Four dimensional optoacoustic imaging of perfusion in preclinical breast tumor model in vivo (Conference Presentation)

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ABSTRACT

Imaging plays an increasingly important role in clinical management and preclinical studies of cancer. Application of optical molecular imaging technologies, in combination with highly specific contrast agent approaches, eminently contributed to understanding of functional and histological properties of tumors and anticancer therapies. Yet, optical imaging exhibits deterioration in spatial resolution and other performance metrics due to light scattering in deep living tissues. High resolution molecular imaging at the whole-organ or whole-body scale may therefore bring additional understanding of vascular networks, blood perfusion and microenvironment gradients of malignancies. In this work, we constructed a volumetric multispectral optoacoustic tomography (vMSOT) scanner for cancer imaging in preclinical models and explored its capacity for real-time 3D intravital imaging of whole breast cancer allografts in mice. Intrinsic tissue properties, such as blood oxygenation gradients, along with the distribution of externally administered liposomes carrying clinically-approved indocyanine green dye (lipo-ICG) were visualized in order to study vascularization, probe penetration and extravasation kinetics in different regions of interest within solid tumors.

The use of v-MSOT along with the application of volumetric image analysis and perfusion tracking tools for studies of pathophysiological processes within microenvironment gradients of solid tumors demonstrated superior volumetric imaging system performance with sustained competitive resolution and imaging depth suitable for investigations in preclinical cancer models.

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