

AbstractID: 8111 Title: Scatter Profiles for a 16-slice CT Scanner with Cylindrical and Anthropomorphic Head and Body Phantoms

Purpose: We sought to validate the stray radiation dose maps provided by CT manufacturers and to investigate the effects of varying phantom composition and shape on these scatter profiles especially as they pertain to shielding requirements.

Methods and Materials: The standard CT dosimetry cylindrical body phantom was used to validate the published results by the manufacturer. The technique factors used were: 8 x 3 mm detector configuration, 140 kVp, 400mA, 2 second rotation time, and 350 mm FOV. A 150 cc ion chamber at isocenter height and always facing isocenter was used to measure the secondary radiation. The chamber was clamped to a rolling cart and was moved in 50 cm increments around isocenter to cover a grid of 3 m x 4 m. This was repeated for the standard CT dosimetry head phantom, an anthropomorphic head phantom, and an anthropomorphic chest and pelvis phantoms.

Results: There was poor agreement between the nominal data obtained for the standard CT dosimetry body phantom and that supplied by the manufacturer especially on the cranial side of the gantry. There was considerable difference between the results from standard CT dosimetry body phantom and the anthropomorphic pelvis phantom, both in magnitude (40% higher on average) and shape of the isodose contour plots. In addition, comparisons between anthropomorphic head and the standard CT dosimetry head phantom will be presented as isodose contour plots in the horizontal plane 100 cm from the floor.

Conclusions: There were differences in the scatter magnitude between the manufacturer supplied values and those measured. However, as this information is often used in barrier shielding calculations, these differences were not significant enough to alter shielding requirements for barriers 1.5 meters or further away from isocenter. The manufacturer values tended to be somewhat higher and thus more conservative than those measured.