
UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORMS-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

PHIO PHARMACEUTICALS CORP.

(Exact name of Registrant as specified in its charter)

Delaware
*(State or other jurisdiction of
incorporation or organization)*

2834
*(Primary Standard Industrial
Classification Code Number)*

45-3215903
*(I.R.S. Employer
Identification Number)*

**257 Simarano Drive, Suite 101
Marlborough, Massachusetts 01752
(508) 767-3861**

(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

**Gerrit Dispersyn, Dr. Med. Sc.
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Approximate date of commencement of proposed sale to the public:
As soon as practicable after the effective date of this Registration Statement.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box.

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

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

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer
 Non-accelerated filer Smaller reporting company
 Emerging growth company

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

Title of each class of securities to be registered ⁽¹⁾	Proposed maximum aggregate offering price ⁽¹⁾⁽²⁾	Amount of registration fee
Units comprised of shares of common stock, par value \$0.0001 per share, and warrants to purchase common stock ⁽³⁾	\$ 10,000,000	\$ 1,298.00
(i) Shares of common stock included in the units ⁽⁴⁾		
(ii) Warrants to purchase common stock included in the units ⁽⁴⁾		
Pre-funded units comprised of pre-funded warrants and warrants to purchase common stock ⁽³⁾	10,000,000	1,298.00
(i) Pre-funded warrants to purchase common stock included in the units ⁽⁴⁾		
(ii) Warrants to purchase common stock included in the units ⁽⁴⁾		
Shares of common stock issuable upon exercise of warrants ⁽³⁾	10,000,000	1,298.00
Shares of common stock issuable on conversion of pre-funded warrants ⁽³⁾	100,000	12.98
Underwriter’s warrants to purchase common stock ⁽⁵⁾		
Shares of common stock issuable upon exercise of underwriter’s warrants ⁽⁶⁾	937,500	121.69
Total	\$ 31,037,500	\$ 4,028.67

(1) Estimated solely for the purpose of computing the amount of the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended (the “Securities Act”).

(2) Pursuant to Rule 416 under the Securities Act, the shares of common stock registered hereby also include an indeterminate number of additional shares of common stock as may, from time to time, become issuable by reason of stock splits, stock dividends, recapitalizations or other similar transactions.

(3) The proposed maximum aggregate offering price of the units proposed to be sold in the offering will be reduced on a dollar-for-dollar basis based on the offering price of any pre-funded units offered and sold in the offering, and as such the proposed maximum aggregate offering price of the units and pre-funded units (including the common stock issuable upon exercise of the pre-funded warrants included in the pre-funded units), if any, is \$10,000,000.

(4) No separate fee is required pursuant to Rule 457(i) under the Securities Act.

(5) No separate fee is required pursuant to Rule 457(g) under the Securities Act.

(6) Represents warrants to purchase a number of shares of common stock equal to 7.5% of the number of shares of common stock (i) included within the units and (ii) issuable upon the exercise of the pre-funded warrants included within the pre-funded units placed in this offering at an exercise price equal to 125% of the offering price per unit (excluding any shares of common stock underlying the warrants included in the units and the pre-funded units sold in this offering).

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

The information in this preliminary prospectus is not complete and may be changed. These securities may not be sold until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities, and it is not soliciting an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to completion, dated October 1, 2019

Preliminary Prospectus



Up to **Units (each Unit consisting of one share of Common Stock and one Warrant to purchase one share of Common Stock)**

Up to **Pre-funded Units (each Pre-funded Unit consisting of one Pre-funded Warrant to Purchase one share of Common Stock and one Warrant to purchase one share of Common Stock)**

Shares of Common Stock Underlying the Pre-funded Warrants and

Shares of Common Stock Underlying the Warrants

We are offering up to units (each unit consisting of one share of common stock and one warrant to purchase one share of our common stock) at a public offering price of \$ per unit. Each warrant included in the units has a per share exercise price of \$.

We are also offering to those purchasers whose purchase of units in this offering would result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% of our outstanding common stock following the consummation of this offering, the opportunity to purchase, in lieu of the number of units that would result in ownership in excess of 4.99% of our outstanding common stock, pre-funded units (each pre-funded unit consisting of one pre-funded warrant to purchase one share of our common stock and one warrant to purchase one share of our common stock) at a public offering price equal to the price per unit being sold to the public in this offering minus \$0.01. Each pre-funded warrant included in the pre-funded units will have a per share exercise price of \$0.01. The pre-funded warrants contained in the pre-funded units will be exercisable immediately and may be exercised at any time until the pre-funded warrants are exercised in full. Each warrant included in the pre-funded units has a per share exercise price of \$. The warrants to purchase one share of our common stock contained in the units and pre-funded units will be exercisable beginning on the date of issuance and will expire on the fifth anniversary of the date of issuance.

For each pre-funded unit we sell, the number of units we are offering will be decreased on a one-for-one basis. The units and pre-funded units have no stand-alone rights and will not be certificated or issued as stand-alone securities. The shares of common stock, pre-funded warrants and warrants comprising such units are immediately separable and will be issued separately in this offering.

Our common stock is listed on The Nasdaq Capital Market under the symbol "PHIO". The closing price of our common stock on September 30, 2019, as reported by Nasdaq, was \$0.2751 per share. We do not intend to apply for listing of the pre-funded warrants or the warrants on any securities exchange or other trading system.

There is no established public trading market for the pre-funded warrants or warrants, and we do not expect a market to develop. Without an active trading market, the liquidity of the pre-funded warrants and warrants will be limited. We have assumed a public offering price of \$ per unit, the last reported sale price for our common stock as reported on The Nasdaq Capital Market on October , 2019, and \$ per pre-funded unit. The actual offering price per unit or pre-funded unit will be negotiated between us and the underwriter based on the trading of our common stock prior to the offering, among other things, and may be at a discount to the current market price. Therefore, the assumed public offering price used throughout this prospectus may not be indicative of the final offering price.

You should read this prospectus, together with additional information described under the headings "Incorporation of Certain Information by Reference" and "Where You Can Find More Information," carefully before you invest in our securities.

Investing in our securities involves a high degree of risk. Before making any investment in these securities, you should consider carefully the risks and uncertainties described in the section entitled “Risk Factors” beginning on page 6 of this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense. The securities are not being offered in any jurisdiction where the offer is not permitted.

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

(1) In addition, we have agreed to pay the underwriter a management fee in the amount of 1% of the aggregate offering price paid, to issue warrants to the underwriter in an amount equal to 7.5% of the aggregate number of shares underlying the units and pre-funded units, and to reimburse the underwriter for certain expenses. See “Underwriting” for additional information.

We have granted the underwriter the option to purchase up to additional shares of common stock at a purchase price of \$ per share and/or warrants to purchase up to an aggregate of shares of common stock at a purchase price of \$0.01 per warrant with an exercise price of \$ per share, less the underwriting discounts and commissions, solely to cover overallocments, if any. The underwriter may exercise its option at any time within 30 days from the date of this prospectus. If the underwriter exercises the option in full, the total underwriting discounts and commissions payable by us will be \$, and the total proceeds to us, before expenses, will be \$.

Sole Book-Running Manager

H.C. Wainwright & Co.

The date of this prospectus is , 2019

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ABOUT THIS PROSPECTUS

We have not authorized anyone to provide you with information other than that contained or incorporated by reference in this prospectus or in any free writing prospectus prepared by or on behalf of us or to which we have referred you. We take no responsibility for and can provide no assurance as to the reliability of, any other information that others may give to you. We are offering to sell, and seeking offers to buy, securities only in jurisdictions where offers and sales are permitted. The information contained or incorporated by reference in this prospectus or any free writing prospectus is accurate only as of its date, regardless of its time of delivery or any sale of our securities. Our business, financial condition, results of operations, and prospects may have changed since that date.

This prospectus contains or incorporates by reference summaries of certain provisions contained in some of the documents described herein, but reference is made to the actual documents for complete information. All of the summaries are qualified in their entirety by the actual documents. Copies of some of the documents referred to herein have been filed or have been incorporated by reference as exhibits to the registration statement of which this prospectus forms a part, and you may obtain copies of those documents as described in this prospectus under the headings “Incorporation of Certain Information by Reference” and “Where You Can Find More Information.”

