

## AbstractID: 6769 Title: Implementation and Special Considerations for Dedicated PET/CT Simulation in Radiation Oncology

### Purpose:

Our radiation oncology department has implemented PET/CT simulation having performed over 125 procedures in the past year. Dedicated PET/CT simulator eliminates the need to fuse outside PET studies and provides scans in the treatment position. However, PET/CT brings special challenges that must be managed to ensure image quality, spatial accuracy, efficient process flow, accurate target definition, and radiation safety.

### Materials/Methods:

In January 2005 our department began providing F-18 FDG PET/CT simulations on a GE Discovery ST hybrid scanner and GE Advantage Sim software (GE Healthcare, Waukesha WI). Patients were immobilized on a flat table insert, injected, scanned, and had isocenters placed. Phantom studies were performed to ensure spatial accuracy and image quality of the automated fusion software. Studies included measurement of displacement of table height due to patient weight. Due to the time spent adjacent to the patient and the expected high exposure rates, process flow was modified in order to reduce staff exposure.

### Results/Discussion:

Our department was able to confirm spatial accuracy of the automated fusion via phantom studies to meet manufacturer specifications. However, we did reveal a significant table deflection of up to 10mm from the external lasers to the inside bore of the CT scanner which caused a change in scan protocol. Contouring window levels were studied with similar phantoms to determine appropriate settings. Process flow was aided by the hiring of an experienced, certified nuclear medicine technologist to assist the radiation therapists. Additionally, we implemented the process of immobilizing the patient prior to injection to reduce staff exposure. We determined in a separate study dose rates of up to 94 $\mu$ Sv/hr at 15 cm from the patient.

### Conclusion:

Dedicated PET/CT simulation in radiation oncology departments is a useful modality, but can add to time and complexity to the simulation workflow.