non-U.S. Holders Taxation of Distributions on Common Stock." Starting in 2019, payments of the gross proceeds from a sale or exchange of our common stock or other securities may also be subject to FATCA withholding absent proof of FATCA compliance prior to January 1, 2019.

THE PRECEDING DISCUSSION OF MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES IS NOT TAX ADVICE. HOLDERS OF SUBSCRIPTION RIGHTS, SHARES OF OUR COMMON STOCK AND PARTICIPATING WARRANTS SHOULD CONSULT THEIR OWN TAX ADVISORS REGARDING THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO THEIR PARTICULAR SITUATIONS AND THE CONSEQUENCES UNDER FEDERAL ESTATE AND GIFT TAX LAWS, FOREIGN, STATE AND LOCAL LAWS AND TAX TREATIES OF THE RECEIPT, OWNERSHIP AND EXERCISE OF SUBSCRIPTION RIGHTS AND THE ACQUISITION, OWNERSHIP AND DISPOSITION OF SHARES OF OUR COMMON STOCK, PRE-FUNDED WARRANTS AND WARRANTS ACQUIRED UPON EXERCISE OF SUBSCRIPTION RIGHTS AND SHARES OF OUR COMMON STOCK ACQUIRED UPON EXERCISE OF PRE-FUNDED WARRANTS OR WARRANTS.

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DESCRIPTION OF SECURITIES

Our authorized capital stock consists of 25,000,000 shares of common stock, par value \$0.01 per share, and 5,000,000 shares of preferred stock, par value \$0.01 per share. On July 7, 2016, 2,740,615 shares of our common stock were outstanding, 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 our 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 our common stock are entitled to one vote for each share on all matters voted on by stockholders, including the election of directors. Holders of our 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 our 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 our 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 our 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.

Warrants

Tradable Warrants Included in Units Issuable in the Rights Offering

The Warrants to be issued as a part of this Rights Offering will be separately transferable following their issuance and through their expiration five years from the date of issuance. The Warrants entitle the holder to purchase one share of common stock at an exercise price of \$5.88 per share, 120% of the per Unit price, from the date of issuance through its expiration five years after the date of issuance. We have applied to list the Warrants for trading on NASDAQ under the symbol "ONTXW," however, there is no assurance that a sufficient number of Subscription Rights will be exercised so that the Warrants will meet the minimum listing criteria to be accepted for listing on NASDAQ. The common stock underlying the Warrants, upon issuance, will also be traded on NASDAQ under the symbol "ONTX."

All Warrants that are purchased in the Rights Offering as part of the Units will be issued in book-entry, or uncertificated, form meaning that you will receive a direct registration (DRS) account statement from our transfer agent reflecting ownership of Warrants if you are a holder of record of shares or warrants. The Subscription Agent will arrange for the issuance of the Warrants as soon as

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practicable after the expiration of the Rights Offering, payment for the Units subscribed for has cleared, and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected. If you hold your shares of common stock in the name of a custodian bank, broker, dealer, or other nominee, DTC will credit your account with your nominee with the Warrants you purchased in the Rights Offering.

The Warrants will be exercisable by paying the exercise price in cash, or, solely during any period when a registration statement for the exercise of the Warrants is not in effect, exercisable on a cashless basis.

The exercise price of the Warrants and the number of shares of common stock issuable upon exercise of the Warrants are subject to adjustment in certain circumstances, including a stock split of, stock dividend on, or a subdivision, combination or recapitalization of the common stock.

Except as described below, a holder may not exercise any portion of the Warrant to the extent that the holder would beneficially own more than 4.99% of our outstanding common stock 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 stock after exercising the holder's Warrants up to 9.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Warrants. The foregoing limitation on exercise does not apply to any holder who beneficially owns in excess of 4.99% of our outstanding common stock immediately prior to the Rights Offering.

No public market currently exists for the Warrants. We have applied to list the Warrants on NASDAQ under the symbol "ONTXW," although there is no assurance that a sufficient number of Subscription Rights will be exercised so that the Warrants will meet the minimum listing criteria to be accepted for listing on NASDAQ. Even if the Warrants are listed on NASDAQ, an active public market for the Warrants may not be developed or sustained. Without an active trading market, the liquidity of the Warrants will be limited.

Subject to applicable laws and the restriction on transfer set forth in the warrant, 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.

After the one-year anniversary of issuance, we may redeem the Warrants for \$0.001 per Warrant if our common stock is above \$14.70 per share, 250% of the exercise price, for each of 10 consecutive trading days.

The Warrants do not confer upon the holder any voting or any other rights of a shareholder of the Company. Upon notice to the Warrants holders, we have the right at any time and from time to time, to reduce the exercise price or to extend the Warrants termination date.

