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

SCHEDULE 14A INFORMATION

**Proxy Statement Pursuant to Section 14(a) of the
Securities Exchange Act of 1934
(Amendment No.)**

Filed by the Registrant Filed by a Party other than the Registrant

Check the appropriate box:

- Preliminary Proxy Statement
 Confidential, for Use of the Commission Only (as permitted by Rule 14a-6(e)(2))
 Definitive Proxy Statement
 Definitive Additional Materials
 Soliciting Material under §240.14a-12

ATYR PHARMA, INC.

(Name of Registrant as Specified In Its Charter)

(Name of Person(s) Filing Proxy Statement, if other than the Registrant)

Payment of Filing Fee (Check the appropriate box):

- No fee required.
- Fee computed on table below per Exchange Act Rules 14a-6(i)(1) and 0-11.
- (1) Title of each class of securities to which transaction applies: _____
- (2) Aggregate number of securities to which transaction applies: _____
- (3) Per unit price or other underlying value of transaction computed pursuant to Exchange Act Rule 0-11 (set forth the amount on which the filing fee is calculated and state how it was determined): _____
- (4) Proposed maximum aggregate value of transaction: _____
- (5) Total fee paid: _____
- Fee paid previously with preliminary materials.
- Check box if any part of the fee is offset as provided by Exchange Act Rule 0-11(a)(2) and identify the filing for which the offsetting fee was paid previously. Identify the previous filing by registration statement number, or the Form or Schedule and the date of its filing.
- (1) Amount Previously Paid: _____
- (2) Form, Schedule or Registration Statement No.: _____
- (3) Filing Party: _____
- (4) Date Filed: _____
-
-

aTyr Pharma, Inc.
3545 John Hopkins Court, Suite #250
San Diego, CA 92121

NOTICE OF ANNUAL MEETING OF STOCKHOLDERS

To Be Held On May 15, 2018

Dear Stockholder:

You are cordially invited to attend the 2018 Annual Meeting of Stockholders of aTyr Pharma, Inc., a Delaware corporation (the "Company"). The meeting will be held on Tuesday, May 15, 2018 at 8:30 a.m. local time at the offices of aTyr Pharma, Inc., 3545 John Hopkins Court, Suite #250, San Diego, California 92121, for the following purposes:

1. To elect two Class III directors, as nominated by the Board of Directors, to hold office until the 2021 Annual Meeting of Stockholders or until their successors are duly elected and qualified.
2. To ratify the appointment of Ernst & Young LLP as the independent registered public accounting firm of the Company for its fiscal year ending December 31, 2018.
3. To approve, under applicable NASDAQ listing rules, the issuance of 11,429,760 shares of the Company's common stock upon the conversion of 2,285,952 outstanding shares of the Company's Class X Convertible Preferred Stock.
4. To transact such other business as may properly come before the meeting or any adjournment or postponement thereof.

These items of business are more fully described in the Proxy Statement accompanying this Notice.

Proposal 1 relates solely to the election of two Class III directors nominated by the Board of Directors and does not include any other matters relating to the election of directors, including without limitation, the election of directors nominated by any stockholder of the Company.

The Board of Directors has fixed the close of business on Thursday, March 22, 2018 as the record date for the determination of stockholders entitled to notice of, and to vote at, the Annual Meeting of Stockholders, or at any adjournments of the Annual Meeting of Stockholders.

In order to ensure your representation at the Annual Meeting of Stockholders, you are requested to submit your proxy as instructed in the Important Notice Regarding the Availability of Proxy Materials that you will receive in the mail. You may also request a paper proxy card at any time on or before May 4, 2018 to submit your vote by mail. If you attend the Annual Meeting of Stockholders and file with the Secretary of the Company an instrument revoking your proxy or a duly executed proxy bearing a later date, your proxy will not be used.

All stockholders are cordially invited to attend the Annual Meeting of Stockholders.

By Order of the Board of Directors

aTyr Pharma, Inc.



Sanjay S. Shukla, M.D., M.S.
President and Chief Executive Officer

San Diego, California
April 3, 2018

Your vote is important, whether or not you expect to attend the Annual Meeting of Stockholders. You are urged to vote either via the Internet or telephone, or vote by mail by requesting a printed copy of the proxy card, as instructed in the Important Notice Regarding the Availability of Proxy Materials that you will receive in the mail. Voting promptly will help avoid the additional expense of further solicitation to assure a quorum at the meeting.

TABLE OF CONTENTS

<u>PROXY STATEMENT</u>	1
<u>PROPOSAL 1—ELECTION OF DIRECTORS</u>	5
<u>PROPOSAL 2—RATIFICATION OF AUDITORS</u>	15
<u>PROPOSAL 3—APPROVAL, UNDER APPLICABLE NASDAQ LISTING RULES, THE ISSUANCE OF 11,429,760 SHARES OF THE COMPANY’S COMMON STOCK UPON THE CONVERSION OF 2,285,952 OUTSTANDING SHARES OF THE COMPANY’S CLASS X CONVERTIBLE PREFERRED STOCK</u>	16
<u>EXECUTIVE OFFICERS</u>	18
<u>COMPENSATION OF EXECUTIVE OFFICERS</u>	19
<u>CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS</u>	26
<u>SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT</u>	27
<u>SECTION 16(a) BENEFICIAL OWNERSHIP REPORTING COMPLIANCE</u>	31
<u>AUDIT COMMITTEE REPORT</u>	31
<u>HOUSEHOLDING OF PROXY MATERIALS</u>	32
<u>OTHER MATTERS</u>	32

ATYR PHARMA, INC.
PROXY STATEMENT
FOR THE 2018 ANNUAL MEETING OF STOCKHOLDERS
May 15, 2018

INFORMATION CONCERNING SOLICITATION AND VOTING

General

This proxy statement ("Proxy Statement") is furnished in connection with the solicitation of proxies for use prior to or at the 2018 Annual Meeting of Stockholders (the "Annual Meeting") of aTyr Pharma, Inc. (the "Company"), a Delaware corporation, to be held at 8:30 a.m. local time on Tuesday, May 15, 2018 and at any adjournments or postponements thereof for the following purposes:

- To elect two Class III directors, as nominated by the Company's Board of Directors ("Board of Directors"), to hold office until the 2021 Annual Meeting of Stockholders or until their successors are duly elected and qualified;
- To ratify the appointment of Ernst & Young LLP as the independent registered public accounting firm of the Company for its fiscal year ending December 31, 2018;
- To approve, under applicable NASDAQ listing rules, the issuance of 11,429,760 shares of the Company's common stock upon the conversion of 2,285,952 outstanding shares of the Company's Class X Convertible Preferred Stock; and
- To transact such other business as may properly come before the meeting or any adjournment or postponement thereof.

The Annual Meeting will be held at the offices of the Company, 3545 John Hopkins Court, Suite #250, San Diego, California 92121. On or about April 3, 2018, we mailed to all stockholders entitled to vote at the Annual Meeting a Notice of Internet Availability of Proxy Materials (the "Notice") containing instructions on how to access this Proxy Statement and our 2017 Annual Report on Form 10-K ("Annual Report").

Solicitation

This solicitation is made by the Board of Directors on behalf of the Company. We will bear the costs of preparing, mailing, online processing and other costs of the proxy solicitation made by our Board of Directors. Certain of our officers and employees may solicit the submission of proxies authorizing the voting of shares in accordance with the Board of Directors' recommendations. Such solicitations may be made by telephone, facsimile transmission or personal solicitation. No additional compensation will be paid to such officers, directors or regular employees for such services. We will reimburse banks, brokerage firms and other custodians, nominees and fiduciaries for reasonable out-of-pocket expenses incurred by them in sending proxy materials to stockholders.

Important Notice Regarding the Availability of Proxy Materials

In accordance with rules and regulations of the U.S. Securities and Exchange Commission (the "SEC"), instead of mailing a printed copy of our proxy materials to each stockholder of record, the Company may furnish proxy materials via the internet. Accordingly, all of the Company's stockholders will receive a Notice, to be mailed on or about April 3, 2018.

On the date of mailing the Notice, stockholders will be able to access all of the proxy materials on the website at **www.proxydocs.com/life**. The proxy materials will be available free of charge. The Notice will instruct you as to how you may access and review all of the important information contained in the proxy materials (including the Annual Report) over the internet or through other methods specified on the website. The website contains instructions as to how to vote by internet or over the telephone. The Notice also instructs you as to how you may request a paper or email copy of the proxy card. If you received a Notice and would like to receive printed copies of the proxy materials, you should follow the instructions for requesting such materials included in the Notice.

Voting Rights and Outstanding Shares

Only holders of record of our common stock as of the close of business on March 22, 2018 are entitled to receive notice of, and to vote at, the Annual Meeting. Each holder of common stock will be entitled to one vote for each share held on all matters to be voted upon at the Annual Meeting. At the close of business on March 22, 2018, there were 29,797,663 shares of common stock issued and outstanding.

A quorum of stockholders is necessary to take action at the Annual Meeting. Stockholders representing a majority of the outstanding shares of our common stock (present in person or represented by proxy) will constitute a quorum. We will appoint an inspector of elections for the meeting to determine whether or not a quorum is present and to tabulate votes cast by proxy or in person at the Annual Meeting. Abstentions, withheld votes and broker non-votes (which occur when a broker, bank or other nominee holding shares for a beneficial owner does not vote on a particular matter because such broker, bank or other nominee does not have discretionary authority to vote on that matter and has not received voting instructions from the beneficial owner) are counted as present for purposes of determining the presence of a quorum for the transaction of business at the Annual Meeting.

Votes Required for Each Proposal

To elect our directors and approve the other proposals being considered at the Annual Meeting, the voting requirements are as follows:

Proposal	Vote Required	Discretionary Voting Permitted?
Election of Directors	Plurality	No
Ratification of Ernst & Young LLP	Majority	Yes
Approval of the issuance of shares of common stock upon conversion of the Company's outstanding Class X Convertible Preferred Stock	Majority	No

"Discretionary Voting Permitted" means that brokers will have discretionary voting authority with respect to shares held in street name for their clients, even if the broker does not receive voting instructions from their client.

"Majority" means a majority of the votes properly cast for and against such matter.

"Plurality" means a plurality of the votes properly cast on such matter. For the election of directors, the two nominees receiving the plurality of votes entitled to vote and cast will be elected as directors.

The vote required and method of calculation for the proposals to be considered at the Annual Meeting are as follows:

Proposal One—Election of Directors. If a quorum is present, the director nominees receiving the highest number of votes, in person or by proxy, will be elected as directors. You may vote "FOR" all nominees, "WITHHOLD" for all nominees, or "WITHHOLD" for any nominee by specifying the name of the nominee on your proxy card. Proposal One is not considered to be a discretionary item, so if you do not instruct your broker how to vote with respect to this proposal, your broker may not vote on this proposal, and those votes will be counted as broker "non-votes." Withheld votes and broker non-votes will have no effect on the outcome of the election of the directors.

Proposal Two—Ratification of Ernst & Young LLP as Independent Registered Public Accountants. Approval of this proposal requires the affirmative vote of a majority of the votes properly cast for and against such matter. You may vote "FOR," "AGAINST" or "ABSTAIN" from voting on this proposal. If you abstain from voting on this matter, your shares will not be counted as "votes cast" with respect to such matter, and the abstention will have no effect on the proposal. Broker non-votes will not be counted as "votes cast" and will therefore have no effect on the proposal. Proposal Two is considered to be a discretionary item, and your broker will be able to vote on this proposal even if it does not receive instructions from you.

Proposal Three—Approval of the Issuance of Shares of Common Stock upon Conversion of the Company's Outstanding Class X Convertible Preferred Stock. Approval of this proposal requires the affirmative vote of a majority of the votes properly cast for and against such matter. You may vote "FOR," "AGAINST" or "ABSTAIN" from voting on this proposal. If you abstain from voting on this matter, your shares will not be counted as "votes cast" with respect to such matter,

and the abstention will have no effect on the proposal. Broker non-votes will not be counted as "votes cast" and will therefore have no effect on the proposal.

We request that you vote your shares by proxy following the methods as instructed by the Notice: over the Internet, by telephone or by mail. If you choose to vote by mail, your shares will be voted in accordance with your voting instructions if the proxy card is received prior to or at the Annual Meeting. If you sign and return your proxy card but do not give voting instructions, your shares will be voted FOR (i) the election of each of the Company's two nominees as directors; (ii) the ratification of the appointment of Ernst & Young LLP as the independent registered public accounting firm for the Company for the fiscal year ending December 31, 2018; (iii) approval of the issuance of shares of the Company's common stock upon the conversion of the Company's outstanding Class X Convertible Preferred Stock; and (iv) as the proxy holders deem advisable, in their discretion, on other matters that may properly come before the Annual Meeting.

Voting by Proxy Over the Internet or by Telephone

Stockholders whose shares are registered in their own names may vote by proxy by mail, over the Internet or by telephone. Instructions for voting by proxy over the Internet or by telephone are set forth on the Notice. The Internet and telephone voting facilities will close at 11:59 p.m. Eastern Time on May 14, 2018. The Notice will also provide instructions on how you can elect to receive future proxy materials electronically or in printed form by mail. If you choose to receive future proxy materials electronically, you will receive an email next year with instructions containing a link to the proxy materials and a link to the proxy voting site. Your election to receive proxy materials electronically or in printed form by mail will remain in effect until you terminate such election.

If your shares are held in street name, the voting instruction form sent to you by your broker, bank or other nominee should indicate whether the institution has a process for beneficial holders to provide voting instructions over the Internet or by telephone. A number of banks and brokerage firms participate in a program that also permits stockholders whose shares are held in street name to direct their vote over the Internet or by telephone. If your bank or brokerage firm gives you this opportunity, the voting instructions from the bank or brokerage firm that accompany this Proxy Statement will tell you how to use the Internet or telephone to direct the vote of shares held in your account. If your voting instruction form does not include Internet or telephone information, please complete and return the voting instruction form in the self-addressed, postage-paid envelope provided by your broker. Stockholders who vote by proxy over the Internet or by telephone need not return a proxy card or voting instruction form by mail, but may incur costs, such as usage charges, from telephone companies or Internet service providers.

Revocability of Proxies

Any proxy may be revoked at any time before it is exercised by filing an instrument revoking it with the Company's Secretary or by submitting a duly executed proxy bearing a later date prior to the time of the Annual Meeting. Stockholders who have voted by proxy over the Internet or by telephone or have executed and returned a proxy and who then attend the Annual Meeting and desire to vote in person are requested to notify the Secretary in writing prior to the time of the Annual Meeting. We request that all such written notices of revocation to the Company be addressed to Nancy Denyes Krueger, Secretary, c/o aTyr Pharma, Inc., at the address of our principal executive offices at 3545 John Hopkins Court, Suite #250, San Diego, CA 92121. Our telephone number is (858) 731-8389. Stockholders may also revoke their proxy by entering a new vote over the Internet or by telephone.

Stockholder Proposals to be Presented at the Next Annual Meeting

Any stockholder who meets the requirements of the proxy rules under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), may submit proposals to the Board of Directors to be presented at the 2019 annual meeting. Such proposals must comply with the requirements of Rule 14a-8 under the Exchange Act and be submitted in writing by notice delivered or mailed by first-class United States mail, postage prepaid, to our Secretary at our principal executive offices at the address set forth above no later than December 4, 2018 in order to be considered for inclusion in the proxy materials to be disseminated by the Board of Directors for such annual meeting. If the date of the 2019 annual meeting is moved by more than 30 days from the date contemplated at the time of the previous year's proxy statement, then notice must be received within a reasonable time before we begin to print and send proxy materials. If that happens, we will publicly announce the deadline for submitting a proposal in a press release or in a document filed with the SEC. A proposal submitted outside the requirements of Rule 14a-8 under the Exchange Act will be considered untimely if received after February 17, 2019.

