Organovo and Collaborators Publish Data in Toxicological Sciences Demonstrating Power of 3D Bioprinted Human Liver Tissues in Modeling Drug-Induced Liver Injury Leading to Fibrosis

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SAN DIEGO, Sept. 13, 2016 (GLOBE NEWSWIRE) -- Organovo Holdings, Inc. (NASDAQ:ONVO) ("Organovo"), a three-dimensional biology company focused on delivering scientific and medical breakthroughs using its 3D bioprinting technology, today announced a publication in the scientific journal, Toxicological Sciences, which demonstrates the power of Organovo's ExVive ™ Human Liver Tissue to effectively model drug-induced liver injury leading to fibrosis.

Using Organovo's 3D bioprinted human liver tissues, researchers from Organovo, The Institute for Drug Safety Sciences and the University of North Carolina at Chapel Hill were able to reconstruct key aspects of methotrexate and thioacetamide-induced progressive human liver injury in a way that other models, including *in vitro* cellular models and animal models, have not been able to achieve. Repeated, low-concentration exposure to these compounds enabled the detection and differentiation of multiple modes of liver injury, including hepatocellular damage and progressive fibrogenesis. ExVive Human Liver Tissue was used to track the transient and surging production of immunomodulatory and chemotactic cytokines in a concentration and treatment-dependent manner. In addition, the model showed treatment-dependent upregulation of fibrosis-associated genes, *ACTA2* and *COL1A1*, which mimics the hallmark features of a classic wound-healing response. The publication's lead authors were Leah M. Norona, University of North Carolina at Chapel Hill, and Deborah G. Nguyen, Ph.D., Senior Director of Research & Development at Organovo.

"This data set clearly shows that our ExVive Human Liver Tissue can recapitulate key features of drug, chemical and TGF-β1-induced fibrogenesis at the cellular, molecular, and histological levels and can be used to better understand the onset and progression of human liver injury," said Dr. Sharon Presnell, chief scientific officer, Organovo. "The presence of multiple cell types and the tissue-like architecture make the product uniquely capable of modeling complex disease states and providing a comprehensive and cell-type specific view of the mechanism of toxicity to improve risk assessment of drugs and develop alternative solutions."

"This demonstration of methotrexate-induced fibrosis in our liver model has become a strong driver of customer adoption," said Paul Gallant, general manager, Organovo. "Having data that so clearly shows a capability that has been elusive in the past is very compelling, and we're continuing to build a solid base of customers given the growing validation of ExVive Human Liver Tissue's ability to demonstrate correlation with known clinical results."

Modeling drug-induced liver injury has been challenging because existing preclinical animal models may fail to translate results into humans due to species variations in metabolism, injury response, and ability to repair and regenerate tissue. 2D cell culture models are also used to study liver disease states, but they do not reliably mimic liver structure, function and multicellular architecture. The Company's 3D bioprinting technology creates tissues that are spatially patterned, three-dimensional, and multicellular. Organovo's 3D bioprinted human liver tissues are composed of patient-derived parenchymal (hepatocyte) and non-parenchymal (endothelial and hepatic stellate) cell populations and can provide insights into the dynamic and complex intercellular interactions that occur during drug-induced liver injury. Many drugs, such as methotrexate, offer therapeutic benefits that often outweigh toxicity risks. In these cases, the clinical paradigm is focused on measuring and managing toxicity rather than a requirement that the drug be free from any evidence of toxicity. The ExVive platform stands out as an exceptional tool to model and understand tissue-level toxicity, owing to its durable nature and the presence of multiple tissue-specific cell types that are essential in modulating tissue injury, resistance to injury and recovery.

The publication entitled, "Modeling compound-induced fibrogenesis in vitro using three-dimensional bioprinted human liver tissues," was published online on September 8 and can be found here: http://toxsci.oxfordjournals.org/content/early/2016/09/02/toxsci.kfw169.full.pdf.

About Organovo Holdings, Inc.
Organovo designs and creates functional, three-dimensional human tissues for use in medical research and therapeutic applications. The Company develops 3D human tissue models through internal development and in collaboration with pharmaceutical, academic and other partners. Organovo's 3D human tissues have the potential to accelerate the drug discovery process, enabling treatments to be developed faster and at lower cost. The Company's ExVive Human Liver and Kidney Tissues are used in toxicology and other preclinical drug testing. The Company also actively conducts early research on specific tissues for therapeutic use in direct surgical applications. In addition to numerous scientific publications, the Company's technology has been featured in The Wall Street Journal, Time Magazine, The Economist, Forbes, and numerous other media outlets. Organovo is changing the shape of life science research and transforming medical care. Learn more at www.organovo.com.

Forward-Looking Statements
Any statements contained in this press release that do not describe historical facts constitute forward-looking statements as that term is defined in the Private Securities Litigation Reform Act of 1995. Any forward-looking statements contained herein are based on current expectations, but are subject to a number of risks and uncertainties. The factors that could cause the Company's actual future results to differ materially from current expectations include, but are not limited to, risks and uncertainties relating to the Company's ability to develop, market and sell products and services based on its technology; the expected benefits and efficacy of the Company's products, services and technology; the market acceptance of the Company's products and services; the Company's business, research, product development, regulatory approval, marketing and distribution plans and strategies; the Company's ability to successfully complete the contracts and recognize the revenue represented by the contracts included in its previously reported total contract bookings and secure additional contracted collaborative relationships. These and other factors are identified and described in more detail in the Company's filings with the SEC, including its Annual Report on Form 10-K filed with the SEC on June 9, 2016 and its Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016. You should not place undue reliance on these forward-looking statements, which speak only as of the date that they were made. These cautionary statements should be considered with any written or oral forward-looking statements that the Company may issue in the future. Except as required by applicable law, including the securities laws of the United States, the Company does not intend to update any of the forward-looking statements to conform these statements to reflect actual results, later events or circumstances or to reflect

the occurrence of unanticipated events.

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