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

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**FORM S-8  
REGISTRATION STATEMENT  
UNDER  
THE SECURITIES ACT OF 1933**

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**ATYR PHARMA, INC.**  
(Exact name of registrant as specified in its charter)

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Delaware  
(State or other jurisdiction of  
incorporation or organization)

20-3435077  
(I.R.S. Employer  
Identification No.)

3545 John Hopkins Court, Suite #250  
San Diego, CA 92121  
(Address of Principal Executive Offices)

ATYR PHARMA, INC. 2014 STOCK PLAN  
ATYR PHARMA, INC. 2015 STOCK OPTION AND INCENTIVE PLAN  
ATYR PHARMA, INC. 2015 EMPLOYEE STOCK PURCHASE PLAN  
(Full title of the plans)

John D. Mendlein, Ph.D.  
Chief Executive Officer and Executive Chairman  
3545 John Hopkins Court, Suite #250  
San Diego, CA 92121  
(Name and address of agent for service)

(858) 731-8389  
(Telephone number, including area code, of agent for service)

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*Copies to:*

Kingsley L. Taft  
Maggie L. Wong  
Mitzi Chang  
Goodwin Procter LLP  
3 Embarcadero Center, 24th Floor  
San Francisco, CA 94111  
Telephone: (415) 733-6000

Nancy D. Krueger  
Vice President, Legal Affairs  
aTyr Pharma, Inc.  
3545 John Hopkins Court, Suite #250  
San Diego, CA 92121  
Telephone: (858) 731-8389

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

Large accelerated filer

Accelerated filer

Non-accelerated filer  (Do not check if a smaller reporting company)

Smaller reporting company

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**CALCULATION OF REGISTRATION FEE**

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Title of securities to be registered	Amount to be registered(1)	Proposed maximum offering price per share	Proposed maximum aggregate offering price	Amount of registration fee
Common stock, \$0.001 par value per share	1,197,408(2)	\$14.00(6)	\$16,763,712	\$1,947.95
Common stock, \$0.001 par value per share	1,991,589(3)	\$6.20(7)	\$12,347,852	\$1,434.83
Common stock, \$0.001 par value per share	377,158(4)	\$14.00(6)	\$5,280,212	\$613.57
Common stock, \$0.001 par value per share	227,623(5)	\$14.00(6)	\$3,186,722	\$370.30
<b>Total</b>	<b>3,793,778</b>			<b>\$4,366.65</b>

- (1) Pursuant to Rule 416 under the Securities Act of 1933, as amended (the "Securities Act"), this registration statement shall also cover any additional shares of common stock which become issuable under the above-named plans by reason of any stock dividend, stock split, recapitalization or any other similar transaction effected without the receipt of consideration which results in an increase in the number of our outstanding shares of common stock. Pursuant to Rule 416(c) under the Securities Act, this registration statement shall also cover an indeterminate amount of interests to be offered or sold pursuant to the 2015 Employee Stock Purchase Plan (the "ESPP").
- (2) Represents 1,197,408 shares of common stock available for future issuance under the 2015 Stock Option and Incentive Plan (the "2015 Plan"). See footnote 3.
- (3) Represents 1,991,589 shares of common stock subject to outstanding awards under the 2014 Stock Plan (the "2014 Plan"). To the extent shares of common stock that are subject to awards under the 2014 Plan are forfeited, cancelled, repurchased, expired or otherwise terminated (other than by exercise) from and after the effective date of the 2015 Plan, such shares will be available for future issuance under the 2015 Plan.
- (4) Represents 377,158 shares of common stock subject to outstanding awards under the 2015 Plan.
- (5) Represents 227,623 shares of common stock available for future issuance under the ESPP.
- (6) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(h) of the Securities Act, and based on \$14.00, the initial public offering price of the registrant's common stock set forth on the cover page of the registrant's prospectus dated May 6, 2015 relating to its initial public offering.
- (7) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(h) of the Securities Act. For the 1,991,589 shares of common stock reserved for issuance upon the exercise of outstanding awards granted under the 2014 Plan, the Proposed Maximum Offering Price Per Share is \$6.20 per share, which is the weighted average exercise price of the awards granted under the 2014 Plan.

