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

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**Form S-3**

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

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**ADVENTRX Pharmaceuticals, Inc.**

*(Exact name of registrant as specified in its charter)*

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

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

**84-1318182**  
*(I.R.S. Employer  
Identification Number)*

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**6725 Mesa Ridge Road,  
Suite 100,  
San Diego, CA 92121  
(858) 552-0866**  
*(Address, including zip code, and telephone number, including  
area code, of registrant's principal executive offices)*

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**Brian M. Culley**  
**Principal Executive Officer**  
**ADVENTRX Pharmaceuticals, Inc.**  
**6725 Mesa Ridge Road, Suite 100**  
**San Diego, CA 92121**  
**Telephone: (858) 552-0866**  
*(Name, address, including zip code, and telephone number,  
including area code, of agent for service)*

**With a Copy to:**

**Michael S. Kagnoff, Esq.**  
**DLA Piper LLP (US)**  
**4365 Executive Drive, Suite 1100**  
**San Diego, CA 92121**  
**Telephone: (858) 677-1400**

**Patrick L. Keran, Esq.**  
**Principal Financial and Accounting Officer**  
**and General Counsel**  
**ADVENTRX Pharmaceuticals, Inc.**  
**6725 Mesa Ridge Road, Suite 100**  
**San Diego, CA 92121**  
**Telephone: (858) 552-0866**

**Approximate date of commencement of proposed sale to the public:** As soon as practicable after the effective date of this Registration Statement.

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 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, please 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(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 statement for the same offering

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.

(Check one):

Large accelerated filer

Accelerated filer

Non-accelerated filer   
(Do not check if a smaller reporting company)

Smaller reporting company

#### CALCULATION OF REGISTRATION FEE

| Title of Each Class of Securities to be Registered (1) | Proposed Maximum Aggregate Offering Price(2) | Amount of Registration Fee(4)(5) |
|--|--|----------------------------------|
| Common Stock, par value \$0.001 per share              |  |                                  |
| Preferred Stock, par value \$0.001 per share           |  |                                  |
| Debt Securities(3)                                     |  |                                  |
| Warrants   |  |                                  |
| Units  |  |                                  |
| Total  | \$ 3,901,311                                 | \$ 278.16                        |

- (1) There are being registered hereunder such indeterminate number of shares of common stock, such indeterminate number of shares of preferred stock, such indeterminate principal amount of debt securities, and such indeterminate number of warrants to purchase common stock, preferred stock or debt securities as will have an aggregate initial offering price not to exceed \$3,901,311. This does not include \$25,000,000 in securities previously registered pursuant to the Registrant's Registration Statement on Form S-3 (File No. 333-159376) declared effective June 4, 2009 (the "Registration Statement"). Any securities registered hereunder may be sold separately or as units with other securities registered hereunder. The proposed maximum initial offering price per unit will be determined, from time to time, by the registrant in connection with the issuance by the registrant of the securities registered hereunder. The securities registered also include such indeterminate number of shares of common stock and preferred stock and amount of debt securities as may be issued upon conversion or exchange for preferred stock or debt securities that provide for conversion or exchange, upon exercise of warrants or pursuant to the antidilution provisions of any such securities. In addition, pursuant to Rule 416 under the Securities Act, the shares being registered hereunder include such indeterminate number of shares of common stock and preferred stock as may be issuable with respect to the shares being registered hereunder as a result of stock splits, stock dividends or similar transactions.
- (2) The proposed maximum initial offering price per unit will be determined, from time to time, by the registrant in connection with the issuance by the registrant of the securities registered hereunder and is not specified as to each class of security pursuant to General Instruction II.D. of Form S-3. The Registrant has estimated the proposed maximum aggregate offering price solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended (the "Securities Act").
- (3) If any debt securities are issued at an original issue discount, then the offering price of such debt securities shall be in such greater principal amount as shall result in an aggregate initial offering price not to exceed \$3,901,311, less the aggregate dollar amount of all securities previously issued hereunder.
- (4) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act. Pursuant to Rule 416 under the Securities Act, the shares being registered hereunder include such indeterminate number of shares of common stock as may be issuable with respect to the shares being registered hereunder as a result of stock splits, stock dividends, anti-dilution provisions, or similar transactions. No additional registration fee is being paid for these shares.
- (5) This registration fee was previously paid by the Registrant pursuant to Rule 457(p) under the Securities Act. The Registrant previously paid a registration fee of \$10,700 pursuant to a registration statement on Form S-3 (File No. 333-133729) (the "Prior Registration Statement"), originally filed with the Commission on May 2, 2006 and declared effective on May 8, 2006. Pursuant to Rule 415(a)(5) under the Securities Act, the Prior Registration Statement expired on May 8, 2009. Of the \$100,000,000 securities registered pursuant to the Prior Registration Statement, only \$39,998,750 of the securities were sold before the Prior Registration Statement expired. Pursuant to Rule 457(p), the amount of the registration fee associated with the unsold securities from the Prior Registration Statement, \$3,348, was applied to the registration fee of \$1,395 associated with the Registration Statement and offsets entirely the \$278.16 registration fee for this registration statement.

