AbstractID: 11882 Title: CE-Imaging - SAM

Hybrid SPECT/CT is rapidly becoming a mainstream imaging modality and creating a new paradigm for SPECT imaging. The ability to contemporaneously acquire electromechanically registered dual-modality SPECT and CT scans improves the SPECT image quality due to CT-based attenuation correction, and enhances the diagnostic confidence of SPECT by providing an anatomical overlay. The first generation SPECT/CT systems used single-slice CT scanners and produced CT images of limited quality for anatomical overlay. The CT systems integrated into the latest generation of SPECT/CT systems are fully-functional diagnostic scanner (scan parameters includes tube current, tube voltage, rotation speed, collimation, pitch, slice thickness, FOV, etc.). In addition to generating high-quality attenuation maps these CT systems can produce CT scans with diagnostic image quality, capable of greatly improving both the localization and specificity of abnormalities detected on the corresponding SPECT scan. In some cases, these systems are also capable of performing diagnostic CT scans with contrast enhancement. The widest use of SPECT/CT is currently in oncology, with applications including: tumor localization, staging and response to treatment; pre-surgical mapping (e.g., parathyroid adenomas, sentinel lymph nodes); differentiation of skeletal metastases from other disease processes; functional image-based radiation therapy treatment planning (e.g., lung perfusion); and quantitative SPECT/CT-based internal radionuclide therapy dosimetry/treatment planning. Cardiac SPECT/CT is currently focused primarily on improved attenuation correction of SPECT myocardial perfusion images. SPECT/CT is also being utilized for imaging bone and other non-malignant diseases.

This lecture will review the physics principles underlying SPECT/CT imaging, present several examples of the clinical application of SPECT/CT, and provide an overview of the currently available SPECT/CT scanner types and models.

Educational Objectives:

1. To understand the physical principles underlying SPECT/CT image acquisition, processing, and reconstruction.
2. To understand current and future clinical applications of SPECT/CT imaging.
3. To become familiar with the various commercially-available SPECT/CT product offerings.