Our Amended and Restated Bylaws ("Bylaws") also provide for separate notice procedures to recommend a person for nomination as a director or to propose business to be considered by stockholders at a meeting. To be considered timely under these provisions, the stockholder's notice must be received by our Secretary at our principal executive offices at the address set forth above no earlier than January 15, 2019 and no later than February 14, 2019. Our Bylaws also specify requirements as to the form and content of a stockholder's notice.

The Board of Directors, a designated committee thereof or the chairman of the meeting may refuse to acknowledge the introduction of any stockholder proposal if it is not made in compliance with the applicable notice provisions.

PROPOSAL 1

ELECTION OF DIRECTORS

General

Our certificate of incorporation provides for a Board of Directors that is divided into three classes. The term for each class is three years, staggered over time. This year, the term of the directors in Class III expires. Two of our Class III directors will each stand for re-election at the Annual Meeting and one will be retiring from our Board of Directors at the end of his term. Our Board of Directors is currently comprised of nine members, and effective as of our Annual Meeting, our Board will consist of eight members. If the Class III director nominees are elected at the Annual Meeting, the composition of our Board of Directors will be as follows: Class III—Dr. Sanjay S. Shukla and Mr. Jeffrey S. Hatfield; Class II— Drs. James C. Blair and John D. Mendlein and Mr. Timothy P. Coughlin; Class I— Mr. John K. Clarke, and Drs. Amir H. Nashat and Paul Schimmel. Dr. Srinivas Akkaraju is retiring from the Board of Directors at the end of his term.

In the absence of instructions to the contrary, the persons named as proxy holders in the accompanying proxy intend to vote in favor of the election of the nominees designated below to serve until the 2021 Annual Meeting of Stockholders and until their successors shall have been duly elected and qualified. Each nominee is currently a director. The Board of Directors expects that each nominee will be available to serve as a director, but if any such nominee should become unavailable or unwilling to stand for election, it is intended that the shares represented by the proxy will be voted for such substitute nominee as may be designated by the Board of Directors. The biographies of our directors and their ages as of March 1, 2018 are set forth below.

Name	Age	Position
Sanjay S. Shukla, M.D., M.S.	46	President, Chief Executive Officer and Director
John K. Clarke (1)(2)(3)	64	Chairman of the Board
Srinivas Akkaraju, M.D., Ph.D. (2)(4)	49	Director
James C. Blair, Ph.D. (2)(3)	78	Director
Timothy P. Coughlin (1)(4)	51	Director
Jeffrey S. Hatfield (3)(4)	60	Director
John D. Mendlein, Ph.D.	58	Director
Amir H. Nashat, Sc.D. (1)(4)	45	Director
Paul Schimmel, Ph.D.	77	Director

(1) Member of the Audit Committee.

(2) Member of the Compensation Committee.

(3) Member of the Nominating and Corporate Governance Committee.

(4) Member of the Strategic Alliance Committee.

Nominees for Director

Class III:

The persons listed below are nominated for election to Class III of the Board of Directors to serve a three-year term ending at the 2021 Annual Meeting of Stockholders and until their successors are elected and qualified.

The Board of Directors recommends that you vote FOR the following nominees.

Jeffrey S. Hatfield has served as a director since April 2017. Mr. Hatfield currently serves as Chief Executive Officer and a member of the Board of Directors at Zafgen, a biopharmaceutical company dedicated to significantly improving the health and well-being of patients affected by metabolic diseases. Previously, Mr. Hatfield served as President, Chief Executive Officer and a member of the Board of Directors of Vitae Pharmaceuticals from 2004 to 2016. As CEO, Mr. Hatfield successfully transitioned Vitae from a novel platform technology start-up to a thriving product-focused company with a robust pipeline of multiple first-in-class clinical stage and pre-clinical stage assets generated from the company's internal discovery engine. Mr. Hatfield took the company public in 2014, and in October 2016, Vitae Pharmaceuticals was acquired by Allergan plc for approximately \$639 million in cash. Prior to joining Vitae Pharmaceuticals, Mr. Hatfield worked at Bristol-Myers Squibb in a variety of executive positions, including: Senior Vice President of BMS's Immunology and Virology Divisions, where he was responsible for all aspects of the \$1 billion business; President and General Manager, Canada; and, Vice President, U.S. Managed Health Care. He previously served as a Board member of Ambit Biosciences before its acquisition by Daiichi-Sankyo

in 2015, and as a member of the Board of Directors of the Biotechnology Industry Organization (BIO), serving on the Executive Company Section. Mr. Hatfield currently serves as a Board member of Miragen Therapeutics and InVivo Therapeutics, both biotherapeutic companies, and as an Adjunct Professor and member of the Dean's Advisory Committee for Purdue University's College of Pharmacy, where he is a Distinguished Alumni. Mr. Hatfield holds an M.B.A. from The Wharton School, University of Pennsylvania and a bachelor's degree in Pharmacy from Purdue University. The Board of Directors believes Mr. Hatfield is qualified to serve on our board of directors due to his extensive experience within the field of drug discovery and development and his broad leadership experience.

Sanjay S. Shukla, M.D., M.S. has served as our President and Chief Executive Officer and as a board member since November 2017. Dr. Shukla served as our Chief Medical Officer from March 2016 to November 2017. From April 2015 to March 2016, Dr. Shukla worked in an advisory capacity for a number of companies, including as a consultant to aTyr from January 2016 to March 2016. Prior to that, from October 2012 to April 2015, Dr. Shukla served as Vice President and Global Head of Integrated Medical Services for Novartis, a biopharmaceutical company, where he led global medical affairs operations, with oversight for all pharma general medicines therapies, both inline and in development. Dr. Shukla served as Chief Executive Officer of RXMD, a clinical development consultancy that assisted in advancing proof of concept for early stage drug candidates, from April 2009 to September 2012. Prior to that, Dr. Shukla served in a variety of clinical development, data analytics and drug safety roles at Vifor Pharma, a biopharmaceutical company, and Aspreva Pharmaceuticals (acquired by Vifor Pharma). Dr. Shukla received his M.D. from Howard University College of Medicine and his Bachelors of Science in Microbiology and Master of Science in Epidemiology and Biostatistics from the University of Maryland. The Board of Directors believes that Dr. Shukla is qualified to serve on our board of directors due to his experience as our Chief Executive Officer and previously as our Chief Medical Officer, as well as his medical background, experience in the life science industry and his leadership experience.

Continuing Directors:

Class I: Currently Serving Until the 2019 Annual Meeting

John K. Clarke has served as Chairman of our Board of Directors since September 2005. Mr. Clarke is Managing Partner of Cardinal Partners, a venture capital firm focused on healthcare investing. He co-founded Cardinal Partners in 1997 and has served as President of CHP Management, Inc. since that time. He currently serves as a director on the boards of Alnylam Pharmaceuticals, Inc., a publicly traded biopharmaceutical company, and various privately held biotechnology companies including Abide Therapeutics, Inc., Vividion Therapeutics, Inc. and Ivenix Corporation. He has also served as a director for several biotechnology and biopharmaceutical companies including Momenta Pharmaceuticals, Inc., Verastem, Inc. and Sirtris Pharmaceuticals, Inc. (acquired by GlaxoSmithKline); healthcare information technology companies, including TechRx Technology Services Corporation (acquired by NDCHealth) and Visicu, Inc. (acquired by Phillips Electronics); and a privately held biopharmaceutical company, Rib-X Pharmaceuticals Inc. Mr. Clarke holds an A.B. in economics and biology from Harvard University and an M.B.A. from the Wharton School at the University of Pennsylvania. The Board of Directors believes Mr. Clarke is qualified to serve on our board of directors due to his extensive experience within the field of drug discovery and development and his broad leadership experience on various public and private company boards.

Amir H. Nashat, Sc.D. has served as a director since November 2006. He is also a Managing General Partner at Polaris Partners, a venture capital firm. He joined Polaris in April 2002 and focuses on investments in healthcare, consumer products and energy. Dr. Nashat is currently a director of Fate Therapeutics, Inc., Selecta Biosciences, Inc. and Syros Pharmaceuticals, Inc., all are publicly traded biopharmaceutical companies, as well as a director of several private companies. Additionally, Dr. Nashat has served as a director of Receptos, Inc. (acquired by Celgene Corporation), Adnexus Therapeutics, Inc. (acquired by Bristol-Myers Squibb Company) and other private companies. Dr. Nashat holds a Sc.D. in chemical engineering from the Massachusetts Institute of Technology with a minor in biology and an M.S. and B.S. in materials science and mechanical engineering from the University of California, Berkeley. The Board of Directors believes Dr. Nashat is qualified to serve on our board of directors due to his extensive experience within the field of drug discovery and development, his broad leadership experience on various boards, and his financial expertise with life sciences companies.

Paul Schimmel, Ph.D. has served as a director since September 2005. Dr. Schimmel is currently a director of Alnylam Pharmaceuticals, Inc. and Tocagen, Inc., both biopharmaceutical companies, as well as a director of several private companies. Dr. Schimmel is a member of The Scripps Research Institute Board of Directors and an Ernest and Jean Hahn Professor at The Skaggs Institute for Chemical Biology at The Scripps Research Institute. He was formerly the John D. and Catherine T. MacArthur Professor of Biochemistry and Biophysics in the Department of Biology at the Massachusetts Institute of Technology. Dr. Schimmel holds a B.A. from Ohio Wesleyan University and a Ph.D. in biochemistry and biophysics from the Massachusetts Institute of Technology. He is a member of the American Academy of Arts and Sciences, the National Academy

of Sciences, The National Academy of Medicine, The National Academy of Inventors, and the American Philosophical Society. The Board of Directors believes Dr. Schimmel is qualified to serve on our board of directors due to his role as one of our scientific founders and his discoveries and scientific leadership in the field of tRNA synthetase biology and other areas important to the development of therapeutics.

Class II: Currently Serving Until the 2020 Annual Meeting

James C. Blair, Ph.D. has served as a director since December 2010. Dr. Blair has been a Partner of Domain Associates, a venture capital firm with a focus on life sciences, since the company's founding in 1985. Present board memberships include Clovis Oncology, Inc., a biopharmaceutical company, as well as numerous private company boards. Dr. Blair currently serves on the board of directors of the Prostate Cancer Foundation and the Sanford Burnham Prebys Medical Discovery Institute. He is also on the advisory boards of the Department of Molecular Biology at Princeton University, the USC Stevens Institute for Innovation, and the Division of Chemistry and Chemical Engineering at the California Institute of Technology. Dr. Blair holds a B.S.E. in electrical engineering from Princeton University and an M.S.E. and Ph.D. in electrical engineering from the University of Pennsylvania. The Board of Directors believes that Dr. Blair is qualified to serve on our board of directors due to his experience in the life science industry and his years of business and leadership experience.

Timothy P. Coughlin has served as a director since April 2017. Mr. Coughlin served as Chief Financial Officer of Neurocrine Biosciences, Inc. from September 2006 to February 2017. Prior to joining Neurocrine in 2002, he was with Catholic Health Initiatives, a nationwide integrated healthcare delivery system, where he served as Vice President, Financial Services. Mr. Coughlin also served as a Senior Manager in the Health Sciences practice of Ernst & Young LLP and its predecessors from 1989 to 1999. Mr. Coughlin currently serves on the board of directors of Retrophin, Inc. and Fate Therapeutics, Inc., two biotechnology companies where he chairs the audit committees and is also a member of the compensation committees. Mr. Coughlin holds a master's degree from San Diego State University and a bachelor's degree from Temple University. Mr. Coughlin is a certified public accountant in both California and Pennsylvania. The Board of Directors believes that Mr. Coughlin is qualified to serve on our board of directors due to his extensive background in financial and accounting matters for public companies, his experience in the life science industry and his years of business and leadership experience.

John D. Mendlein, Ph.D. has served as a member of our Board of Directors since July 2010 and also currently serves as our strategic advisor. Dr. Mendlein served as our Chief Executive Officer from September 2011 to November 2017 and as Executive Chairman of the Board of Directors from July 2010 to December 2015. Dr. Mendlein is President, Corporate and Product Strategy and a director of Moderna Therapeutics, Inc., a biopharmaceutical company. Dr. Mendlein is Vice Chairman of the Board of Fate Therapeutics, Inc., a biopharmaceutical company, and also holds board positions with Editas Medicine, Inc. and Axcella Health, Inc., which are biopharmaceutical companies. Dr. Mendlein also serves on the Biotechnology Industry Organization ("BIO") emerging companies board. Dr. Mendlein previously served as the Chief Executive Officer of Adnexus Therapeutics, Inc., a biopharmaceutical company, from 2005 to 2008, which was purchased by Bristol-Myers Squibb Company in 2008. Dr. Mendlein also served on the board of directors of Monogram Biosciences, Inc., an HIV and oncology diagnostic company that was acquired by Laboratory Corporation of America Holdings in 2009. Before that, he served as Chairman and Chief Executive Officer of Affinium Pharmaceuticals, Ltd. (acquired by Debiopharm Group) from 2000 to 2005, and as a board member, General Counsel and Chief Knowledge Officer at Aurora Bioscience Corporation (acquired by Vertex Pharmaceuticals), a biotechnology company, from August 1996 to September 2001. Dr. Mendlein holds a Ph.D. in physiology and biophysics from the University of California, Los Angeles, a J.D. from the University of California, Hastings College of the Law, and a B.S. in biology from the University of Miami. Dr. Mendlein is the co-author or co-inventor of over 210 publications and published patents, including a number of patents associated with our company. The Board of Directors believes that Dr. Mendlein is qualified to serve our board of directors due to his prior experience as our Chief Executive Officer, as well as his extensive experience in the life science industry and his years of business and leadership experience.

Retiring Class III Director:

The person listed below is retiring from the Board of Directors as of the Annual Meeting date and not standing for re-election at the Annual Meeting.

Srinivas Akkaraju, M.D., Ph.D. Dr. Akkaraju has served as a director since March 2015. He is a Founder and Managing General Partner at Samsara BioCapital, L.P. Dr. Akkaraju served as a general partner of Sofinnova Ventures, from April 2013 to February 2016. From January 2009 to April 2013, Dr. Akkaraju served as Managing Director of New Leaf Venture Partners. From August 2006 to December 2008, Dr. Akkaraju served as a Managing Director at Panorama Capital, LLC, a private equity firm founded by the former venture capital investment team of J.P. Morgan Partners, LLC, a private equity division of JPMorgan Chase & Co. Prior to co-founding Panorama Capital, he was with J.P. Morgan Partners, which he

joined in April 2001 and of which he became a Partner in January 2005. From October 1998 to April 2001, he was in Business and Corporate Development at Genentech, Inc. (now a member of the Roche Group), a biotechnology company, most recently as Senior Manager. In addition to aTyr, Dr. Akkaraju serves as a director of Seattle Genetics, Intercept Pharmaceuticals, Inc., Syros Pharmaceuticals, Inc. and Versartis, Inc., which are all publicly traded biotechnology companies. Previously, Dr. Akkaraju served as a director on the boards of ZS Pharma, Barrier Therapeutics, Inc., Eyetech Pharmaceuticals, Inc. and Synageva Biopharma Corp., all publicly traded biotechnology companies, and Amarin Corporation plc, a foreign publicly traded biotechnology company. Prior to joining Genentech, Dr. Akkaraju was a graduate student at Stanford University, where he received an M.D. and a Ph.D. in Immunology. He holds B.A.s in biochemistry and computer science from Rice University. During the term of his service, the Board of Directors believed that Dr. Akkaraju was qualified to serve on our board of directors due to his strong scientific background coupled with extensive experience in private equity and venture capital investing allowing him to thoroughly understand our technology and provide strong business and strategic expertise.