No action is being taken in any jurisdiction outside the United States to permit an offering of our securities or possession or distribution of this prospectus in that jurisdiction. Persons who come into possession of this prospectus in jurisdictions outside the United States are required to inform themselves about and to observe any restrictions as to this offering and the distribution of this prospectus applicable to that jurisdiction.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements can be identified by words such as “intends,” “believes,” “anticipates,” “indicates,” “plans,” “expects,” “suggests,” “may,” “should,” “potential,” “designed to,” “will” and similar references, although not all forward-looking statements contain these words. Forward-looking statements are neither historical facts nor assurances of future performance. These statements are based only on our current beliefs, expectations and assumptions regarding the future of our business, future plans and strategies, projections, anticipated events and trends, the economy and other future conditions. Because forward-looking statements relate to the future, they are subject to inherent uncertainties, risks and changes in circumstances that are difficult to predict and many of which are outside of our control. Risks that could cause actual results to vary from expected results expressed in our forward-looking statements include, but are not limited to:

- our ability to obtain sufficient financing to develop our product candidates;
- expected ongoing significant research and development expenses without a current source of revenue, which may lead to uncertainty as to our ability to continue as a going concern;
- dilution that could be caused by future financing transactions or future issuances of capital stock in strategic transactions;
- our strategic focus on immuno-oncology;
- the novel and unproven approach associated with our RNAi technology;
- our limited experience as a company in immuno-oncology;
- identifying and developing product candidates, including whether we are able to commence clinical trials in humans or obtain approval for our product candidates;
- our dependence on the success of our product candidates, which may not receive regulatory approval or be successfully commercialized;
- factors could prevent us from obtaining regulatory approval or commercializing our product candidates on a timely basis, or at all;
- U.S. Food and Drug Administration (“FDA”) regulation of our therapeutics;
- our reliance on in-licensed technologies and the potential need for additional intellectual property rights in the future;
- our ability to protect our intellectual property rights and the adequacy of our intellectual property rights;
- competitive risks, including the risks associated with competing against companies in the immuno-oncology space with significantly greater resources;
- our reliance on third parties for the manufacture of our clinical product candidates;
- potential product liability claims;
- pricing regulations, third-party reimbursement practices or healthcare reform initiatives;
- our ability to attract, hire and retain qualified personnel;
- effectiveness of our internal control over financial reporting; and
- volatility of our common stock.

Our actual results and financial condition may differ materially from those indicated in the forward-looking statements as a result of the foregoing factors, as well as those identified in this prospectus under the heading “Risk Factors” and in other filings the Company periodically makes with the Securities and Exchange Commission. Therefore, you should not rely unduly on any of these forward-looking statements. Forward-looking statements contained in this prospectus speak as of the date hereof and the Company does not undertake to update any of these forward-looking statements to reflect a change in its views or events or circumstances that occur after the date of this report.

PROSPECTUS SUMMARY

The following summary highlights certain information contained elsewhere in this prospectus and the documents incorporated by reference herein. This summary provides an overview of selected information and does not contain all of the information you should consider in making your investment decision. Therefore, you should read the entire prospectus and the documents incorporated by reference herein carefully before investing in our securities. Investors should carefully consider the information set forth under "Risk Factors" beginning on page 6 of this prospectus and the financial statements and other information incorporated by reference in this prospectus. In this prospectus, unless otherwise noted, (1) the term "Phio" refers to Phio Pharmaceuticals Corp. and our subsidiary, MirImmune, LLC and (2) the terms "Company," "we," "us," and "our" refer to the ongoing business operations of Phio and MirImmune, LLC, whether conducted through Phio or MirImmune, LLC.

Overview

Phio Pharmaceuticals Corp. is a biotechnology company developing the next generation of immuno-oncology therapeutics based on our self-delivering RNAi ("INTASYL™") therapeutic platform. The Company's efforts are focused on silencing tumor-induced suppression of the immune system through our proprietary INTASYL™ platform with utility in immune cells and/or the tumor micro-environment. Our goal is to develop powerful INTASYL™ therapeutic compounds that can weaponize immune effector cells to overcome tumor immune escape, thereby providing patients a powerful new treatment option that goes beyond current treatment modalities.

Our development efforts are based on our broadly patented INTASYL™ technology platform. Our INTASYL™ compounds do not require a delivery vehicle to penetrate into tissues and cells and are designed to "silence" or down-regulate, the expression of a specific gene which is over-expressed in cancer. We believe that our INTASYL™ platform uniquely positions the Company in the field of immuno-oncology because of this and the following reasons:

- Efficient uptake of INTASYL™ to immune cells obviating the need for facilitated delivery (mechanical or formulation);
- Can target multiple genes (i.e. multiple immunosuppression pathways) in a single therapeutic entity;
- Gene silencing by INTASYL™ has been shown to have a sustained, or long-term, effect *in vivo*;
- Favorable clinical safety profile of INTASYL™ with local administration; and
- Can be readily manufactured under current good manufacturing practices.

The self-delivering nature of our compounds makes INTASYL™ ideally suited for use with adoptive cell transfer ("ACT") treatments and direct therapeutic use. ACT consists of the infusion of immune cells with antitumor properties. These cells can be derived from unmodified (i.e. naturally occurring) immune cells, immune cells isolated from resected tumors, or genetically engineered immune cells recognizing tumor neoantigens/neoepitopes cells.

Currently, ACT therapies for the treatment of solid tumors face several hurdles. Multiple inhibitory mechanisms restrain immune cells used in ACT from effectively eradicating tumors, including immune checkpoints, reduced cell fitness and cell persistence. Furthermore, the immunosuppressive tumor micro-environment (the "TME") can pose a formidable barrier to immune cell infiltration and function.

Phio has developed a product pipeline based on its INTASYL™ technology that allows easy, precise, rapid, and selective non-genetically modified programming of ACT cells (*ex-vivo*, during manufacturing) and of the TME (*in vivo*, by local application), resulting in improved cell-based immunotherapy.

Adoptive Cell Transfer

In ACT, immune cells are isolated from patients, donors or retrieved from allogeneic immune cell banks. The immune cells are then expanded and modified before being returned and used to treat the same patient. We believe our INTASYL™ compounds are ideally suited to be used in combination with ACT, in order to make these immune cells more effective.

ACT includes a number of different types of immunotherapy treatments. These treatments use immune cells, that are grown in a lab to large numbers, followed by administering them to the body to fight the cancer cells. Sometimes, immune cells that naturally recognize a tumor are used, while other times immune cells are modified or “engineered” to make them recognize and kill the cancer cells. There are several cell types that can be used in ACT, including: a.) non-engineered cell therapy in which immune cells are grown from the patient’s tumor or blood, such as tumor infiltrating lymphocytes (“TILs”), or from donor blood or tissue such as natural killer (“NK”) cells, dendritic cells (“DC”) and macrophages, and b.) engineered immune cells that are genetically modified to recognize specific tumor proteins and to remain in an activated state (such as TCRs, CAR T-cells, or CAR-NK cells).

Our approach to immunotherapy builds on well-established methodologies of ACT and involves the treatment of immune cells with our INTASYL™ compounds while they are grown in the lab and before administering them to the patient. Because our INTASYL™ compounds do not require a delivery vehicle to penetrate into the cells, we are able to enhance the function of these cells (for example, by inhibiting the expression of immune checkpoint genes) by merely adding our INTASYL™ compounds during the expansion process and without the need for genetic engineering. After enhancing these cells *ex vivo*, they are returned to the patient for treatment.

We have a number of collaborations with leading academic centers and corporate institutions. Corporate collaborators include, but are not limited to, Carisma Therapeutics, Inc., Iovance Biotherapeutics, Inc. and Glycostem Therapeutics BV. Data developed in-house and with our collaborators has shown that PH-762, our lead pipeline compound, can elicit PD-1 checkpoint blockade by silencing PD-1 receptor expression resulting in enhanced T cell activation and tumor cytotoxicity. We have also shown that PH-804, our second pipeline compound, can silence the expression of TIGIT in NK cells and T cells, overcoming their exhaustion and thereby becoming “weaponized.”

We expect to enter the clinic with PH-762 in ACT therapy for solid tumors, such as in melanoma, in the first half of 2020. The Company also expects to enter the clinic with PH-804 in ACT in the second half of 2020.

Tumor Micro-Environment

We are exploring the use of our INTASYL™ compounds directly towards TME targets. Impacting the tumor cells and/or the TME through a direct use of INTASYL™, locally administered directly into the tumor, could potentially become an important form of (neo)adjuvant therapy. We believe that this will also show that our contributions with our INTASYL™ compounds in immuno-oncology are not limited to use with a cell therapy platform. Additionally, the Company has shown in a clinical setting that its INTASYL™ compounds are safe and well-tolerated following local administration.

For additional information about the Company, please refer to other documents we have filed with the Securities and Exchange Commission and that are incorporated by reference into this prospectus, as listed under the heading “Incorporation of Certain Information by Reference.”

Corporate Information

We were incorporated in the state of Delaware in 2011 as RXi Pharmaceuticals Corporation. On November 19, 2018, the Company changed its name to Phio Pharmaceuticals Corp., to reflect its transition from a platform company to one that is fully committed to developing groundbreaking immuno-oncology therapeutics. Our executive offices are located at 257 Simarano Drive, Suite 101, Marlborough, MA 01752, and our telephone number is (508) 767-3861. The Company’s website address is <http://www.phioharma.com>. Our website and the information contained on that site, or connected to that site, is not part of or incorporated by reference into this prospectus.

