

**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)

**500 Boylston Street**  
**11<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)

**Keith M. Gottesdiener, M.D.**  
**Chief Executive Officer and President**  
**Rhythm Pharmaceuticals, Inc.**  
**500 Boylston Street**  
**11<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, or a smaller reporting 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="radio"/>	Accelerated filer	<input type="radio"/>
Non-accelerated filer	<input checked="" type="radio"/> (Do not check if a smaller reporting company)	Smaller reporting company	<input type="radio"/>
		Emerging growth company	<input checked="" type="radio"/>

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(1)	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price Per Share	Amount of Registration Fee
Common Stock, \$0.001 par value per share				
2017 Equity Incentive Plan	4,018,538(2)	\$ 28.51(3)	\$ 73,546,537(3)	\$ 9,157
2017 Employee Stock Purchase Plan	272,841(4)	\$ 24.23(5)	\$ 6,610,937(5)	\$ 823
<b>Total</b>	<b>4,291,379</b>			<b>\$ 9,980</b>

- 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") and 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.
- Shares of common stock reserved for issuance under the EIP consist of (a) 1,821,580 shares of common stock issuable upon exercise of stock options outstanding under the EIP as of the date hereof and (b) 2,196,958 shares of common stock available for future issuance under the EIP.
- 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 (a) outstanding options under the EIP are based on the weighted-average exercise price per share of such outstanding options, which is equal to \$5.99 and (b) 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 October 5, 2017, which is equal to \$28.51.
- Represents shares reserved for issuance under the ESPP as of the date of this Registration Statement.
- Estimated solely for the purpose of this offering under Rules 457(c) and 457(h) of the Securities Act on the basis of the average of the high and low price per share of the Registrant's common stock as reported on Nasdaq on October 5, 2017, multiplied by 85%, which is the percentage of the price per share applicable to purchases under the ESPP.

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**PART I**

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

**Item 1. Plan Information\***

**Item 2. Registrant Information and Employee Plan Annual Information\***

\*Information required by Part I to be included in the Section 10(a) prospectus will be sent or given to employees as specified by Rule 428(b)(1) under the Securities Act of 1933, as amended (the "Securities Act"), and is omitted from this Registration Statement in accordance with Rule 428(b)(1) under the Securities Act and the Note to Part I of Form S-8.

**PART II**

**INFORMATION REQUIRED IN THE REGISTRATION STATEMENT**

*In this registration statement, Rhythm Pharmaceuticals, Inc. is sometimes referred to as "Registrant," "we," "us" or "our."*

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

The Securities and Exchange Commission (the "SEC") allows us to incorporate by reference the information we file with them, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this registration statement, and later information filed with the SEC will update and supersede this information. We hereby incorporate by reference into this registration statement the following documents previously filed with the SEC:

- (a) The prospectus filed by the Registrant with the SEC pursuant to Rule 424(b) under the Securities Act, on October 5, 2017, relating to the registration statement on Form S-1, as amended (No. 333-220337), which contains the Registrant's audited financial statements for the latest fiscal year for which such statements have been filed;
- (b) The Registrant's Current Report on Form 8-K as filed with the SEC on October 10, 2017; and
- (c) The description of the Registrant's common stock contained in the Registrant's registration statement on Form 8-A (Registration No. 001-38223), filed by the Registrant with the SEC under Section 12(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), on September 29, 2017, including any amendments or reports filed for the purpose of updating such description.

All documents that the Registrant subsequently files pursuant to Sections 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 offered have been sold or which deregisters all of such shares then remaining unsold, shall be deemed to be incorporated by reference in this registration statement and to be a part hereof from the date of the filing of such documents; except as to specific sections of such documents as set forth therein.

Any statement contained in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such 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, and exhibits furnished on such form that relate to such items, 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.

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

Section 145 of the Delaware General Corporation Law authorizes a corporation's board of directors to grant, and authorizes a court to award, indemnity to officers, directors, and other corporate agents.

As permitted by Delaware law, our amended and restated certificate of incorporation provides that, to the fullest extent permitted by Delaware law, no director will be personally liable to us or our stockholders for monetary damages for breach of fiduciary duty as a director. Pursuant to Delaware law such protection would be not available for liability:

for any breach of a duty of loyalty to us or our stockholders;

for acts or omissions not in good faith or that involve intentional misconduct or a knowing violation of law;

for any transaction from which the director derived an improper benefit; or

for an act or omission for which the liability of a director is expressly provided by an applicable statute, including unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the Delaware General Corporation Law.

Our amended and restated certificate of incorporation also provides that if Delaware law is amended after the approval by our stockholders of the amended and restated certificate of incorporation to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of our directors will be eliminated or limited to the fullest extent permitted by Delaware law.

Our amended and restated bylaws further provide that we must indemnify our directors and officers to the fullest extent permitted by Delaware law. Our amended and restated bylaws also authorize us to indemnify any of our employees or agents and permit us to secure insurance on behalf of any officer, director, employee or agent for any liability arising out of his or her action in that capacity, whether or not Delaware law would otherwise permit indemnification.

