Department of Biomedical Engineering
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The Pursuit of Theranostics with MRI

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Yeung Kin Man Academic Building

Abstract

Theranostic MRI has become an emerging strategy in which imaging is incorporated with therapeutics. The delivery of therapeutic agents or biologics, both location and quantity, can be directly visualized using the imaging companion, allowing physicians to adjust the treatment in real-time. Our lab has focused on the development of theranostic MRI using both label-free and labeling approaches. This seminar will provide a comprehensive overview of those advanced theranostic approaches along with examples, including 1) label-free approach achieved using Chemical Exchange Saturation Transfer (CEST) MRI for detecting drugs, drug carriers, and natural substrates/products of enzyme; 2) unconventional, green labeling approach achieved by diamagnetic polymers such as dextrans and deuterium oxide (D2O), 3) classic labeling approach achieved by highly sensitive nanoparticles such as superparamagnetic iron oxide (SPIO).

Biography

Dr. Guanshu Liu is a Professor in the Russell H. Morgan Department of Radiology at Johns Hopkins University School of Medicine and F.M. Kirby Center at Kennedy Krieger Institute. Dr. Liu is also a faculty member of the Sidney Kimmel Comprehensive Cancer Center and an affiliated member of the Institute for NanoBioTechnology (INBT). Dr. Liu received his bachelor's degree from the University of Science and Technology of China (USTC) in 1998 and Ph.D. degree from the Department of Biomedical Engineering at Case Western Reserve University in 2008. Dr. Liu has been a faculty member in the Department of Radiology and the F. M. Kirby Research Center for Functional Brain Imaging at the Kennedy Krieger Institute since February 2008.

Dr. Liu has been actively working in the fields of molecular imaging, chemical exchange saturation transfer (CEST) MRI contrast technology, and image-guided drug delivery and intervention. He has pioneered the development of various novel and translatable theranostic MRI technologies. These technologies integrate MRI contrast with a therapeutic agent for directly visualizing the delivery of therapeutics and monitoring treatment response. Dr. Liu has published more than 100 peer-reviewed research articles with an H index of 45 on Google Scholar. He also has 10 patents and provisional disclosures. He serves as a Senior Editor for the journal Molecular Imaging and Biology, Associate Editor for Cancer Imaging and Image-directed Interventions of Frontiers in Oncology, and editorial board member for the journal Biosensors. He received Johns Hopkins Discovery Award (2016), Marilyn Hilton MS Research Fund (2020), and the Distinguished Investigator (DI) Award, Academy for Radiology & Biomedical Imaging Research (2022).