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

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**EXPLANATORY NOTE AND  
INCORPORATION OF CERTAIN INFORMATION BY REFERENCE**

The Registration Statement on Form S-3 is being filed with the Securities and Exchange Commission (the "Commission") pursuant to Rule 462(b) under the Securities Act of 1933, as amended, for the sole purpose of registering additional securities of the same class as were included in our Registration Statement on Form S-3, File No. 333-159376, declared effective June 4, 2009. The contents of such Registration Statement, including the exhibits thereto, are hereby incorporated by reference.

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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-3 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, on January 4, 2010.

ADVENTRX PHARMACEUTICALS, INC.

By: /s/ Brian M. Culley  
Brian M. Culley  
Principal Executive 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.

| <b>Signature</b>                                | <b>Title</b>   | <b>Date</b>     |
|---|--|-----------------|
| <u>/s/ Brian M. Culley</u><br>Brian M. Culley   | Chief Business Officer and Senior Vice President<br>(Principal Executive Officer)                    | January 4, 2010 |
| <u>/s/ Patrick L. Keran</u><br>Patrick L. Keran | General Counsel, Secretary and Vice President, Legal<br>(Principal Financial and Accounting Officer) | January 4, 2010 |
| <u>*</u><br>Jack Lief                           | Chair of the Board   | January 4, 2010 |
| <u>*</u><br>Michael M. Goldberg                 | Director   | January 4, 2010 |
| <u>*</u><br>Mark J. Pykett                      | Director   | January 4, 2010 |
| <u>*</u><br>Eric K. Rowinsky                    | Director   | January 4, 2010 |

\*By: /s/ Brian M. Culley  
Brian M. Culley, Attorney-in-Fact

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**EXHIBIT INDEX**

| <b>Exhibit<br/>Number</b> | <b>Description</b>  |
|---------------------------|---|
| 5.1                       | Opinion of DLA Piper LLP (US)   |
| 23.1                      | Consent of J.H. Cohn LLP, independent registered public accounting firm |
| 23.2                      | Consent of DLA Piper LLP (US) (included in Exhibit 5.1)                 |
| *24.1                     | Power of Attorney (included on signature page)                          |

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\* Previously filed with the Registrant's registration statement on Form S-3 (File No. 333-159376).

**DLA Piper LLP (US)**  
4365 Executive Drive, Suite 1100  
San Diego, California 92121-2133  
www.dlapiper.com

**T 858.677.1400**  
**F 858.677.1401**

January 4, 2010

ADVENTRX Pharmaceuticals, Inc.  
6725 Mesa Ridge Road, Suite 100  
San Diego, California 92121

Ladies and Gentlemen:

We have acted as counsel to ADVENTRX Pharmaceuticals, Inc., a Delaware corporation (the "**Company**"), in connection with the filing of a Registration Statement on Form S-3 filed on January 4, 2010 (the "**Registration Statement**"), filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended (the "**Securities Act**"). The Registration Statement is being filed to register additional securities pursuant to Rule 462(b) for the offering related to the Company's Registration Statement on Form S-3 (Commission File No. 333-159376) declared effective June 4, 2009. The Registration Statement relates to the Company's:

