

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

**FORM S-8**

**REGISTRATION STATEMENT  
UNDER  
THE SECURITIES ACT OF 1933**

**Rhythm Pharmaceuticals, Inc.**

(Exact name of Registrant as specified in its charter)

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

**46-2159271**  
(I.R.S. Employer  
Identification Number)

**222 Berkeley Street  
12<sup>th</sup> Floor  
Boston, MA 02116**  
(Address of Principal Executive Offices)

**2017 Equity Incentive Plan  
2017 Employee Stock Purchase Plan**  
(Full Title of the Plan)

**Hunter Smith  
Chief Financial Officer  
Rhythm Pharmaceuticals, Inc.  
222 Berkeley Street  
12<sup>th</sup> Floor  
Boston, MA 02116  
(857) 264-4280**

(Name, address, including zip code, and 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	<input type="checkbox"/>		Accelerated filer	<input checked="" type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>		Smaller reporting company	<input type="checkbox"/>
			Emerging growth company	<input checked="" type="checkbox"/>

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.

**CALCULATION OF REGISTRATION FEE**

Title of Each Class of Securities to be Registered	Amount to be Registered <sup>(1)</sup>	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price	Amount of Registration Fee
Common Stock, \$0.001 par value per share				
2017 Equity Incentive Plan	1,759,870 <sup>(2)</sup>	\$ 18.33 <sup>(3)</sup>	\$ 32,258,417.10 <sup>(3)</sup>	\$ 4,187.14
2017 Employee Stock Purchase Plan	439,968 <sup>(4)</sup>	\$ 18.33 <sup>(5)</sup>	\$ 8,064,613.44 <sup>(5)</sup>	\$ 1,046.79
Total	2,199,838		\$ 40,323,030.54	\$ 5,233.93

(1) Pursuant to Rule 416(a) under the Securities Act of 1933, as amended (the “Securities Act”), this registration statement shall also cover any additional shares of the Registrant’s common stock that become issuable under the 2017 Equity Incentive Plan (the “EIP”) or the 2017 Employee Stock Purchase

Plan (the "ESPP") by reason of any stock dividend, stock split, recapitalization or similar transaction effected without the Registrant's receipt of consideration which would increase the number of outstanding shares of common stock.

- (2) Represents additional shares of common stock authorized for issuance under the EIP pursuant to the provisions of the EIP that provide for an automatic annual increase in the number of shares authorized for issuance under the EIP.
  - (3) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to this offering under Rules 457(c) and 457(h) of the Securities Act. The offering price per share and the aggregate offering price for shares reserved for future issuance under the EIP are based on the average of the high and low price per share of the Registrant's common stock as reported on The Nasdaq Global Market ("Nasdaq") on February 27, 2020, which is equal to \$18.33.
  - (4) Represents additional shares of common stock authorized for issuance under the ESPP pursuant to the provisions of the ESPP that provide for an automatic annual increase in the number of shares authorized for issuance under the ESPP.
  - (5) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to this offering under Rules 457(c) and 457(h) of the Securities Act. The offering price per share and the aggregate offering price for shares reserved for future issuance under the ESPP are based on the average of the high and low price per share of the Registrant's common stock as reported on Nasdaq on February 27, 2020, which is equal to \$18.33.
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## INCORPORATION OF DOCUMENTS BY REFERENCE

This Registration Statement on Form S-8 is being filed for the purpose of registering an additional 1,759,870 shares of common stock of Rhythm Pharmaceuticals, Inc. (the "Company") to be issued pursuant to the Rhythm Pharmaceuticals, Inc. 2017 Equity Incentive Plan (the "EIP") and an additional 439,968 shares of common stock of the Company to be issued pursuant to the Rhythm Pharmaceuticals, Inc. 2017 Employee Stock Purchase Plan (the "ESPP"). The Company previously registered shares of its common stock for issuance under the EIP and the ESPP on Registration Statements on Form S-8 filed with the Securities and Exchange Commission (the "Commission") on [October 12, 2017](#) (File No. 333-220925) and [February 13, 2019](#) (File No. 333-229642), and registered additional shares of its common stock for issuance under the EIP on a Registration Statement on Form S-8 filed with the Commission on [March 14, 2018](#) (File No. 333-223647). Pursuant to General Instruction E to Form S-8, this Registration Statement hereby incorporates by reference the contents of the Registration Statements referenced above.

## PART II

### INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

#### Item 8. Exhibits.

The exhibits to the registration statement are listed in the Exhibit Index attached hereto and incorporated by reference herein.