The Warrants will be issued pursuant to a warrant agreement by and between us and Wells Fargo Bank, N.A., as the warrant agent.

Pre-Funded Warrants Issuable in Lieu of Common Stock in the Rights Offering

Any Pre-Funded Warrants issued as a part of this Rights Offering will be separately transferable following their issuance and through their expiration five years from the date of issuance. The Pre-Funded Warrants entitle the holder to purchase one share of common stock at an exercise price of \$0.01 per share, and the subscription price per Unit for any such electing investors will be reduced to \$4.89 (which equals the Subscription Price for the other Units sold in the Rights Offering, less the \$0.01 exercise price for each Pre-Funded Warrant). Each Pre-Funded Warrant will be exercisable from the date of issuance through its expiration seven years after the date of issuance. The Pre-Funded Warrants will not be listed for trading on any stock exchange or market.

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Any Pre-Funded Warrants that are purchased in the Rights Offering as part of the Units will be issued in physical form. We will arrange for the issuance of the Pre-Funded Warrants as soon as practicable after the expiration of the Rights Offering, payment for the Units subscribed for has cleared, and all prorating calculations and reductions contemplated by the terms of the Rights Offering have been effected.

The Pre-Funded Warrants will be exercisable by paying the exercise price in cash or on a cashless basis. The exercise price of the Pre-Funded Warrants and the number of shares of common stock issuable upon exercise of the Pre-Funded Warrants are subject to adjustment in certain circumstances, including a stock split of, stock dividend on, or a subdivision, combination or recapitalization of the common stock.

A holder may not exercise any portion of the Pre-Funded Warrant to the extent that the holder would beneficially own more than 4.99% of our outstanding common stock 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 stock after exercising the holder's Pre-Funded Warrant up to 9.99% of the number of shares of our 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 Warrant.

Subject to applicable laws, the pre-funded warrants may be offered for sale, sold, transferred or assigned without our consent.

The Pre-Funded Warrants do not confer upon the holder any voting or any other rights of a shareholder of the Company.

Other Currently Outstanding Warrants

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-ten reverse stock split effective May 31, 2016. 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.

Prior to our initial public offering, in connection with a credit facility, we issued a warrant to purchase 6,128 shares of Series G convertible preferred stock in June 2009. The warrant was immediately exercisable upon issuance and expires on July 30, 2016. Following the consummation of our initial public offering and the conversion of our Series G convertible preferred stock into shares of

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common stock in July 2013, and subsequent adjustments pursuant to the adjustment provisions set forth in that warrant, after our one-for-ten reverse stock split on May 31, 2016, the warrant was exercisable for approximately 582 shares of common stock at an exercise price per share of approximately \$103.08.

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.

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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 our 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;

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.

Transfer Agent

The transfer agent and registrar for our common stock is Wells Fargo Bank, N.A.

Listing

Our common stock is listed on the Nasdaq Capital Market under the symbol "ONTX."

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PLAN OF DISTRIBUTION

On or about July 8, 2016, we will distribute the Subscription Rights, Subscription Rights Statements and copies of this prospectus to the holders of our common stock and participating warrants on the Record Date. Subscription Rights holders who wish to exercise their Subscription Rights and purchase Units must complete the Subscription Rights Statement and return it with payment for the shares to the Subscription Agent at the following address:

By Mail:

**Wells Fargo Bank, N.A.
Shareowner Services
Voluntary Corporate Actions
P.O. Box 64858
St. Paul, Minnesota 55164-0858**

By Hand or Overnight Courier:

**Wells Fargo Bank, N.A.
Shareowner Services
Voluntary Corporate Actions
1110 Centre Pointe Curve, Suite 101
Mendota Heights, Minnesota 55120**

See "The Rights Offering Methods for Exercising Subscription Rights."

If you have any questions, you should contact the dealer-manager for the Rights Offering:

**Maxim Group LLC
405 Lexington Avenue
New York, New York 10174
Attention Syndicate Department
Email: syndicate@maximgrp.com
Telephone: (212) 895-3745**

Other than as described in this prospectus, we do not know of any existing agreements between any shareholder, broker, dealer, underwriter or agent relating to the sale or distribution of the underlying common stock.

Maxim Group LLC is the dealer-manager of this Rights Offering. We and Maxim may introduce one or more co-dealer-managers and one or more financial advisors to assist in the Rights Offering. In any such event, Maxim Group LLC will be the lead dealer-manager. In such capacity, the dealer-manager will provide marketing assistance and advice to us in connection with this offering and will solicit the exercise of Subscription Rights and participation in the Over-Subscription Privilege. The dealer-manager is not underwriting or placing any of the Subscription Rights or the Units, shares of common stock, Warrants or Pre-Funded Warrants being issued in this offering, and does not make any recommendation with respect to such Subscription Rights (including with respect to the exercise or expiration of such Subscription Rights), Units, shares of common stock, Warrants or Pre-Funded Warrants.

