

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
WASHINGTON, DC 20549

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**FORM S-1  
REGISTRATION STATEMENT**  
*UNDER  
THE SECURITIES ACT OF 1933*

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**RXi Pharmaceuticals Corporation**

(Exact name of registrant as specified in its charter)

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

**2834**  
(Primary Standard Industrial  
Classification Code Number)

**45-3215903**  
(I.R.S. Employer  
Identification Number)

**257 Simarano Drive, Suite 101  
Marlborough, Massachusetts 01752  
(508) 767-3861**  
(Address, including zip code, and telephone number, including  
area code, of registrant's principal executive offices)

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**Geert Cauwenbergh, Dr. Med. Sc.  
President  
RXi Pharmaceuticals Corporation  
257 Simarano Drive, Suite 101  
Marlborough, Massachusetts 01752  
(508) 767-3861**  
(Name, address, including zip code, and telephone number,  
including area code, of agent for service)

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*With copies to:*

**Ryan A. Murr**  
**Gibson, Dunn & Crutcher LLP**  
**555 Mission Street**  
**San Francisco, CA 94105**  
**(415) 393-8373**

**Oded Har-Even**  
**Robert V. Condon III**  
**Zysman, Aharoni, Gayer and Sullivan & Worcester LLP**  
**1633 Broadway, 32nd Floor**  
**New York, NY 10019**  
**Telephone: (212) 660-5003**

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Approximate date of commencement of proposed sale to the public: As soon as practicable after this registration statement becomes effective.

If any of the securities being registered on this form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, as amended, check the following box.

If this form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.  333-227173

If this form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

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. (Check one):

Large accelerated filer   
Non-accelerated filer

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 to Section 7(a)(2)(B) of the Securities Act.

**CALCULATION OF REGISTRATION FEE**

| <b>Title of Each Class of Securities to be Registered</b>   | <b>Proposed Maximum Aggregate Offering Price<sup>(1)(2)</sup></b> | <b>Amount of Registration Fee</b> |
|---|---|-----------------------------------|
| Pre-funded units comprised of pre-funded warrants to purchase shares of common stock, par value \$0.0001 per share, and warrants to purchase common stock | \$ 1,182,858.10   |                                   |
| (i) Pre-funded warrants included in the units (3)   |   |                                   |
| (ii) Warrants to purchase common stock included in the units (3)  |   |                                   |
| Shares of common stock issuable upon exercise of warrants   | \$ 1,200,001.00   |                                   |
| Shares of common stock issuable upon conversion of pre-funded warrants  | \$17,142.90   |                                   |
| Underwriter's warrants to purchase common stock (4)   |   |                                   |
| Shares of common stock issuable upon exercise of underwriter's warrants (5)   | \$ 112,500.50   |                                   |
| <b>Total</b>  | <b>\$ 2,512,502.50</b>  | <b>\$ 304.52 (6)</b>              |

- (1) Estimated solely for the purpose of computing the amount of the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended (the "**Securities Act**"). Represents the additional number of units, shares and warrants being registered hereby and does not include the securities that the registrant previously registered on the Registration Statement on Form S-1 (File No. 333-227173), as amended (the "**Registration Statement**").
- (2) Pursuant to Rule 416 under the Securities Act, the shares of common stock registered hereby also include an indeterminate number of additional shares of common stock as may, from time to time, become issuable by reason of stock splits, stock dividends, recapitalizations or other similar transactions.
- (3) No separate fee is required pursuant to Rule 457(i) under the Securities Act.
- (4) No separate fee is required pursuant to Rule 457(g) under the Securities Act.
- (5) Represents warrants to purchase a number of shares of common stock equal to 7.5% of the number of shares of common stock (i) included within the units and (ii) issuable upon the exercise of the pre-funded warrants included within the pre-funded units placed in this offering at an exercise price equal to 125% of the offering price per unit (excluding any shares of common stock underlying the warrants included in the units and the pre-funded units sold in this offering).
- (6) The registrant previously registered units, shares of its common stock and warrants to purchase shares of common stock for which the fee was \$5,315.37 on the Registration Statement, which was declared effective by the Securities and Exchange Commission on September 28, 2018. In accordance with Rule 462(b) under the Securities Act, an additional amount of securities having a proposed maximum aggregate offering price of \$2,512,502.50 is hereby registered.

