

PROSPECTUS SUPPLEMENT NO. 2
(TO PROSPECTUS DATED July 6, 2012)

Organovo Holdings, Inc

Common Stock, Par Value \$0.001 Per Share

This Prospectus Supplement No. 2 (the "Supplement") supplements our Prospectus (the "Prospectus") dated July 6, 2012, as supplemented by the prospectus supplement dated November 14, 2012, relating to the resale of up to 32,095,974 shares of our common stock, including up to 16,747,987 shares of our common stock issuable upon the exercise of warrants, by the selling stockholders listed on pages 13 through 18 of the Prospectus, including any permitted donee, pledgee, transferee or other successor in interest. We will not receive any proceeds from any sales of the warrants or common stock by the selling security holders. Any proceeds received by us from the exercise of warrants by the selling security holders will be used for general corporate purposes.

Recent Developments

This Prospectus Supplement No. 2 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 December 28, 2012 (the "8-K"). Accordingly, we have attached the 8-K 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 Any statement contained in the Prospectus shall be deemed to be modified or superseded to the extent that information in this Prospectus Supplement modifies or supersedes such statement. Any statement that is modified or superseded shall not be deemed to constitute a part of the Prospectus except as modified or superseded by this Prospectus Supplement.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 6 of the Prospectus, as updated and supplemented by the "Risk Factors" beginning on page 25 of our Quarterly Report on Form 10-Q for the quarter ended September 30, 2012 filed with the Securities and Exchange Commission on November 14, 2012.

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 December 28, 2012

**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): December 21, 2012

ORGANOVO HOLDINGS, INC.
(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction
of incorporation)

000-54621
(Commission
File Number)

27-1488943
(I.R.S. Employer
Identification No.)

**6275 Nancy Ridge Dr.,
San Diego, California 92121**
(Address of principal executive offices, including zip code)

(858) 550-9994
(Registrant's telephone number, including area code)

(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 (see General Instruction A.2. below):

- 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 3.02. Unregistered Sales of Equity Securities

On December 21, 2012, Organovo Holdings, Inc. (the “**Company**”) consummated its offer (the “**Warrant Tender Offer**”) to amend certain of its outstanding warrants to purchase an aggregate of 14,510,928 shares of the Company’s common stock, including: (i) outstanding warrants to purchase 1,500,000 shares of the Company’s common stock issued to investors participating in the Company’s bridge financing completed in November 2011 (the “**Bridge Warrants**”); (ii) outstanding warrants to purchase 11,653,678 shares of the Company’s common stock issued to investors participating in the Company’s private placement financings closed on February 8, 2012, February 29, 2012 and March 16, 2012 (the “**Investor Warrants**”); and (iii) outstanding warrants to purchase 1,357,250 shares of the Company’s common stock issued to investors in the Company’s private placement transactions completed in 2011 (the “**Private Warrants**”, and collectively with the Bridge Warrants and the Investor Warrants, the “**Original Warrants**”).

The Warrant Tender Offer expired at 5:00 p.m. Pacific Time on December 21, 2012. Pursuant to the Warrant Tender Offer, an aggregate of 9,578,344 Original Warrants were tendered by their holders and were amended and exercised in connection therewith for an aggregate exercise price of approximately \$7.7 million, including the following: 502,500 Bridge Warrants; 8,606,094 Investor Warrants; and 469,750 Private Warrants. Such tendered Original Warrants represent approximately 66.0% of the Company’s outstanding Original Warrants as of November 16, 2012.

Following the amendment and exercise of the 9,578,344 Original Warrants, the Company had 58,493,717 shares of common stock issued and outstanding, excluding outstanding options and warrants to purchase 2,762,253 and 11,064,779 shares of the Company’s common stock, respectively.

The Company issued the Original Warrants in private placement transactions in reliance on the exemption from registration provided by Rule 506 of Regulation D under the Securities Act of 1933, as amended (the “**Securities Act**”). In connection with such transactions, the holders of the Original Warrants represented that they were “accredited investors.” Similarly, the issuance of the shares of the Company’s common stock upon the amendment and exercise of the 9,578,344 Original Warrants was exempt from registration under the Securities Act pursuant to Rule 506 of Regulation D. In connection with the Warrant Tender Offer, the holders of the tendered warrants represented that they were “accredited investors.”

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.

Date: December 28, 2012

ORGANOVO HOLDINGS, INC.

/s/ Barry Michaels

Barry Michaels

Chief Financial Officer