Board of Directors' Role in Risk Management

Risk is inherent with every business, and how well a business manages risk can ultimately determine its success. We face a number of risks, including risks relating to our financial condition, development and commercialization activities, operations and intellectual property. Management is responsible for the day-to-day management of risks we face, while our Board of Directors, as a whole and through its committees, has responsibility for the oversight of risk management. In its risk oversight role, our Board of Directors has the responsibility to satisfy itself that the risk management processes designed and implemented by management are adequate and functioning as designed.

The role of our Board of Directors in overseeing the management of our risks is conducted primarily through committees of the Board of Directors, as disclosed in the descriptions of each of the committees below and in the charters of each of the committees. The full Board of Directors (or the appropriate board committee in the case of risks that are under the purview of a particular committee) discusses with management our major risk exposures, their potential impact on our company, and the steps we take to manage them. When a board committee is responsible for evaluating and overseeing the management of a particular risk or risks, the chairman of the relevant committee reports on the discussion to the full Board of Directors during the committee reports portion of the next board meeting. This enables our Board of Directors and its committees to coordinate the risk oversight role, particularly with respect to risk interrelationships.

Compensation Risk Assessment

We believe that although a portion of the compensation provided to our executive officers and other employees is performance-based, our executive compensation program does not encourage excessive or unnecessary risk taking. This is primarily due to the fact that our compensation programs are designed to encourage our executive officers and other employees to remain focused on both short-term and long-term strategic goals, in particular in connection with our pay-for-performance compensation philosophy. As a result, we do not believe that our compensation programs are reasonably likely to have a material adverse effect on the Company.

Board of Directors and Committees of the Board

During 2017, the Board of Directors held a total of ten meetings. All directors attended at least 75% of the total number of Board meetings and of the total number of meetings of Board committees on which the director served during the time he or she served on the Board or such committees.

Our Board of Directors has determined that all of our directors, except for Drs. Mendlein and Shukla, are independent, as determined in accordance with the rules of The NASDAQ Stock Market ("NASDAQ") and the SEC. In making such independence determination, the Board of Directors considered the relationships that each non-employee director has with us and all other facts and circumstances that the Board of Directors deemed relevant in determining their independence, including the beneficial ownership of our capital stock by each non-employee director. In considering the independence of the directors listed above, our Board of Directors considered the association of our directors with the holders of more than 5% of our common stock. There are no family relationships among any of our directors or executive officers.

The Board of Directors has a standing Audit Committee, Compensation Committee, Nominating and Corporate Governance Committee and Strategic Alliance Committee. Each of our Audit Committee, Compensation Committee, Nominating and Corporate Governance Committee and Strategic Alliance Committee is composed entirely of independent directors in accordance with current NASDAQ listing standards. Furthermore, our Audit Committee meets the enhanced independence standards established by the Sarbanes-Oxley Act of 2002 and related rulemaking of the SEC. Copies of our Audit Committee, Compensation Committee, Nominating and Corporate Governance Committee and Strategic Alliance

Committee charters and our corporate governance guidelines are available, free of charge, on our website at <http://www.atyrpharma.com>, under the "Investors/Corporate Governance" link.

Audit Committee

Mr. Clarke, Mr. Coughlin and Dr. Nashat currently serve on the Audit Committee, which is chaired by Mr. Coughlin. Our Board of Directors has designated Mr. Coughlin as an "Audit Committee financial expert," as defined under the applicable rules of the SEC. The Audit Committee's responsibilities include:

- appointing, approving the compensation of, and assessing the independence of our independent registered public accounting firm;
- approving auditing and permissible non-audit services, and the terms of such services, to be provided by our independent registered public accounting firm;
- reviewing the internal audit plan with the independent registered public accounting firm and members of management responsible for preparing our financial statements;
- reviewing and discussing with management and the independent registered public accounting firm our annual and quarterly financial statements and related disclosures as well as critical accounting policies and practices used by us;
- reviewing the adequacy of our internal control over financial reporting;
- establishing policies and procedures for the receipt and retention of accounting-related complaints and concerns;
- recommending, based upon the Audit Committee's review and discussions with management and the independent registered public accounting firm, whether our audited financial statements shall be included in our Annual Report on Form 10-K;
- monitoring the integrity of our financial statements and our compliance with legal and regulatory requirements as they relate to our financial statements and accounting matters;
- preparing the Audit Committee report required by SEC rules to be included in our annual proxy statement;
- reviewing all related party transactions for potential conflict of interest situations and approving all such transactions; and
- reviewing quarterly earnings releases.

During 2017, the Audit Committee held four meetings.

Compensation Committee

Dr. Akkaraju, Dr. Blair and Mr. Clarke currently serve on the Compensation Committee, which is chaired by Dr. Blair. The Compensation Committee's responsibilities include:

- annually reviewing and approving corporate goals and objectives relevant to the compensation of our Chief Executive Officer;
- evaluating the performance of our Chief Executive Officer in light of such corporate goals and objectives and recommending the compensation of our Chief Executive Officer to the Board of Directors for approval;
- reviewing and approving the compensation of our other officers;
- reviewing and establishing our overall management and employee compensation, philosophy and policy;
- overseeing and administering our compensation and similar plans;
- evaluating and assessing potential and current compensation advisers in accordance with the independence standards identified in the applicable NASDAQ Stock Market and SEC rules;
- retaining and approving the compensation of any compensation advisers;
- reviewing and approving our policies and procedures for the grant of equity-based awards;
- reviewing and making recommendations to our Board of Directors with respect to director compensation;

- preparing the compensation committee report required by the SEC rules to be included in our annual proxy statement;
- reviewing and discussing with management the compensation discussion and analysis to be included in our annual proxy statement or Annual Report on Form 10-K; and
- reviewing and discussing with our Board of Directors corporate succession plans for the Chief Executive Officer and other key officers.

Pursuant to its charter, the Compensation Committee has the authority to retain compensation consultants to assist in its evaluation of executive and director compensation. The Compensation Committee engaged Radford Aon Hewitt, a business unit of Aon plc. ("Radford") as a compensation consultant in 2017. The Compensation Committee instructed the consultant to develop a peer group of companies to assess the competitiveness of the executive, equity and Board of Directors compensation programs and to review the Company's equity program and broader equity practices. Our Compensation Committee plans to retain one or more third-party compensation advisors to provide similar information and advice in future years for consideration in establishing overall compensation for the Company's executives and directors. We do not believe the retention of, and the work performed by, Radford creates any conflict of interest.

During 2017, the Compensation Committee held six meetings.

Nominating and Corporate Governance Committee

Dr. Blair, Mr. Clarke and Mr. Hatfield currently serve on the Nominating and Corporate Governance Committee, which is chaired by Mr. Clarke. The Nominating and Corporate Governance Committee's responsibilities include:

- developing and recommending to the Board of Directors criteria for board and committee membership;
- establishing procedures for identifying and evaluating Board of Director candidates, including nominees recommended by stockholders;
- identifying individuals qualified to become members of the Board of Directors;
- recommending to the Board of Directors the persons to be nominated for election as directors and to each of the Board's committees;
- developing and recommending to the Board of Directors a set of corporate governance guidelines; and
- overseeing the evaluation of the Board of Directors.

During 2017, the Nominating and Corporate Governance Committee held two meetings.

Strategic Alliance Committee

The Strategic Alliance Committee was established in September 2016 to assist management and the Board of Directors in:

- assessing potential related party transactions involving a Board member or any other Board member recusal matter in which a contractual relationship is contemplated; and
- reviewing and evaluating key strategic transactions outside the ordinary course of the Company's business.

Dr. Akkaraju, Mr. Coughlin, Mr. Hatfield and Dr. Nashat currently serve on the Strategic Alliance Committee, which is chaired by Dr. Akkaraju.

During 2017, the Strategic Alliance Committee held one meeting.

Board Leadership

The positions of our Chairman of the Board and Chief Executive Officer are presently separated at aTyr. Separating these positions allows our Chief Executive Officer to focus on our day-to-day business, while allowing the Chairman of the Board to lead our Board of Directors in its fundamental role of providing advice to and independent oversight of management. Our Board of Directors recognizes the time, effort and energy that the Chief Executive Officer must devote to his position in the current business environment, as well as the commitment required to serve as our Chairman of the Board, particularly as our Board of Directors' oversight responsibilities continue to grow. Our Board of Directors also believes that this structure

ensures a greater role for the independent directors in the oversight of our Company and active participation of the independent directors in setting agendas and establishing priorities and procedures for the work of our Board of Directors.

While our Bylaws and corporate governance guidelines do not require that our Chairman of the Board and Chief Executive Officer positions be separate, our Board of Directors believes that having separate positions and having an independent outside director serve as Chairman of the Board is the appropriate leadership structure for us at this time and demonstrates our commitment to good corporate governance. Our separated Chairman of the Board and Chief Executive Officer positions are augmented by the independence of seven of our nine directors, and our four entirely independent Board committees that provide appropriate oversight in the areas described above. At executive sessions of independent directors, these directors speak candidly on any matter of interest, without the Chief Executive Officer or other executives present. The independent directors met five times in 2017 without management present. We believe this structure provides consistent and effective oversight of our management and the Company.

Director Nominations

The director qualifications developed to date focus on what our Board believes to be essential competencies to effectively serve on the Board of Directors. The Nominating and Corporate Governance Committee must reassess such criteria from time to time and submit any proposed changes to the Board of Directors for approval. Presently, at a minimum, the Nominating and Corporate Governance Committee must be satisfied that each nominee it recommends (i) has experience at a strategic or policymaking level in a business, government, non-profit or academic organization of high standing, (ii) is highly accomplished in his or her respective field, with superior credentials and recognition, (iii) is well regarded in the community and has a long-term reputation for high ethical and moral standards (iv) has sufficient time and availability to devote to the affairs of the Company, particularly in light of the number of boards of directors on which such nominee may serve, and (v) to the extent such nominee serves or has previously served on other boards, the nominee has a demonstrated history of actively contributing at board meetings.

In addition to those minimum qualifications, the Nominating and Corporate Governance Committee recommends that our Board of Directors select persons for nomination to help ensure that:

- a majority of our Board is "independent" in accordance with NASDAQ standards;
- each of the Audit Committee, Compensation Committee, Nominating and Corporate Governance Committee and Strategic Alliance Committee be comprised entirely of independent directors; and
- at least one member of the Audit Committee shall have the experience, education and other qualifications necessary to qualify as an "Audit Committee financial expert" as defined by the rules of the SEC.

In addition to other standards the Nominating and Corporate Governance Committee may deem appropriate from time to time for the overall structure and compensation of the Board of Directors, the Nominating and Corporate Governance Committee may consider the following factors when recommending that our Board select persons for nomination:

- whether a nominee has direct experience in the biotechnology or pharmaceuticals industry or in the markets in which the Company operates; and
- whether the nominee, if elected, assists in achieving a mix of Board members that represents a diversity of background and experience.

Although the Nominating and Corporate Governance Committee may consider whether nominees assist in achieving a mix of Board members that represents a diversity of background and experience, which is not only limited to race, gender or national origin, we have no formal policy regarding Board diversity.

The Nominating and Corporate Governance Committee adheres to the following process for identifying and evaluating nominees for the Board of Directors. First, it solicits recommendations for nominees from non-employee directors, our Chief Executive Officer, other executive officers, third-party search firms or any other source it deems appropriate. The Nominating and Corporate Governance Committee then reviews and evaluates the qualifications of proposed nominees and conducts inquiries it deems appropriate; all proposed nominees are evaluated in the same manner, regardless of who initially recommended such nominee. In reviewing and evaluating proposed nominees, the Nominating and Corporate Governance Committee may consider, in addition to the minimum qualifications and other criteria for Board membership approved by our Board from time to time, all facts and circumstances that it deems appropriate or advisable, including, among other things, the skills of the proposed nominee, his or her depth and breadth of business experience or other background characteristics, his or her independence and the needs of the Board.

If the Nominating and Corporate Governance Committee decides to retain a third-party search firm to identify proposed nominees, it has sole authority to retain and terminate such firm and to approve any such firm's fees and other retention terms.

Each nominee for election as director at the 2018 Annual Meeting is recommended by the Nominating and Corporate Governance Committee and is presently a director and stands for re-election by the stockholders. From time to time, the Company may pay fees to third-party search firms to assist in identifying and evaluating potential nominees, although no such fees have been paid in connection with nominations to be acted upon at the 2018 Annual Meeting.

Pursuant to our Bylaws, stockholders who wish to nominate persons for election to the Board of Directors at an annual meeting must be a stockholder of record at the time of giving the notice, entitled to vote at the meeting, present (in person or by proxy) at the meeting and must comply with the notice procedures in our Bylaws. A stockholder's notice of nomination to be made at an annual meeting must be delivered to our principal executive offices not less than 90 days nor more than 120 days before the anniversary date of the immediately preceding annual meeting. However, if an annual meeting is more than 30 days before or more than 60 days after such anniversary date, the notice must be delivered no later than the later of the 90th day prior to such annual meeting or the 10th day following the day on which the first public announcement of the date of such annual meeting was made. A stockholder's notice of nomination may not be made at a special meeting unless such special meeting is held in lieu of an annual meeting. The stockholder's notice must include the following information for the person making the nomination:

- name and address;
- the class and number of shares of the Company owned beneficially or of record;
- disclosure regarding any derivative, swap or other transactions which give the nominating person economic risk similar to ownership of shares of the Company or provide the opportunity to profit from an increase in the price of value of shares of the Company;
- any proxy (other than a revocable proxy given in response to a public proxy solicitation made pursuant to, and in accordance with, the Exchange Act), agreement, arrangement, understanding or relationship that confers a right to vote any shares of the Company;
- any agreement, arrangement, understanding or relationship engaged in for the purpose of acquiring, holding, disposing or voting of any shares of any class or series of capital stock of the Company;
- any rights to dividends or other distributions on the shares that are separate from the underlying shares;
- any performance-related fees that the nominating person is entitled to based on any increase or decrease in the value of any shares of the Company;
- a description of all agreements, arrangements or understandings by and between the proposing stockholder and another person relating to the proposed business (including an identification of each party to such agreement, arrangement or understanding and the names, addresses and class and number of shares owned beneficially or of record of other stockholders known by the proposing stockholder support such proposed business);
- a statement whether or not the proposing stockholder will deliver a proxy statement and form of proxy to holders of, in the case of a business proposal, at least the percentage of voting power of all shares of capital stock required to approve the proposal or, in the case of director nominations, at least the percentage of voting power of all of the shares of capital stock reasonably believed by the proposing stockholder to be sufficient to elect the nominee; and
- any other information relating to the nominating person that would be required to be disclosed in a proxy statement filed with the SEC.

With respect to proposed director nominees, the stockholder's notice must include all information required to be disclosed in a proxy statement in connection with a contested election of directors or otherwise required pursuant to Regulation 14A under the Exchange Act (including such person's written consent to being named in the proxy statement as a nominee and to serving as a director if elected).

For matters other than the election of directors, the stockholder's notice must also include a brief description of the business desired to be brought before the meeting, the reasons for conducting such business at the meeting and any material interest in such business of the stockholder(s) proposing the business.

The stockholder's notice must be updated and supplemented, if necessary, so that the information required to be provided in the notice is true and correct as of the record date for the meeting and as of the date that is ten business days prior to the meeting.

The Board of Directors, a designated committee thereof or the chairman of the meeting will determine if the procedures in our Bylaws have been followed, and if not, declare that the proposal or nomination be disregarded. The nominee must be willing to provide any other information reasonably requested by the Nominating and Corporate Governance Committee in connection with its evaluation of the nominee's independence. There have been no material changes to the process by which stockholders may recommend nominees to our Board of Directors.

Stockholder Communications with the Board of Directors

Stockholders may send correspondence to the Board of Directors c/o the Chairman of the Board at our principal executive offices at the address set forth above. The Company will forward all correspondence addressed to the Board or any individual Board member.