THE OFFERING

Units offered by us:	We are offering up to _____ units consisting of one share of our common stock and one warrant to purchase one share of our common stock.
Pre-funded units offered by us:	We are also offering to those purchasers whose purchase of units in this offering would result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% of our outstanding common stock following the consummation of this offering, the opportunity to purchase, in lieu of the number of units that would result in ownership in excess of 4.99% of our outstanding common stock, pre-funded units. Each pre-funded unit consists of one pre-funded warrant to purchase one share of our common stock and one warrant to purchase one share of our common stock. The purchase price of each pre-funded unit will equal the price per unit being sold to the public in this offering minus \$0.01. Each pre-funded warrant included in the pre-funded units will have a per share exercise price of \$0.01. The pre-funded warrants contained in the pre-funded units will be exercisable immediately and may be exercised at any time until the pre-funded warrants are exercised in full. This offering also relates to the shares of common stock issuable upon exercise of any pre-funded warrants contained in the pre-funded units sold in this offering. For each pre-funded unit we sell, the number of units we are offering will be decreased on a one-for-one basis. Because we will issue warrants as part of each unit or pre-funded unit, the number of warrants sold in this offering will not change as a result of a change in mix of the units and pre-funded units sold.
Warrants offered by us:	We are offering warrants to purchase _____ shares of our common stock. Each unit and pre-funded unit includes a warrant to purchase one share of our common stock. Each warrant included in the units and pre-funded units has a per share exercise price of \$ _____. The warrants will be exercisable beginning on the date of issuance and expire on the fifth anniversary of the date of issuance.
Offering price:	The assumed public offering price is \$ _____ per unit and \$ _____ per pre-funded unit, which is based on the last reported sale price for our common stock as reported on The Nasdaq Capital Market on October _____, 2019. The actual offering price per unit and pre-funded unit will be negotiated between us and the underwriter based on the trading of our common stock prior to the offering, among other things, and may be at a discount to the current market price.
Option to purchase additional securities:	We have granted an option to the underwriter to purchase up to _____ additional shares of common stock at a purchase price of \$ _____ per share and/or warrants to purchase _____ shares of common stock at a purchase price of \$0.01 per warrant with an exercise price of \$ _____ per share solely to cover overallocments, if any. The underwriter may exercise its option at any time and from time to time within 30 days from the date of this prospectus.
Common stock outstanding after this offering:	_____ shares ⁽¹⁾⁽²⁾ .
Use of proceeds:	We estimate that the net proceeds from this offering will be approximately \$ _____, after deducting the underwriter discounts and commissions and estimated offering expenses payable by us. We intend to use substantially all of the net proceeds from this offering primarily towards the development of the Company's immuno-oncology program, for other research and development activities and for general working capital. See "Use of Proceeds" for a more complete description of the intended use of proceeds from this offering.

Risk factors:

You should read the “Risk Factors” section beginning on page 6 of this prospectus for a discussion of factors to consider carefully before deciding to invest in shares of our securities.

Nasdaq Capital Market symbol:

Our common stock is listed on The Nasdaq Capital Market under the symbol “PHIO.” We do not intend to apply for listing of the pre-funded warrants or warrants on any securities exchange or nationally recognized trading system.

- (1) The number of shares of common stock to be outstanding after this offering is based on 25,091,197 shares of common stock outstanding as of June 30, 2019. The number of shares of our common stock to be outstanding after this offering excludes the following:
- 154,402 shares of common stock issuable upon the exercise of stock options outstanding, having a weighted average exercise price of \$56.59 per share;
 - 615,491 shares of common stock issuable upon the vesting of restricted stock units outstanding, having a weighted average grant date fair value of \$0.72 per share;
 - 26,816,284 shares of common stock issuable upon the exercise of warrants outstanding, having a weighted average exercise price of \$1.44 per share;
 - An aggregate of 203,078 shares of common stock reserved for future issuance under our 2012 Long Term Incentive Plan; and
 - An aggregate of 444,617 shares of common stock reserved for future issuance under the Company’s employee stock purchase plan (“**ESPP**”).
- (2) Except as otherwise indicated, the number of shares of common stock presented in this prospectus excludes: (i) no exercises by the underwriter of its option to purchase additional securities, (ii) no sale of any pre-funded units, (iii) no exercises of the warrants issued in this offering, and (iv) no exercise of the warrants issued to the underwriter in connection with this offering.

RISK FACTORS

Investing in our securities involves a high degree of risk. Before investing in our securities, you should carefully consider the risks, uncertainties and assumptions described below, discussed under the heading "Risk Factors" included in our most recent Annual Report on Form 10-K for the year ended December 31, 2018, as revised or supplemented by subsequent filings, which are on file with the Securities and Exchange Commission and are incorporated herein by reference, and which may be amended, supplemented or superseded from time to time by other reports we file with the Securities and Exchange Commission in the future. Our business, financial condition, results of operations and future growth prospects could be materially and adversely affected by any of these risks. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks Related to this Offering

We have broad discretion in how we use the net proceeds of this offering, and we may not use these proceeds effectively or in ways with which you agree.

Our management will have broad discretion as to the application of the net proceeds of this offering and could use them for purposes other than those contemplated at the time of the offering. Our stockholders may not agree with the manner in which our management chooses to allocate and spend the net proceeds. Moreover, our management may use the net proceeds for corporate purposes that may not increase the market price of our common stock.

The offering price was set by our Board of Directors and does not necessarily indicate the actual or market value of our common stock.

Our Board of Directors approved the offering price and other terms of this offering after considering, among other things: the number of shares authorized in our certificate of incorporation; the current market price of our common stock; trading prices of our common stock over time; the volatility of our common stock; our current financial condition and the prospects for our future cash flows; the availability of and likely cost of capital of other potential sources of capital; and market and economic conditions at the time of the offering. The offering price is not intended to bear any relationship to the book value of our assets or our past operations, cash flows, losses, financial condition, net worth or any other established criteria used to value securities. The offering price may not be indicative of the fair value of the common stock.

Because the public offering price of our common stock included in the units or issuable upon exercise of the warrants or pre-funded warrants will be substantially higher than the net tangible book value per share of our outstanding common stock following this offering, new investors will experience immediate and substantial dilution.

The public offering price of our common stock included in the units or issuable upon exercise of the warrants or pre-funded warrants will be substantially higher than the net tangible book value per share of our common stock immediately following this offering based on the total value of our tangible assets less our total liabilities. Therefore, if you purchase shares of our common stock, included in the units or issuable upon exercise of the warrants or pre-funded warrants in this offering, you will experience immediate and substantial dilution. See the section entitled "Dilution" beginning on page 9 of this prospectus for a more detailed discussion of the dilution you will incur if you purchase common stock in this offering.

There is no public market for the pre-funded warrants and warrants.

There is no established public trading market for the pre-funded warrants or the warrants in this offering, and we do not expect a market to develop. In addition, the pre-funded warrants and the warrants are not listed, and we do not intend to apply for listing of the pre-funded warrants and the warrants on any securities exchange or trading system. Without an active market, the liquidity of the pre-funded warrants and the warrants is limited, and investors may be unable to liquidate their investments in the pre-funded warrants and the warrants.

A pre-funded warrant or warrant does not entitle the holder to any rights as common stockholders until the holder exercises the pre-funded warrant or warrant for shares of our common stock.

Until you acquire shares of our common stock upon exercise of your pre-funded warrants or warrants, the pre-funded warrants or warrants will not provide you any rights as a common stockholder. Upon exercise of your pre-funded warrants or warrants, you will be entitled to exercise the rights of a common stockholder only as to matters for which the record date occurs on or after the exercise date.

The pre-funded warrants and the warrants in this offering are speculative in nature.

Neither the pre-funded warrants nor the warrants in this offering confer any rights of common stock ownership on its holders, such as voting rights or the right to receive dividends, but rather merely represent the right to acquire shares of common stock at a fixed price, as the case may be, and, with respect to the warrants, during a fixed period of time. Specifically, commencing on the date of issuance, holders of the pre-funded warrants may exercise their right to acquire common stock and pay an exercise price of \$0.01 per share at any time until the pre-funded warrants are exercised in full. Commencing on the date of issuance, holders of the warrants may exercise their right to acquire common stock and pay an exercise price of \$ _____ per share of common stock. The warrants will be exercisable beginning on the date of issuance and expire on the fifth anniversary of the date of issuance.

Moreover, following this offering, the market value of the pre-funded warrants and the warrants, if any, is uncertain and there can be no assurance that the market value of the pre-funded warrants or the warrants will equal or exceed their imputed offering price. There can also be no assurance that the market price of the common stock will ever equal or exceed the exercise price of the warrants, and consequently, whether it will ever be profitable for holders of the warrants to exercise the warrants.

USE OF PROCEEDS

We estimate that the net proceeds to us from this offering will be approximately \$ [REDACTED], based on an assumed public offering price per unit of \$ [REDACTED], the last reported sale price of our common stock on The Nasdaq Capital Market on October [REDACTED], 2019, assuming the sale of [REDACTED] units and no sale of any pre-funded units in this offering, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of warrants issued pursuant to this offering. If the underwriter exercises its option to purchase the additional securities in full, we estimate that the net proceeds will be approximately \$ [REDACTED] million, based on an assumed public offering price per unit of \$ [REDACTED], the last reported sale price of our common stock on The Nasdaq Capital Market on October [REDACTED], 2019, assuming the sale of [REDACTED] units and no sale of any pre-funded units in this offering, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued pursuant to this offering.

