InSyTe FLECT/CT Application Spotlight

Probe development

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Title: Multifunctional human serum albumin-therapeutic nucleotide conjugate with redox and pH sensitive drug release mechanism for cancer theranostics
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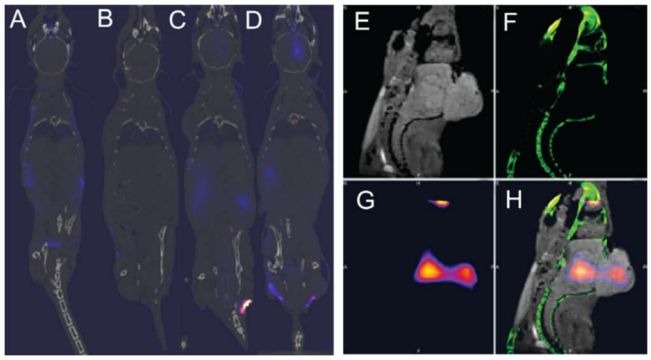
Application Areas: Probe development, Cancer, Diagnostics, Therapeutics, Theranostics

Summary: Theranostics is a new area of research where chemical probes developed for disease diagnostics are combined with therapeutic agents, resulting in an "all-in-one" agent that can be used to diagnose and then treat disease concurrently. In this application spotlight, a team of researchers from Novosibirsk, Russia, and India report on the development of a novel multifunctional probe for cancer theranostics. This probe combines a chemotherapy agent, trifluorothymidine (TFT), that doubles as a magnetic resonance imaging (MRI) contrast agent, a fluorescent dye (Cy7), and a drug carrier (albumin) that has greater uptake in tumors. After synthesizing the probe and verifying successful synthesis, the researchers performed in vitro tests of the theranostic probe before moving to a preclinical xenograft tumor model to assess in vivo performance of the probe. Since the multifunctional probe has both an MR contrast agent and a fluorescent dye, in vivo assessment of the probe localization was performed using both MRI and the InSyTe FLECT/CT.



In this figure from the featured publication, the authors used the InSyTe FLECT/CT to assess probe localization in a preclinical model of glioblastoma. FLECT scans were performed at 1 hr (A,C) and 72 hr (B,D) after probe injection in a control animal (A,B) and cancer model (C,D). The authors also fused MRI (E) data with CT (F) and FLECT (G) data into a single image (H).

InSyTe FLECT/CT Spotlight: Using the InSyTe FLECT/CT, the research team was able to visualize localization of the multifunctional probe in vivo immediately after injection to 72 hours post injection. This showcases a strength of the InSyTe FLECT/CT, as the compatibility of gas anesthesia with the FLECT/CT facilitates time course studies and rapid screening. Additionally, the research team was able to co-register FLECT and CT data with MRI data taken with a separate system. This is possible since FLECT and CT reconstructed data is output in industry standard DICOM format that can be visualized with software of the researchers' choosing and can be co-registered with imaging data from other modalities. While the research team will still need to confirm probe localization with standard biochemical techniques, the InSyTe FLECT/CT has enabled them to easily perform initial visualization of the cancer theranostic probe localization in a preclinical cancer model.