Director Attendance at Annual Meetings

Directors are encouraged to attend the Annual Meeting. Eight of our directors attended the 2017 Annual Meeting of Stockholders.

Compensation Committee Interlocks and Insider Participation

None of the members of the Compensation Committee is, or has at any time during the past fiscal year been, an officer or employee of the Company or had any relationship requiring disclosure under Item 404 of Regulation S-K. None of the members of the Compensation Committee has formerly been an officer of the Company. None of our executive officers serve, or in the past fiscal year, have served as a member of the Board of Directors or Compensation Committee of any other entity that has one or more executive officers serving as a member of our Board of Directors or Compensation Committee.

Director Compensation

In April 2015, our Board of Directors adopted a non-employee director compensation policy, which became effective upon the completion of our initial public offering in May 2015, that is designed to provide a total compensation package that enables us to attract and retain, on a long-term basis, high-caliber non-employee directors. In January 2016 and February 2017, our Board of Directors adopted amendments to the policy with respect to the cash and equity component of compensation to our non-employee directors. Under this policy, as amended to date, all non-employee directors are paid cash compensation for service on the Board of Directors and committees of the Board of Directors as set forth below, prorated based on days of service during a calendar year.

Board of Directors	Annual Retainer
All non-employee members	\$ 37,500
Additional retainer for Chairperson	\$ 35,000
Audit Committee:	
Chairperson	\$ 25,000
Non-Chairperson members	\$ 8,000
Compensation Committee:	
Chairperson	\$ 10,000
Non-Chairperson members	\$ 5,000
Nominating and Corporate Governance Committee:	
Chairperson	\$ 7,500
Non-Chairperson members	\$ 4,000
Strategic Alliance Committee:	
Chairperson	\$ 10,000
Non-Chairperson members	\$ 8,000

In addition, under the policy, each new non-employee director who is initially appointed or elected to our Board of Directors will receive an option grant to purchase up to 32,000 shares of common stock, which will vest in equal monthly installments during the 36 months following the grant date, subject to the director's continued service on our Board of Directors. Thereafter, on the date of each annual meeting of stockholders, each continuing non-employee director will be eligible to receive an annual option grant to purchase up to 20,000 shares of common stock, which will vest in full upon the earlier of the first anniversary of the date of grant or the date of the following annual meeting of stockholders, subject to the director's continued service on our Board of Directors. All of the foregoing options will be granted with an exercise price equal to the fair market value of our common stock on the date of grant.

We have agreed to reimburse all reasonable out-of-pocket expenses incurred by non-employee directors in attending Board and committee meetings.

Director Compensation Table—2017

The following table sets forth information with respect to the compensation earned by our non-employee directors during the fiscal year ended December 31, 2017. During 2017, Drs. Shukla and Mendlein did not receive compensation for service on the Board of Directors and the compensation paid to Drs. Shukla and Mendlein as employees of the Company is set forth under the heading "Compensation of Executive Officers—Summary Compensation Table" below.

Name	Fees Earned or Paid in Cash (\$)	Option Awards \$(1)	Total (\$)
John K. Clarke (Chairman) (2)	\$ 91,750	\$ 52,278	\$ 144,028
Srinivas Akkaraju, M.D., Ph.D. (3)	\$ 55,489(11)	\$ 52,278	\$ 107,767
James C. Blair, Ph.D. (4)	\$ 51,500	\$ 52,278	\$ 103,778
Timothy P. Coughlin (5)	\$ 45,845	\$ 141,824	\$ 187,669
Kathryn E. Falberg (6)	\$ 27,457(11)	\$ —	\$ 27,457
Mark Goldberg, M.D. (7)	\$ 35,462	\$ 52,278	\$ 87,740
Jeffrey S. Hatfield (8)	\$ 27,919	\$ 148,652	\$ 176,571
Amir H. Nashat, Sc.D. (9)	\$ 55,891(11)	\$ 52,278	\$ 108,169
Paul Schimmel, Ph.D. (10)	\$ 38,750	\$ 52,278	\$ 91,028

- (1) In accordance with SEC rules, this column reflects the aggregate grant date fair value of the option awards granted during 2017 computed in accordance with Financial Accounting Standard Board Accounting Standards Codification Topic 718 for stock-based compensation transactions ("ASC 718"). Assumptions used in the calculation of these amounts are included in Note 6 to our consolidated financial statements included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2017. These amounts do not reflect the actual economic value that may be realized by the directors upon the vesting of the stock options, the exercise of the stock options or the sale of the common stock underlying such stock options.
- (2) Mr. Clarke held stock options to purchase an aggregate of 76,286 shares of common stock as of December 31, 2017.
- (3) Dr. Akkaraju held stock options to purchase an aggregate of 76,286 shares of common stock as of December 31, 2017.
- (4) Dr. Blair held stock options to purchase an aggregate of 76,286 shares of common stock as of December 31, 2017.
- (5) Mr. Coughlin joined our Board of Directors on April 7, 2017. Mr. Coughlin held stock options to purchase an aggregate of 52,000 shares of common stock as of December 31, 2017.
- (6) Ms. Falberg completed her service on our Board of Directors as of our 2017 Annual Meeting of Stockholders on May 9, 2017 and therefore has not served on the Board since that date and did not receive the annual option grant on May 9, 2017.
- (7) Dr. Goldberg resigned from our Board of Directors effective December 11, 2017. The annual option grant made to Dr. Goldberg on May 9, 2017 was cancelled in connection with his resignation from our Board of Directors.
- (8) Mr. Hatfield joined our Board of Directors on April 3, 2017. Mr. Hatfield held stock options to purchase an aggregate of 52,000 shares of common stock as of December 31, 2017.
- (9) Dr. Nashat held stock options to purchase an aggregate of 76,286 shares of common stock as of December 31, 2017.
- (10) Dr. Schimmel held stock options to purchase an aggregate of 108,470 shares of common as of December 31, 2017.
- (11) Amount includes \$2,989 for Dr. Akkaraju, \$2,391 for Ms. Falberg and \$2,391 for Dr. Nashat paid in March 2017 as a retroactive fee for services provided in 2016 as a member of the Company's Strategic Alliance Committee, approved by the Board in February 2017. The Strategic Alliance Committee was established in September 2016.

Required Vote

The nominees receiving the highest number of affirmative votes of all the votes properly cast shall be elected as Class III directors to serve until the 2021 Annual Meeting of Stockholders or until their successors have been duly elected and qualified.

Recommendation of the Board of Directors

The Board of Directors recommends that the stockholders vote FOR the election of the nominees listed above.

PROPOSAL 2

RATIFICATION OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Audit Committee has appointed Ernst & Young LLP as the Company's independent registered public accounting firm for 2018. Representatives of Ernst & Young LLP will attend the Annual Meeting and will have the opportunity to make a statement if they desire to do so. They will also be available to respond to appropriate questions.

The Company's organizational documents do not require that the stockholders ratify the selection of Ernst & Young LLP as the Company's independent registered public accounting firm, and stockholder ratification is not binding on the Company, the Board or the Audit Committee. The Company requests such ratification, however, as a matter of good corporate practice. The ratification of the selection of Ernst & Young LLP requires the affirmative vote of a majority of the votes cast on the proposal at the Annual Meeting. Our Board, including our Audit Committee, values the opinions of our stockholders and, to the extent there is any significant vote against the ratification of the selection of Ernst & Young LLP as disclosed in this Proxy Statement, we will consider our stockholders' concerns and evaluate what actions may be appropriate to address those concerns, although the Audit Committee, in its discretion, may still retain Ernst & Young LLP.

The following table shows information about fees billed to the Company by Ernst & Young LLP for the fiscal years ended December 31, 2017 and 2016:

Fees billed by Ernst & Young LLP	2017	2016
Audit Fees (1)	\$ 386,131	\$ 337,350
Audit Related Fees	—	—
Tax Fees	—	—
All Other Fees	—	—
Total	\$ 386,131	\$ 337,350

(1) Includes fees associated with the annual audit of our financial statements, the reviews of our interim financial statements and the issuance of consent and comfort letters in connection with our private placement offering and registration statements.

Audit Committee Pre-Approval Policies

The Audit Committee is directly responsible for the appointment, retention and termination, and for determining the compensation, of the Company's independent registered public accounting firm. The Audit Committee shall pre-approve all auditing services and the terms thereof and non-audit services (other than non-audit services prohibited under Section 10A(g) of the Exchange Act or the applicable rules of the SEC or the Public Company Accounting Oversight Board), except that pre-approval is not required for the provision of non-audit services if the "de minimus" provisions of Section 10A(i)(1)(B) of the Exchange Act are satisfied. The Audit Committee may delegate to the chairperson of the Audit Committee the authority to grant pre-approvals for audit and non-audit services, provided such approvals are presented to the Audit Committee at its next scheduled meeting. All services provided by Ernst & Young LLP during fiscal year 2017 and 2016 were pre-approved by the Audit Committee in accordance with the pre-approval policy described above.

Required Vote

The ratification of the selection of Ernst & Young LLP requires the affirmative vote of a majority of the votes cast on the proposal at the Annual Meeting (meaning the number of shares voted "for" the proposal must exceed the number of shares voted "against" the proposal). Abstentions are not considered votes cast for the foregoing purpose, and will have no effect on the vote for this proposal.

Recommendation of the Board of Directors

The Board of Directors recommends that the stockholders vote FOR the ratification of the appointment of Ernst & Young LLP as the independent registered public accounting firm of the Company for its fiscal year ending December 31, 2018.

PROPOSAL 3

APPROVAL, UNDER APPLICABLE NASDAQ LISTING RULES, OF THE ISSUANCE OF 11,429,760 SHARES OF THE COMPANY'S COMMON STOCK UPON THE CONVERSION OF 2,285,952 SHARES OF THE COMPANY'S CLASS X CONVERTIBLE PREFERRED STOCK

Sale of Class X Convertible Preferred Stock

As set forth in our Form 8-K filed on August 28, 2017, on August 27, 2017, we entered into a Securities Purchase Agreement (the "Securities Purchase Agreement") for a private placement (the "Private Placement") with a select group of institutional investors, including Viking Global Opportunities Illiquid Investments Sub-Master LP ("VGO Fund", together with its affiliates, "Viking"), EcoR1 Capital, Redmile Group, LLC, and other accredited investors, certain of whom are affiliated with the directors and officers of the Company (collectively, the "Purchasers"). Pursuant to the Securities Purchase Agreement, (i) VGO Fund agreed to purchase 1,777,784 shares of the Company's common stock, par value \$0.001 per share (the "Common Shares"), at a price of \$2.65 per share, 2,285,952 shares of the Company's Class X Convertible Preferred Stock, par value \$0.001 per share (the "Preferred Shares" and, together with the Common Shares, the "Shares"), at a price of \$13.25 per share, and warrants, to purchase up to that number of additional shares of common stock equal to thirty seven and one half percent (37.5%) of the number of Shares purchased by VGO Fund on an if-converted to common stock basis (rounded up to the nearest whole share), and (ii) the remaining Purchasers agreed to purchase an aggregate of 4,094,336 shares of the Company's common stock, at a price of \$2.65 per share, and warrants to purchase up to that number of additional shares of common stock equal to thirty seven and one half percent (37.5%) of the number of shares of common stock purchased by such remaining Purchaser (rounded up to the nearest whole share), for an aggregate purchase price of approximately \$45.8 million.

Each Preferred Share is convertible into five shares of the Company's common stock. VGO Fund is prohibited from converting the Preferred Shares into shares of the Company's common stock if, as a result of such conversion, Viking would own more than 9.50% of the shares of the Company's common stock then issued and outstanding, which percentage may change at VGO Fund's election upon 61 days' notice to the Company to (i) any other number less than or equal to 19.99% or (ii) subject to approval of the Company's stockholders to the extent required in accordance with the NASDAQ Global Market rules, any number in excess of 19.99%.

In the event of the Company's liquidation, dissolution or winding up, holders of Preferred Shares will participate *pari passu* with the holders of the Company's common stock in any distribution of proceeds, *pro rata* based on the number of shares held by each such holder, as if such Preferred Shares had converted to common stock. The Preferred Shares have no voting rights.

Nasdaq Listing Requirements

Because our common stock is listed on the NASDAQ Global Market, we are subject to the NASDAQ's Listing Rules. The potential issuance of the shares of our common stock upon conversion of the Preferred Shares implicates certain of the NASDAQ listing standards requiring prior stockholder approval in order to maintain our listing on the NASDAQ Global Market, including under NASDAQ Listing Rule 5635 which requires prior stockholder approval for the issuance, other than in a public offering, of common stock (or securities convertible into common stock) equal to 20% or more of the common stock or 20% or more of the voting power outstanding before the issuance for less than the greater of book or market value of the stock (the "NASDAQ Cap"). Even if securities are issued at a premium to the then current market price of the common stock, this rule will apply if the conversion price is subject to certain types of anti-dilution adjustments.

Pursuant to our Certificate of Designation of Preferences, Rights and Limitations of Class X Convertible Preferred Stock (the "CoD") which the Company adopted in connection with the sale of Class X Convertible Preferred Stock, the Class X Convertible Preferred Stock is convertible into common stock. However, in order to comply with NASDAQ Listing Rules, the CoD contains a limitation on the maximum number of shares of common stock issuable upon conversion of the Class X Convertible Preferred Stock, such that absent stockholder approval of this proposal in accordance with the stockholder approval requirements of NASDAQ Marketplace Rule 5635 (the "Class X Proposal"), the Company is not required to issue shares of common stock upon conversion of any shares of Class X Convertible Preferred Stock to the extent that the aggregate issuance of such Shares would be greater than 19.99% of the number of shares of the common stock outstanding immediately after giving effect to the issuance of shares of common stock (a "Blocked Conversion"). If the Company's stockholders approve the issuance in accordance with NASDAQ Marketplace Rule 5635, then based on the Class X Convertible Preferred Stock conversion rate, the 2,285,952 Preferred Shares that are outstanding would be convertible into 11,429,760 shares of the Company's common stock (subject to adjustment for stock dividend, stock split, combination or other recapitalization). This

means that there are currently shares of the Company's common stock (the "Blocked Shares") that VGO Fund cannot acquire pursuant to the conversion of its Preferred Shares (even if VGO Fund elects, in accordance with the CoD, to increase above 9.50% the percentage of outstanding shares of the Company's common stock held by Viking following any such conversion) because they are subject to a Blocked Conversion. The percentage of our common stock beneficially owned by VGO Fund would increase substantially if VGO Fund elects to increase the percentage limitation above 9.50% and would further increase substantially if the Company obtains approval for this proposal (up to 38.50% assuming VGO Fund exercised its warrants and no other shares of common stock were issued upon exercise of the warrants purchased by all other Purchasers).

Effect of the Class X Proposal on Stockholders

If stockholders approve this proposal, VGO Fund will be able to convert all of its outstanding Class X Convertible Preferred Stock into common stock for a maximum of 11,429,760 shares of common stock (subject to adjustment for stock dividend, stock split, combination or other recapitalization). If stockholders do not approve this proposal, our issuance of the Blocked Shares will remain subject to limitation under the NASDAQ Cap, and, pursuant to Section 6(d) of the CoD, we will be required to solicit the approval of the Class X Proposal at each annual meeting hereafter to the extent approval has not then been obtained.

Required Vote

The approval of Proposal Three requires that a majority of the votes properly cast vote FOR this proposal. Shares that are voted "abstain" and broker "non-votes" will not affect the outcome of this proposal.

Recommendation of the Board of Directors

The Board of Directors recommends that the stockholders vote FOR the approval under NASDAQ Listing Rules of the issuance of 11,429,760 shares of our common stock upon conversion of the outstanding Class X Convertible Preferred Stock.

