

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

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

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

Delaware
(State or other jurisdiction of
incorporation or organization)

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

10240 Sorrento Valley Road, Suite 300
San Diego, CA 92121
(Address of Principal Executive Offices) (Zip Code)

ATYR PHARMA, INC. 2015 STOCK OPTION AND INCENTIVE PLAN, AS AMENDED
(Full titles of the plans)

Sanjay S. Shukla, M.D., M.S.
President, Chief Executive Officer and Director
10240 Sorrento Valley Road, Suite 300
San Diego, CA 92121
(858) 731-8389

(Name and address of agent for service) (Telephone number, including area code, of agent for service)

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

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

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

EXPLANATORY NOTE

This Registration Statement on Form S-8 (the “**Registration Statement**”) is being filed by aTyr Pharma, Inc. (the “**Registrant**”) for the purpose of registering 4,000,000 additional shares of the Registrant’s common stock, par value \$0.001 per share (“**Common Stock**”), issuable pursuant to the Registrant’s 2015 Stock Option and Incentive Plan, as amended (the “**2015 Plan**”), pursuant to an amendment to the 2015 Plan approved by the stockholders of the Registrant on May 11, 2026.

INCORPORATION OF DOCUMENTS BY REFERENCE

The Registrant previously registered shares of its Common Stock for issuance under the 2015 Plan under Registration Statements on Form S-8 filed with the Securities and Exchange Commission (the “**Commission**”) on [May 7, 2015](#) (File No. 333-203955), [April 1, 2016](#) (File No. 333-210543), [March 22, 2017](#) (File No. 333-216880), [March 23, 2018](#) (File No. 333-223865), [May 20, 2019](#) (File No. 333-231594), [August 18, 2020](#) (File No. 333-248090), [May 14, 2021](#) (File No. 333-256145), [May 11, 2022](#) (File No. 333-264866), [August 10, 2023](#) (File No. 333-273876), [August 13, 2024](#) (File No. 333-281525) and [August 7, 2025](#) (File No. 333-289364).

This Registration Statement is being filed for the purpose of registering additional securities of the same class as other securities for which Registration Statements of the Registrant on Form S-8 relating to the same employee benefit plans are effective.

Pursuant to General Instruction E to Form S-8, this Registration Statement hereby incorporates by reference the contents of the registration statements referenced above and the description of the Registrant’s Common Stock which is contained in a Registration Statement on [Form 8-A](#) filed with the Commission on May 6, 2015 (File No. 001-37378) under Section 12(b) of the Securities Exchange Act of 1934, as amended, including any amendment or report filed for the purpose of updating such description, including [Exhibit 4.6](#) to the Registrant’s Annual Report on Form 10-K for the fiscal year ended December 31, 2023, as filed with the Commission on March 14, 2024.

Item 8. Exhibits.

The exhibits to this Registration Statement are listed below:

Exhibit Number	Exhibit Title	Form	Incorporated by Reference		Filing Date
			File No.	Exhibit	
4.1	Restated Certificate of Incorporation of the Registrant	10-Q	001-37378	3.1	November 14, 2022
4.2	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant	8-K	001-37378	3.1	June 28, 2019
4.3	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant	10-Q	001-37378	3.3	May 12, 2020
4.4	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant	8-K	001-37378	3.1	May 4, 2021
4.5	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant	8-K	001-37378	3.1	April 29, 2022
4.6	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant	8-K	001-37378	3.1	May 19, 2023
4.7	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant	10-Q	001-37378	3.7	May 15, 2026
4.8	Amended and Restated Bylaws of the Registrant	10-Q	001-37378	3.6	November 14, 2022
4.9	Specimen Common Stock Certificate	S-1/A	333-203272	4.1	April 27, 2015
5.1	Opinion of Cooley LLP	—	—	—	Filed herewith
23.1	Consent of Cooley LLP (included in Exhibit 5.1)	—	—	—	Filed herewith
23.2	Consent of Independent Registered Public Accounting Firm	—	—	—	Filed herewith
24.1	Power of Attorney (included on the signature page hereto)	—	—	—	Filed herewith
99.1	aTyr Pharma, Inc. 2015 Stock Option and Incentive Plan, as amended	10-Q	001-37378	10.1	May 15, 2026
107	Filing Fee Table	—	—	—	Filed herewith

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 August, 2026.

