

AbstractID: 11096 Title: Effects of imaging artifacts from a wide-bore CT scanner on treatment planning

Purpose: The wide-bore GE Lightspeed RT CT scanner provides a standard 50cm field-of-view (FOV) and can reconstruct images extended to 65 cm for large patients using extrapolated attenuation data. Images from the 65 cm FOV reconstruction have image artifacts that distort CT numbers and structure contours, especially in the region beyond 50 cm. This work investigates the effects of these imaging artifacts on treatment planning.

Method and Materials: A CT phantom with inserts of different compositions was imaged to evaluate the distortion on CT numbers. Images of the phantom were taken at the bore center and at the edge where half of the inserts were outside of the standard FOV for comparison. The mean CT number of each insert was calculated and averaged over 3 consecutive slices. An anthropomorphic phantom was also imaged in a similar fashion. The center and the shifted images of the anthropomorphic phantom were registered in Eclipse TPS and automatically contoured at a threshold of -350 HU to determine the body contour difference. The change in monitor unit calculation due to the contour deviation was estimated.

Results: The CT phantom image near the bore edge showed that the CT numbers beyond 50 cm were distorted, e.g., difference up to 356 HU and percent difference up to 115% in CT number was observed. The insert CT numbers within the 50 cm region were also affected but to a lesser degree. Along the body of the anthropomorphic phantom, contour difference of 0.4 to 1.8 cm was observed. These contour differences give MU deviation from 1.7% to 8% for 6 MV photon and 1.0% to 4.4% for 23 MV photon for single field.

Conclusion: Image artifacts from extended FOV reconstruction alter the CT numbers and the contours of imaging objects and can yield inaccuracy in treatment planning dose calculation.