Preclinical study shows potential of new technologies to detect response to cancer therapy earlier

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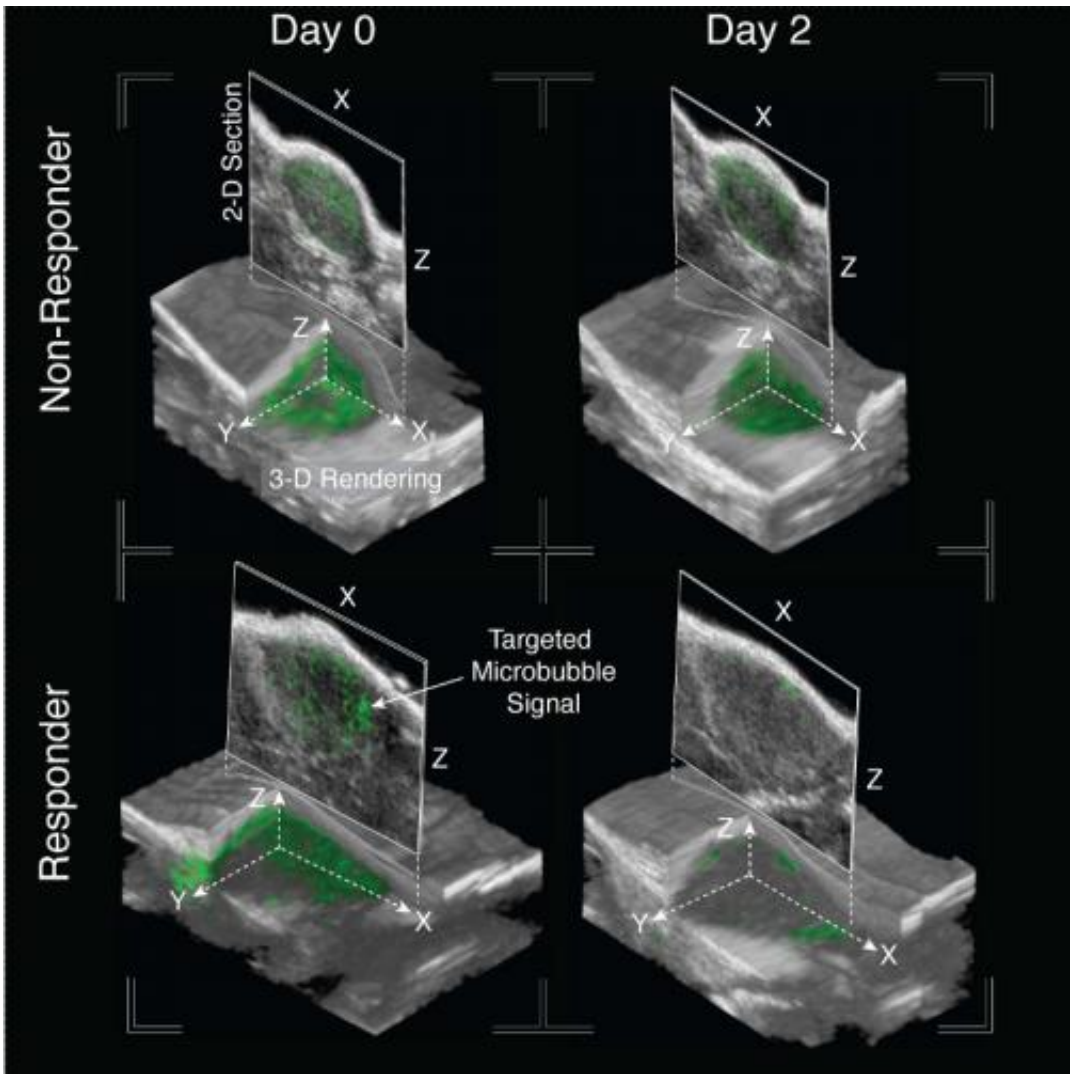

3-D Ultrasound Molecular Imaging (USMI) images of non-responder and responder pancreatic xenografts before (day 0) and after (day 2) treatment. The

grayscale image shows a volume of the tumor and surrounding tissue. Credit: Dayton Lab, UNC

The research was published early in the January issue of the journal *Technology in Cancer Research and Treatment*. The article describes experiments using ultrasonic molecular imaging (USMI) and Dynamic Contrast Enhanced-Perfusion Imaging (DCE-PI) to measure response to therapy for pancreatic cancer.

Paul Dayton, PhD, senior author says, "What we found is that using two non-invasive technologies, we can detect response to therapy earlier than by relying on tumor volume changes. Having new non-invasive, inexpensive technologies available to measure response to therapy earlier during the course of treatment would be a significant advance in the ability to tailor a person's treatment to improve outcomes."

Dr. Dayton, an Associate Professor of Biomedical Engineering, worked with Jen Jen Yeh, MD, Associate Professor of Surgery and Pharmacology, to evaluate the imaging technologies on human pancreatic cancer in a pre-clinical model. Both faculty are members of the Lineberger Comprehensive Cancer Center.

USMI has the ability to characterize non-invasively the biologic processes at the cellular and molecular levels. It does this through the use of targeted contrast agents, which are markers that bind to specific proteins expressed on cancer cells within the body. These contrast agents enable a standard ultrasound system to detect signals from cancer cells that would otherwise be undetectable.

Ultrasound DCE-PI is a method used to non-invasively monitor the blood flow in the microcirculation. Since growing tumors require

abnormally increased blood flow, changes in blood vessel structure or density can provide information regarding tumor malignancy.

The team used a drug that inhibits a protein specific to tumors. They then used the imaging tools to measure the response of two different tumors, one known to respond to the drug therapy, and a second known not to respond. The results indicated that USMI was able to detect molecular signs of tumor response to therapy after only 2 days. A change in blood flow in the tumor was observed to detect response after day 14 using DCE-PI. Over the same period, standard volume measurements were not able to detect therapeutic response, and prior studies suggested that volume measurements do not become indicative of response until approximately 28 days. Thus, these methods showed a notable improvement in the early identification of tumor response to therapy, using contrast enhanced ultrasound imaging.

Although the contrast agents for USMI are not yet available in the United States, they are currently in clinical trials in Europe for cancer imaging.

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