ATYR PHARMA, INC.

By: /s/ Sanjay S. Shukla
Sanjay S. Shukla, M.D., M.S.
President, Chief Executive Officer and Director

POWER OF ATTORNEY AND SIGNATURES

We, the undersigned officers and directors of aTyr Pharma, Inc., hereby severally constitute and appoint Sanjay S. Shukla, M.D., M.S. and Jill M. Broadfoot, 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 their and in their 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 or she 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 or her 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.

Signature	Title	Date
<u>/s/ Sanjay S. Shukla</u> Sanjay S. Shukla, M.D., M.S.	President, Chief Executive Officer and Director <i>(Principal Executive Officer)</i>	August 7, 2026
<u>/s/ Jill M. Broadfoot</u> Jill M. Broadfoot	Chief Financial Officer <i>(Principal Financial and Accounting Officer)</i>	August 7, 2026
<u>/s/ Timothy P. Coughlin</u> Timothy P. Coughlin	Chairman of the Board	August 7, 2026
<u>/s/ Eric Benevich</u> Eric Benevich	Director	August 7, 2026
<u>/s/ Jane A. Gross</u> Jane A. Gross, Ph.D.	Director	August 7, 2026
<u>/s/ Svetlana Lucas</u> Svetlana Lucas, Ph.D.	Director	August 7, 2026
<u>/s/ Sara L. Zaknoen</u> Sara L. Zaknoen, M.D.	Director	August 7, 2026

Charles J. Bair
+1 858 550 6142
cbair@cooley.com

August 7, 2026

aTyr Pharma, Inc.
10240 Sorrento Valley Road, Suite 300
San Diego, CA 92121

Ladies and Gentlemen:

We have acted as counsel to aTyr Pharma, Inc., a Delaware corporation (the “**Company**”), in connection with the filing by the Company of a registration statement on Form S-8 (the “**Registration Statement**”) with the Securities and Exchange Commission (the “**Commission**”) covering the offering of up to 4,000,000 shares (the “**Shares**”) of the Company’s common stock, \$0.001 par value per share (“**Common Stock**”) issuable pursuant to the Company’s 2015 Stock Option and Incentive Plan, as amended (the “**Plan**”).

In connection with this opinion, we have examined and relied upon the Registration Statement and the related prospectus, the Plan, the Company’s certificate of incorporation and bylaws, each as currently in effect, and such other records, documents, certificates, memoranda and instruments as in our judgment are necessary or appropriate to enable us to render the opinion expressed below. We have assumed the genuineness of all signatures, the authenticity of all documents submitted to us as originals, the conformity to originals of all documents submitted to us as copies, the accuracy, completeness and authenticity of certificates of public officials, and the due authorization, execution and delivery of all documents by all persons other than by the Company. As to certain factual matters, we have relied upon a certificate of an officer of the Company and have not independently verified such matters.

Our opinion is expressed only with respect to the General Corporation Law of the State of Delaware. We express no opinion to the extent that any other laws are applicable to the subject matter hereof and express no opinion and provide no assurance as to compliance with any federal or state securities law, rule or regulation.

On the basis of the foregoing, and in reliance thereon, we are of the opinion that the Shares, when sold and issued in accordance with the Plan, and the Registration Statement and related prospectus, will be validly issued, fully paid and nonassessable (except as to Shares issued pursuant to deferred payment arrangements, which will be fully paid and nonassessable when such deferred payments are made in full).

This opinion is limited to the matters expressly set forth in this letter, and no opinion has been or should be implied, or may be inferred, beyond the matters expressly stated. This opinion speaks only as to law and facts in effect or existing as of the date hereof, and we have no obligation or responsibility to update or supplement this letter to reflect any facts or circumstances that may hereafter come to our attention or any changes in law that may hereafter occur.

We consent to the filing of this opinion as an exhibit to the Registration Statement. In giving such consent, we do not thereby admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act of 1933, as amended, or the rules and regulations of the Commission thereunder.

Sincerely,

Cooley LLP

By: /s/ Charles J. Bair
Charles J. Bair

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. 2015 Stock Option and Incentive Plan, as amended, of our report dated March 5, 2026, with respect to the consolidated financial statements of aTyr Pharma, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2025, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

San Diego, California
August 7, 2026

aTYR PHARMA INC

[illegible]