In connection with this Rights Offering, we have agreed to pay to the dealer-manager a cash fee equal to (a) 4.5% of the dollar amount of the Units sold to any holders of Subscription Rights who were beneficial owners of shares of our common stock prior to July 30, 2013, and (b) 8.0% of the dollar amount of the Units sold to any other holders of Subscription Rights. We will provide to the dealer-manager upon completion of the Rights Offering a non-accountable expense allowance equal to the lesser of \$100,000 or 3% of the gross proceeds of the Rights Offering for expenses incurred in

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connection with the Rights Offering. We advanced \$30,000 against out-of-pocket accountable expenses to Maxim Group LLC upon its engagement as a dealer-manager; provided that Maxim Group LLC will promptly reimburse to us (i) any portion of the advance not used for actual out-of-pocket expenses, if the Rights Offering is not completed, and (ii) the full amount of the advance, if the Rights Offering is completed.

From the Record Date until 90 days after the closing of the Rights Offering, we have agreed not to issue, agree to issue or announce the issuance of any shares of common stock or common stock equivalents without the consent of the dealer-manager, subject to certain exceptions including a pre-existing agreement, equity awards, conversion of derivative securities and in connection with any acquisitions, partnerships or strategic transactions.

We have also agreed to indemnify the dealer-manager and its respective affiliates against certain liabilities arising under the Securities Act. The dealer-manager's participation in this offering is subject to customary conditions contained in the dealer-manager agreement, including the receipt by the dealer-manager of an opinion of our counsel. The dealer-manager and its affiliates may provide to us from time to time in the future in the ordinary course of their business certain financial advisory, investment banking and other services for which they will be entitled to receive fees.

Maxim Group LLC is a broker-dealer and member of the Financial Industry Regulatory Authority, Inc. The principal business address of Maxim Group LLC is 405 Lexington Avenue, New York, New York 10174.

EXPERTS

The consolidated financial statements of Onconova Therapeutics, Inc. appearing in Onconova Therapeutics, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2015 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 consolidated 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 shares of common stock offered hereby and certain other legal matters will be passed upon for us by Pepper Hamilton LLP, Philadelphia, Pennsylvania.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the Securities and Exchange Commission, or "SEC." You may read and copy any documents we file with the SEC at the SEC's Public Reference Room at 100 F Street, NE, Washington, D.C. 20549. You may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. In addition, our filings with the SEC are available to the public through the SEC's Internet site at <http://www.sec.gov>. Information about us is also available on our website at <http://www.onconova.com>. This URL and the SEC's URL above are intended to be inactive textual references only. The information on the SEC's website and our website is not part of, and is not incorporated into, this prospectus.

We have filed a registration statement covering our shares of common stock subject to this offering, of which this prospectus forms a part. This prospectus, however, does not contain all of the information set forth in the registration statement and the exhibits to the registration statement. For

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further information concerning us and the securities we may offer and sell, you should read the entire registration statement and the exhibits to the registration statement. The registration statement has been filed electronically and may be obtained in any manner listed above. Any statements contained in this prospectus concerning the provisions of any document are not necessarily complete, and, in each instance, reference is made to the copy of such document filed as an exhibit to the registration statement or otherwise filed with the SEC. Each such statement is qualified in its entirety by such reference.

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. We incorporate by reference the documents listed below:

Our Annual Report on Form 10-K for the fiscal year ended December 31, 2015, which we filed with the SEC on March 28, 2016;

Our Definitive Proxy Statement on Schedule 14A for our 2016 Annual Meeting of Stockholders held May 18, 2016, which we filed with the SEC on April 13, 2016;

Our Quarterly Report on Form 10-Q for the fiscal period ended March 31, 2016, which we filed with the SEC on May 11, 2016;

Our current reports on Form 8-K filed with the SEC on January 6, 2016, February 4, 2016, February 17, 2016, March 9, 2016, May 23, 2016 and May 31, 2016;

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) 759-3036, Attention: Benjamin Hoffman.

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.

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PROSPECTUS

**Subscription Rights to Purchase Up to 4,256,186 Units
Consisting of an Aggregate of Up to 4,256,186 Shares of Common Stock
and Warrants to Purchase Up to 3,192,140 Shares of Common Stock
at a Subscription Price of \$4.90 Per Unit**

Dealer-Manager

Maxim Group LLC

July 7, 2016