In addition, our amended and restated bylaws also provide that we are required to advance expenses to our directors and officers as incurred in connection with legal proceedings against them for which they may be indemnified and that the rights conferred in the amended and restated bylaws are not exclusive.

We have entered into indemnification agreements with each of our directors and executive officers. These agreements, among other things, require us to indemnify each director and officer to the fullest extent permitted by Delaware law, our amended and restated certificate of incorporation and our amended and restated bylaws, for expenses such as, among other things, attorneys' fees, judgments, fines, and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action by or in our right, arising out of the person's services as our director or executive officer or as the director or executive officer of any subsidiary of ours or any other company or enterprise to which the person provides services at our request.

#### **Item 7. Exemption from Registration Claimed.**

Not applicable.

#### **Item 8. Exhibits.**

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

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#### **Item 9. Undertakings.**

(a) The 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;
  - (ii) To reflect in the prospectus any facts or events arising after the effective date of the Registration Statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the Registration Statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the SEC 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) do not apply if the registration statement is on Form S-8 and the information required to be included in a post-effective amendment by those paragraphs is contained in periodic reports filed with or furnished to the SEC by the Registrant pursuant to section 13 or 15(d) of the Exchange Act that are incorporated by reference in the registration statement.

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

(c) Insofar as indemnification for liabilities arising under the Securities Act 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 SEC such indemnification is against public policy as expressed in the Securities 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

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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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### Exhibit Index

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Herewith
		Form	Date	Number	
4.1	<a href="#">Amended and Restated Certificate of Incorporation of the Registrant, as currently in effect.</a>	S-1/A	9-25-17	3.3	
4.2	<a href="#">Amended and Restated Bylaws of the Registrant, as currently in effect.</a>	S-1/A	9-25-17	3.5	
4.3	<a href="#">Form of Common Stock Certificate of the Registrant.</a>	S-1/A	9-25-17	4.1	
5.1	<a href="#">Opinion of Morgan, Lewis &amp; Bockius LLP.</a>				X
23.1	<a href="#">Consent of Ernst &amp; Young LLP, independent registered public accounting firm.</a>				X
23.2	<a href="#">Consent of Morgan, Lewis &amp; Bockius LLP. Reference is made to Exhibit 5.1.</a>				X
24.1	<a href="#">Power of Attorney. Reference is made to the signature page hereto.</a>				X
99.1#	<a href="#">2017 Equity Incentive Plan and Form of Option Agreement and Notice of Exercise.</a>	S-1/A	9-25-17	10.2	
99.2#	<a href="#">Rhythm Pharmaceuticals, Inc. 2017 Employee Stock Purchase Plan</a>	S-1/A	9-25-17	10.10	

# Indicates management contract or compensatory plan.

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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 Boston, Commonwealth of Massachusetts on October 12, 2017.

**RHYTHM PHARMACEUTICALS, INC.**

By: /s/ KEITH M. GOTTESDIENER  
Keith M. Gottesdiener  
President and Chief Executive Officer

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### 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)	October 12, 2017
<u>/s/ Hunter Smith</u> Hunter Smith	Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)	October 12, 2017
<u>/s/ John J. Hulburt</u> John J. Hulburt	Controller	October 12, 2017
<u>/s/ Neil Exter</u> Neil Exter	Director	October 12, 2017
<u>/s/ Todd Foley</u> Todd Foley	Director	October 12, 2017
<u>/s/ Christophe R. Jean</u> Christophe R. Jean	Director	October 12, 2017
<u>/s/ Ed Mathers</u> Ed Mathers	Director	October 12, 2017
<u>/s/ David W. J. McGirr</u> David W. J. McGirr	Director	October 12, 2017
<u>/s/ David P. Meeker</u> David P. Meeker	Director	October 12, 2017

October 12, 2017

Rhythm Pharmaceuticals, Inc.  
500 Boylston Street, 11th Floor  
Boston, MA 02116

Re: Registration Statement on Form S-8; 4,291,379 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 4,291,379 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 "2017 Plan") and 2017 Employee Stock Purchase Plan (the "ESPP" and together with the 2017 Plan, 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 October 12, 2017 (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 duly registered on the books of the transfer agent and registrar therefor in the name or on behalf of the purchasers and have been issued by the Company against payment therefor in the circumstances contemplated by the Plans, assuming in each case 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

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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 our report dated May 23, 2017, except for Note 13, as to which the date is September 22, 2017, with respect to the financial statements of Rhythm Pharmaceuticals, Inc. included in Amendment No. 1 to the Registration Statement (Form S-1 No. 333-220337) and related Prospectus of Rhythm Pharmaceuticals, Inc. for the registration of its common stock.

/s/ **Ernst & Young LLP**

Boston, Massachusetts  
October 6, 2017

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