The actual offering price per unit and pre-funded unit, as applicable, will be as determined between us and the underwriter at the time of pricing, and may be at a discount to the current market price of our common stock. These estimates exclude the proceeds, if any, from the exercise of warrants in this offering. If all of the warrants sold in this offering were to be exercised in cash at an assumed exercise price of \$ [REDACTED] per unit, we would receive additional net proceeds of approximately \$ [REDACTED] million. However, the warrants contain a cashless exercise provision that permit exercise of the warrants on a cashless basis at any time where there is no effective registration statement under the Securities Act covering the issuance of the underlying shares. We cannot predict when or if these warrants will be exercised or whether they will be exercised for cash. It is possible that these warrants may be exercised solely on a cashless basis.

A \$ [REDACTED] increase or decrease in the assumed public offering price of \$ [REDACTED] per unit, which was the last reported sale price of our common stock on The Nasdaq Capital Market on October [REDACTED], 2019, would increase or decrease the net proceeds to us from this offering by \$ [REDACTED] million or \$ [REDACTED] million, respectively, assuming that the number of units offered by us, as set forth on the cover page of this prospectus, remains the same, after deducting the estimated underwriter discounts and commissions and estimated offering expenses payable by us, assuming no sale of any pre-funded units and excluding the proceeds, if any, from the exercise of the warrants issued pursuant to this offering.

Similarly, each increase or decrease of [REDACTED] units offered by us would increase or decrease the net proceeds to us by approximately \$ [REDACTED] million or \$ [REDACTED] million, respectively, assuming the assumed public offering price of \$ [REDACTED] per unit remains the same, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, assuming no sale of any pre-funded units and excluding the proceeds, if any, from the exercise of the warrants issued pursuant to this offering.

We intend to use the net proceeds from this offering to fund the development of the Company's immuno-oncology program, for other research and development activities and for general working capital needs. We may also use a portion of the net proceeds to acquire or invest in complementary businesses, products and technologies or to fund the development of any such complementary businesses, products or technologies that we may acquire in a stock-based acquisition. We have no current plans for any such acquisitions.

MARKET FOR COMMON STOCK

Our common stock is listed on The Nasdaq Capital Market under the symbol “PHIO.”

As of September 27, 2019, there were approximately 64 holders of record of our common stock. Because many of our shares are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of individual stockholders represented by these holders of record.

DIVIDEND POLICY

We have never declared or paid any cash dividends and do not anticipate paying any cash dividends on our common stock in the foreseeable future. We expect to retain future earnings, if any, for use in our development activities and the operation of our business. The payment of any future dividends will be subject to the discretion of our Board of Directors and will depend, among other things, upon our results of operations, financial condition, cash requirements, prospects and other factors that our Board of Directors may deem relevant.

DILUTION

Our net tangible book value as of June 30, 2019, was \$9.7 million, or \$0.39 per share of common stock. Net tangible book value per share represents total tangible assets less total liabilities, divided by the number of shares of common stock outstanding. Assuming that we issue only units (and no pre-funded units) at a per share public offering price of \$, the last reported sale price of our common stock on The Nasdaq Capital Market on October , 2019, and after deducting the underwriting fees and estimated offering expenses payable by us, and excluding any proceeds received upon exercise of warrants issued pursuant to this offering, our net tangible book value as of June 30, 2019, would have been \$, or \$ per share. This represents an immediate increase in net tangible book value of \$ per share to existing stockholders and an immediate dilution in net tangible book value of \$ per share to purchasers of common stock in this offering.

The following table illustrates this per-share dilution:

<u>Public offering price per share of common stock included in a unit</u>	\$	–
Net tangible book value per share as of June 30, 2019	\$	0.39
Increase per share attributable to this offering	\$	–
As adjusted net tangible book value per share after giving effect to this offering	\$	–
Dilution per share to investors in this offering	\$	–

Each \$ increase or decrease in the assumed public offering price of \$ per unit, the last reported sale price of our common stock on The Nasdaq Capital Market on October , 2019, would increase (decrease) our as adjusted net tangible book value per share after this offering by approximately \$ or \$, respectively, and the dilution per share to new investors purchasing units in this offering by \$ or \$, respectively, assuming the number of units offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting underwriting fees and estimated offering expenses payable by us. We may also increase or decrease the number of units to be offered in this offering. Each increase or decrease of units offered by us would increase (decrease) our as adjusted net tangible book value per share by \$ or \$, respectively, and the dilution per share to new investors purchasing units in this offering by \$ or \$, respectively, assuming that the assumed public offering price remains the same, and after deducting underwriting fees and estimated offering expenses payable by us, and excluding any proceeds from the exercise of the warrants issued pursuant to this offering. The information discussed above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering as determined between us and the underwriter at pricing.

If the underwriter exercises its option to purchase additional securities in full, and assuming no sale of any pre-funded units in this offering, the as adjusted net tangible book value per share after this offering would be \$ per share, the increase in net tangible book value per share to existing stockholders would be \$ per share and the dilution to new investors purchasing units in this offering would be \$ per share.

The number of shares of common stock outstanding used in the calculations above is based on 25,091,197 shares outstanding as of June 30, 2019, and excludes:

- 154,402 shares of common stock issuable upon the exercise of stock options outstanding, having a weighted average exercise price of \$56.59 per share;
- 615,491 shares of common stock issuable upon the vesting of restricted stock units outstanding, having a weighted average grant date fair value of \$0.72 per share;
- 26,816,284 shares of common stock issuable upon the exercise of warrants outstanding, having a weighted average exercise price of \$1.44 per share;
- An aggregate of 203,078 shares of common stock reserved for future issuance under our 2012 Long Term Incentive Plan; and
- An aggregate of 444,617 shares of common stock reserved for future issuance under the Company's ESPP.

Except as otherwise indicated, the number of shares of common stock presented in this prospectus excludes: (i) no exercises by the underwriter of its option to purchase additional securities, (ii) no sale of any pre-funded units; (iii) no exercises of the warrants issued in this offering; and (iv) no exercise of the warrants issued to the underwriter in connection with this offering.

Furthermore, we may choose to raise additional capital through the sale of equity or convertible debt securities due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. New investors will experience further dilution if any of our outstanding options or warrants are exercised, new options are issued and exercised under our equity incentive plans or we issue additional shares of common stock, other equity securities or convertible debt securities in the future.

DESCRIPTION OF SECURITIES WE ARE OFFERING

Capital Stock

The following summary description of our capital stock is based on the provisions of our amended and restated certificate of incorporation and amended and restated bylaws and the applicable provisions of the Delaware General Corporation Law ("DGCL"). This information is qualified entirely by reference to the applicable provisions of our amended and restated certificate of incorporation, bylaws and the DGCL. For information on how to obtain copies of our amended and restated certificate of incorporation and bylaws, which are exhibits to the registration statement of which this prospectus is a part, see the sections titled "Where You Can Find More Information" and "Incorporation of Certain Information by Reference" in this prospectus.

General

Our authorized capital stock consists of 100,000,000 shares of common stock, par value \$0.0001 per share and 10,000,000 shares of preferred stock, par value \$0.0001 per share.

Common Stock

Holders of our common stock are entitled to one vote per share for the election of members of our board of directors and on all other matters that require stockholder approval. Holders of our common stock may not cumulate votes for the election of directors. Subject to any preferential rights of any outstanding preferred stock, in the event of our liquidation, dissolution or winding up, holders of our common stock are entitled to share ratably in the assets remaining after payment of liabilities and the liquidation preferences of any outstanding preferred stock. Holders of common stock have the right to receive dividends when, as and if, declared by the board of directors. The Company's common stock does not carry any preemptive rights enabling a holder to subscribe for, or receive shares of, any class of our common stock or any other securities convertible into shares of any class of our common stock. There are no redemption or sinking-fund provisions applicable to the common stock.

Preferred Stock

The shares of preferred stock have such rights and preferences as our board of directors shall determine, from time to time, the board of directors may divide the preferred stock into any number of series and shall fix the designation and number of shares of each such series. Our board of directors may determine and alter the rights, powers, preferences and privileges, and qualifications, restrictions and limitations thereof, including, but not limited to, voting rights (if any), granted to and imposed upon any wholly unissued series of preferred stock. Our board of directors (within the limits and restrictions of any resolutions adopted originally fixing the number of shares of any series) may increase or decrease the number of shares of that series; provided, that no such decrease shall reduce the number of shares of such series to a number less than the number of shares of such series then outstanding, plus the number of shares reserved for issuance upon the exercise of outstanding options, rights or warrants or upon the conversion of any outstanding securities issued by the Corporation convertible into shares of such series.

Our common stock is subject to the express terms of our preferred stock and any series thereof. Our board of directors may issue preferred stock with voting, dividend, liquidation and other rights that could adversely affect the relative rights of the holders of the common stock.