Proposed sales to take place as soon after the effective date of the registration statement as awards are granted, exercised or distributed under the 2014 Plan, 2015 Plan or ESPP, as applicable.

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**PART I**

**INFORMATION REQUIRED IN THE SECTION 10(a) PROSPECTUS**

The information called for in Part I of Form S-8 to be contained in the Section 10(a) prospectus is not being filed with or included in this registration statement (by incorporation by reference or otherwise) in accordance with the rules and regulations of the Securities and Exchange Commission (the "Commission").

**PART II**

**INFORMATION REQUIRED IN THE REGISTRATION STATEMENT**

**Item 3. Incorporation of Documents by Reference.**

The following documents filed with the Commission by the registrant are incorporated by reference into this registration statement:

- (a) The registrant's prospectus filed pursuant to Rule 424(b) under the Securities Act on May 7, 2015 relating to the registration statement on Form S-1, as amended (File No. 333-203272), which contains the Registrant's audited financial statements for the latest fiscal year which such statements have been filed; and
- (b) The description of the registrant's common stock contained in the registrant's registration statement on Form 8-A (Registration No. 001-37378) filed with the Commission on May 6, 2015 under Section 12(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), including any amendments or reports filed for the purpose of updating such description.

All documents subsequently filed by the registrant pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act prior to the filing of a post-effective amendment to the registration statement which indicates that all of the shares of common stock registered hereunder have been sold or which deregisters all of such shares then remaining unsold, shall be deemed to be incorporated by reference into this registration statement and to be a part hereof from the respective dates of filing of such documents, except as to any portion of any future annual or quarterly report to stockholders or document or current report furnished under current Items 2.02 or 7.01 of Form 8-K that is not deemed filed under such provisions. Any statement contained in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for purposes of this registration statement to the extent that a statement contained herein, or in any other subsequently filed document that also is or is deemed to be incorporated by reference herein, modifies or supersedes such earlier statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this registration statement.

Under no circumstances will any information filed under current items 2.02 or 7.01 of Form 8-K be deemed incorporated herein by reference unless such Form 8-K expressly provides to the contrary.

**Item 4. Description of Securities.**

Not applicable.

**Item 5. Interests of Named Experts and Counsel.**

None.

**Item 6. Indemnification of Directors and Officers.**

Section 145 of the Delaware General Corporation Law (the "DGCL") authorizes a corporation to indemnify its directors and officers against liabilities arising out of actions, suits and proceedings to which they are made or threatened to be made a party by reason of the fact that they have served or are currently serving as a director or

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

The registrant has adopted provisions in the registrant's certificate of incorporation and bylaws to be in effect at the completion of its initial public offering that limit or eliminate the personal liability of the registrant's directors and officers to the fullest extent permitted by the DGCL, as it now exists or may in the future be amended. Consequently, a director or officer will not be personally liable to the registrant or its stockholders for monetary damages or breach of fiduciary duty as a director, except for liability for:

- any breach of the director's duty of loyalty to the registrant or its stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- any unlawful payments related to dividends or unlawful stock purchases, redemptions or other distributions; or
- any transaction from which the director derived an improper personal benefit.

These limitations of liability do not alter director liability under the federal securities laws and do not affect the availability of equitable remedies such as an injunction or rescission.

In addition, the registrant's bylaws provide that:

- the registrant will indemnify its directors, officers and, in the discretion of its board of directors, certain employees to the fullest extent permitted by the DGCL, as it now exists or may in the future be amended; and
- the registrant will advance reasonable expenses, including attorneys' fees, to its directors and, in the discretion of its board of directors, to its officers and certain employees, in connection with legal proceedings relating to their service for or on behalf of the registrant, subject to limited exceptions.