- (i) common stock, \$0.001 par value per share (the "**Common Stock**");
- (ii) preferred stock, \$0.001 par value per share (the "**Preferred Stock**");
- (iii) senior debt securities (the "**Senior Debt Securities**");
- (iv) subordinated debt securities (the "**Subordinated Debt Securities**" and, together with the Senior Debt Securities, the "**Debt Securities**");
- (v) warrants representing rights to purchase Common Stock, Preferred Stock, or Debt Securities (the "**Warrants**"); and
- (vi) units comprised of one or more Debt Securities, shares of Common Stock, shares of Preferred Stock, or Warrants in any combination (the "**Units**");

Collectively, the Common Stock, the Preferred Stock, the Debt Securities, the Warrants, and the Units are referred to herein as the "**Securities**"; all of which may be issued from time to time on a delayed or continuous basis pursuant to Rule 415 under the Securities Act at an aggregate initial offering price not to exceed \$3,901,311.

We have been advised by the Company that:

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1. The rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation privileges of each series of Preferred Stock will be set forth in a certificate of designation to be approved by the Company's Board of Directors, or in an amendment to the Company's Amended and Restated Certificate of Incorporation to be approved by the Company's Board of Directors and stockholders, and that one or both of these documents will be filed either as an exhibit to an amendment to the Registration Statement to be filed after the date of this opinion or as an exhibit to a Current Report on Form 8-K to be filed after the Registration Statement has become effective;
  2. The Senior Debt Securities may be issued pursuant to an indenture between the Company and a trustee to be named in such indenture, which indenture will be filed either as an exhibit to an amendment to the Registration Statement to be filed after the date of this opinion or as an exhibit to a Current Report on Form 8-K to be filed after the Registration Statement has become effective;
  3. The Subordinated Debt Securities may be issued pursuant to an indenture between the Company and a trustee to be named in such indenture, which indenture will be filed either as an exhibit to an amendment to the Registration Statement to be filed after the date of this opinion or as an exhibit to a Current Report on Form 8-K to be filed after the Registration Statement has become effective;
  4. The particular terms of any Debt Securities will be set forth in a supplement to the prospectus forming a part of the Registration Statement;
  5. Warrants may be issued pursuant to a warrant agreement to be entered into between the Company and a financial institution as warrant agent or directly issued by the Company to the purchasers of such Warrants (in each case, the "*Warrant Agreement*"). The Warrant Agreement will be filed either as an exhibit to an amendment to the Registration Statement to be filed after the date of this opinion or as an exhibit to a Current Report on Form 8-K to be filed after the Registration Statement has become effective, and the particular terms of any series of Warrants will be set forth in a supplement to the prospectus forming a part of the Registration Statement; and
  6. Units may be issued pursuant to a unit agreement to be entered into between the Company and a financial institution as unit agent or directly issued by the Company to the purchasers of such Units (in each case, the "*Unit Agreement*"). The Unit Agreement will be filed either as an exhibit to an amendment to the Registration Statement to be filed after the date of this opinion or as an exhibit to a Current Report on Form 8-K to be filed after the Registration Statement has become effective, and the particular terms of any series of Units will be set forth in a supplement to the prospectus forming a part of the Registration Statement.
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In rendering the opinions set forth below, we have assumed that (i) all information contained in all documents reviewed by us is true and correct; (ii) all signatures on all documents examined by us are genuine; (iii) all documents submitted to us as originals are authentic and all documents submitted to us as copies conform to the originals of those documents; (iv) each natural person signing any document reviewed by us had the legal capacity to do so; (v) the Registration Statement, and any further amendments thereto (including post-effective amendments) will have become effective and comply with all applicable laws; (vi) a prospectus supplement will have been prepared and filed with the Commission describing the Securities offered thereby; (vii) all Securities will be issued and sold in compliance with applicable federal and state securities laws and in the manner stated in the Registration Statement and the applicable prospectus supplement; (viii) a definitive purchase, underwriting or similar agreement with respect to any Securities offered will have been duly authorized and validly executed and delivered by the Company and the other parties thereto; (ix) the Company has reserved from its authorized but unissued and unreserved shares of stock a number sufficient to issue all Securities; (x) the certificates representing the Securities will be duly executed and delivered; and (xi) if the holders of the Debt Securities are granted rights to inspect corporate books and records and to vote in the election of directors or any matters on which stockholders of the Company may vote, such rights are set forth in the Company's Amended and Restated Certificate of Incorporation or the Amended and Restated Certificate of Incorporation grants to the Company's Board of Directors the power to confer such voting or inspection rights and the Company's Board of Directors has conferred such rights.