Anti-Takeover Effects of Provisions of the Certificate of Incorporation and Bylaws

Certificate of Incorporation and Bylaw Provisions. Certain provisions of our certificate of incorporation and bylaws, which provisions are summarized in the following paragraphs, may have an anti-takeover effect and may delay, defer or prevent a takeover attempt that a stockholder might consider in its best interest, including those attempts that might result in a premium over the market price for the shares held by stockholders.

Filling Vacancies. Any vacancy on our board of directors, however occurring, including a vacancy resulting from an increase in the size of the board of directors, may only be filled by the affirmative vote of a majority of our directors then in office even if less than a quorum.

No Written Consent of Stockholders. Our certificate of incorporation provides that all stockholder actions are required to be taken by a vote of the stockholders at an annual or special meeting, and that stockholders may not take any action by written consent in lieu of a meeting.

Advance Notice Requirements. Our bylaws include advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings of our stockholders. These procedures provide that notice of stockholder proposals must be timely given in writing to our corporate secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at our principal executive offices not less than 90 days nor more than 120 days prior to the first anniversary date of the annual meeting for the preceding year. The notice must contain certain information specified in the amended and restated bylaws.

Amendment to Bylaws and Certificate of Incorporation. As required by the DGCL any amendment to our certificate of incorporation must first be approved by a majority of our board of directors and, if required by law or our certificate of incorporation, thereafter be approved by a majority of the outstanding shares entitled to vote on the amendment, and a majority of the outstanding shares of each class entitled to vote thereon as a class. Our bylaws may be amended by the affirmative vote of a majority vote of the directors then in office, subject to any limitations set forth in the bylaws.

Blank Check Preferred Stock. Our amended and restated certificate of incorporation provides for 10,000,000 authorized shares of preferred stock. The existence of authorized but unissued shares of preferred stock may enable our board of directors to render more difficult or to discourage an attempt to obtain control of the Company by means of a merger, tender offer, proxy contest, or otherwise. In this regard, the amended and restated certificate of incorporation grants the board of directors broad power to establish the rights and preferences of authorized and unissued shares of preferred stock. The issuance of shares of preferred stock could decrease the amount of earnings and assets available for distribution to holders of shares of common stock. The issuance may also adversely affect the relative rights and powers, including voting rights, of these holders and may have the effect of delaying, deterring, or preventing a change of control of the Company.

Exclusive Forum Provision in Certificate of Incorporation. Our certificate of incorporation provides that the Court of Chancery of the State of Delaware is the exclusive forum for the following types of actions or proceedings: any derivative action or proceeding brought on behalf of the Company, any action asserting a claim of breach of a fiduciary duty owed by any director, officer or other employee of the Company to the Company or the Company's stockholders, any action asserting a claim against the Company arising pursuant to any provision of the DGCL or the Company's certificate of incorporation or bylaws, or any action asserting a claim against the Company governed by the internal affairs doctrine. Despite the fact that the certificate of incorporation provides for this exclusive forum provision to be applicable to the fullest extent permitted by applicable law, Section 27 of the Securities and Exchange Act of 1934, as amended (the "**Exchange Act**"), creates exclusive federal jurisdiction over all suits brought to enforce any duty or liability created by the Exchange Act or the rules and regulations thereunder and Section 22 of the Securities Act of 1933, as amended (the "**Securities Act**"), creates concurrent jurisdiction for federal and state courts over all suits brought to enforce any duty or liability created by the Securities Act or the rules and regulations thereunder. As a result, this provision of the Company's certificate of incorporation would not apply to claims brought to enforce a duty or liability created by the Securities Act, Exchange Act, or any other claim for which the federal courts have exclusive jurisdiction.

Delaware Business Combination Statute

Section 203 of the DGCL provides that, subject to exceptions set forth therein, an "interested stockholder" of a Delaware corporation shall not engage in any business combination, including mergers or consolidations or acquisitions of additional shares of the corporation, with the corporation for a three-year period following the date that such stockholder becomes an interested stockholder unless:

- Prior to such date, the board of directors of the corporation approved either the business combination or the transaction that 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, other than statutorily excluded shares; or
- On or subsequent to such date, the business combination is approved by the board of directors of the corporation and authorized at an annual or special meeting of the stockholders by the affirmative vote of at least 66-2/3% of the outstanding voting stock which is not owned by the interested stockholder.

Except as otherwise set forth in Section 203, an “interested stockholder” is defined to include:

- Any person that is the owner of 15% or more of the outstanding voting stock of the corporation, or is an affiliate or associate of the corporation and 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 date of determination; and
- The affiliates and associates of any such person.

Section 203 may make it more difficult for a person who would be an interested stockholder to effect various business combinations with a corporation for a three-year period. We have not elected to be exempt from the restrictions imposed under Section 203. The provisions of Section 203 may encourage persons 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 approves either the business combination or the transaction which results in any such person becoming an interested stockholder. Such provisions also may have the effect of preventing changes in our management. It is possible that such provisions could make it more difficult to accomplish transactions, which our stockholders may otherwise deem to be in their best interests.

Units

We are offering up to _____ units, with each unit consisting of one share of common stock and one warrant to purchase one share of our common stock. We are also offering to those purchasers, whose purchase of units in this offering would result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% of our outstanding common stock following the consummation of this offering, the opportunity to purchase, in lieu of units that would result in ownership in excess of 4.99% of our outstanding common stock, pre-funded units. Each pre-funded unit consists of one pre-funded warrant to purchase one share of common stock and one warrant to purchase one share of our common stock. For each pre-funded unit we sell, the number of units we are offering will be decreased on a one-for-one basis. The shares of common stock accompanying warrants included in each unit will be issued separately, and the pre-funded warrants to purchase one share of common stock and the accompanying warrants included in each pre-funded unit will be issued separately. Units or pre-funded units will not be issued or certificated. We are registering the shares of common stock included in the units and the shares of common stock issuable from time to time upon exercise of the pre-funded warrants included in the pre-funded units and the warrants included in the units and the pre-funded units offered hereby.

Description of Warrants

The material terms and provisions of the warrants being issued in this offering are summarized below. The following description is subject to, and qualified in its entirety by, the form of warrant, which has been filed as an exhibit to the registration statement of which this prospectus is a part. Prospective investors should carefully review the terms and provisions set forth in the form of warrant.

Exercise Price. The initial exercise price is \$ _____ per share of common stock. The exercise price is subject to appropriate adjustment in the event of certain stock dividends and distributions, stock splits, stock combinations, reclassifications or similar events affecting our common stock.

Exercisability. The warrants are exercisable at any time after the date of issuance, and at any time up to the date that is five years from the date of issuance, at which time any unexercised warrants will expire and cease to be exercisable. The warrants will be exercisable, at the option of each holder, in whole or in part by delivering to us a duly executed exercise notice and by payment in full in immediately available funds for the number of shares of common stock purchased upon such exercise. If a registration statement registering the issuance of the shares of common stock underlying the warrants under the Securities Act of 1933, as amended, is not then effective or available, the holder may only exercise the warrant through a cashless exercise, in whole or in part, in which case the holder would receive upon such exercise the net number of shares of common stock determined according to the formula set forth in the warrant. No fractional shares of common stock will be issued in connection with the exercise of a warrant. In lieu of fractional shares, we will either pay the holder an amount in cash equal to the fractional amount multiplied by the exercise price or round up to the next whole share.

Exercise Limitation. A holder will not have the right to exercise any portion of the warrant if the holder (together with its affiliates) would beneficially own in excess of 4.99% 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 warrant. However, any holder may increase or decrease such percentage to any other percentage not in excess of 9.99%, provided that any increase in such percentage shall not be effective until 61 days after such notice to us.

Transferability. Subject to applicable laws, the warrants may not be offered for sale, sold, transferred or assigned without our consent. There is currently no trading market for the warrants and a trading market is not expected to develop.

Fundamental Transactions. In the event of a fundamental transaction, as described in the warrants and generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our properties or assets, or our consolidation or merger with or into another person, the holders of the warrants will instead be entitled to receive upon exercise of the warrants the kind and amount of securities, cash or other property that the holders would have received had they exercised the warrants immediately prior to such fundamental transaction.

Exchange Listing. We do not plan to apply to list the warrants on The Nasdaq Capital Market, any other national securities exchange or any other nationally recognized trading system.

Rights as a Stockholder. Except as otherwise provided in the warrants or by virtue of such holder's ownership of shares of our common stock, the holder of a warrant does not have the rights or privileges of a holder of our common stock, including any voting rights, until the holder exercises the warrant.

Description of Pre-Funded Warrants

The material terms and provisions of the pre-funded warrants being issued in this offering are summarized below. The following description is subject to, and qualified in its entirety by, the form of pre-funded warrant, which has been filed as an exhibit to the registration statement of which this prospectus is a part. Prospective investors should carefully review the terms and provisions set forth in the form of pre-funded warrant.