The registrant has entered into indemnification agreements with each of its directors and intends to enter into such agreements with certain of its executive officers. These agreements provide that the registrant will indemnify each of its directors, certain of its executive officers and, at times, their affiliates to the fullest extent permitted by the DGCL. The registrant will advance expenses, including attorneys' fees (but excluding judgments, fines and settlement amounts), to each indemnified director, executive officer or affiliate in connection with any proceeding in which indemnification is available and the registrant will indemnify its directors and officers for any action or proceeding arising out of that person's services as a director or officer brought on behalf of the registrant or in furtherance of the registrant's rights. Additionally, certain of the registrant's directors may have certain rights to indemnification, advancement of expenses or insurance provided by their affiliates, which indemnification relates to and might apply to the same proceedings arising out of such director's services as a director referenced herein. Nonetheless, the registrant has agreed in the indemnification agreements that the registrant's obligations to those same directors are primary and any obligation of the affiliates of those directors to advance expenses or to provide indemnification for the expenses or liabilities incurred by those directors are secondary.

The registrant also maintains general liability insurance which covers certain liabilities of its directors and officers arising out of claims based on acts or omissions in their capacities as directors or officers, including liabilities under the Securities Act.

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Item 7. Exemption from Registration Claimed.

Not applicable.

Item 8. Exhibits.

See the Exhibit Index on the page immediately preceding the exhibits for a list of exhibits filed as part of this registration statement on Form S-8, which Exhibit Index is incorporated herein by reference.

Item 9. Undertakings.

(a) The undersigned registrant hereby undertakes:

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

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

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

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

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

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

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

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

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

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## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of San Diego, State of California, this 7th day of May, 2015.

### ATYR PHARMA, INC.

By: /s/ John D. Mendlein  
John D. Mendlein, Ph.D.  
*Chief Executive Officer and Executive Chairman*

## POWER OF ATTORNEY AND SIGNATURES

We, the undersigned officers and directors of aTyr Pharma, Inc., hereby severally constitute and appoint John D. Mendlein, Ph.D. and Frederic Chereau, and each of them singly (with full power to each of them to act alone), our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution in each of them for him and in his name, place and stead, and in any and all capacities, to sign for us and in our names in the capacities indicated below any and all amendments (including post-effective amendments) to this registration statement on Form S-8, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as full to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities and on the date indicated below.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ John D. Mendlein</u> John D. Mendlein, Ph.D.	Chief Executive Officer and Executive Chairman <i>(Principal Executive Officer)</i>	May 7, 2015
<u>/s/ Stan Blackburn</u> Stan Blackburn	Principal Financial and Accounting Officer <i>(Principal Financial and Accounting Officer)</i>	May 7, 2015
<u>/s/ John K. Clarke</u> John K. Clarke	Chairman of the Board and Director	May 7, 2015
<u>/s/ Srinivas Akkaraju</u> Srinivas Akkaraju, M.D., Ph.D.	Director	May 7, 2015
<u>/s/ James C. Blair</u> James C. Blair, Ph.D.	Director	May 7, 2015
<u>/s/ Kathryn E. Falberg</u> Kathryn E. Falberg	Director	May 7, 2015
<u>/s/ Mark Goldberg</u> Mark Goldberg	Director	May 7, 2015
<u>/s/ Amir H. Nashat</u> Amir H. Nashat, Sc.D.	Director	May 7, 2015
<u>/s/ Paul Schimmel</u> Paul Schimmel, Ph.D.	Director	May 7, 2015

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**EXHIBIT INDEX**

<b>Exhibit No.</b>	<b>Description</b>
4.1	Form of Restated Certificate of Incorporation of the Registrant (1)
4.2	Form of Amended and Restated Bylaws of the Registrant (2)
4.3	Specimen Common Stock Certificate (3)
5.1*	Opinion of Goodwin Procter LLP
23.1*	Consent of Independent Registered Public Accounting Firm
23.3*	Consent of Goodwin Procter LLP (included in Exhibit 5.1)
24.1*	Power of Attorney (included on signature page)
99.1	2014 Stock Plan and forms of agreements thereunder (4)
99.2	2015 Stock Option and Incentive Plan and form agreements thereunder (5)
99.3	2015 Employee Stock Purchase Plan (6)

\* Filed herewith.

