

ADVENTRX PHARMACEUTICALS, INC.

- 11,283 shares of 4.25660% Series D Convertible Preferred Stock
- Warrants to Purchase up to 19,800,000 shares of Common Stock
- 79,800,000 shares of Common Stock Underlying the Convertible Preferred Stock and the Warrants

This prospectus supplement should be read in conjunction with the prospectus dated October 6, 2009, prospectus supplement No. 1 filed on November 10, 2009, prospectus supplement No. 2 filed on January 4, 2010, prospectus supplement No. 3 filed on January 4, 2010 and prospectus supplement No. 4 filed on February 11, 2010 (collectively, the "Prospectus"), which is to be delivered with this prospectus supplement. This prospectus supplement updates the information in the Prospectus. If there is any inconsistency between the information in the Prospectus and this prospectus supplement, you should rely on the information in this prospectus supplement.

Pursuant to the Prospectus, we offered up to \$11,283,000 of our 4.25660% Series D Convertible Preferred Stock, or 11,283 shares based on a stated value of \$1,000 per share, and warrants to purchase up to 19,800,000 shares of our common stock. Delivery of the convertible preferred stock and warrants was made on or about October 9, 2009. In addition, pursuant to the Prospectus, 79,800,000 shares of our common stock issuable upon conversion of the convertible preferred stock and exercise of the warrants were registered to permit their resale to the public by the purchasers of our convertible preferred stock and warrants. We are not selling the shares of common stock issuable upon conversion of the convertible preferred stock or exercise of the warrants, and therefore will not receive any proceeds from such sales, other than the exercise price, if any, to be received upon exercise of the warrants.

This prospectus supplement includes the following documents, as filed by us with the Securities and Exchange Commission:

- Our Current Report on Form 8-K filed on March 1, 2010.

The exhibits to the Current Report on Form 8-K are not included with this prospectus supplement and are not incorporated herein by reference.

Investing in our securities involves a high degree of risk. Before buying any of our securities, you should read the discussion of material risks of investing in our securities in "Risk Factors" beginning on page 6 of the Prospectus, as updated by this prospectus supplement.

You should rely only on the information contained in the Prospectus, any free writing prospectus prepared by us or on our behalf and this prospectus supplement. We have not authorized anyone to provide you with different or additional information. If anyone provides you with different or additional information, you should not rely on it.

Our common stock is listed on the NYSE Amex under the symbol "ANX." The last reported sale price of our common stock on the NYSE Amex on February 26, 2010 was \$0.29 per share. We do not intend to list the convertible preferred stock or warrants on any securities exchange.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of the Prospectus or this prospectus supplement. Any representation to the contrary is a criminal offense.

The date of this prospectus supplement is March 1, 2010.

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

FORM 8-K

**CURRENT REPORT
Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

Date of Report (Date of earliest event reported): **March 1, 2010**

ADVENTRX Pharmaceuticals, Inc.

(Exact name of registrant as specified in its charter)

Delaware

(State or other Jurisdiction of
Incorporation)

001-32157

(Commission File Number)

84-1318182

(IRS Employer Identification No.)

6725 Mesa Ridge Road, Suite 100

San Diego, CA

(Address of Principal Executive Offices)

92121

(Zip Code)

Registrant's telephone number, including area code: **(858) 552-0866**

N/A

(Former name or former address if changed since last report.)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
 - Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
 - Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
 - Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))
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Item 8.01. Other Events.

On March 1, 2010, ADVENTRX Pharmaceuticals, Inc. issued a press release announcing that it received a refuse to file letter from the U.S. Food and Drug Administration (FDA) regarding its New Drug Application (NDA) for ANX-530 (vinorelbine injectable emulsion). The press release is attached hereto as Exhibit 99.1 and is incorporated herein by reference.

Item 9.01. Financial Statements and Exhibits.

(d) Exhibits.

The list of exhibits called for by this Item is incorporated by reference to the Exhibit Index filed with this report.

SIGNATURE

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, hereunto duly authorized.

ADVENTRX PHARMACEUTICALS, INC.

Dated: March 1, 2010

By: /s/ Patrick L. Keran

Name: Patrick L. Keran

Title: Chief Operating Officer

EXHIBIT INDEX

99.1 Press release, dated March 1, 2010