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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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ACELRX PHARMACEUTICALS, INC.  
(Exact name of registrant as specified in its charter)

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Delaware (State or other jurisdiction of incorporation or organization)	351 Galveston Drive Redwood City, CA 94063 (650) 216-3500 (Address of principal executive offices, including zip code)	41-2193603 (I.R.S. Employer Identification No.)
	2011 Equity Incentive Plan 2011 Employee Stock Purchase Plan (Full titles of the plans)	

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Howard B. Rosen  
Interim Chief Executive Officer  
AcelRx Pharmaceuticals, Inc.  
351 Galveston Drive  
Redwood City, CA 94063  
(650) 216-3500  
(Name, address, including zip code, and telephone number, including area code, of agent for service)

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*Copies to:*  
Mark B. Weeks  
Cooley LLP  
3175 Hanover Street  
Palo Alto, California 94304  
(650) 843-5000  
Facsimile: (650) 849-7400

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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 the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting 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"/> (Do not check if a smaller reporting company)	Smaller reporting company	<input type="checkbox"/>

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**CALCULATION OF REGISTRATION FEE**

<b>Title of Securities to be Registered</b>	<b>Amount to be Registered(1)</b>	<b>Proposed Maximum Offering Price Per Share(2)</b>	<b>Proposed Maximum Aggregate Offering Price(2)</b>	<b>Amount of Registration Fee</b>
Common Stock, par value \$0.001 per share	2,714,859 shares	\$3.96	\$10,752,335	\$1,083

- (1) Pursuant to Rule 416(a) promulgated 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 plan set forth herein by reason of any stock dividend, stock split, recapitalization or other similar transaction effected without receipt of consideration that increases the number of outstanding shares of the Registrant's Common Stock.
  - (2) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to Rule 457(h) and Rule 457(c) promulgated under the Securities Act. The offering price per share and the aggregate offering price are based upon the average of the high and low prices of the Registrant's Common Stock as reported on the NASDAQ Global Market on March 4, 2016.
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## EXPLANATORY NOTE

This Registration Statement on Form S-8 is being filed for the purpose of registering an additional (i) 1,809,906 shares of the common stock of AcelRx Pharmaceuticals, Inc. (the “Registrant”) to be issued pursuant to the Registrant’s 2011 Equity Incentive Plan and (ii) 904,953 shares of the Registrant’s common stock to be issued pursuant to the Registrant’s 2011 Employee Stock Purchase Plan.

### INCORPORATION BY REFERENCE OF CONTENTS OF REGISTRATION STATEMENT ON FORM S-8

The contents of the Registration Statements on Form S-8 (File Nos. 333-202709, 333-194634, 333-187206, 333-180334 and 333-172409) are incorporated by reference herein.

### EXHIBITS

<b>Exhibit Number</b>	<b>Description</b>
3.1	Amended and Restated Certificate of Incorporation of the Registrant. <sup>(1)</sup>
3.2	Amended and Restated Bylaws of the Registrant. <sup>(2)</sup>
4.1	Reference is made to Exhibits 3.1 and 3.2.
4.2	Specimen Common Stock Certificate of the Registrant. <sup>(3)</sup>
4.3	Second Amended and Restated Investor’s Rights Agreement, among the Registrant and certain of its security holders, dated as of November 23, 2009. <sup>(4)</sup>
4.4	Warrant to Purchase Common Stock of the Registrant, issued to Hercules Technology II, L.P., dated as of December 16, 2013. <sup>(5)</sup>
4.5	Warrant to Purchase Common Stock of the Registrant, issued to Hercules Technology Growth Capital, Inc., dated as of December 16, 2013. <sup>(6)</sup>
4.6	Form of Warrant issued to certain purchasers pursuant to the Securities Purchase Agreement dated May 29, 2012, between the Registrant and the purchasers identified therein. <sup>(7)</sup>
4.7	Warrant Modification Agreement to Purchase Common Stock of the Registrant, issued to Hercules Technology II, L.P. dated as of September 17, 2015. <sup>(8)</sup>
4.8	Warrant Modification Agreement to Purchase Common Stock of the Registrant, issued to Hercules Technology Growth Capital, Inc. dated as of September 17, 2015. <sup>(9)</sup>
5.1	Opinion of Cooley LLP.
23.1	Consent of OUM & Co., LLP, Independent Registered Public Accounting Firm.
23.2	Consent of Ernst & Young, LLP, Independent Registered Public Accounting Firm.
23.3	Consent of Cooley LLP (included in Exhibit 5.1).
24.1	Power of Attorney. Reference is made to the signature page of this Form S-8.
99.1	2011 Equity Incentive Plan. <sup>(10)</sup>
99.2	Forms of Stock Option Grant Notice, Stock Option Exercise Notice and Stock Option Agreement under 2011 Equity Incentive Plan. <sup>(11)</sup>
99.3	Form of Restricted Stock Unit Award Agreement under 2011 Equity Incentive Plan. <sup>(12)</sup>
99.4	2011 Employee Stock Purchase Plan. <sup>(13)</sup>