- (1) Filed as Exhibit 3.2 to the Registrant's Amendment No. 1 to Registration Statement on Form S-1, filed on May 1, 2015 and incorporated herein by reference.
- (2) Filed as Exhibit 3.4 to the Registrant's Amendment No. 1 to Registration Statement on Form S-1, filed on April 27, 2015 and incorporated herein by reference.
- (3) Filed as Exhibit 4.1 to the Registrant's Amendment No. 1 to Registration Statement on Form S-1, filed on April 27, 2015 and incorporated herein by reference.
- (4) Filed as Exhibit 10.1 to the Registrant's to Amendment No. 1 to Registration Statement on Form S-1, filed on April 27, 2015 and incorporated herein by reference.
- (5) Filed as Exhibit 10.2 to the Registrant's to Amendment No. 1 to Registration Statement on Form S-1, filed on April 27, 2015 and incorporated herein by reference.
- (6) Filed as Exhibit 10.14 to the Registrant's Amendment No. 1 to Registration Statement on Form S-1, filed on April 27, 2015 and incorporated herein by reference.



May 7, 2015

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

Re: Securities Being Registered under Registration Statement on Form S-8

Ladies and Gentlemen:

We have acted as counsel to you in connection with your filing of a Registration Statement on Form S-8 (the "Registration Statement") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), on or about the date hereof relating to an aggregate of 3,793,778 shares (the "Shares") of Common Stock, \$0.001 par value per share, of aTyr Pharma, Inc., a Delaware corporation (the "Company"), that may be issued pursuant to the Company's 2014 Stock Plan, 2015 Stock Option and Incentive Plan and 2015 Employee Stock Purchase Plan (collectively, the "Plans").

We have reviewed such documents and made such examination of law as we have deemed appropriate to give the opinions set forth below. We have relied, without independent verification, on certificates of public officials and, as to matters of fact material to the opinion set forth below, on certificates of officers of the Company.

The opinion set forth below is limited to the Delaware General Corporation Law (which includes reported judicial decisions interpreting the Delaware General Corporation Law).

For purposes of the opinion set forth below, we have assumed that a sufficient number of authorized but unissued shares of the Company's Common Stock will be available for issuance when the Shares are issued.

Based on the foregoing, we are of the opinion that the Shares have been duly authorized and, upon issuance and delivery against payment therefor in accordance with the terms of the Plans, will be validly issued, fully paid and nonassessable.

We hereby consent to the inclusion of this opinion as Exhibit 5.1 to the Registration Statement. In giving our consent, we do not admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations thereunder.

Very truly yours,

/s/ GOODWIN PROCTER LLP

GOODWIN PROCTER LLP



**Consent of Independent Registered Public Accounting Firm**

We consent to the incorporation by reference in the Registration Statement (Form S-8) pertaining to the ATYR PHARMA, INC. 2014 STOCK PLAN, ATYR PHARMA, INC. 2015 STOCK OPTION AND INCENTIVE PLAN, and the ATYR PHARMA, INC. 2015 EMPLOYEE STOCK PURCHASE PLAN of aTyr Pharma Inc. of our report dated April 3, 2015 (except for paragraphs 7, 8, and 9 of Note 10, as to which the date is April 25, 2015, and except for paragraph 10 of Note 10, as to which the date is May 5, 2015), with respect to the consolidated financial statements of aTyr Pharma, Inc. included in its Registration Statement (Form S-1 No. 333-203272), filed with the Securities and Exchange Commission.

/s/ Ernst & Young

San Diego, California  
May 5, 2015