EXECUTIVE OFFICERS

The following table sets forth certain information about our executive officers as of the date of this proxy:

Name	Age	Position
Sanjay S. Shukla, M.D., M.S.	46	President, Chief Executive Officer and Director
David J. King, Ph.D.	59	Chief Scientific Officer
Ashraf Amanullah, Ph.D.	50	Senior Vice President, Biologics Development and Manufacturing

Executive Officers

Sanjay S. Shukla, M.D., M.S. has served as our President and Chief Executive Officer and as a board member since November 2017. Dr. Shukla served as our Chief Medical Officer from March 2016 to November 2017. From April 2015 to March 2016, Dr. Shukla worked in an advisory capacity for a number of companies, including as a consultant to aTyr from January 2016 to March 2016. Prior to that, from October 2012 to April 2015, Dr. Shukla served as Vice President and Global Head of Integrated Medical Services for Novartis, a biopharmaceutical company, where he led global medical affairs operations, with oversight for all pharma general medicines therapies, both inline and in development. Dr. Shukla served as Chief Executive Officer of RXMD, a clinical development consultancy that assisted in advancing proof of concept for early stage drug candidates, from April 2009 to September 2012. Prior to that, Dr. Shukla served in a variety of clinical development, data analytics and drug safety roles at Vifor Pharma, a biopharmaceutical company, and Aspreva Pharmaceuticals (acquired by Vifor Pharma). Dr. Shukla received his M.D. from Howard University College of Medicine and his Bachelors of Science in Microbiology and Master of Science in Epidemiology and Biostatistics from the University of Maryland.

David J. King, Ph.D. has served as our Chief Scientific Officer since February 2018. Prior to that, he served as our Senior Vice President, Research from September 2016 to February 2018. Dr. King's industry experience is highlighted by his tenures at Medarex, Inc. (acquired by Bristol-Myers Squibb in 2009) and Celltech Therapeutics Ltd. (acquired by UCB in 2004). At Medarex, he led programs to identify therapeutic antibodies and played a key role in programs targeting novel biologics (including PD-1), and at Celltech, he directed the protein biochemistry and antibody engineering activities that led to the discovery and development of Cimzia® (TNF antagonist). After Medarex, Dr. King served as Chief Scientific Officer at AnaptysBio, Inc. from November 2008 to February 2016 where he led research that developed a novel technology for generating antibody therapeutics, which was successfully used to generate innovative clinical candidates for a number of pharmaceutical partnerships and for internal development. Most recently, Dr. King served as Senior Vice President of Research at Tunitas Therapeutics, where he led the company's research and preclinical activities from February 2016 to September 2016. Dr. King received his B.S. from the University of Warwick and his Ph.D. from the University of Surrey, both in the United Kingdom, and was a Glaxo Group Research postdoctoral fellow.

Ashraf Amanullah, Ph.D. has served as Senior Vice President, Biologics Development and Manufacturing since February 2018. Prior to that, he served as our Vice President, Biologics Development and Manufacturing from November 2015 to February 2018. Prior to joining aTyr Pharma, he served as Senior Director at Gilead Sciences from September 2011 to August 2015, a biopharmaceutical company, where he was responsible for CMC operations for Biologics overseeing drug substance, analytical operations, quality controls, formulations, drug product and device development as well as external manufacturing operations. Prior to Gilead, Dr. Amanullah was Director of Process Development at Genentech from September 2006 to August 2011, a biotechnology company, with responsibility for process development for early stage therapeutics and support of late stage and post approval process development. Dr. Amanullah has also held various positions at Merck & Co. Inc., a global health care company, over a nine-year tenure with responsibility for vaccines process development, clinical manufacturing and commercialization support. He is the author of 55 peer-reviewed publications. Dr. Amanullah received his Ph.D. in Chemical Engineering from The University of Birmingham (U.K.) and conducted post-doctoral studies with Novo Nordisk and University College London/Merck & Co. Inc.

COMPENSATION OF EXECUTIVE OFFICERS

The following table presents information regarding the total compensation earned by each individual who served as our chief executive officer at any time during the fiscal year ended December 31, 2017 and our two other most highly compensated executive officers who were serving as executive officers as of December 31, 2017. We refer to these officers in this Proxy Statement as our named executive officers. The following table also sets forth information regarding total compensation earned by each of our named executive officers during the fiscal year ending December 31, 2017 and 2016.

SUMMARY COMPENSATION TABLE

Name and Principal Position	Year	Salary (\$)	Bonus (\$)	Option Awards (\$) (1)	Non-Equity Incentive Plan Compensation (\$) (2)	All Other Compensation (\$)	Total (\$)
Sanjay S. Shukla, M.D., M.S. <i>President and CEO</i>	2017	402,813 (3)	—	1,620,279	131,625	9,840 (4)	2,164,557
	2016	284,135	31,250 (5)	612,872	87,750	80,443	1,096,450
John D. Mendlein, Ph.D. <i>Former CEO/Current Director</i>	2017	518,167	—	2,412,378 (6)	165,750	20,603 (4)	3,116,898
	2016	494,700	—	865,816	192,933	16,028	1,569,477
David J. King, Ph.D. (7) <i>Chief Scientific Officer</i>	2017	300,000	—	173,979	68,250	7,130 (4)	549,359
Sanuj K. Ravindran, M.D. (8) <i>Former Chief Business Officer</i>	2017	384,342	—	412,467 (9)	—	386,687 (4)	1,183,496
	2016	373,798	25,000 (10)	1,096,130	75,000	91,422	1,661,350

- (1) Amounts shown reflect aggregate full grant date fair value of shares of option awards granted during the year in accordance with FASB ASC Topic 718. Pursuant to FASB ASC Topic 718, the amounts shown exclude the impact of estimated forfeitures related to service-based vesting conditions. For additional information on the valuation assumptions underlying the value of these shares of options, see Part II, Item 8 "Financial Statements and Supplementary Data" of our 2017 Annual Report on Form 10-K in the Notes to Consolidated Financial Statements, Note 6, "Stockholders Equity". For Dr. Mendlein, the amounts reported include stock-based compensation expense related to modification of certain terms of outstanding options and continuance of unvested options to vest. See below for description of the Strategic Advisor Agreement entered with Dr. Mendlein for further details. For Dr. Ravindran, the amounts reported include stock-based compensation expense related to modification of certain terms of outstanding options and extension of the exercise period of his options in accordance with his Transition and Separation Agreement and Consulting Agreement and Consulting Agreement entered with Dr. Ravindran for further details.
- (2) The amounts reported for 2017 and 2016 reflect the cash bonus determined by our Compensation Committee (for the named executive officers other than the CEO), and by our Board of Directors upon recommendation of our Compensation Committee (for our CEO), based on certain performance goals and achievement of certain developmental, clinical or regulatory milestones as specified by our Board of Directors upon recommendation of our Compensation Committee.
- (3) As described in the description of the CEO Transition below, Dr. Shukla was promoted to President and Chief Executive Officer effective November 1, 2017 with an annual base salary of \$450,000.
- (4) The amounts reported in 2017 in this column include: (i) 401(k) employer match of \$9,000, and life insurance premium of \$840 to Dr. Shukla; (ii) 401(k) employee match of \$12,172 and life insurance premium of \$8,431 to Dr. Mendlein; (iii) reimbursement of relocation expenses of \$1,547, 401(k) employee match of \$4,743 and life insurance premium of \$840 to Dr. King; and (iv) severance payment of \$378,750, 401(k) employee match of \$7,097 and life insurance premium of \$840 to Dr. Ravindran.
- (5) Amount represents a sign-on bonus paid to Dr. Shukla pursuant to his offer letter.
- (6) In accordance with SEC rules, this amount included share-based compensation expense of \$1,917,207 related to modification of certain terms of outstanding options and continuance of unvested options to vest. See below for description of the Strategic Advisor Agreement entered with Dr. Mendlein for further details.
- (7) Dr. King was not a named executive officer in 2016.
- (8) Dr. Ravindran resigned as Chief Business Officer effective December 31, 2017.
- (9) In accordance with SEC rules, this amount included share-based compensation expense of \$305,403 related to modification of certain terms of outstanding options and extension of the exercise period of his options in accordance with his Transition and Separation Agreement and Consulting Agreement and Consulting Agreement entered with Dr. Ravindran for further details.
- (10) Amount represents a sign-on bonus paid to Dr. Ravindran pursuant to his offer letter.

Base Salaries. Our Compensation Committee reviews the base salaries of our executive officers, including our named executive officers, from time to time and makes adjustments as it determines to be reasonable and necessary to reflect the scope of an executive officer's performance, contributions, responsibilities, experience, prior salary level, position (in the case of a promotion) and market conditions.

Bonuses. In January 2016, the Board of Directors adopted the Company's Senior Executive Cash Incentive Bonus Plan (the "Bonus Plan"), which applies to certain key executives (the "Executives"), that are recommended by the Compensation Committee and selected by the Board of Directors. The Bonus Plan provides for bonus payments based upon the attainment of performance targets established by the Compensation Committee and related to operational and financial metrics with respect to the Company or any of its subsidiaries (the "Performance Goals"), which may include achievement of specified research and development, publication, clinical and/or regulatory milestones, total shareholder return, earnings before interest, taxes, depreciation and amortization, net income (loss) (either before or after interest, taxes, depreciation, stock compensation expense, restructuring charges and/or amortization), changes in the market price of the Company's common stock, economic value-added, funds from operations or similar measure, sales or revenue, acquisitions or strategic transactions, operating income (loss), cash flow (including, but not limited to, operating cash flow and free cash flow), return on capital, assets, equity, or investment, return on sales, gross or net profit levels, productivity, expense, margins, operating efficiency, customer satisfaction, working capital, earnings (loss) per share of the Company's common stock, sales or market shares and number of customers. Any bonuses paid under the Bonus Plan will be based upon objectively determinable bonus formulas that tie such bonuses to one or more performance targets relating to the Performance Goals. The bonus formulas will be adopted in each performance period by the Compensation Committee and communicated to each Executive. No bonuses will be paid under the Bonus Plan unless and until the Compensation Committee makes a determination with respect to the attainment of the performance objectives. Notwithstanding the foregoing, the Compensation Committee may adjust bonuses payable under the Bonus Plan based on achievement of individual performance goals or pay bonuses (including, without limitation, discretionary bonuses) to Executives under the Bonus Plan based upon such other terms and conditions as the Compensation Committee may in its discretion determine.

Equity Incentive Compensation. We generally grant stock options to our employees, including our named executive officers, in connection with their initial employment with us. We also have historically granted stock options on an annual basis as part of annual performance reviews of our employees.

Outstanding Equity Awards at Fiscal Year-End

The following table sets forth certain information with respect to outstanding equity awards held by each of our named executive officers as of December 31, 2017:

Name	Vesting Commencement Date	Number of Securities Underlying Unexercised Options (#)		Number of Securities Underlying Unexercised Options (#)		Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)	Option Exercise Price (\$)	Option Expiration Date
		Exercisable	Unexercisable	Exercisable	Unexercisable			
Sanjay S. Shukla, M.D., M.S.	3/30/2016	71,313 (1)	91,687 (1)	—	—	—	4.86	3/30/2026
	9/13/2016	8,594 (2)	18,906 (2)	—	—	—	3.06	9/13/2026
	2/7/2017	13,542 (2)	51,458 (2)	—	—	—	3.30	2/7/2027
	11/1/2017	9,375 (2)	440,625 (2)	—	—	—	4.00	11/1/2027
John D. Mendlein, Ph.D.	1/01/2011	50,979 (1)	—	—	—	—	0.72	3/16/2021
	3/16/2011	42,228 (3)	—	—	—	—	0.72	3/16/2021
	9/13/2012	137,871 (3)	—	—	—	—	0.88	9/13/2022
	4/19/2013	119,214 (3)	—	—	—	—	4.06	6/28/2023
	1/1/2014	24,620 (3)	524 (3)	—	—	—	4.06	3/5/2024
	4/17/2015	83,813 (2)	41,907 (2)	—	—	—	9.15	4/17/2025
	5/6/2015	105,553 (2)	57,884 (2)	—	—	—	14.00	5/6/2025
	10/1/2015	38,458 (2)	32,542 (2)	—	—	—	10.24	10/1/2025
	1/27/2016	64,688 (2)	70,312 (2)	—	—	—	6.14	1/27/2026
2/7/2017	38,542 (2)	146,458 (2)	—	—	—	3.30	2/7/2027	
David J. King, Ph.D.	9/21/2016	45,313 (1)	99,687 (1)	—	—	—	3.29	9/21/2026
	2/7/2017	13,542 (2)	51,458 (2)	—	—	—	3.30	2/7/2017
Sanuj K. Ravindran, M.D.	1/4/2016	111,563 (4)	—	—	—	—	9.13	3/31/2019
	9/13/2016	25,594 (5)	—	—	—	—	3.06	3/31/2019
	2/7/2017	18,333 (5)	—	—	—	—	3.30	3/31/2019

- (1) 1/4th of the shares subject to the option vested one year from Vesting Commencement Date and the remaining shares subject to the option vested in 36 equal monthly installments following the one-year anniversary of the Vesting Commencement Date. The option is subject to full acceleration in the event the employee is terminated by the Company without Cause or resigns for Good Reason within the period commencing two months prior to and ending twelve (12) months following a Change in Control or Sale Event (as such capitalized terms are defined in the 2014 Stock Plan or the 2015 Stock Option and Incentive Plan ("2015 Stock Plan"), as applicable or the respective stock option agreements evidencing such stock option). As set forth in Dr. Mendlein's Strategic Advisor Agreement, the options granted to Dr. Mendlein accelerate upon a change in control and have an extended option exercise period. See below for description of the Strategic Advisor Agreement entered with Dr. Mendlein for further details.
- (2) 1/48th of the total shares subject to the option vest monthly from the Vesting Commencement Date set forth in the table above. The option is subject to full acceleration in the event the employee is terminated by the Company without Cause or resigns for Good Reason within the period commencing two months prior to and ending twelve (12) months following a Change in Control or Sale Event (as such capitalized terms are defined in the 2014 Stock Plan or the 2015 Stock Plan, as applicable or the respective stock option agreements evidencing such stock option). As set forth in Dr. Mendlein's Strategic Advisor Agreement, the options granted to Dr. Mendlein accelerate upon a change in control and have an extended option exercise period. See below for description of the Strategic Advisor Agreement entered with Dr. Mendlein for further details.
- (3) 1/48th of the total shares subject to the option vest monthly from the Vesting Commencement Date set forth in the table above. In September 2015, the Compensation Committee approved an acceleration of the vesting schedule such that any unvested options would vest according to a four year vesting schedule rather than a six year vesting schedule. The option is subject to full acceleration in the event the employee is terminated by the Company without Cause or resigns for Good Reason within the period commencing two months prior to and ending twelve (12) months following a Change in Control or Sale Event (as such capitalized terms are defined in the 2014 Stock Plan or the respective stock option agreements evidencing such stock option). As set forth in Dr. Mendlein's Strategic Advisor Agreement, the options granted to Dr. Mendlein accelerate upon a change in control and have an extended option exercise period. See below for description of the Strategic Advisor Agreement entered with Dr. Mendlein for further details.

- (4) 1/4th of the shares subject to the option vested one year from Vesting Commencement Date and the remaining shares subject to the option vested in 36 equal monthly installments following the one-year anniversary of the Vesting Commencement Date. As set forth in Dr. Ravindran's Transition and Separation Agreement and Consulting Agreement, the vested shares remain exercisable for 15 months following the termination of his consulting services on December 31, 2018. See below for description of the Transition and Separation Agreement and Consulting Agreement entered with Dr. Ravindran for further details.
- (5) 1/48th of the total shares subject to the option vest monthly from the Vesting Commencement Date. As set forth in Dr. Ravindran's Transition and Separation Agreement and Consulting Agreement, the vested shares remain exercisable for 15 months following the termination of his consulting services on December 31, 2018. See below for description of the Transition and Separation Agreement and Consulting Agreement entered with Dr. Ravindran for further details.