Purchasers whose purchase of units in this offering would result in the purchase, together with its affiliates and certain related parties, beneficially owning more than 4.99% of our outstanding common stock following the consummation of this offering, may purchase, in lieu of the number of units that would result in ownership in excess of 4.99% of our outstanding common stock, pre-funded units (each pre-funded unit consisting of one pre-funded warrant to purchase one share of our common stock and one warrant to purchase one share of our common stock) at a public offering price equal to the price per unit being sold to the public in this offering minus \$0.01. Each pre-funded warrant included in the pre-funded units will have a per share exercise price of \$0.01. Thus, the purchaser is essentially paying the purchase price for a unit at closing of the offering, but is not deemed to beneficially own the shares of common stock included in the units until the purchaser exercises the pre-funded warrant. Once purchased, the purchase price of the pre-funded warrants is not refundable. While the pre-funded warrants permit waiver of provisions by us and the holder of the pre-funded warrants, this would not affect the pre-funding as that is the purchase price of the instrument which is paid at the time of closing and becomes part of our proceeds received from this offering. In addition, the pre-funded warrants are perpetual and do not have an expiration date.

Exercise Price. The initial exercise price is \$0.01 per share of common stock. The exercise price is subject to appropriate adjustment in the event of certain stock dividends and distributions, stock splits, stock combinations, reclassifications or similar events affecting our common stock.

Exercisability. The pre-funded warrants will be immediately exercisable and may be exercised at any time until the pre-funded warrants are exercised in full. The pre-funded warrants will be exercisable, at the option of each holder, in whole or in part by delivering to us a duly executed exercise notice and by payment in full in immediately available funds for the number of shares of common stock purchased upon such exercise. If a registration statement registering the issuance of the shares of common stock underlying the pre-funded warrants under the Securities Act of 1933, as amended, is not then effective or available, the holder may only exercise the pre-funded warrant through a cashless exercise, in whole or in part, in which case the holder would receive upon such exercise the net number of shares of common stock determined according to the formula set forth in the pre-funded warrant. No fractional shares of common stock will be issued in connection with the exercise of a pre-funded warrant. In lieu of fractional shares, we will either pay the holder an amount in cash equal to the fractional amount multiplied by the exercise price or round up to the next whole share.

Exercise Limitation. A holder will not have the right to exercise any portion of the pre-funded warrant if the holder (together with its affiliates) would beneficially own in excess of 4.99% 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 warrants. However, any holder may increase or decrease such percentage to any other percentage not in excess of 9.99%, provided that any increase in such percentage shall not be effective until 61 days after such notice to us.

Transferability. Subject to applicable laws, the pre-funded warrants may not be offered for sale, sold, transferred or assigned without our consent. There is currently no trading market for the pre-funded warrants and a trading market is not expected to develop.

Fundamental Transactions. In the event of a fundamental transaction, as described in the pre-funded warrants and generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our properties or assets, or our consolidation or merger with or into another person, the holders of the pre-funded warrants will instead be entitled to receive upon exercise of the pre-funded warrants the kind and amount of securities, cash or other property that the holders would have received had they exercised the pre-funded warrants immediately prior to such fundamental transaction.

Exchange Listing. We do not plan to apply to list the pre-funded warrants on The Nasdaq Capital Market, any other national securities exchange or any other nationally recognized trading system.

Rights as a Stockholder. Except as otherwise provided in the pre-funded warrants or by virtue of such holder's ownership of shares of our common stock, the holder of a pre-funded warrant does not have the rights or privileges of a holder of our common stock, including any voting rights, until the holder exercises the pre-funded warrant.

UNDERWRITING

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

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

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

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

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

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

Underwriting Discount, Commissions and Expenses

We have agreed to pay an underwriter discount of 7.5% of the aggregate gross proceeds raised in this offering.

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

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

We estimate the total expenses payable by us for this offering to be approximately \$ _____, which amount includes (i) the underwriting discounts and commissions of \$ _____ (\$ _____ if the underwriter's option to purchase additional securities is exercised in full), (ii) an assumed management fee in the amount of \$ _____ which represents 1.0% of the assumed aggregate offering price, (iii) a \$40,000 non-accountable expense allowance payable to the underwriter, (iv) reimbursement of the accountable expenses of the underwriter equal to \$100,000, including the legal fees of the underwriter being paid by us, and (v) other estimated expenses of approximately \$ _____ which includes legal, accounting, printing costs and various fees associated with the registration and listing of our shares.

Underwriter Warrants

We have agreed to issue to the underwriter warrants to purchase _____ shares of our common stock (equal to 7.5% of the aggregate number of shares underlying the units and pre-funded units sold in this offering). The underwriter warrants will have substantially the same terms as the terms of the warrants offered pursuant to this prospectus, except that the exercise price per share will be \$ _____ (equal to 125% of the public offering price for the shares sold in this offering). Pursuant to FINRA Rule 5110(g), the underwriter warrants and any shares issued upon exercise of the underwriter warrants shall not be sold, transferred, assigned, pledged, or hypothecated, or be the subject of any hedging, short sale, derivative, put or call transaction that would result in the effective economic disposition of the securities by any person for a period of 180 days immediately following the date of effectiveness or commencement of sales of this offering, except the transfer of any security: (i) by operation of law or by reason of our reorganization; (ii) to any FINRA member firm participating in the offering and the officers or partners thereof, if all securities so transferred remain subject to the lock-up restriction set forth above for the remainder of the time period; (iii) if the aggregate amount of our securities held by the underwriter or related persons do not exceed 1% of the securities being offered; (iv) that is beneficially owned on a pro rata basis by all equity owners of an investment fund, provided that no participating member manages or otherwise directs investments by the fund and the participating members in the aggregate do not own more than 10% of the equity in the fund; or (v) the exercise or conversion of any security, if all securities remain subject to the lock-up restriction set forth above for the remainder of the time period.

Right of First Refusal

We have also agreed, subject to certain conditions, to give the underwriter a twelve-month right of first refusal from the closing date of any securities offering consummated during the term of our engagement with the underwriter, to act as a lead book-running manager, lead underwriter or lead placement agent in any financing involving an underwriter or placement agent following the closing date of this offering. In addition, we will pay the underwriter a cash fee as provided under our engagement agreement with them equal to the underwriting discount percentage in this offering in the event that the offering contemplated hereby does not close and any investor contacted by the underwriter in connection with this offering (other than certain insider investors) purchases securities from us at any time between the termination of the offering and nine months after the date of termination or expiration of the offering.

Option to Purchase Additional Securities

We have granted the underwriter the option to purchase up to _____ additional shares of common stock at a purchase price of \$ _____ per share and/or warrants to purchase _____ shares of common stock at a purchase price of \$0.01 per warrant with an exercise price of \$ _____ per share of common stock, less the underwriting discounts and commissions. The underwriter may exercise the option at any time and from time to time within 30 days from the date of this prospectus. If any additional shares of common stock and/or warrants are purchased pursuant to the option, the underwriter will offer these shares of common stock and warrants on the same terms as those on which the other units are being offered hereby.

Determination of Offering Price

The actual offering price of the securities we are offering will be negotiated between us and the underwriter based on the trading of our common stock prior to the offering, among other things, and may be at a discount to the current market price.

Lock-up Agreements

Pursuant to certain "lock-up" agreements, our executive officers and directors have agreed, subject to certain exceptions, not to offer, pledge, sell, contract to sell or otherwise transfer or dispose of, directly or indirectly, any shares or any securities convertible into or exercisable or exchangeable for shares, whether currently owned or subsequently acquired, without the prior written consent of the underwriter, for a period of 90 days from the date of effectiveness of the underwriting agreement. Pursuant to the underwriting agreement, we and our subsidiaries have agreed, subject to certain exceptions, not to issue, enter into any agreement to issue or announce the issuance or proposed issuance of any shares of common stock or common stock equivalents for a period of 90 days from the purchase and sale of securities by the underwriters and the Company, respectively, under the underwriting agreement.

Stabilization, Short Positions and Penalty Bids

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

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

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

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

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

Indemnification

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

Other Relationships

The underwriter and its affiliates have engaged in, and may in the future engage in, investment banking and other commercial dealings in the ordinary course of business with us or our affiliates. They have received, or may in the future receive, customary fees and commissions for these transactions.

Listing

Our common stock is listed on The Nasdaq Capital Market under the symbol "PHIO". We do not intend to apply for listing of the pre-funded warrants or the warrants on any securities exchange or other trading system.

LEGAL MATTERS

Certain legal matters relating to the issuance of the securities offered by this prospectus will be passed upon for us by Gibson, Dunn & Crutcher LLP, San Francisco, California. Certain legal matters in connection with this offering will be passed upon for the underwriter by Zysman, Aharoni, Gayer and Sullivan & Worcester LLP, New York, New York.

EXPERTS

The consolidated financial statements as of December 31, 2018 and 2017 and for each of the two years in the period ended December 31, 2018 incorporated by reference in this prospectus have been so incorporated in reliance on the report of BDO USA, LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND MORE INFORMATION

We are required to file annual, quarterly and current reports, proxy statements and other information with the Securities and Exchange Commission (the “SEC”). You may read and copy any document filed by us at the SEC’s Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. Our filings with the SEC are also available to the public at the SEC’s Internet web site at <http://www.sec.gov>. Copies of certain information filed by us with the SEC are also available on our website at www.phiopharma.com. Our website is not a part of this prospectus and is not incorporated by reference in this prospectus, and you should not consider the contents of our website in making an investment decision with respect to our common stock.

