

AbstractID: 8753 Title: A Small Field-of-View, Mobile PET/SPECT System for Bedside Environments: A Dynamic Cardiac Phantom Study using ^{99m}Tc and ¹⁸F-FDG

Purpose: Asses the performance capability of a small field-of-view mobile PET/SPECT unit for ^{99m}Tc and F-18 FDG cardiac SPECT imaging in bedside environments with critically ill patients who cannot be transported to a traditional SPECT system.

Method and Materials: A dynamic cardiac phantom was used to evaluate the effects of angular sampling, counts per projection, cardiac motion, and out of field activity in bedside SPECT imaging using ^{99m}Tc and F-18 FDG. The mobile SPECT system consists of two detector heads with pixilated NaI scintillators and is capable of maneuvering in an ICU or ER to image patients that are confined to bed. 180 degree SPECT acquisitions were performed with angular samplings of 19, 10, and 5 evenly spaced angles and 500, 250, and 100 thousand counts per projection. Collimated F-18 FDG SPECT imaging is preferred over PET in this environment due to difficulties in positioning a detector beneath a bed. More projection angles with less attenuation effect can be obtained with anterior SPECT as well. Acquisitions were performed at end systole, end diastole, with the heart beating (72 BPM and 45% EF), and with the heart beating and activity in the simulated liver. **Results:** Viable images were reconstructed using MLEM for both ^{99m}Tc and F-18 FDG. Contrast increases with increased angular sampling and counts per projection in these images. Viable images can be obtained with lower sampling if the situation requires it. F-18 FDG imaging will require higher counts and projection angles due to center-of-rotation errors. **Conclusion:** SPECT cardiac imaging of immobile, critically ill patients is possible using both Tc-^{99m} and F-18 FDG. The versatility of this system makes it a useful tool for examining patients who could not have this exam but would benefit from it greatly.