401(k) Savings Plan and Other Benefits. We maintain a tax-qualified retirement plan, or the 401(k) Plan, that provides eligible U.S. employees with an opportunity to save for retirement on a tax advantaged basis. Eligible employees are able to defer eligible compensation subject to applicable annual Internal Revenue Code of 1986, as amended (the "Code") limits. Employees' pre-tax contributions are allocated to each participant's individual account and are then invested in selected investment alternatives according to the participants' directions. Employees are immediately and fully vested in their contributions. Our 401(k) Plan is intended to be qualified under Section 401(a) of the Code with our 401(k) Plan's related trust intended to be tax exempt under Section 501(a) of the Code. As a tax-qualified retirement plan, contributions to our 401(k) Plan and earnings on those contributions are not taxable to the employees until distributed from our 401(k) Plan. In April 2015, our Board of Directors approved a policy under which, starting on June 1, 2015, we match employee contributions under the 401(k) Plan in an amount up to 3% of each applicable employee's compensation (equivalent to a 50% match with respect to up to 6% of such employee's compensation). We also pay, on behalf of our employees, a significant portion of premiums for health, life and disability insurance.

Employment Arrangements with Our Named Executive Officers

We consider it essential to the best interests of our stockholders to attract high quality executives and foster the continuous employment of our key management personnel. In this regard, we believe some severance arrangements are necessary. We also recognize that the possibility of a change in control may exist and that the uncertainty and questions that it may raise among management could result in the departure or distraction of management personnel to the detriment of the Company and our stockholders. In order to reinforce and encourage the continued attention and dedication of certain key members of management, on December 21, 2015, the Compensation Committee approved the Company's Executive Severance and Change in Control Policy (the "Policy"). The purpose of the Policy is to provide certain of the Company's senior management employees with compensation and benefits in the event of a termination of employment without Cause or for Good Reason (as such terms are defined in the Policy).

The post-termination compensation and benefits under the Policy include the (i) acceleration of time-based vesting provisions of outstanding equity awards that would have vested within 12 months of the termination, (ii) severance in the amount of 12 months of base salary, and (iii) payment of the employer portion of group health care benefits under COBRA for up to 12 months after termination.

In addition, if the termination occurs within two months prior to or one year after the closing of a Sale Event (as defined in the Policy), then, in lieu of the benefits described above, such eligible employee is entitled to (i) full acceleration of time-based vesting provisions of all outstanding equity awards, (ii) severance in the amount of 12 months of base salary, (iii) payment of the employee's bonus target for the calendar year in which the termination occurred, and (iv) payment of the employer portion of group health care benefits under COBRA for up to 12 months after termination.

In each case, receipt of any compensation or benefits under the Policy is subject to the eligible employee's execution of a severance agreement and release.

To the extent Section 280G of the Code is applicable with respect to payments to an eligible employee, such eligible employee shall be entitled to receive either: (a) payment of the full amounts set forth above to which the eligible employee is entitled or (b) payment of such lesser amount that does not trigger excise taxes under Section 4999 of the Code, whichever results in the employee receiving a higher amount after taking into account all federal, state, and local income, excise and employment taxes.

Employees who are party to an agreement or an arrangement with the Company that provides greater benefits in the aggregate than set forth in the Policy are not eligible to receive any payments or benefits under the Policy.

In addition, we have also entered into a written employment agreement with our President and Chief Executive Officer that provides for payments in connection with the resignation, retirement or other termination of such named executive officer, or a change in control, as described below.

Sanjay S. Shukla, M.D., M.S.

Dr. Shukla entered into an at-will employment offer letter with us on March 30, 2016 to serve as our Chief Medical Officer, which provided for an initial base salary of \$375,000, subject to adjustments as determined by the Company in its sole discretion. Pursuant to the terms of his employment offer letter, Dr. Shukla was considered annually for a bonus target, in an amount of up to 40% of his then-current base salary, as determined by our board of directors based on corporate achievements of goals and achievement of Dr. Shukla's individual goals.

On November 1, 2017, we announced a leadership transition whereby Dr. Shukla, our then-current Chief Medical Officer, succeeded Dr. Mendlein, our then-current Chief Executive Officer, as the Company's President, Chief Executive Officer, and principal executive officer effective as of November 1, 2017 (the "CEO Transition").

Under the terms of an employment agreement with Dr. Shukla entered November 1, 2017 (the "CEO Employment Agreement"), Dr. Shukla shall be entitled to an initial annual base salary of \$450,000, subject to annual review and increase as determined by the Compensation Committee. In addition, Dr. Shukla is eligible for an annual bonus target, in the amount of 45% of his then-current base salary for the rest of 2017, and then in an amount of 50% of his then-current base salary for subsequent calendar years, as determined by the Compensation Committee. Dr. Shukla was granted an option to purchase 450,000 shares of the Company's common stock, effective as of November 1, 2017, pursuant to the Company's equity 2015 Plan.

Dr. Shukla's employment is at-will. In the event that Dr. Shukla's employment is terminated by Dr. Shukla for Good Reason or by the Company without Cause (as such terms are defined below), Dr. Shukla will be entitled to receive (i) the amount of his accrued but unpaid salary and unpaid expense reimbursements and any accrued but unused vacation as of the date of termination, (ii) any vested benefits Dr. Shukla may have under any employee benefit plan, which shall be paid in accordance with the terms of such employee benefit plans, as of the date of termination, (iii) any earned but unpaid incentive compensation from the prior calendar year, (iv) an amount equal to Dr. Shukla's current annual base salary plus his annual target incentive compensation in the year of termination, (v) acceleration of the time-based vesting provisions of all stock options or other stock-based awards that would have vested within 12 months of the termination, (vi) payment of the amount that would reasonably be required to obtain equivalent health insurance coverage for up to 12 months after termination, in the case of each of (iv), (v) and (vi), subject to the execution of a separation agreement and release.

In the event that Dr. Shukla's employment is terminated by the Company without Cause or by Dr. Shukla for Good Reason within two months prior and 12 months after any Change in Control, as such terms are defined below, Dr. Shukla is entitled to (i) a cash payment equal to his then-current base salary plus his annual target incentive compensation in the year of termination, (ii) full acceleration of the time-based vesting provisions of all outstanding stock options or other stock-based awards, and (iii) payment of the amount that would reasonably be required to obtain equivalent health insurance coverage for up to 12 months after termination.

Under the CEO Employment Agreement, the terms below are generally defined as follows:

"Cause" means (i) conduct by the employee constituting a material act of willful misconduct in connection with the performance of his duties; (ii) the employee's conviction of, or the entry of a pleading of guilty or nolo contendere by the employee to, any crime involving (A) fraud or embezzlement in either case that results in material damage to the Company or any of its subsidiaries or affiliates or (B) any felony; (iii) willful and repeated failure by the employee to substantially perform the duties, functions and responsibilities of his positions that result in material damage to the Company or any of its subsidiaries and affiliates, that continues after he has received prior written notice from the Board of such purported repeated failure, which notice details the grounds of such purported repeated failure and requests its cure, and the employee has been given a reasonable opportunity to cure which will not be less than 30 days; or (iv) a material breach by the employee of any of the material provisions contained in the CEO Employment Agreement which has continued for more than 30 days following written notice of such purported breach; and

"Change in Control" means (i) any "person," as such term is used in Sections 13(d) and 14(d) of the Exchange Act (other than the Company, any of its subsidiaries, or any trustee, fiduciary or other person or entity holding securities under any employee benefit plan or trust of the Company or any of its subsidiaries), together with all "affiliates" and "associates" (as such terms are defined in Rule 12b-2 under the Act) of such person, shall become the "beneficial owner" (as such term is defined in Rule 13d-3 under the Act), directly or indirectly, of securities of the Company representing 50 percent or more of the combined voting power of the Company's then outstanding securities having the right to vote in an election of the Board ("Voting Securities") (in such case other than as a result of an

acquisition of securities directly from the Company); (ii) the date a majority of the members of the Board is replaced during any 12-month period by directors whose appointment or election is not endorsed by a majority of the members of the Board before the date of the appointment or election; or (iii) the consummation of (A) any consolidation or merger of the Company or any subsidiary of the Company where the stockholders of the Company, immediately prior to the consolidation or merger, would not, immediately after the consolidation or merger, beneficially own (as such term is defined in Rule 13d-3 under the Act), directly or indirectly, shares representing in the aggregate more than 50 percent of the voting shares of the Company issuing cash or securities in the consolidation or merger (or of its ultimate parent corporation, if any), or (B) any sale or other transfer (in one transaction or a series of transactions contemplated or arranged by any party as a single plan) of all or substantially all of the assets of the Company; provided, however, that with respect to clause (A) above and as approved by the Board, a Change of Control shall be deemed to have occurred upon the consummation of a transaction whereby shares representing in the aggregate of more than 30 percent but less than 50 percent of the voting shares of the Company are beneficially owned by the acquiring party or parties and such transaction includes a contingent right for the acquiring party or parties to acquire additional voting shares of the Company that would represent more than 50 percent of the Company's voting shares in the aggregate.

"Good Reason" means (i) a material diminution in the Executive's responsibilities, authority or duties; (ii) a material diminution in the Executive's Base Salary except for across-the-board salary reductions based on the Company's financial performance similarly affecting all or substantially all senior management employees of the Company; or (iii) relocation of the Company's executive headquarters to a location more than 50 miles from San Diego, California.

John D. Mendlein, Ph.D.

As described above, Dr. Mendlein served as our CEO until November 1, 2017 (the "CEO Transition Date") and continued as a full-time employee of the Company until December 31, 2017. He continues to serve as a director and strategic advisor of the Company.

Up until the CEO Transition Date, Dr. Mendlein's employment was pursuant to an at-will employment agreement with us dated as of January 1, 2010. On December 23, 2015, upon the recommendation of the Compensation Committee, the Board approved the amendment and restatement of the employment agreement, which provided for an initial annual base salary of \$472,750, subject to annual review and increase as determined by the Compensation Committee (the "Former CEO Employment Agreement"). Pursuant to the terms of the Former CEO Employment Agreement, Dr. Mendlein was considered for a bonus target from time to time, in an amount of 50% of his then-current base salary, as determined by the Compensation Committee.

Effective as of the CEO Transition Date, Dr. Mendlein serves as a strategic advisor to the Company pursuant to the terms of an advisor agreement entered with Dr. Mendlein (the "Strategic Advisor Agreement"). Pursuant to the terms of the Strategic Advisor Agreement, the Company agreed to (i) pay Dr. Mendlein as a strategic advisor to the Company for a period of up to four years, at a monthly rate of \$42,500 for the first year and \$7,500 per month for the rest of the term; (ii) as part of its annual review of compensation, pay Dr. Mendlein a to-be-determined cash bonus in February 2018 with respect to 2017 performance, (iii) reimburse Dr. Mendlein for certain benefits continuation through December 31, 2018; (iv) allow for continued vesting of Dr. Mendlein's outstanding time-based employee stock options for so long as Dr. Mendlein continues providing services to the Company as a strategic advisor; (v) provide for an extended option exercise period with respect to certain employee stock options held by Dr. Mendlein; and (vi) fully accelerate the vesting of all of his outstanding time-based employee stock options in the event of a change in control. Either party may terminate the Strategic Advisor Agreement after the first year, provided that payments under the agreement and continued vesting of outstanding employee stock options are guaranteed through the second year of the agreement in the event the Board terminates the agreement for convenience or Dr. Mendlein terminates for the Company's material breach of the agreement.

Furthermore, as a non-employee director, Dr. Mendlein will be eligible to receive cash and equity compensation as of January 1, 2018 pursuant to the Company's non-employee director compensation policy so long as he remains a member of the Board of Directors.

David J. King, Ph.D.

Dr. King entered into an at-will employment offer letter with us on September 14 2016, which provided for an initial base salary of \$290,000, subject to adjustments as determined by the Company in its sole discretion. Pursuant to the terms of his employment offer letter, Dr. King is eligible for an annual bonus, currently in a target amount of up to 40% of his then-

current base salary, as determined by our board of directors based on corporate achievements of goals and achievement of Dr. King's individual goals.

Dr. King is also eligible to receive certain post-termination compensation and benefits in accordance with the Policy described above.

Sanuj K. Ravindran, M.D.

Dr. Ravindran entered into an at-will employment offer letter with us on October 23, 2015, which provided for an initial base salary of \$375,000, subject to adjustments as determined by the Company in its sole discretion. Pursuant to the terms of his employment offer letter, Dr. Ravindran was considered annually for a bonus target, previously in an amount of up to 40% of his then-current base salary, as determined by our board of directors based on corporate achievements of goals and achievement of Mr. Ravindran's individual goals.

On December 11, 2017, we agreed upon a transition plan with Dr. Ravindran whereby Dr. Ravindran would transition from his role as Chief Business Officer to that of a business advisor to the Company. Dr. Ravindran's last day of employment as the Chief Business Officer with the Company was December 31, 2017.

To implement this transition, the Company and Dr. Ravindran entered into a Transition and Separation Agreement (the "Transition Agreement") and a Consulting Agreement (the "Consulting Agreement"). Pursuant to the terms of the Transition Agreement, the Company agreed to (i) provide the following benefits: a payment equal to Dr. Ravindran's annual salary, continuation of certain benefits for one year, and one year acceleration of time-based vesting for outstanding stock options, in each case conditioned upon a general release of claims; (ii) retain Dr. Ravindran as a consultant pursuant to the terms of the Consulting Agreement; and (iii) provide for an extended option exercise period of three months following the termination of services provided under the Consulting Agreement for Dr. Ravindran's outstanding options. Pursuant to the terms of the Consulting Agreement, Dr. Ravindran will provide advisory services related to the Company's business development efforts and investor relations plans through the end of 2018 at a rate of \$15,000 per month for the first four months, \$10,000 per month for the next four months and \$5,000 per month for the final four months.

Securities Authorized for Issuance under Equity Compensation Plans

The table below sets forth information regarding our equity compensation plans in effect as of December 31, 2017:

Plan Category	Equity Compensation Plan Information		
	Number of Securities to be Issued upon Exercise of Outstanding Options, Warrants and Rights (a)	Weighted Average Exercise Price of Outstanding Options, Warrants and Rights (b) (1)	Number of Securities Remaining Available for Future Issuance under Equity Compensation Plan (Excluding Securities Reflected in Column (a)) (c)
Equity compensation plans approved by security holders: 2014 Stock Plan and 2015 Stock Plan and 2015 Employee Stock Purchase Plan ("ESPP")(2)	4,512,359 (3)	\$ 5.52 (3)	1,349,246
Equity compensation plans not approved by security holders: Inducement option grant (4)	145,000	\$ 3.29	—
Total	4,666,359		1,349,246

- (1) The weighted-average exercise price is calculated based solely on outstanding stock options.
- (2) The number of shares of stock available for issuance under the 2015 Stock Plan will be automatically increased each January 1, from January 1, 2016 until January 1, 2019, by the lesser of (i) 1,840,000 shares of common stock, (ii) 4% of the outstanding number of shares of the Company's common stock on the immediately preceding December 31, and (iii) an amount as determined by the compensation committee of the Company's Board of Directors. The number of shares of stock available for issuance under the ESPP will be automatically increased each January 1, 2016 until January 1, 2019, by the lesser of 1% of the outstanding number of shares of common stock on the immediately preceding December 31 or such lesser amount of shares as determined by the compensation committee of the Company's Board of Directors. On January 1, 2018, the number of shares available for issuance under our 2015 Stock Plan and our ESPP increased by 1,191,566 shares and 297,891 shares, respectively, pursuant to these provisions. These increases are not reflected in the table above. We no longer grant new awards under our 2014 Stock Plan, and any awards previously granted under such plan prior to our initial public offering that are forfeited, canceled, reacquired by us prior to vesting satisfied without the issuance of stock or otherwise terminated (other than by exercise) are added to shares available for issuance under the 2015 Stock Plan.
- (3) Does not include purchase rights accruing under the ESPP because the purchase right (and therefore the number of shares to be purchased) will not be determined until the end of the purchase period.
- (4) In September, 2016, we granted a non-qualified stock option as an inucement award in connection with the hiring of Dr. King. This option was an inducement grant issued outside of our 2015 Stock Plan in accordance with NASDAQ Listing Rule 5635(c)(4).

CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS

Other than the compensation agreements and other arrangements described under "Compensation of Executive Officers" and the transactions described below, since January 1, 2017, there has not been and there is not currently proposed, any transaction or series of similar transactions to which we were, or will be, a party in which the amount involved exceeded, or will exceed, \$120,000 and in which any director, executive officer, holder of five percent or more of any class of our capital stock or any member of the immediate family of, or entities affiliated with, any of the foregoing persons, had, or will have, a direct or indirect material interest.

Payments and Stock Issuance to The Scripps Research Institute

We provide funding to The Scripps Research Institute, or TSRI, under an amended and restated research funding and option agreement. Since January 1, 2017, we have paid \$2.7 million to TSRI under the agreement and amendments. Paul Schimmel, Ph.D., one of our directors, is a faculty member and director at TSRI and such payments fund a portion of his research activities conducted at TSRI.

Charitable Donations to National Foundation for Cancer Research

Since January 1, 2017, we have provided charitable donations to the National Foundation for Cancer Research, or NFCR, in the aggregate amount of \$0.2 million. We have requested that the donations be restricted to a laboratory that performs basic research on the role of aminoacyl tRNA synthetase fragments and splice variants in cancer biology and therapeutics. The NFCR in its discretion selected Dr. Schimmel's laboratory at TSRI as the laboratory to receive these funds.

Private Placement

The following table summarizes the participation in our Private Placement by our directors, entities affiliated with our directors, or holders of five percent or more of our voting securities:

Name of Investor	Shares of Class X Convertible Preferred Stock	Shares of Common Stock	Warrants to Purchase Common Stock	Aggregate Purchase Price Paid
Viking Global Opportunities Illiquid Investments Sub-Master LP	2,285,952	1,777,784	4,952,829	\$ 34,999,991.60
Entities affiliated with EcoR1 Capital, LLC	—	1,886,792	707,547	\$ 4,999,998.80
Entities affiliated with Redmile Group, LLC	—	1,886,792	707,547	\$ 4,999,998.80
Paul Schimmel Prototype PSP (1) Paul Schimmel, Trustee				
FBO Paul Schimmel	—	94,336	35,376	\$ 249,990.40
John D. Mendlein, Ph.D.	—	37,736	14,151	\$ 100,000.40

(1) Paul Schimmel, a member of our board of directors, is affiliated with Paul Schimmel Prototype PSP.

Executive Officer and Director Compensation

Employment Agreements

We have entered into offer letters or employment agreements with each of Drs. Shukla and King and certain of our executive officers. For more information regarding these arrangements, see "Executive and Director Compensation—Employment Arrangements with Our Named Executive Officers."

Stock Option Awards

For information regarding stock option awards and other equity incentive awards granted to our named executive officers and directors, see "Election of Directors—Director Compensation" and "Compensation of Executive Officers."

Indemnification Agreements

We have entered into agreements to indemnify our directors and executive officers. These agreements will, among other things, require us to indemnify these individuals for certain expenses (including attorneys' fees), judgments, fines and settlement amounts reasonably incurred by such person in any action or proceeding, including any action by or in our right, on account of any services undertaken by such person on behalf of our company or that person's status as a member of our board of directors to the maximum extent allowed under Delaware law.

Procedures for Approval of Related Person Transactions

The Audit Committee conducts an appropriate review of all related party transactions for potential conflict of interest situations on an ongoing basis, and the approval of the Audit Committee is required for all such transactions. The Audit Committee follows the policies and procedures set forth in our Related Person Transaction Policy in order to facilitate such review. The Related Person Transaction Policy is written.

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The following table sets forth the beneficial ownership of the Company's common stock as of January 30, 2018 by: (i) each of the executive officers named in the table under the heading "Summary Compensation Table," (ii) each current director, (iii) all current directors and executive officers as a group, and (iv) all persons known to the Company to be the beneficial owners of more than 5% of the Company's common stock. The table is based upon information supplied by our executive officers, directors and principal stockholders and a review of filings by the beneficial owners with the SEC pursuant to Sections 13(d) and 13(g) of the Exchange Act. A total of 29,879,162 shares of the Company's common stock were issued and outstanding as of January 30, 2018.

Beneficial Owner(1)	Number of Shares of Common Stock Owned (2)	Number of Shares of Common Stock Acquirable Within 60 days (3)	Total Number of Shares of Common Stock Beneficially Owned (4)	Percentage of Shares Beneficially Owned
5% Stockholders:				
EcoR1 Capital, LLC (5) 409 Illinois Street San Francisco, CA 94158	3,917,972	707,547	4,625,519	15.2%
FMR LLC (6) 245 Summer Street, Boston, Massachusetts 02210	4,463,752	—	4,463,752	15.0%
Viking Global Investors LP (7) 55 Railroad Avenue, Greenwich, Connecticut 06830	1,384,300	1,597,390	2,981,690	9.5%
Entities affiliated with Redmile Group, LLC (8) One Letterman Drive, Building D, Suite D3-300 San Francisco, CA 94129	1,886,792	707,547	2,594,339	8.5%
Sofinnova Venture Partners, IX, L.P. (9) 3000 Sand Hill Road, Bldg. 4, Suite 250 Menlo Park, CA 94025	1,866,126	—	1,866,126	6.3%
Entities affiliated with Polaris Venture Management V, LLC (10) 1000 Winter Street, Suite 3350 Waltham, MA 02451	1,827,992	—	1,827,992	6.1%
Entities affiliated with Domain Partners VIII, L.P. (11) One Palmer Square Princeton, NJ 08542	1,827,520	—	1,827,520	6.1%
Entities affiliated with Alta Partners Management VIII, LLC (12) One Embarcadero Center, Suite 3700 San Francisco, CA 94111	1,777,875	—	1,777,875	6.0%
CHP II, L.P. (13) 230 Nassau Street Princeton, NJ 08542	1,758,158	—	1,758,158	5.9%
Directors and Named Executive Officers:				
Sanjay S. Shukla, M.D., M.S. (14)	3,500	156,292	159,792	*
David J. King, Ph.D. (15)	—	76,667	76,667	*
Sanuj K. Ravindran, M.D. (16)	—	155,490	155,490	*
John K. Clarke (13) (17)	1,863,036	38,317	1,901,353	6.4%
Srinivas Akkaraju, M.D., Ph. D. (18)	—	50,889	50,889	*
James C. Blair, Ph.D. (11) (19)	1,833,806	38,317	1,872,123	6.3%
Timothy P. Coughlin (20)	—	9,778	9,778	*
Jeffrey S. Hatfield (21)	—	9,778	9,778	*
John D. Mendlein, Ph.D. (22)	370,382	764,929	1,135,311	3.7%
Amir H. Nashat, Sc.D. (10) (23)	1,840,564	38,317	1,878,881	6.3%
Paul Schimmel, Ph.D. (24)	1,140,171	78,826	1,218,997	4.1%
All directors and executive officers as a group (12 persons) (25)	7,069,958	1,494,039	8,563,997	25.0%

* Represents beneficial ownership of less than 1% of the shares of common stock.

(1) Unless otherwise indicated, the address for each beneficial owner is c/o aTyr Pharma, Inc., 3545 John Hopkins Court, Suite 250, San Diego, CA 92121.

- (2) Represents shares of common stock owned, excluding shares of common stock that are listed under the heading “Number of Shares of Common Stock Acquirable Within 60 days”, by the named parties as of January 30, 2018.
- (3) Shares of common stock subject to stock options, restricted stock units, warrants or Preferred Shares acquirable within 60 days of January 30, 2018, regardless of exercise price, are deemed to be outstanding for computing the percentage ownership of the person holding such options and the percentage ownership of any group of which the holder is a member, but are not deemed outstanding for computing the percentage of any other person.
- (4) Beneficial ownership is determined in accordance with the rules of the SEC and generally includes voting or investment power with respect to securities. Except as indicated by footnote, and subject to community property laws where applicable, the Company believes that the persons named in the table have sole voting and investment power with respect to all shares of common stock shown as beneficially owned by them, subject to applicable community property laws.
- (5) Includes warrants to purchase 707,547 shares of common stock that are exercisable within 60 days of January 30, 2018. Based on Schedule 13G filed with the SEC on February 14, 2018, which indicates that (i) EcoR1 Capital, LLC (“EcoR1”) and Oleg Nodelman have shared voting power and shared dispositive power with respect to 4,625,519 shares of common stock, and (ii) EcoR1 Capital Fund Qualified, L.P. (“Qualified Fund”) has shared voting power and shared dispositive power with respect to 3,788,888 shares of common stock. EcoR1 is the general partner and investment adviser of investment funds, including Qualified Fund. Mr. Nodelman is the control person of EcoR1. The funds managed by EcoR1, including Qualified Fund, hold the common stock for the benefit of their investors and have the right to receive or the power to direct the receipt of dividends from, or the proceeds from the sale of, the common stock. Such persons and entities disclaim beneficial ownership of the shares listed herein, except to the extent of any pecuniary interest therein.
- (6) Based on Schedule 13G/A filed with the SEC on February 13, 2018, which indicates that FMR LLC had sole voting power with respect to 560,702 shares of common stock and had sole power to dispose or to direct the disposition of 4,463,752 shares of common stock. Abigail P. Johnson is a Director, the Chairman and the Chief Executive Officer of FMR LLC. Members of the Johnson family including Abigail P. Johnson, are the predominant owners, directly or through trusts, of Series B voting common shares of FMR LLC, representing 49% of the voting power of FMR LLC. The Johnson family group and all other Series B shareholders have entered into a shareholders’ voting agreement under which all Series B voting common shares will be voted in accordance with the majority vote of Series B voting common shares. Accordingly, through their ownership of voting common shares and the execution of the shareholders’ voting agreement, members of the Johnson family may be deemed, under the Investment Company Act of 1940, to form a controlling group with respect to FMR LLC. Neither FMR LLC nor Abigail P. Johnson has the sole power to vote or direct the voting of the shares owned directly by the various investment companies registered under the Investment Company Act (“Fidelity Funds”) advised by Fidelity Management & Research Company (“FMR Co”), a wholly owned subsidiary of FMR LLC, which power resides with the Fidelity Funds’ Boards of Trustees. Fidelity Management & Research Company carries out the voting of the shares under written guidelines established by the Fidelity Funds’ Boards of Trustees.
- (7) Includes (i) 1,384,300 shares of common stock held by VGO Fund (the “Common Shares”), and (ii) shares of common stock underlying the Preferred Shares (the “Underlying Shares”) and warrants to purchase common stock held by VGO Fund (the “Warrant Shares”), subject to the beneficial ownership limitations described below as set forth in each of the warrant to purchase common stock held by the VGO Fund (“Warrants”) and the CoD, such limitations resulting in beneficial ownership of an aggregate of 1,597,390 Warrant Shares and/or Underlying Shares. The VGO Fund holds 2,285,952 Preferred Shares, each convertible into five shares of common stock, and Warrants to purchase 4,952,829 shares of Common Stock at an exercise price of \$4.64 per share, subject to adjustments as provided under the terms of the Warrants. Pursuant to the terms of the Warrants and the CoD, VGO Fund will not be able to convert the Preferred Shares into shares of common stock or exercise the Warrants if, as a result of such conversion or exercise, VGO Fund, together with any other persons whose beneficial ownership of Common Shares would be aggregated with VGO Fund’s for purposes of Section 13(d) and Section 16 of the Exchange Act and the applicable regulations of the SEC, including any group of which VGO Fund is a member, would beneficially own more than 9.50% of the shares of our common stock then issued and outstanding, which percentage may change at VGO Fund’s election upon 61 days’ notice to us to (i) any other number less than or equal to 19.99% or (ii) subject to approval of our stockholders to the extent required in accordance with the NASDAQ Global Market rules as described in Proposal Three in this Proxy Statement, any number in excess of 19.99%. Each of Viking Global Opportunities Portfolio GP LLC (the “Subsidiary General Partner”), the general partner of the VGO Fund, Viking Global Opportunities GP LLC (the “General Partner”), the sole owner of the Subsidiary General Partner, Viking Global Investors LP (the “Management Company”), which provides managerial services to the VGO Fund, and O. Andreas Halvorsen, David C. Ott and Rose Shabet, the executive committee members of the General Partner and Viking Global Partners LLC, the general partner of the Management Company, may be deemed to have voting and investment power over the shares held of record by the VGO Fund. If Proposal Three in this Proxy Statement is approved by the stockholders and VGO Fund elects pursuant to the CoD to increase the percentage of shares of common stock that it, together with its affiliates, may beneficially own to cover the maximum number of shares of common stock issuable upon the conversion of all outstanding Preferred Shares and the exercise of all Warrant Shares, then VGO Fund would beneficially own an aggregate of 46,171,751 shares of common stock, representing a beneficial ownership percentage of 38.5%.
- (8) Based on Schedule 13G filed with the SEC on March 8, 2018, consists of 1,886,792 shares of common stock owned by certain private investment vehicles and separately managed accounts managed by Redmile Group, LLC, which shares of common stock may be deemed beneficially owned by Redmile Group, LLC as investment manager of such private investment vehicles and separately managed accounts. Certain private investment vehicles and separately managed accounts managed by Redmile Group, LLC also hold warrants to purchase an aggregate of 707,547 shares of common stock, which shares of common stock may also be deemed beneficially owned by Redmile Group, LLC as investment manager of such private investment vehicles and separately managed accounts.
- (9) Based on Schedule 13D filed with the SEC on May 15, 2015, consists of 1,866,126 shares of common stock held by Sofinnova Venture Partners IX, L.P. (“SVP IX”). Sofinnova Management IX, L.L.C. (“SM IX”), the general partner of SVP IX, may be deemed to have sole voting and dispositive power, and Dr. Michael F. Powell, Dr. James I. Healy and Dr. Anand Mehra, the managing members of SM IX, may be deemed to have shared voting and dispositive power, with respect to such shares. Such persons and entities disclaim beneficial ownership of the shares listed herein, except to the extent of any pecuniary interest therein.
- (10) Based on Form 13F filed with the SEC on February 8, 2018 and on a report on Schedule 13D filed with the SEC on May 22 2015, consists of an aggregate of 1,827,992 shares of common stock of which (i) 1,763,894 shares are held by Polaris Venture Partners V, L.P.; (ii) 34,378 shares are held by Polaris Venture Partners Entrepreneurs’ Fund V, L.P.; (iii) 12,082 shares are held by Polaris Venture Partners Founders’

Fund V, L.P., and (iv) 17,638 shares are held by Polaris Venture Partners Special Founders' Fund V, L.P. Each of the funds has sole voting and investment power with respect to the shares held by such funds. The general partner of by Polaris Venture Partners V, L.P., Polaris Venture Partners Entrepreneurs' Fund V, L.P., Polaris Venture Partners Founders' Fund V, L.P., and Polaris Venture Partners Special Founders' Fund V, L.P. is Polaris Venture Management Co. V. LLC ("Polaris Management"), and Polaris Management may be deemed to have sole voting and investment power over such shares. In addition, Jonathan A. Flint and Terrance G. McGuire are managing members of Polaris Management and may be deemed to have shared power to vote and dispose of these shares, and our director, Amir H. Nashat is a holder of an assignee interest in Polaris Management and may be deemed to have shared power to vote and dispose of such shares.