We have filed a registration statement, of which this prospectus is a part, covering the securities offered hereby. As allowed by SEC rules, this prospectus does not include all of the information contained in the registration statement and the included exhibits, financial statements and schedules. You are referred to the registration statement, the included exhibits, financial statements and schedules for further information. You should review the information and exhibits in the registration statement for further information about us and our subsidiaries and the securities we are offering. Statements in this prospectus concerning any document we filed as an exhibit to the registration statement or that we otherwise filed with the SEC are not intended to be comprehensive and are qualified by reference to these filings. You should review the complete document to evaluate these statements.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to “incorporate by reference” the information we have filed with them, which means that we can disclose important information to you by referring you to those documents. The information we incorporate by reference is an important part of this prospectus, and information that we file later with the SEC will automatically update and supersede this information. The documents we are incorporating by reference are:

- Our [Annual Report on Form 10-K for the year ended December 31, 2018](#) filed with the SEC on March 27, 2019;
- Our [Quarterly Report on Form 10-Q for the period ended March 31, 2019](#) filed with the SEC on May 14, 2019 and our [Quarterly Report on Form 10-Q for the period ended June 30, 2019](#), filed with the SEC on August 12, 2019;
- Our Current Reports on Form 8-K, filed with the SEC on [January 28, 2019](#), [February 15, 2019](#), and [August 9, 2019](#); and
- The description of our common stock contained in our registration statement on [Form 8-A12B filed](#) with the SEC on February 7, 2014, including any amendment or report filed for the purpose of updating such description.

All documents we file with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, except as to any portion of any report or document that is not deemed filed under such provisions, (1) on or after the date of filing of the registration statement containing this prospectus and prior to the effectiveness of the registration statement and (2) on or after the date of this prospectus until the earlier of the date on which all of the securities registered hereunder have been sold or the registration statement of which this prospectus is a part has been withdrawn, shall be deemed incorporated by reference in this prospectus and to be a part of this prospectus from the date of filing of those documents and will be automatically updated and, to the extent described above, supersede information contained or incorporated by reference in this prospectus and previously filed documents that are incorporated by reference in this prospectus.

Nothing in this prospectus shall be deemed to incorporate information furnished but not filed with the SEC pursuant to Item 2.02, 7.01 or 9.01 of Form 8-K.

Upon written or oral request, we will provide without charge to each person, including any beneficial owner, to whom a copy of the prospectus is delivered a copy of any or all of the reports or documents incorporated by reference herein (other than exhibits to such documents, unless such exhibits are specifically incorporated by reference herein). You may request a copy of these filings, at no cost, by writing or telephoning us at the following address: Phio Pharmaceuticals Corp., 257 Simarano Drive, Suite 101, Marlborough, Massachusetts 01752 Attention: Investor Relations, telephone: (508) 767-3861. We maintain a website at www.phio-pharma.com. You may access our definitive proxy statements on Schedule 14A, annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and periodic amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the SEC free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. The information contained in, or that can be accessed through, our website is not incorporated by reference in, and is not part of, this prospectus. We have not authorized any one to provide you with any information that differs from that contained in this prospectus. Accordingly, you should not rely on any information that is not contained in this prospectus. You should not assume that the information in this prospectus is accurate as of any date other than the date of the front cover of this prospectus.

Phio Pharmaceuticals Corp.



Up to **Units (each Unit consisting of one share of Common Stock and one Warrant to purchase one share of Common Stock)**

Up to **Pre-funded Units (each Pre-funded Unit consisting of one Pre-funded Warrant to Purchase one share of Common Stock and one Warrant to purchase one share of Common Stock)**

Shares of Common Stock Underlying the Pre-funded Warrants and

Shares of Common Stock Underlying the Warrants

PROSPECTUS

, 2019

PART II

Information Not Required in Prospectus

ITEM 13. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION

The following table sets forth the fees and expenses, other than underwriting fees and expenses, payable in connection with the registration of the common stock hereunder. All amounts are estimates except the SEC registration fee and the FINRA filing fee.

Item	Amount to be paid
SEC registration fee	\$ 4,028.67
FINRA filing fee	*
Printing expenses	*
Legal fees and expenses	*
Accounting fees and expenses	*
Transfer Agent fees and expenses	*
Miscellaneous expenses	*
Total	\$ *

* To be completed by amendment.

ITEM 14. INDEMNIFICATION OF DIRECTORS AND OFFICERS

Section 145 of the DGCL authorizes a corporation to indemnify its directors and officers against liabilities arising out of actions, suits and proceedings to which they are made or threatened to be made a party by reason of the fact that they have served or are currently serving as a director or officer to a corporation. The indemnity may cover expenses (including attorneys' fees) judgments, fines and amounts paid in settlement actually and reasonably incurred by the director or officer in connection with any such action, suit or proceeding. Section 145 permits corporations to pay expenses (including attorneys' fees) incurred by directors and officers in advance of the final disposition of such action, suit or proceeding. In addition, Section 145 provides that a corporation has the power to purchase and maintain insurance on behalf of its directors and officers against any liability asserted against them and incurred by them in their capacity as a director or officer, or arising out of their status as such, whether or not the corporation would have the power to indemnify the director or officer against such liability under Section 145.

Our certificate of incorporation provides that we will indemnify to the fullest extent authorized or permitted by the DGCL or any other applicable law as now or hereafter in effect any person made, or threatened to be made, a defendant or witness to any action, suit or proceeding (whether civil, criminal or otherwise) by reason of the fact that he is or was a director of our corporation or by reason of the fact that such director, at our request, is or was serving any other corporation, partnership, joint venture, trust, employee benefit plan or other enterprise in any capacity. Our certificate of incorporation also provides that no amendment or repeal of the certificate of incorporation will apply to or have any effect on any right to indemnification provided in the certificate of incorporation with respect to any acts or omissions occurring prior to such amendment or repeal.

As permitted by the DGCL, our bylaws, as amended, provide that we will indemnify to the fullest extent authorized or permitted by applicable law as now or hereafter in effect any person who was or is made, or is threatened to be made, a party or is otherwise involved in any action, suit or proceeding (whether civil, criminal, administrative or investigative), by reason of the fact that he (or a person for whom he is the legal representative) is or was a director or officer of our corporation, is or was serving at our request as a director, officer, employee, member, trustee or agent of another corporation or of a partnership, joint venture, trust, nonprofit entity or other enterprise.

Consequently, no director of the corporation will be personally liable to the corporation or its stockholders for monetary damages for any breach of fiduciary duty by such a director as a director. However, notwithstanding the preceding sentence, a director will be liable to the extent provided by Delaware law (1) for any breach of the director's duty of loyalty to the corporation or its stockholders, (2) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (3) for payments of unlawful dividends or for unlawful stock repurchases or redemption, or (4) for any transaction from which the director derived an improper personal benefit.

We have entered into indemnification agreements with each of our executive officers and directors. These agreements provide that, subject to limited exceptions and among other things, we will indemnify each of our executive officers and directors to the fullest extent permitted by law and advance expenses to each indemnitee in connection with any proceeding in which a right to indemnification is available.

We also maintain insurance on behalf of any person who is or was our director, officer, trustee, employee or agent or serving at our request as a director, officer, trustee, employee or agent of another corporation, partnership, joint venture, trust, non-profit entity or other enterprise against any liability asserted against the person and incurred by the person in any such capacity, or arising out of his or her status as such.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted for directors, officers, or persons who control us, we have been informed that, in the opinion of the SEC, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

ITEM 15. RECENT SALES OF UNREGISTERED SECURITIES

In the three years preceding the filing of this registration statement, we have issued the following securities that were not registered in the Securities Act.

On January 6, 2017, the Company issued an aggregate of 275,036 shares of common stock and an aggregate of 1,118,224 shares of Series C Convertible Preferred Stock to MirImmune Inc. pursuant to that certain Stock Purchase Agreement dated January 6, 2017, in consideration for the Company's acquisition of MirImmune outstanding capital stock. On June 9, 2017, with the approval of the Company's stockholders in accordance with the Nasdaq stockholder approval requirements, Series C Convertible Preferred Stock outstanding were automatically converted into 111,822 shares of common stock, such that there were no shares of Series C Convertible Preferred Stock issued or outstanding after the conversion.

On August 8, 2017, the Company entered into a purchase agreement (the "**2017 Purchase Agreement**") with Lincoln Park. As a commitment fee for entering into the 2017 Purchase Agreement, the Company issued to Lincoln Park 45,000 shares of Company common stock at a price per share of \$5.80.