We have examined the Registration Statement, including the exhibits thereto, and such other documents, corporate records, and instruments and have examined such laws and regulations as we have deemed necessary for purposes of rendering the opinions set forth herein. Based upon such examination and subject to the further provisions hereof, we are of the following opinion:

1. The Common Stock will be validly issued, fully paid and nonassessable, *provided that* (i) the Company's Board of Directors or an authorized committee thereof has specifically authorized the issuance of such Common Stock in exchange for consideration that the Board of Directors or such committee determines as adequate and in excess of the par value of such Common Stock ("**Common Stock Authorizing Resolutions**"), (ii) the terms of the offer, issuance and sale of shares of Common Stock have been duly established in conformity with the Company's Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws and do not violate any applicable law or result in a default under or breach of any agreement or instrument binding on the Company and comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company and (iii) the Company has received the consideration provided for in the applicable Common Stock Authorizing Resolutions.

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2. The Preferred Stock will be validly issued, fully paid and nonassessable, *provided that* (i) the Company's Board of Directors or an authorized committee thereof has specifically authorized the issuance of such Preferred Stock in exchange for consideration that the Board of Directors or such committee determines as adequate and in excess of the par value of such Preferred Stock ("**Preferred Stock Authorizing Resolutions**"), (ii) the rights, preferences, privileges and restrictions of the Preferred Stock have been established in conformity with applicable law, (iii) an appropriate certificate of designation approved by the Company's Board of Directors, or an amendment to the Company's Amended and Restated Certificate of Incorporation approved by the Company's Board of Directors and stockholders, has been duly filed with the State of Delaware, (iv) the terms of the offer, issuance and sale of shares of such class or series of Preferred Stock have been duly established in conformity with the Company's Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws and do not violate any applicable law or result in a default under or breach of any agreement or instrument binding upon the Company and comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company, and (v) the Company has received the consideration provided for in the applicable Preferred Stock Authorizing Resolutions.

3. The Debt Securities will constitute valid and legally binding obligations of the Company, *provided that* (i) the Company's Board of Directors or an authorized committee thereof has specifically authorized the issuance of such Debt Securities in exchange for consideration that the Board of Directors or such committee determines as adequate ("**Debt Securities Authorizing Resolutions**"), (ii) the applicable indenture conforms with applicable law and is enforceable in accordance with its terms, (iii) the terms of the Debt Securities and of the offer, issuance and sale of such Debt Securities have been duly established in conformity with the applicable indenture, the Company's Amended and Restated Certificate of Incorporation and the applicable Debt Securities Authorizing Resolutions and do not violate any applicable law or result in a default under or breach of any agreement or instrument binding upon the Company and comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company, (iv) such Debt Securities have been duly executed and authenticated in accordance with the applicable indenture and offered, issued and sold as contemplated in the Registration Statement, and (v) the Company has received the consideration provided for in the applicable Debt Securities Authorizing Resolutions.

4. The Warrants will constitute valid and legally binding obligations of the Company, *provided that* (i) the Company's Board of Directors or an authorized committee thereof has specifically authorized the issuance of such Warrants in exchange for consideration that the Board of Directors or such committee determines as adequate ("**Warrant Authorizing Resolutions**"), which include the terms upon which the Warrants are to be issued, their form and content and the consideration for which shares are to be issued upon exercise of the Warrants, (ii) the Warrant Agreement relating to the Warrants has been duly authorized,

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executed and delivered and is enforceable in accordance with its terms, (iii) the terms of the offer, issuance and sale of such Warrants have been duly established in conformity with the applicable Warrant Agreement and the applicable Warrant Authorizing Resolutions, (iv) the Warrant Agreement and the offer, issuance and sale of the Warrants do not violate any applicable law or result in a default under or breach of any agreement or instrument binding upon the Company and comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company, (v) such Warrants have been duly executed and countersigned in accordance with the Warrant Agreement and offered, issued and sold as contemplated in the Registration Statement, the applicable Warrant Authorizing Resolutions and the Warrant Agreement, and (vi) the Company has received the consideration provided for in the applicable Warrant Authorizing Resolutions.