- (11) Based on Schedule 13G filed with the SEC on January 19, 2016, consists of (i) 1,807,820 shares held by Domain Partners VIII, L.P.; (ii) 13,414 shares held by DP VIII Associates, L.P.; and (iii) 6,286 shares held by Domain Associates, LLC. Each of the funds has sole voting and dispositive power over such shares. One Palmer Square Associates VIII, LLC ("One Palmer") is the general partner of Domain Partners and Domain Associates and may be deemed to have sole voting and investment power over such shares. One Palmer disclaims beneficial ownership of all shares held by Domain Partners and Domain Associates in which it does not have an actual pecuniary interest. One of our directors, Dr. Blair, is a managing member of One Palmer. Dr. Blair disclaims beneficial ownership of all shares held by One Palmer in which he does not have an actual pecuniary interest.
- (12) Based on Schedule 13G filed with the SEC on February 6, 2018, which indicates that Alta Partners VIII, L.P. beneficially owns 1,777,875 shares of common stock and exercises sole voting and dispositive control over such shares, except to the extent that (i) Alta Partners Management VIII, LLC is the general partner of Alta Partners VIII, L.P. and may be deemed to share the right to direct the voting and dispositive control over the shares held by such fund. Alta Partners Management VIII, LLC disclaims beneficial ownership of all such shares, except to the extent of its pecuniary interest therein; and (ii) Daniel Janney, Guy Nohra and Farah Champs are managing directors of Alta Partners Management VIII, LLC and may be deemed to share the right to direct the voting and dispositive control over the shares held by such fund. Each of Mr. Janney, Mr. Nohra and Ms. Champs disclaim beneficial ownership of all such shares, except to the extent of his or her pecuniary interest therein.
- (13) Based on Schedule 13G filed with the SEC on February 4, 2016, which indicates that 1,758,158 shares of common stock are held by CHP II, L.P. ("CHP"). The general partner of CHP is CHP II Management, LLC ("CHP Management"), which may be deemed to beneficially own certain of the shares held by CHP. CHP Management disclaims beneficial ownership of all shares held by CHP in which it does not have an actual pecuniary interest. John Clarke, one of our directors, Brandon Hull and John Park are managing members of CHP Management and as members of the general partner, they may be deemed to beneficially own certain of the shares held by CHP Management. The managing members disclaim beneficial ownership of all shares held by CHP Management in which they do not have an actual pecuniary interest.
- (14) Includes (i) 3,500 shares of common stock held by Dr. Shukla; and (ii) 156,292 shares of common stock that Dr. Shukla has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (15) Represents 76,667 shares of common stock that Dr. King has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (16) Represents 155,490 shares of common stock that Dr. Ravindran has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (17) Includes (i) 104,878 shares of common stock held by our director, Mr. Clarke; and (ii) 38,317 shares of common stock that Mr. Clarke has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (18) Includes 50,889 shares of common stock that our director, Dr. Akkaraju, has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (19) Includes (i) 6,286 shares of common stock held by our director, Dr. Blair; and (ii) 38,317 shares of common stock that Dr. Blair has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (20) Represents 9,778 shares of common stock that Mr. Coughlin has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (21) Represents 9,778 shares of common stock that Mr. Hatfield has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (22) Includes (i) 370,382 shares of common stock held by our director, Dr. Mendlein; (ii) 750,778 shares of common stock that Dr. Mendlein has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options; and (iii) warrants to purchase 14,151 shares of common stock that are exercisable within 60 days of January 30, 2018.
- (23) Includes (i) 12,572 shares of common stock held by our director, Dr. Nashat; and (ii) 38,317 shares of common stock that Dr. Nashat has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options.
- (24) Includes (i) 40,440 shares of common stock held by our director, Dr. Schimmel; (ii) 377,917 shares of common stock held by the Paul Schimmel Prototype PSP, Paul Schimmel, Trustee, FBO Paul Schimmel ("Prototype PSP"); (iii) 721,814 shares of common stock held by the Schimmel Revocable Trust U/A Dtd 9/6/2000; (iv) 43,450 shares of common stock that Dr. Schimmel has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options; and (v) warrants to purchase 35,376 shares of common stock that are exercisable by Prototype PSP within 60 days of January 30, 2018.
- (25) Includes the number of shares beneficially owned by the named executive officers and directors listed in the above table, as well as: 18,499 shares of common stock held by Dr. Amanullah, 73,105 shares of common stock that Dr. Amanullah has the right to acquire from us within 60 days of January 30, 2018 pursuant to the exercise of stock options and 3,334 shares of common stock that Dr. Amanullah has the right to acquire from us within 60 days of January 30, 2018 pursuant to the vesting of restricted stock units.

SECTION 16(a) BENEFICIAL OWNERSHIP REPORTING COMPLIANCE

Section 16(a) of the Exchange Act requires our officers and directors, and persons who own more than 10% of a registered class of our equity securities, to file reports of ownership and changes in ownership (Forms 3, 4 and 5) with the SEC. Officers, directors and greater than 10% stockholders are required to furnish us with copies of all such forms which they file.

To our knowledge, based solely on our review of such reports or written representations from certain reporting persons, we believe that all of the filing requirements applicable to our officers, directors, greater than 10% beneficial owners and other persons subject to Section 16 of the Exchange Act were complied with during the year ended December 31, 2017.

The following Audit Committee Report is not considered proxy solicitation material and is not deemed filed with the Securities and Exchange Commission. Notwithstanding anything to the contrary set forth in any of the Company's filings made under the Securities Act of 1933 or the Exchange Act that might incorporate filings made by the Company under those statutes, the Audit Committee Report shall not be incorporated by reference into any prior filings or into any future filings made by the Company under those statutes.

AUDIT COMMITTEE REPORT

The Audit Committee of the Board of Directors (the "Audit Committee") has furnished this report concerning the independent audit of the Company's financial statements. Each member of the Audit Committee meets the enhanced independence standards established by the Sarbanes-Oxley Act of 2002 and rulemaking of the Securities and Exchange Commission (the "SEC") and the NASDAQ Stock Market regulations. A copy of the Audit Committee Charter is available on the Company's website at <http://www.atyrpharma.com>.

The Audit Committee's responsibilities include assisting the Board of Directors regarding the oversight of the integrity of the Company's financial statements, the Company's compliance with legal and regulatory requirements, the independent registered public accounting firm's qualifications and independence, and the performance of the Company's internal audit function and the independent registered public accounting firm.

In fulfilling its oversight responsibilities, the Audit Committee reviewed and discussed the Company's financial statements for the fiscal year ended December 31, 2017 with the Company's management and Ernst & Young LLP. In addition, the Audit Committee has discussed with Ernst & Young LLP, with and without management present, their evaluation of the Company's internal accounting controls and overall quality of the Company's financial reporting. The Audit Committee also discussed with Ernst & Young LLP the matters required to be discussed by Statement on Auditing Standards No. 114 (formerly SAS 61), as amended (AICPA, *Professional Standards*, Vol. 1 AU section 380), as adopted by the Public Company Accounting Oversight Board in Rule 3200T. The Audit Committee also received the written disclosures and the letter from Ernst & Young LLP required by the Public Company Accounting Oversight Board Rule 3526 and the Audit Committee discussed the independence of Ernst & Young LLP with that firm.

Based on the Audit Committee's review and discussions noted above, the Audit Committee recommended to the Board of Directors, and the Board of Directors approved, that the audited financial statements be included in the Company's Annual Report for the fiscal year ended December 31, 2017.

The Audit Committee and the Board of Directors have recommended the selection of Ernst & Young LLP as the Company's independent registered public accounting firm for the year ending December 31, 2018.

AUDIT COMMITTEE

TIMOTHY P. COUGHLIN, CHAIRMAN
JOHN C. CLARKE
AMIR H. NASHAT

HOUSEHOLDING OF PROXY MATERIALS

We have made available a procedure approved by the SEC known as "householding." This procedure allows multiple stockholders residing at the same address the convenience of receiving a single copy of our Notice, Annual Report on Form 10-K and proxy materials, as applicable. This allows us to save money by reducing the number of documents we must print and mail, and helps protect the environment as well.

Householding is available to both registered stockholders (i.e., those stockholders with certificates registered in their name) and streetname holders (i.e., those stockholders who hold their shares through a brokerage).

Registered Stockholders

If you are a registered stockholder and would like to consent to a mailing of proxy materials and other stockholder information only to one account in your household, as identified by you, we will deliver or mail a single copy of our Annual Report and proxy materials for all registered stockholders residing at the same address. Your consent will be perpetual unless you revoke it, which you may do at any time by contacting the Householding Department of American Stock Transfer & Trust Company, LLC ("AST"), at 6201 15th Avenue, Brooklyn, New York 11219 or by calling AST's toll-free number which is (800) 934-5449.

Registered stockholders who have not consented to householding will continue to receive copies of Annual Reports and proxy materials for each registered stockholder residing at the same address. As a registered stockholder, you may elect to participate in householding and receive only a single copy of Annual Reports or proxy statements for all registered stockholders residing at the same address by contacting AST as outlined above.

Street Name Holders

Stockholders who hold their shares through a brokerage may elect to participate in householding or revoke their consent to participate in householding by contacting their respective brokers.

OTHER MATTERS

We are not aware of any matters that may come before the meeting other than those referred to in the Notice. If any other matter shall properly come before the Annual Meeting, however, the persons named in the accompanying proxy intend to vote all proxies in accordance with their best judgment.

Accompanying this Proxy Statement is our Annual Report. Copies of our Annual Report are available free of charge on our website at www.atyrpharma.com or you can request a copy free of charge by calling Investor Relations at (858) 223-1163 or sending an e-mail request to investorrelations@atyrpharma.com. Please include your contact information with the request.

By Order of the Board of Directors,



Sanjay S. Shukla, M.D., M.S.
President, Chief Executive Officer and Director

April 3, 2018



ANNUAL MEETING OF ATYR PHARMA, INC.

Date: May 15, 2018
Time: 8:30 A.M. (Local Time)
Place: Offices of aTyr Pharma, Inc.
3545 John Hopkins Court, Suite #250
San Diego, California 92121

Please make your marks like this: [X] Use dark black pencil or pen only

Board of Directors Recommends a Vote FOR proposals 1, 2 and 3.

1: To elect two Class III directors, as nominated by the Board of Directors, to hold office until the 2021 Annual Meeting of Stockholders or until their successors are duly elected and qualified.

01 Jeffrey S. Hatfield
02 Sanjay S. Shukla, M.D., M.S.
For Withhold
Against Abstain

2: To ratify the appointment of Ernst & Young LLP as the independent registered public accounting firm of the Company for its fiscal year ending December 31, 2018.

3: To approve, under applicable NASDAQ listing rules, the issuance of 11,429,760 shares of the Company's common stock upon the conversion of 2,285,952 outstanding shares of the Company's Class X Convertible Preferred Stock.

4: To transact such other business as may properly come before the meeting or any adjournment or postponement thereof.

Authorized Signatures - This section must be completed for your instructions to be executed.

Please Sign Here Please Date Above
Please Sign Here Please Date Above

Please sign exactly as your name(s) appears on your stock certificate. If held in joint tenancy, all persons should sign. Trustees, administrators, etc. should include title and authority. Corporators should provide full name of corporation and title of authorized officer signing the proxy.



Annual Meeting of aTyr Pharma, Inc. to be held on Tuesday, May 15, 2018 for Holders as of March 22, 2018

This proxy is being solicited on behalf of the Board of Directors

INTERNET TELEPHONE
VOTE BY:
Call 866-284-6674

Go To www.proxypush.com/life
Cast your vote online.
View Meeting Documents.

OR
MAIL
Mark, sign and date your Proxy Card/Voting Instruction Form.
Detach your Proxy Card/Voting Instruction Form.
Return your Proxy Card/Voting Instruction Form in the postage-paid envelope provided.

OR
Mark, sign and date your Proxy Card/Voting Instruction Form.
Detach your Proxy Card/Voting Instruction Form.
Return your Proxy Card/Voting Instruction Form in the postage-paid envelope provided.

The undersigned hereby appoints Sanjay S. Shukla, M.D., M.S. and Nancy D. Krueger, and each or either of them, as the true and lawful attorneys of the undersigned, with full power of substitution and revocation, and authorizes them, and each of them, to vote all the shares of capital stock of aTyr Pharma, Inc. which the undersigned is entitled to vote at said meeting and any adjournment thereof upon the matters specified and upon such other matters as may be properly brought before the meeting or any adjournment thereof, conferring authority upon such true and lawful attorneys to vote in their discretion on such other matters as may properly come before the meeting and revoking any proxy heretofore given.

THE SHARES REPRESENTED BY THIS PROXY WILL BE VOTED AS DIRECTED OR, IF NO DIRECTION IS GIVEN, SHARES WILL BE VOTED FOR THE ELECTION OF THE DIRECTORS IN ITEM 1 AND FOR THE PROPOSALS IN ITEMS 2 AND 3.

All votes must be received by 11:59 P.M., Eastern Time, May 14, 2018.

PROXY TABULATOR FOR
ATYR PHARMA, INC.
P.O. BOX 8016
CARY, NC 27512-9903

Please separate carefully at the perforation and return just this portion in the envelope provided.

Directors Recommend
For
For

For

For

EVENT #

CLIENT #

Proxy — aTyr Pharma, Inc.
Annual Meeting of Stockholders
May 15, 2018, 8:30 a.m. (Pacific Daylight Time)
This Proxy is Solicited on Behalf of the Board of Directors

The undersigned appoints Sanjay S. Shukla, M.D., M.S. and Nancy D. Krueger (the "Named Proxies") and each of them as proxies for the undersigned, with full power of substitution, to vote the shares of common stock of aTyr Pharma, Inc., a Delaware corporation ("the Company"), the undersigned is entitled to vote at the Annual Meeting of Stockholders of the Company to be held at the Offices of aTyr Pharma, Inc. 3545 John Hopkins Court, Suite #250 San Diego, California 92121, on Tuesday, May 15, 2018 at 8:30 a.m. (PDT) and all adjournments thereof.

← Please separate carefully at the perforation and return just this portion in the envelope provided. →

The purpose of the Annual Meeting is to take action on the following:

1. Proposal 1: To elect two Class III directors, as nominated by the Board of Directors, to hold office until the 2021 Annual Meeting of Stockholders or until their successors are duly elected and qualified.
2. Proposal 2: To ratify the appointment of Ernst & Young LLP as the independent registered public accounting firm of the Company for its fiscal year ending December 31, 2018.
3. To approve, under applicable NASDAQ listing rules, the issuance of 11,429,760 shares of the Company's common stock upon the conversion of 2,285,952 outstanding shares of the Company's Class X Convertible Preferred Stock.
4. To transact such other business as may properly come before the Annual Meeting or any adjournment or postponement of the Annual Meeting.

The two Class III directors that are up for election are: Jeffrey S. Hatfield and Sanjay S. Shukla, M.D., M.S.

The Board of Directors of the Company recommends a vote "FOR" all nominees for director and "FOR" each proposal.

This proxy, when properly executed, will be voted in the manner directed herein. If no direction is made, this proxy will be voted "FOR" all nominees for director and "FOR" each proposal. In their discretion, the Named Proxies are authorized to vote upon such other matters that may properly come before the Annual Meeting or any adjournment or postponement thereof.

You are encouraged to specify your choice by marking the appropriate box (SEE REVERSE SIDE) but you need not mark any box if you wish to vote in accordance with the Board of Directors' recommendation. The Named Proxies cannot vote your shares unless you sign and return this card.

To attend the meeting and vote your shares
in person, please mark this box.