



# ORGANOVO

*Life And Work On The Leading Edge Of  
Tissue-Based Medicine*

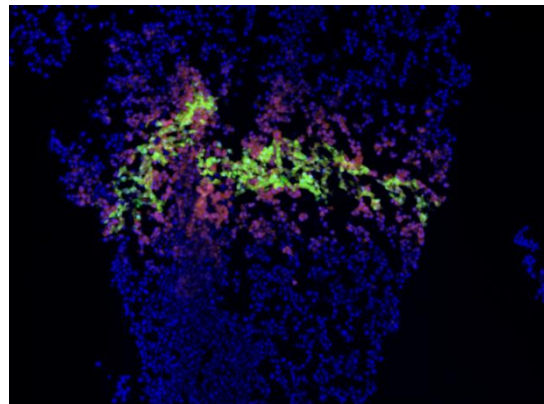
## ***Organovo***

Organovo (ONVO) is a publicly traded company based in San Diego, California that designs and creates functional human tissues using proprietary 3D bioprinting technology. Their goal is to build living human tissues that are proven to function like native tissues. With reproducible 3D tissues that accurately represent human biology and that are viable for more than a month, Organovo is enabling game-changing work in the fields of pharmaceutical testing and medical research. In June 2014, its human liver model product was made available on a limited pre-release basis allowing customers to contract with Organovo for various pre-clinical testing studies to be conducted within Organovo's own facilities. Our research into this company that uses bioinspired 3D printing in its design and materials is based in part on conversations with Michael Renard, Executive Vice President Commercial Operations, Organovo Holdings Inc.

Living bioprinted tissue evolved from the need for better human tissue models that can be used in medical research, drug discovery, and disease modeling. By studying the composition and architecture of native human liver tissue, Organovo's design was informed as to the cell types, the relative ratios of those types, and the architecture of orientation between the various types of cells in native tissue.

The 3D bioprinter is a computer controlled, precise instrument that allows for the highly reproducible production of the tissue design. The bioprinter allows for rapid prototype design improvements which give Organovo's researchers the ability to make required changes in a timely manner. This attribute is not possible with traditional pharmaceutical testing methods.

*(Photo: A histological stain of bioprinted human liver tissue showing hepatocytes, hepatic stellate, and endothelial cells in an organized structure with the cell density and tight junctions of that found in native tissue.)*



Pre-market drug failure rates currently exceed 90% in spite of billions of dollars spent on R&D. Traditional cell cultures used in drug development provide poor prediction of drug interactions in the human body due to their lack of in-vivo like 3D architecture and function. Rising R&D costs, stricter safety requirements, and the desired reduction in animal testing adds significant socioeconomic challenges to the pharmaceutical industry. 3D bioprinted human tissues bring 3D architecture and function providing better predictive outcomes, future therapeutic value, and significant R&D and healthcare cost savings. Positioned as a new product category, direct competitive comparisons are not yet valid, with value being a function of the new information its model can produce.

Angel funding, followed by a public offering and a subsequent secondary offering, were used by Organovo to finance its endeavors. They have not faced any significant constraints in obtaining financing other than the important disclosure requirements of being a public company.

Given that this is a new product category, Organovo does not currently have any direct competitors. Their marketing efforts have primarily focused on making people aware of their innovative model. As would be expected, a significant portion of Organovo's budget is spent on R&D.

The key to success for Organovo has been its ability to provide a unique and differentiated design, with performance proof that validates the attributes related to applications that solve customer problems where current practices are lacking.

Organovo is currently focused on its primary US market as the first phase of release. Future short term plans for Organovo include expanding its geographic presence with its liver product and expanding the product line with other human tissue models, such as kidney, skin, vascular, and lung tissues. They expect that their products will be most transformative in the near term in the drug discovery and pharmaceutical industries. In the long term, Organovo has plans for products that could potentially have an impact on the therapeutic medical device industry.



**May 2016**

