InSyTe FLECT/CT Application Spotlight

Tumor targeting, NIR-I and NIR-II Fluorescence

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Title: Tumor-Associated Immune-Cell-Mediated Tumor-Targeting Mechanism with NIR-II Fluorescence Imaging
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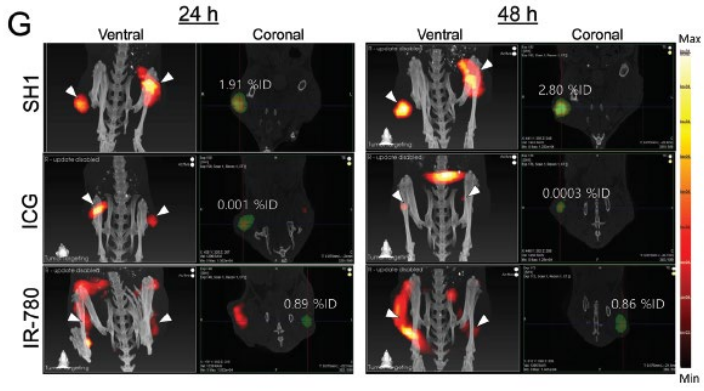
Summary: The tumor microenvironment (TME) is composed of stromal fibroblasts, infiltrating immune cells, blood and lymphatic vascular networks, and the extracellular matrix. It has become an important alternative target in tumor imaging and therapy due to the genetically stable non-tumor cell components in the TME. Tumor associated immune cells (TAICs) can be specifically targeted for cancer detection due to their high abundance in the TME. The authors have reported on targeted heptamethine cyanine based-fluorophores that possess NIR-I and NIR-II fluorescence emission in addition to TAIC-mediated tumor targetability. It has two specific mechanisms to reach the cancerous region by systemic circulation within 24 h, and via internalization by immune cells in bone marrow that also infiltrate the TME. This allows for the SH1 fluorophore signal intensity to gradually increase over time. The authors used a lung carcinoma cell line to image the 3D fluorescence of the SH1 fluorophore entering the TME, in addition to flow cytometry, histological, and serum protein binding analyses.



The authors used the FLECT/CT to study the distribution of the SH1 fluorophore in vivo. Images were acquired at 24 and 48 h timepoints, comparing the distribution of the SH1, ICG, and IR-780 fluorophores. Quantification of the fluorescence data was performed from the two time points, in addition to calculation of the % injected dose using the FLECT/CT.

InSyTe FLECT/CT Spotlight: Using the InSyTe FLECT/CT, the research team obtained in vivo biodistribution images of the SH1, ICG, and IR-780 fluorophores in a lung carcinoma mouse model. The authors developed the SH1 probe to have fluorescence emission at 820nm (NIR-I window) in addition to 1250nm (NIR-II window, with a high quantum efficiency of 11% compared to other commercially available NIR-II dyes. By using the FLECT/CT, the authors were able to compare the fluorescent dyes against each other by performing quantitation at each time point. They were also able to calculate a 2-fold increase % injection dose using the 3D fluorescence data. The SH1 fluorophore presents itself as a promising cancer-targeting agent for future intra-operative optical imaging.