On April 11, 2018, the Company issued 1,510,604 shares of common stock, at a price of \$3.15 per share pursuant to that certain Securities Purchase Agreement dated April 9, 2018. In a concurrent private placement, we sold warrants to purchase a total of 1,132,953 shares of common stock at a price of \$0.125 per underlying warrant share and with an exercise price of \$3.15 per share. In connection with this offering, we issued warrants to purchase a total of 75,530 shares of our common stock with an exercise price of \$4.0546 per share to the placement agent, H.C. Wainwright & Co., LLC. We also agreed to pay the placement agent an aggregate fee equal to \$367,502, which represents 7.5% of the gross proceeds received by us from the sale of the securities in the offering and concurrent private placement.

As of June 30, 2019, we have not sold any shares of common stock to employees, directors, and consultants for cash consideration upon the exercise of stock options and stock awards.

On August 7, 2019, the Company entered into a purchase agreement (the "**2019 Purchase Agreement**") with Lincoln Park. As a commitment fee for entering into the 2019 Purchase Agreement, the Company issued to Lincoln Park 500,000 shares of common stock at a price per share of \$0.3767.

Unless otherwise noted, all of the transactions described in Item 15 were exempt from registration under the Securities Act pursuant to Section 4(a)(2) of the Securities Act in that such sales did not involve a public offering or under Rule 701 promulgated under the Securities Act, in that they were offered and sold either pursuant to written compensatory plans or pursuant to a written contract relating to compensation, as provided by Rule 701.

ITEM 16. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

Exhibits

Exhibit Number	Description	Incorporated by Reference Herein	
		Form	Date
1.1	Form of Underwriting Agreement.***		
2.1	Asset Purchase Agreement, dated March 1, 2013, between RXi Pharmaceuticals Corporation and OPKO Health, Inc. +	Quarterly Report on Form 10-Q (File No. 000-54910)	May 15, 2013
2.2	Stock Purchase Agreement, dated January 6, 2017, by and among RXi Pharmaceuticals Corporation, RXi Merger Sub, LLC, MirImmune Inc., certain shareholders named therein and Alexey Wolfson, Ph.D., in his capacity as Sellers' Representative.	Current Report on Form 8-K (File No. 001-36304)	January 10, 2017
3.1	Amended and Restated Certificate of Incorporation of Phio Pharmaceuticals Corp.	Current Report on Form 8-K (File No. 001-36304)	November 19, 2018
3.2	Amended and Restated Bylaws of Phio Pharmaceutical Corp.	Current Report on Form 8-K (File No. 001-36304)	November 19, 2018
4.1	Form of Warrant.	Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-203389)	May 21, 2015
4.2	Form of Warrant.	Amendment No. 3 to the Registration Statement on Form S-1 (File No. 333-214199)	December 14, 2016
4.3	Form of Warrant.	Current Report on Form 8-K (File No. 001-36304)	April 11, 2018
4.4	Form of Placement Agent Warrant.	Current Report on Form 8-K (File No. 001-36304)	April 11, 2018
4.5	Form of Warrant.	Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-221173)	September 28, 2018
4.6	Form of Pre-Funded Warrant.	Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-221173)	September 28, 2018
4.7	Form of Warrant.***		
4.8	Form of Pre-Funded Warrant.***		
5.1	Opinion of Gibson, Dunn & Crutcher LLP ***		

10.1	Patent and Technology Assignment Agreement between RXi Pharmaceuticals Corporation (formerly RNCS, Inc.) and Advirna, LLC, effective as of September 24, 2011.	Registration Statement on Form S-1 (File No. 333-177498)	October 25, 2011
10.2	RXi Pharmaceuticals Corporation 2012 Long Term Incentive Plan.*	Registration Statement on Form S-8 (File No. 333-177498)	August 24, 2018
10.3	Form of Restricted Stock Unit Award under the Company's 2012 Long Term Incentive Plan.*	Amendment No. 2 to the Registration Statement on Form S-1 (File No. 333-177498)	December 29, 2011
10.4	Form of Incentive Stock Option Award under the Company's 2012 Long Term Incentive Plan, as amended.*	Registration Statement on Form S-1 (File No. 333-191236)	September 18, 2013
10.5	Form of Non-Qualified Stock Option Award under the Company's 2012 Long Term Incentive Plan, as amended.*	Registration Statement on Form S-1 (File No. 333-191236)	September 18, 2013
10.6	RXi Pharmaceuticals Corporation Employee Stock Purchase Plan.*	Registration Statement on Form S-8 (File No. 333-277013)	August 24, 2018
10.7	Form of Indemnification Agreement.*	Amendment No. 3 to the Registration Statement on Form S-1 (File No. 333-177498)	January 23, 2012
10.8	Employment Agreement, dated April 27, 2012, between RXi Pharmaceuticals Corporation and Geert Cauwenbergh, Dr. Med. Sc.*	Current Report on Form 8-K (File No. 333-177498)	May 3, 2012
10.9	Employment Agreement, dated January 6, 2017, between RXi Pharmaceuticals Corporation and Alexey Eliseev, Ph.D.*	Annual Report on Form 10-K (File No. 001-36304)	March 30, 2017
10.10	Non-Competition Agreement, dated January 6, 2017, between RXi Pharmaceuticals Corporation and Alexey Eliseev, Ph.D.*	Annual Report on Form 10-K (File No. 001-36304)	March 30, 2017
10.11	Employment Agreement, dated April 24, 2017, between RXi Pharmaceuticals Corporation and Gerrit Dispersyn, Dr. Med. Sc.*	Post-effective Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-214199)	May 4, 2017
10.12	Employment Agreement, dated April 22, 2019, between Phio Pharmaceuticals Corp. and John A. Barrett, Ph.D.*	Quarterly Report on Form 10-Q (File No. 000-36304)	May 14, 2019
10.13	Lease Agreement dated December 17, 2013 between RXi Pharmaceuticals Corporation and 257 Simarano Drive, LLC, Brighton Properties, LLC, Robert Stubblebine 1, LLC and Robert Stubblebine 2, LLC.	Current Report on Form 8-K (File No. 000-54910)	December 20, 2013
10.14	First Amendment to Lease dated January 22, 2019.	Current Report on Form 8-K (File No. 001-36304)	January 28, 2019

10.15	Purchase Agreement, dated as of August 7, 2019 by and between Phio Pharmaceuticals Corp. and Lincoln Park Capital Fund, LLC.	Current Report on Form 8-K (File No. 001-36304)	August 9, 2019
10.16	First Amendment to Purchase Agreement by and between Phio Pharmaceuticals Corp. and Lincoln Park Capital Fund, LLC.	Registration Statement on Form S-1 (File No. 333-233584)	August 30, 2019
10.17	Registration Rights Agreement, dated as of August 7, 2019, by and between Phio Pharmaceuticals Corp. and Lincoln Park Capital Fund, LLC.	Current Report on Form 8-K (File No. 001-36304)	August 9, 2019
23.1	Consent of BDO USA, LLP, an Independent Registered Public Accounting Firm. **		
23.2	Consent of Gibson, Dunn & Crutcher LLP (included in Exhibit 5.1).***		
24.1	Powers of Attorney (included on the signature page of Part II of this Registration Statement on Form S-1). **		

* Indicates a management contract or compensatory plan or arrangement.

** Filed herewith.

*** To be filed by amendment.

+ Confidential treatment has been requested or granted for certain portions which have been blanked out in the copy of the exhibit filed with the Securities and Exchange Commission. The omitted information has been filed separately with the Securities and Exchange Commission.

Financial Statement Schedules

Certain schedules are omitted because they are not applicable, or are not required by smaller reporting companies.

ITEM 17. UNDERTAKINGS

Insofar as indemnification for liabilities arising under the Securities Act of 1933, as amended may be permitted to directors, officers and controlling persons of the Registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is therefore unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

(a) The undersigned Registrant hereby undertakes:

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

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

(ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and

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

Provided, however, that Paragraphs (a)(1)(i), (ii), and (iii) of this section do not apply if the registration statement is on Form S-1, Form S-3, Form SF-3, or Form F-3 and the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the registrant pursuant to section 13 or section 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m or 78o(d)) that are incorporated by reference in the registration statement.

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof;

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

(4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:

(i) Each prospectus filed by the Registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and

(ii) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii), or (x) for the purpose of providing the information required by section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date;

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

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

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

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

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

(b) The undersigned Registrant, hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the Registrant's annual report pursuant to section 13(a) or section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof;

(c) The undersigned Registrant hereby undertakes that:

(i) For purposes of determining any liability under the Securities Act of 1933, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the Registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act of 1933 shall be deemed to be part of this registration statement as of the time it was declared effective.

(ii) For the purpose of determining any liability under the Securities Act of 1933, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

Consent of Independent Registered Public Accounting Firm

Phio Pharmaceuticals Corp.
Marlborough, Massachusetts

We hereby consent to the incorporation by reference in the prospectus constituting a part of this Registration Statement of our report dated March 27, 2019, relating to the consolidated financial statements of Phio Pharmaceuticals Corp. appearing in the Company's Annual Report on Form 10-K for the year ended December 31, 2018.

We also consent to the reference to us under the caption "Experts" in the Prospectus.

/s/ BDO USA, LLP
Boston, Massachusetts

October 1, 2019