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Multi-modality image-guided nano-theranostics

The merging of molecular imaging and nanomedicine is emerging as a powerful platform to comprehensively interrogate the biology of disease and working of therapies in the era of precision medicine and health. The marriage of the two disciplines stems from the natural compatibility of the biochemicals used as molecular imaging probes and nanoparticles. Nanoparticle technology is advancing at a rapid pace and is finding a “niche” in biomedical applications, including drug delivery, nano-therapeutics, multi-modality imaging and molecular diagnostics. The combination therefore of molecular imaging and nanomedicine is poised to offer a true theranostic approach in precision health. In this talk, we will highlight recent advances in multi-modality image-guided nano-theranostics, from various laboratories including ours. We will describe an “all in one” approach where therapeutic entities are imbedded within nanoparticles, the core/shell of which also serves as molecular imaging agents. The unique intrinsic approach to nano-theranostics will be exemplified by multi-modal molecular imaging including PET/CT, SPECT/CT, MRI and photoacoustic imaging. The “all in one” concept can also accommodate multiple therapeutic strategies including photo-thermal-therapy, targeted radiotherapy, immunotherapy and chemotherapy drugs. We envision that this novel theranostic approach has promising potential for high sensitivity and quantitative imaging using clinically applicable modalities.

Biography

Dr. Zweit is a professor of Radiology, Radiation Oncology, Molecular Pathology, Biochemistry & Molecular Biology and Chemistry. He is the Director of the Center for Molecular Imaging and a senior member of the Massey Cancer Center at Virginia Commonwealth University Medical Center. He leads an inter-disciplinary and inter-collaborative molecular imaging and nanomedicine research program that emphasizes multi-modality molecular imaging approaches to study biochemical and biological pathways in vivo. Professor Zweit's research interests include the development of paradigms for molecular imaging and nanotechnology strategies for preclinical and clinical translational research in cancer, neuroscience and immunotherapy. Zweit is internationally recognized for his work in molecular imaging of cancer drug development, and conducted the “world's first” Molecular PET Imaging clinical trial of Anti-angiogenic therapy in cancer patients (Journal National Cancer Institute 2002 & 2006). Professor Zweit serves as an advisor on a number of national and international committees. He serves on the review body of a number of funding organizations, both in North America and Europe. He has supervised and advised a total of 32 MSc, MD and PhD theses, and 30 post-doctoral Fellows. He has published more than 150 peer reviewed articles, over 250 conference abstracts, and 6 review articles and book chapters. Professor Zweit obtained his PhD and DSc from the University of Manchester Medical School. He received his Nuclear Medicine training at the John F. Kennedy Medical Centre in New Jersey, and attended advanced Nuclear Medicine training at the Brooklyn Hospital in New York. As an Undergraduate, he obtained his Bachelor of Science degree, in Radiation Biophysics, with a Biochemistry double major, from the University of Kansas.

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