**This Registration Statement shall become effective upon filing with the Securities and Exchange Commission in accordance with Rule 462(b) under the Securities Act of 1933, as amended.**

## EXPLANATORY NOTE AND INCORPORATION BY REFERENCE

Pursuant to Rule 462(b) under the Securities Act of 1933, as amended, RXi Pharmaceuticals Corporation, a Delaware corporation (“RXi”), is filing this registration statement with the Securities and Exchange Commission (the “SEC”). This registration statement relates to the public offering of securities contemplated by the Registration Statement on Form S-1 (File No. 333-227173) (the “Registration Statement”) filed by RXi with the SEC on August 31, 2018, as amended, which was declared effective on September 28, 2018.

RXi is filing this registration statement for the sole purpose of increasing the aggregate number of securities offered by RXi by: (i) 1,714,287 pre-funded units, (ii) 1,714,287 shares of common stock underlying such pre-funded units, (iii) 1,714,287 common stock warrants underlying such pre-funded units, (iv) 1,714,287 shares of common stock underlying such warrants, and (v) 128,572 shares of common stock underlying additional underwriters’ warrants being issued in such transaction. The additional securities that are being registered for issuance and sale are in an amount and at a price that together represent no more than 20% of the proposed maximum aggregate offering price set forth in the Calculation of Registration Fee table contained in the Registration Statement. The contents of the Registration Statement, including all amendments and exhibits thereto, are incorporated by reference herein.

The required opinion and consents are listed on the Exhibit Index attached hereto and filed herewith.

## EXHIBIT INDEX

| Exhibit Number | Description of Exhibit   |
|----------------|--|
| 5.1            | <a href="#">Opinion of Gibson, Dunn &amp; Crutcher LLP</a>   |
| 23.1           | <a href="#">Consent of BDO USA, LLP, an Independent Registered Public Accounting Firm.</a>   |
| 23.2           | <a href="#">Consent of Gibson, Dunn &amp; Crutcher, LLP</a> (included in Exhibit 5.1).   |
| 24.1           | Power of Attorney (incorporated by reference to Exhibit 24.1 of the Form S-1 Registration Statement (Registration No. 333-227173)) |

## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in Marlborough, Massachusetts, on October 1, 2018.

### RXi PHARMACEUTICALS CORPORATION

By: /s/ Geert Cauwenbergh  
Geert Cauwenbergh, Dr. Med. Sc.  
President, Chief Executive Officer and acting Chief Financial Officer

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 dates indicated.

| <u>Signature</u>   | <u>Title</u>   | <u>Date</u>     |
|--|--|-----------------|
| <u>/s/ Geert Cauwenbergh</u><br>Geert Cauwenbergh, Dr. Med. Sc.                              | President, Chief Executive Officer, Acting Chief Financial Officer and Director<br>(Principal Executive Officer and Principal Financial Officer) | October 1, 2018 |
| <u>/s/ Caitlin Kontulis</u><br>Caitlin Kontulis  | Senior Director of Finance and Secretary<br>(Principal Accounting Officer)   | October 1, 2018 |
| *<br><u>Robert J. Bitterman</u>  | Director   | October 1, 2018 |
| *<br><u>Keith L. Brownlie</u>  | Director   | October 1, 2018 |
| *<br><u>H. Paul Dorman</u>   | Director   | October 1, 2018 |
| *<br><u>Jonathan E. Freeman, Ph.D.</u>   | Director   | October 1, 2018 |
| *<br><u>Curtis A. Lockshin, Ph.D.</u>  | Director   | October 1, 2018 |
| *<br><u>By: /s/ Geert Cauwenbergh</u><br>Geert Cauwenbergh, Dr. Med. Sc.<br>Attorney-in-fact |  |                 |

GIBSON DUNN

Gibson, Dunn & Crutcher LLP  
555 Mission Street  
San Francisco, CA 94105-0921  
Tel 415.393.8200  
www.gibsondunn.com

October 1, 2018

RXi Pharmaceuticals Corporation  
257 Simarano Drive, Suite 101  
Marlborough, Massachusetts 01752

Re: *RXi Pharmaceuticals Corporation*  
*Registration Statement on Form S-1*

Ladies and Gentlemen:

We have examined the Registration Statement on Form S-1 of RXi Pharmaceuticals Corporation, a Delaware corporation (the "Company") filed with the Securities and Exchange Commission (the "Commission") on the date hereof pursuant to Rule 462(b) (the "Additional Registration Statement") promulgated under the Securities Act of 1933, as amended (the "Securities Act"), in connection with the offering by the Company of: (a) 1,714,287 Pre-Funded Units (the "Pre-Funded Units"), with each Pre-Funded Unit consisting of one Pre-Funded Warrant (a "Pre-Funded Warrant") to purchase one share of the Company's common stock, par value \$0.0001 per share (the "Common Stock") and one warrant to purchase one share of Common Stock (the "Warrants"); (b) 1,714,287 shares of Common Stock underlying the Pre-Funded Warrants (the "Pre-Funded Warrant Shares"); (c) 1,714,287 shares of Common Stock issuable upon exercise of the Warrants (the "Warrant Shares"); and (d) 128,572 shares of Common Stock issuable upon exercise of warrants issued to the underwriters of such offering (the "Underwriter's Warrant Shares"). The Additional Registration Statement incorporates by reference the Registration Statement on Form S-1, File No. 333-227173, as amended (the "Registration Statement"), of the Company, filed with the Commission pursuant to the Securities Act.

In arriving at the opinion expressed below, we have examined originals, or copies certified or otherwise identified to our satisfaction as being true and complete copies of the originals, of specimen common stock certificates, and such other documents, corporate records, certificates of officers of the Company and of public officials and other instruments as we have deemed necessary or advisable to enable us to render the opinions set forth below. In our examination, we have assumed without independent investigation the genuineness of all signatures, the legal capacity and competency of all natural persons, the authenticity of all documents submitted to us as originals and the conformity to original documents of all documents submitted to us as copies.

Based upon the foregoing, and subject to the assumptions, exceptions, qualifications and limitations set forth herein, we are of the opinion that: (i) the Pre-Funded Warrant Shares, the Warrant Shares and the Underwriters' Warrant Shares, when issued upon exercise of the applicable overlying security, will be validly issued, fully paid and non-assessable; (ii) the Pre-Funded Warrants and the Warrants, when issued as set forth in the Registration Statement, will be legal, valid and binding obligations of the Company, enforceable against the Company in accordance with their terms; and (iii) the Pre-Funded Units, when issued against payment thereof as set forth in the Registration Statement, will be validly issued, fully paid and non-assessable.

The opinions expressed above are subject to the following additional exceptions, qualifications, limitations and assumptions:

A. We render no opinion herein as to matters involving the laws of any jurisdiction other than the State of New York and the United States of America and, for purposes of clause (i), the Delaware General Corporation Law. We are not admitted to practice in the State of Delaware; however, we are generally familiar with the Delaware General Corporation Law as currently in effect and have made such inquiries as we consider necessary to render the opinions contained in clause (i) above. This opinion is limited to the effect of the current state of the laws of the State of New York, the United States of America and, to the limited extent set forth above, the laws of the State of Delaware and the facts as they currently exist. We assume no obligation to revise or supplement this opinion in the event of future changes in such laws or the interpretations thereof or such facts.

B. The opinion in clause (ii) above is subject to (a) the effect of any bankruptcy, insolvency, reorganization, moratorium, arrangement or similar laws affecting the rights and remedies of creditors' generally, including without limitation the effect of statutory or other laws regarding fraudulent transfers or preferential transfers, and (b) general principles of equity, including without limitation concepts of materiality, reasonableness, good faith and fair dealing and the possible unavailability of specific performance, injunctive relief or other equitable remedies regardless of whether enforceability is considered in a proceeding in equity or at law.

We consent to the filing of this opinion as an exhibit to the Registration Statement, and we further consent to the use of our name under the caption "Legal Matters" in the Registration Statement and the prospectus that forms a part thereof. In giving these consents, we do not thereby admit that we are within the category of persons whose consent is required under Section 7 of the Securities Act or the Rules and Regulations of the Commission.

Very truly yours,

/s/ GIBSON, DUNN & CRUTCHER

Consent of Independent Registered Public Accounting Firm

RXi Pharmaceuticals Corporation  
Marlborough, Massachusetts

We hereby consent to the incorporation by reference in this Registration Statement on Form S-1 filed pursuant to Rule 462(b) of the Securities Act of 1933, as amended, of our report dated March 26, 2018, relating to the consolidated financial statements of RXi Pharmaceuticals Corporation appearing in the Company's Annual Report on Form 10-K for the year ended December 31, 2017, which is included in Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-227173). Our report contains an explanatory paragraph regarding the Company's ability to continue as a going concern.

We also consent to the reference to us under the caption "Experts" in Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-227173).

/s/ BDO USA, LLP  
Boston, Massachusetts

October 1, 2018