#### Exhibit Index

<b>Exhibit Number</b>	<b>Exhibit Description</b>	<b>Filed Herewith</b>
<a href="#">5.1</a>	<a href="#">Opinion of Morgan, Lewis &amp; Bockius LLP.</a>	<input checked="" type="checkbox"/>
<a href="#">23.1</a>	<a href="#">Consent of Ernst &amp; Young LLP, independent registered public accounting firm.</a>	<input checked="" type="checkbox"/>
<a href="#">23.2</a>	<a href="#">Consent of Morgan, Lewis &amp; Bockius LLP. Reference is made to Exhibit 5.1.</a>	<input checked="" type="checkbox"/>
<a href="#">24.1</a>	<a href="#">Power of Attorney. Reference is made to the signature page hereto.</a>	<input checked="" type="checkbox"/>

**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 Boston, Commonwealth of Massachusetts on March 2, 2020.

**RHYTHM PHARMACEUTICALS, INC.**

By: /s/ Hunter Smith

Hunter Smith

*Chief Financial Officer*

**POWER OF ATTORNEY**

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below does hereby constitute and appoint Keith M. Gottesdiener and Hunter Smith and each of them, with full power of substitution and full power to act without the other, his or her true and lawful attorney-in-fact and agent to act for him or her in his or her name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this registration statement, and to file this registration statement, 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 and necessary to be done in order to effectuate the same as fully, to all intents and purposes, as they or 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, may lawfully do or cause to be done by virtue hereof.

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

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Keith M. Gottesdiener</u> Keith M. Gottesdiener	Chief Executive Officer, President and Director (Principal Executive Officer)	March 2, 2020
<u>/s/ Hunter Smith</u> Hunter Smith	Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)	March 2, 2020
<u>/s/ Stuart Arbuckle</u> Stuart Arbuckle	Director	March 2, 2020
<u>/s/ Todd Foley</u> Todd Foley	Director	March 2, 2020
<u>/s/ Jennifer Good</u> Jennifer Good	Director	March 2, 2020
<u>/s/ Christophe R. Jean</u> Christophe R. Jean	Director	March 2, 2020
<u>/s/ Ed Mathers</u> Ed Mathers	Director	March 2, 2020
<u>/s/ David W. J. McGirr</u> David W. J. McGirr	Director	March 2, 2020
<u>/s/ David P. Meeker</u> David P. Meeker	Director	March 2, 2020

# Morgan Lewis

March 2, 2020

Rhythm Pharmaceuticals, Inc.  
222 Berkeley Street, 12th Floor  
Boston, MA 02116

Re: Registration Statement on Form S-8; 2,199,838 shares of Common Stock of Rhythm Pharmaceuticals, Inc., par value \$0.001 per share

Ladies and Gentlemen:

We have acted as counsel to Rhythm Pharmaceuticals, Inc., a Delaware corporation (the “Company”), in connection with the registration by the Company of an aggregate of 2,199,838 shares of common stock of the Company, par value \$0.001 per share (the “Shares”), issuable under the Company’s 2017 Equity Incentive Plan (the “EIP”) and the Company’s 2017 Employee Stock Purchase Plan (the “ESPP” and together with the EIP, the “Plans”).

The Shares are included in a registration statement on Form S-8 under the Securities Act of 1933, as amended (the “Act”), filed with the Securities and Exchange Commission (the “Commission”) on March 2, 2020 (the “Registration Statement”). This opinion is being furnished in connection with the requirements of Item 601(b)(5) of Regulation S-K under the Act, and no opinion is expressed herein as to any matter pertaining to the contents of the Registration Statement or the related prospectuses, other than as expressly stated herein with respect to the issuance of the Shares.

As such counsel, we have examined such matters of fact and questions of law as we have considered appropriate for purposes of this letter. With your consent, we have relied upon certificates and other assurances of officers of the Company and others as to factual matters without having independently verified such factual matters. We are opining herein as to the General Corporation Law of the State of Delaware (the “DGCL”), and we express no opinion with respect to any other laws.

Subject to the foregoing and the other matters set forth herein, it is our opinion that, as of the date hereof, when the Shares shall have been issued and registered on the books of the transfer agent against payment therefor in the circumstances contemplated by the Plans, assuming that the individual issuances, grants or awards under the Plans are duly authorized by all necessary corporate action and duly issued, granted or awarded and exercised in accordance with the requirements of law and the Plans (and the agreements and awards duly adopted thereunder and in accordance therewith), the issue and sale of the Shares will have been duly authorized by all necessary corporate action of the Company, and the Shares will be validly issued, fully paid and nonassessable. In rendering the foregoing opinion, we have assumed that the Company will comply with all applicable notice requirements regarding uncertificated shares provided in the DGCL.

This opinion is for your benefit in connection with the Registration Statement and may be relied upon by you and by persons entitled to rely upon it pursuant to the applicable provisions of the Act. We consent to your filing 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 Act or the rules and regulations of the Commission thereunder.

Very truly yours,

/s/ MORGAN, LEWIS & BOCKIUS LLP

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**Consent of Independent Registered Public Accounting Firm**

We consent to the incorporation by reference in the Registration Statement (Form S-8) pertaining to the 2017 Equity Incentive Plan and 2017 Employee Stock Purchase Plan of Rhythm Pharmaceuticals, Inc. of our report dated March 2, 2020, with respect to the consolidated financial statements of Rhythm Pharmaceuticals, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2019, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts  
March 2, 2020

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