

Prospectus Supplement No. 8
(To prospectus dated June 14, 2013)



Warrants to Purchase up to 28,097,500 Shares of Common Stock

This Prospectus Supplement No. 8 (the "Prospectus Supplement") supplements our Prospectus dated June 14, 2013 and Prospectus Supplements No. 1 through 7, dated June 26, 2013, August 5, 2013, August 9, 2013, October 30, 2013, November 4, 2013, January 8, 2014 and February 10, 2014, respectively (together, the "Prospectus"), relating to the issuance of up to 28,097,500 shares of our common stock issuable upon exercise of outstanding warrants issued in connection with our registered offering which closed on June 19, 2013. We cannot predict when or if the warrants will be exercised, and it is possible that the warrants may expire and never be exercised.

Recent Developments

This Prospectus Supplement is being filed to update and supplement the information in the Prospectus with the information contained in our Current Report on Form 8-K filed with the Securities and Exchange Commission on February 28, 2014 (the "Current Report"). Accordingly, we have attached the Current Report to this Prospectus Supplement. Any statement contained in the Prospectus shall be deemed to be modified or superseded to the extent that information in this Prospectus Supplement modifies or supersedes such statement. Any statement that is modified or superseded shall not be deemed to constitute a part of the Prospectus except as modified or superseded by this Prospectus Supplement.

This Prospectus Supplement should be read in conjunction with, and may not be delivered or utilized without, the Prospectus.

In reviewing this Prospectus Supplement, you should carefully consider the matters described under the caption "Risk Factors" beginning on page 4 of the Prospectus.

Neither the U.S. Securities and Exchange Commission nor any state securities commission has approved or disapproved these securities or determined if this Prospectus Supplement is truthful or complete. Any representation to the contrary is a criminal offense.

This Prospectus Supplement does not constitute an offer to sell or the solicitation of an offer to buy any securities.

The date of this Prospectus Supplement is February 28, 2014

**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): February 27, 2014

Mast Therapeutics, 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.)

12390 El Camino Real, Suite 150, San Diego, California
(Address of principal executive offices)

92130
(Zip Code)

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

Not applicable
(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(b))
 - 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 3.02. Unregistered Sales of Equity Securities.

On February 27, 2014 (the “Closing Date”), Mast Therapeutics, Inc. (the “Company”) completed its acquisition of Aires Pharmaceuticals, Inc., a privately-held Delaware corporation (“Aires”), pursuant to the terms of the Agreement and Plan of Merger, dated February 7, 2014, by and among the Company, AP Acquisition Sub, Inc., a wholly-owned subsidiary of the Company, Aires, and a stockholders’ representative (the “Merger Agreement”). Aires survived the merger transaction as a wholly-owned subsidiary of the Company. Aires’ lead product candidate, AIR001 (sodium nitrite) inhalation solution, has orphan drug designation in the United States and European Union for the treatment of pulmonary arterial hypertension. The Company previously disclosed the material terms of the Merger Agreement in a current report on Form 8-K it filed with the Securities and Exchange Commission on February 10, 2014.

Pursuant to the terms of the Merger Agreement, on the Closing Date, all outstanding shares of Aires capital stock were converted into the right to receive from the Company, in the aggregate, up to 5,248,536 unregistered shares of the Company’s common stock, par value \$0.001 (the “Merger Consideration”), 1,049,706 of which will be issued and delivered by the Company within ten business days of the Closing Date. In accordance with the terms of the Merger Agreement, the other 4,198,830 shares that comprise the Merger Consideration (the “Holdback Amount”) have been held back from issuance for a period of six months from the Closing Date for the benefit of the Company to satisfy the indemnification obligations of the former Aires stockholders.

The shares of common stock constituting the Merger Consideration are being issued by the Company in reliance on the exemptions provided by Section 4(a)(2) of the Securities Act of 1933, as amended (the “Securities Act”), and Regulation D promulgated thereunder and in reliance on similar exemptions under applicable state laws.

SIGNATURES

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.

Mast Therapeutics, Inc.

February 28, 2014

By: /s/ Patrick L. Keran

Name: Patrick L. Keran

Title: President and Chief Operating Officer