Uncovering cancer's inner workings by capturing live images of growing tumors

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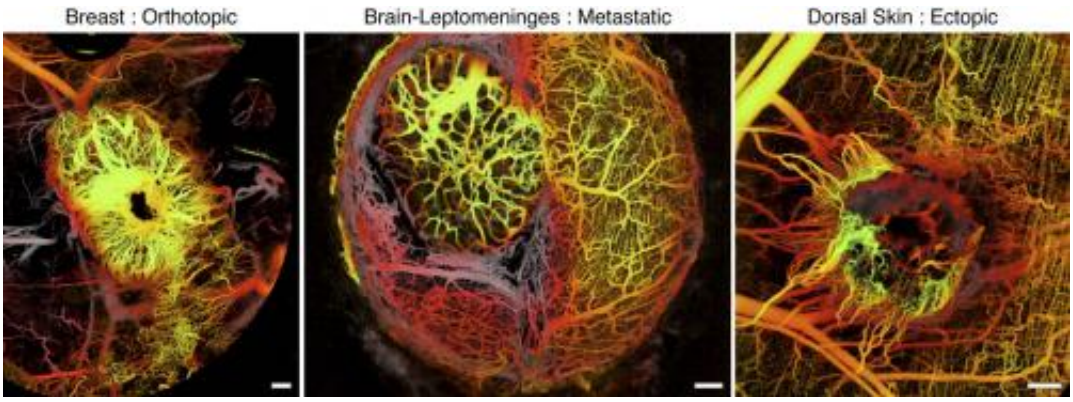


The new imaging tool reveals strikingly different networks of blood vessels surrounding different types of tumors in a mouse model. Left: breast cancer in the breast. Middle: metastatic breast cancer in the brain. Right: ectopic breast cancer in the skin. Credit: *Nature Medicine*

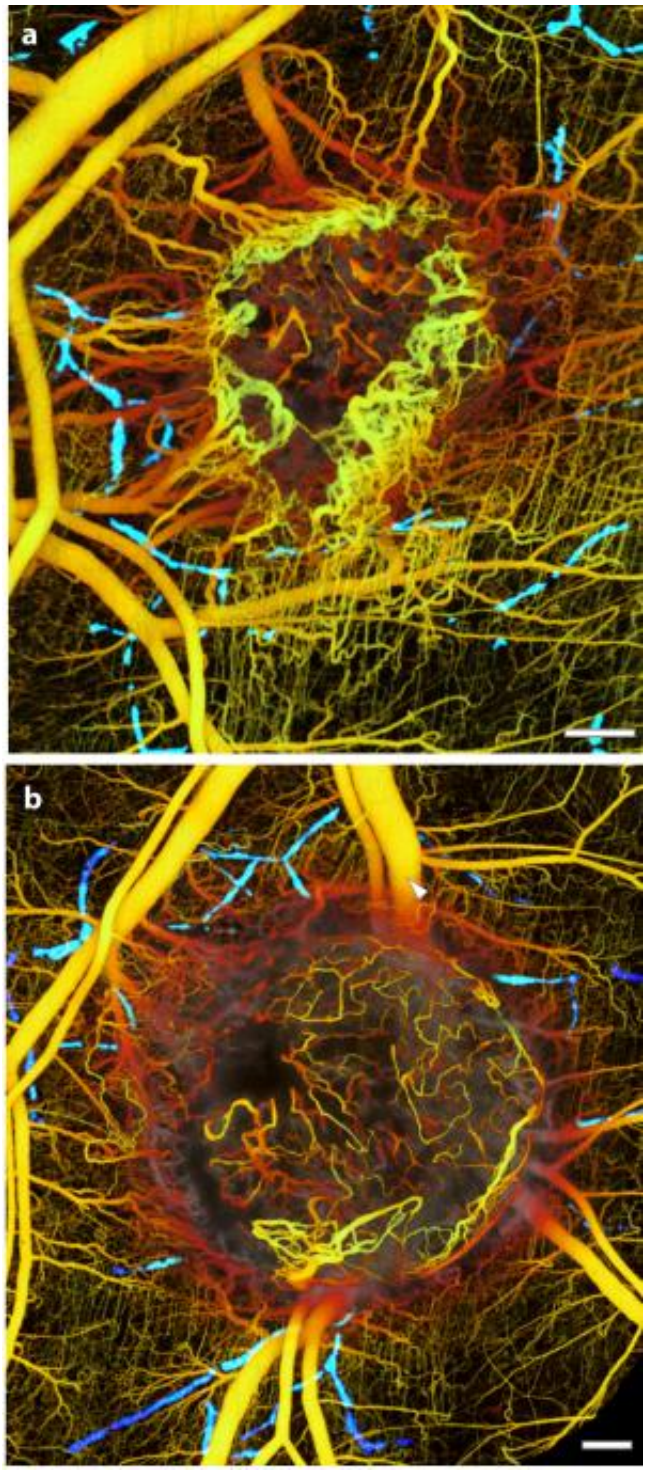
Scientists seeking new ways to fight cancer often try to understand the subtle, often invisible, changes to DNA, proteins, cells, and tissue that alter the body's normal biology and cause disease. Now, to aid in that fight, a team of researchers has developed a sophisticated new optical imaging tool that enables scientists to look deep within tumors and uncover their inner workings. In experiments that will be described at Frontiers in Optics (FiO), The Optical Society's (OSA) Annual Meeting, Dai Fukumura and his colleagues will present new optical imaging techniques to track the movement of molecules, cells, and fluids within tumors; examine abnormalities in the blood vessel network inside them;

and observe how the tumors were affected by treatments.

These techniques, created by Fukumura and his long-term collaborators at Massachusetts General Hospital and Harvard Medical School, combine two different high-tech optical imaging methods that were custom-built for the research. One is called multiphoton laser-scanning microscopy (MPLSM), which is an advanced fluorescence imaging technology that is now commercially available at the high end of the microscope market. The other is called optical frequency domain imaging (OFDI), which images tissues by their light scattering properties. According to Fukumura, OFDI is gaining popularity in the optical imaging field but has yet to become commercially available.

"MPLSM overcomes many of the limitations from which conventional microscopy and confocal microscopy suffer, and OFDI provides robust large volume imaging data," Fukumura said.

Fukumura will present their research at FiO 2013, taking place Oct. 6-10 in Orlando, Fla. There, he will describe how his unique technique can image tumors inside and out, and show detailed pictures of live tumors—images that he and colleagues call "astonishing."



This image shows a tumor before (left) and five days after (right) anti-angiogenic treatment -- a novel treatment approach by inhibiting blood vessel growth. Credit: *Nature Medicine*

He added that while the new combined approach would be too expensive to be used for routine diagnostic purposes, it promises to help researchers better understand the intricate workings of human cancer and aid in drug discovery to treat cancer. "These optical imaging approaches can provide unprecedented insights in the biology and mechanisms of cancer," he said.

Presentation FW5A.2, "Experimental Methods for In Vivo Tissue Imaging," takes place Wednesday, Oct. 9 at 4:15 p.m. EDT at the Bonnet Creek Ballroom, Salon IV at the Hilton Bonnet Creek in Orlando, Fla.

Provided by Optical Society of America