5. Units will constitute valid and legally binding obligations of the Company, *provided that* (i) the Company's Board of Directors or an authorized committee thereof has specifically authorized the issuance of such Units in exchange for consideration that the Board of Directors or such committee determines as adequate ("**Unit Authorizing Resolutions**"), which include the terms upon which the Units are to be issued, their form and content and the consideration for which the Units and any securities issuable upon exercise of any warrants included in the Units are to be issued, (ii) the Unit Agreement relating to the Units has been duly authorized, executed and delivered and is enforceable in accordance with its terms, (iii) the terms of the offer, issuance and sale of such Units have been duly established in conformity with the Unit Agreement and the Unit Authorizing Resolutions, (iv) the Unit Agreement and the offer, issuance and sale of the Units do not violate any applicable law or result in a default under or breach of any agreement or instrument binding upon the Company and comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company, (v) such Units have been duly executed and countersigned in accordance with the Unit Agreement and offered, issued and sold as contemplated in the Registration Statement, the applicable Unit Authorizing Resolutions and the Unit Agreement, and (vi) the Company has received the consideration provided for in the applicable Unit Authorizing Resolutions.

The foregoing opinions are qualified to the extent that the enforceability of any document, instrument or the Securities may be limited by or subject to bankruptcy, insolvency, fraudulent transfer or conveyance, reorganization, moratorium or other similar laws relating to or affecting creditors' rights generally, and general equitable or public policy principles.

We express no opinions concerning (i) the validity or enforceability of any provisions contained in indentures that purport to waive or not give effect to rights to notices, defenses, subrogation or other rights or benefits that cannot be effectively waived under applicable law; (ii) the validity or enforceability of any provisions contained in Warrant Agreements or Unit Agreements that purport to waive or not give effect to rights to notices, defenses, subrogation or other rights or benefits that cannot be effectively waived under applicable law; or (iii) any securities (other than

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ADVENTRX Pharmaceuticals, Inc.  
January 4, 2010  
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shares of common stock) into which the Preferred Stock, the Debt Securities, the Warrants, and the securities comprising the Units may be convertible or exercisable.

In providing this opinion, we have relied as to certain matters on information obtained from public officials and officers of the Company.

We hereby consent to the filing of this opinion as an exhibit to the Registration Statement and the reference to us under the caption "Legal Matters" in the prospectus included in the Registration Statement. In giving this consent, we do not 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 Securities and Exchange Commission promulgated thereunder.

This opinion letter is given to you solely for use in connection with the offer and sale of the Securities while the Registration Statement is in effect and is not to be relied upon for any other purpose. Our opinion is expressly limited to the matters set forth above, and we render no opinion, whether by implication or otherwise, as to any other matters relating to the Company, the Securities or the Registration Statement.

Very truly yours,

/s/ DLA Piper LLP (US)

**DLA Piper LLP (US)**

**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We consent to the incorporation by reference in this Registration Statement on Form S-3 (Registration No. 333- \_\_\_\_\_) of our report dated March 25, 2009 on our audits of the consolidated financial statements of ADVENTRX Pharmaceuticals, Inc. and Subsidiaries (a development stage enterprise) as of December 31, 2008 and 2007 and for the years then ended and for the period from January 1, 2002 through December 31, 2008, which report appears in the Annual Report on Form 10-K of ADVENTRX Pharmaceuticals, Inc for the year ended December 31, 2008. We also consent to the reference to our firm under the caption "Experts."

Our report dated March 25, 2009 contains explanatory paragraphs that state that effective January 1, 2007, ADVENTRX Pharmaceuticals, Inc. and Subsidiaries (a development stage enterprise) adopted Financial Accounting Standards Board Staff Position No. EITF 00-19-2, Accounting for Registration Payment Arrangements, that certain prior year amounts have been restated, and that the Company has suffered recurring losses from operations and negative cash flows from operations that raise substantial doubt about its ability to continue as a going concern. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

/s/ J.H. COHN LLP

San Diego, California  
December 30, 2009