AbstractID: 6607 Title: SBRT Simulations using PET/CT: Radiation Safety Concerns

Purpose: SBRT simulations using a Stereotactic Body Frame (SBF - Elekta) were expanded to include a PET study. Because of the time that staff are in close proximity to the patient, some concerns arose over the radiation safety issues associated with these simulations. This study examines the radiation exposures of the staff performing SBRT simulations and provides some guidance on limiting staff exposure during these simulations.

Methods and Materials: Fifteen patients were simulated with PET/CT using the SBF. Patients were immobilized in the SBF prior to the administration of FDG (18F-fluoro-deoxy-glucose). The patients were removed from the frame, injected with FDG, and allowed to uptake for 45 minutes. After uptake, the patients were repositioned in the SBF. During the repositioning, exposure rates were recorded at the patient's surface, at the SBF surface, and at 15cm, 30cm, and 1m from the SBF, along with administered dose and the approximate time spent on patient repositioning. Comparisons of the estimated dose to the staff were performed with staff performing conventional diagnostic PET studies.

Results: The average time spent in close proximity to the patient after injection was 11.4 minutes, or over twice that reported for diagnostic PET staff. This time yielded an estimated average dose to the staff of 26.5 μSv per simulation.

Conclusions: Occupational exposure limits are 50 mSv per year. Based on the dose per simulation, the staff would have to perform nearly 1900 SBRT simulations per year to exceed the occupational limit. Therefore, at the current rate of 50-100 simulations per year, the addition of PET studies to the SBRT simulations is safe for our staff. However, ALARA principles still require some radiation safety considerations during the SBRT simulations. PET/CT-based SBRT simulations are safe and important for treatment planning that optimizes biologic dose-distribution with highly accurate and reproducible target definition.