CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP120052

Project Title:
Super-high resolution imaging of tumor angiogenesis in deep tissue

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The University of Texas at Arlington

Lay Summary:

Tumor angiogenesis is the growth of new blood vessels for supplying nutrients and oxygen to and removing waste products from the tumor tissue. Noninvasive imaging of tumor angiogenesis can significantly benefit cancer diagnosis and assessment of anti-angiogenic therapy (AT). Unfortunately, current techniques for tumor angiogenesis imaging are greatly limited in several respects. For example, (1) Limited spatial resolution leads to difficulty to image tumor microvessels in deep tissue. While conventional clinical imaging methods, such as magnetic resonance imaging and ultrasound, give images of living tissues deep within the body but at much lower resolution and generally cannot resolve microvessles. (2) Few techniques are available for simultaneous imaging of multiple molecular targets (SIMMT) in tumor angiogenesis. The advent of combined anti-angiogenic therapy treatments requires significant development of noninvasive molecular imaging techniques for SIMMT. Accordingly, developing a high-resolution (~50 microns) imaging technique that can visualize microvessles in deep tissues (tens of millimeters) and potentially conduct SIMMT is highly desirable. We propose to develop a new imaging technique based on ultrasound-sensitive fluorescent probes. The goal of this technique is to significantly improve the spatial resolution without loss of the imaging depth (such as tens of microns resolution at a depth of tens of millimeters)and with capability of conducting SIMMT. If successful, this technique will enable clinicians to noninvasively visualize the details of microvasculature in tumors (such as breast, thyroid, prostate, skin, head and neck tumors) for improving cancer detection/diagnosis and assessment of cancer treatment. The objectives of this project are to develop such a technique, demonstrate its feasibility of imaging tumor angiogenesis with high spatial resolution (tens of microns) in deep tissue (tens of mm) and to study its potential of conducting SIMMT.