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- (1) Incorporated herein by reference to Exhibit 3.1 to the Registrant’s Current Report on Form 8-K (File No. 001-35068), as filed with the Commission on February 18, 2011.
- (2) Incorporated herein by reference to Exhibit 3.4 to the Registrant’s Registration Statement on Form S-1 (File No. 333-170594), as filed with the Commission on January 7, 2011, as amended.
- (3) Incorporated herein by reference to Exhibit 4.2 to the Registrant’s Registration Statement on Form S-1 (File No. 333-170594), as filed with the Commission on January 31, 2011, as amended.
- (4) Incorporated herein by reference to Exhibit 4.3 to the Registrant’s Registration Statement on Form S-1 (File No. 333-170594), as filed with the Commission on November 12, 2010, as amended.



- (5) Incorporated herein by reference to Exhibit 4.5 to the Registrant's Annual Report on Form 10-K (File No. 001-35068), as filed with the Commission on March 17, 2014.
  - (6) Incorporated herein by reference to Exhibit 4.6 to the Registrant's Annual Report on Form 10-K (File No. 001-35068), as filed with the Commission on March 17, 2014.
  - (7) Incorporated herein by reference to Exhibit 4.8 to the Registrant's Current Report on Form 8-K (File No. 001-35068), as filed with the Commission on May 30, 2012.
  - (8) Incorporated herein by reference to Exhibit 4.7 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-35068), as filed with the Commission on November 3, 2015.
  - (9) Incorporated herein by reference to Exhibit 4.8 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-35068), as filed with the Commission on November 3, 2015.
  - (10) Incorporated herein by reference to Exhibit 99.3 to the Registrant's Registration Statement on Form S-8 (File No. 333-172409), as filed with the Commission on February 24, 2011.
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## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, 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 Redwood City, State of California, on this 7th day of March, 2016.

### ACELRX PHARMACEUTICALS, INC.

By:           /s/ HOWARD B. ROSEN            
Howard B. Rosen  
*Interim Chief Executive Officer*

## POWER OF ATTORNEY

**KNOW ALL PERSONS BY THESE PRESENTS**, that each person whose signature appears below constitutes and appoints **HOWARD B. ROSEN** and **TIMOTHY E. MORRIS**, jointly and severally, as his true and lawful attorneys-in-fact and agent, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign 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 and necessary to be done in connection therewith, as fully 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 substitutes or substitute, 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 dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>          /s/ HOWARD B. ROSEN          </u> HOWARD B. ROSEN	Interim Chief Executive Officer and Director <i>(Principal Executive Officer)</i>	March 7, 2016
<u>          /s/ TIMOTHY E. MORRIS          </u> TIMOTHY E. MORRIS	Chief Financial Officer <i>(Principal Financial and Accounting Officer)</i>	March 7, 2016
<u>          /s/ ADRIAN ADAMS          </u> ADRIAN ADAMS	Chairman of the Board of Directors	March 7, 2016
<u>          /s/ PAMELA P. PALMER, M.D., PH.D.          </u> PAMELA P. PALMER, M.D., PH.D.	Director	March 7, 2016
<u>          /s/ MARK G. EDWARDS          </u> MARK G. EDWARDS	Director	March 7, 2016
<u>          /s/ STEPHEN J. HOFFMAN, PH.D., M.D.          </u> STEPHEN J. HOFFMAN, PH.D., M.D.	Director	March 7, 2016
<u>          /s/ RICHARD AFABLE, M.D.          </u> RICHARD AFABLE, M.D.	Director	March 7, 2016
<u>          /s/ MARK WAN          </u> MARK WAN	Director	March 7, 2016

