

University of Macau

Faculty of Science and Technology

Seminar

Title: Radionuclide Imaging: A Promising Avenue for Molecular Imaging
Speaker : Dr. Greta, Mok Seng Peng
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Chinese University of Hong Kong
Language: English
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Venue: HG01, Ho Yin Convention Centre

Abstract

In vivo imaging in the cellular and molecular levels with functional information has been regarded as the future of radiology. Radionuclide imaging techniques, especially positron emission tomography (PET) and single photon emission computed tomography (SPECT), have the ability to detect biological targets with concentration as low as 10^{-12} mol/L as compared to other imaging modalities such as MRI and CT that can detect at the level of 10^{-6} and 10^{-2} mol/L, respectively. The superior sensitivity of radionuclide imaging techniques allows imaging of administered radio-labeled pharmaceuticals at doses free of pharmacologic side effects, unlike the current contrast agents required for MRI and CT. Moreover, most of the tracers mimic endogenous molecules of human and animals, providing direct functional or molecular information about diseases in earlier phases prior to substantial morphological changes. Clinical PET and SPECT imaging have long been used successfully in detecting and diagnosing many functional abnormalities and diseases. More recently, PET has been widely accepted the best imaging method for diagnosing most cancers. In pre-clinical imaging using small animals, radionuclide imaging techniques also provide useful insights for other basic science research and have the potential to shorten drug development time. Dedicated imagers, including microPET and microSPECT, are being developed for small animal imaging and received great interests in biomedical research. In this presentation, we will review the principle of radionuclide imaging, including planar nuclear imaging, PET and SPECT, with focus on small animal PET and SPECT technology. In particular, we will discuss the aspects of small animal SPECT especially multi-pinhole SPECT from advance instrumentation designs, system validation, image generation, to absolute tracer quantitation. We will demonstrate the contributions of the multi-pinhole SPECT techniques in molecular imaging with two biological applications, including quantification of the dose response nature of cardiotoxicity induced by doxorubicin in rat models, and atherosclerotic plaques imaging in ApoE-/- knockout mice, using ^{99m}Tc Annexin V which targets apoptotic cells.

About the speaker

Dr. Mok has been a Research Assistant Professor in the Department of Diagnostic Radiology and Organ Imaging at The Chinese University of Hong Kong since 2009. She got her Ph.D. degree in the Program of Molecular Imaging, Department of Environmental Health Sciences at Johns Hopkins Bloomberg School of Public Health in January 2009. During her postgraduate study, she was also a research assistant in the Division of Medical Imaging Physics, Department of Radiology at Johns Hopkins University. She received her undergraduate from the National Yang-Ming University at Taipei, Taiwan in 2003. She is a board-certified medical radiation technologist in diagnostic radiology, radiation therapy and nuclear medicine in Taiwan. Her post-graduate studies focus on nuclear medicine imaging, and her research interests include SPECT collimator design, small animal imaging using microSPECT and microPET techniques, image assessment using receiver operating characteristics (ROC) methodology, and atherosclerotic plaque imaging. She is the co-inventor of the synthetic aperture (patent pending) and an author of several book chapters, peer-reviewed journal papers and conference roceedings. She has been invited to present her work at over 10 international conferences. She served as Treasurer/Secretary of the Chinese American Society for Nuclear Medicine from 2007-2009.