

AbstractID: 9475 Title: Magnitude of scattered radiation and dose efficiency in volume-of-interest (VOI) cone beam CT

The magnitude of scattered radiation and dose efficiency inside and outside the VOI was investigated for VOI cone beam computed tomography (CBCT) technique. For experiments, a bench-top CBCT system with a flat-panel digital detector was constructed. Two cylindrical polycarbonate phantoms (11 cm and 15 cm in diameter) were used to simulate breasts. To implement the VOI scanning technique, a lead filter with a rectangular opening was placed between the x-ray source and the phantoms. The x-ray tube voltage setting was 80 kVp. The phantoms were imaged without and with the VOI filter for the open field and the VOI field, respectively. Slot scanning technique with varying slot width was used to measure SPR values at the detector plane. Dose measurement was performed using TLD dosimeters at five different locations for the 11-cm phantom and six locations for the 15 cm phantom. The results showed that the SPR value inside the VOI were about 0.37 and 0.039 for the open field and the VOI field, respectively, for the 11 cm phantom. This indicates that the SPR can be reduced by a factor of 9 inside the VOI. The results also showed that dose increases from the center toward to the edge for the open field, but decreases for the VOI field. The dose can be reduced by a factor of 3 or more outside the VOI and by a factor of 1.6 at the center of the phantom for the 11 cm phantom (this work was supported in part by a grant CA104759 from the NCI and a research grant EB00117 from the NIBIB).