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March 7, 2016

AcelRx Pharmaceuticals, Inc.  
351 Galveston Drive  
Redwood City, CA 94063

Ladies and Gentlemen:

We have acted as counsel to AcelRx Pharmaceuticals, Inc., a Delaware corporation (the "**Company**"), in connection with the filing of a Registration Statement on Form S-8 (the "**Registration Statement**") with the Securities and Exchange Commission covering the offering of up to an aggregate of 2,714,859 shares of the Company's Common Stock, par value \$0.001 per share, consisting of (i) 1,809,906 shares (the "**2011 EIP Shares**") pursuant to the Company's 2011 Equity Incentive Plan (the "**2011 EIP**") and (ii) 904,953 shares (the "**2011 ESPP Shares**") pursuant to the Company's 2011 Employee Stock Purchase Plan (the "**2011 ESPP**"), and together with the 2011 EIP, the "**Plans**").

In connection with this opinion, we have examined and relied upon (a) the Registration Statement and related prospectuses, (b) the Plans, (c) the Company's Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, each as currently in effect, and (d) such other documents, records, certificates, memoranda and other instruments as in our judgment are necessary or appropriate to enable us to render the opinion expressed below. We have assumed the genuineness and authenticity of all documents submitted to us as originals, and the conformity to originals of all documents submitted to us as copies thereof.

As to certain factual matters, we have relied upon a certificate of officers of the Company and have not sought to independently verify such matters. Our opinion is expressed only with respect to the General Corporation Law of the State of Delaware.

On the basis of the foregoing, and in reliance thereon, we are of the opinion that the 2011 EIP Shares and the 2011 ESPP Shares, when sold and issued in accordance with the 2011 EIP and the 2011 ESPP, respectively, and the Registration Statement and applicable related prospectuses, will be validly issued, fully paid, and nonassessable (except as to shares issued pursuant to certain deferred payment arrangements, which will be fully paid and nonassessable when such deferred payments are made in full).

We consent to the filing of this opinion as an exhibit to the Registration Statement.

Sincerely,

Cooley LLP

By: /s/ Mark B. Weeks  
Mark B. Weeks

3175 HANOVER STREET, PALO ALTO, CA 94304-1130 T: (650) 843-5000 F: (650) 849-7400 WWW.COOLEY.COM

**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We hereby consent to the incorporation by reference, in the Registration Statement on Form S-8 pertaining to the 2011 Equity Incentive Plan and 2011 Employee Stock Purchase Plan of AcclRx Pharmaceuticals, Inc., of our reports dated March 7, 2016, relating to the consolidated financial statements and the effectiveness of internal control over financial reporting of AcclRx Pharmaceuticals, Inc. appearing in the Company's Annual Report on Form 10-K for the year ended December 31, 2015.

We also consent to the reference to us under the caption "Experts" in the Prospectus.

/s/ OUM & CO. LLP

San Francisco, California  
March 7, 2016

**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We consent to the incorporation by reference in the Registration Statement (Form S-8) pertaining to the 2011 Equity Incentive Plan and the 2011 Employee Stock Purchase Plan of AcelRx Pharmaceuticals, Inc. of our report dated March 12, 2015, except for Note 1 and 7, as to which the date is March 7, 2016, with respect to the consolidated financial statements of AcelRx Pharmaceuticals, Inc., included in its Annual Report (Form 10-K) for the year ended December 31, 2015 filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Redwood City, California  
March 7, 2016