

# AbstractID: 6406 Title: Inter-Observer Image Quality Analysis of Megavoltage Cone Beam-CT versus Megavoltage Fan Beam-CT

**Purpose:** Use of strict scoring criteria to study the inter-observer variability of image quality between megavoltage cone-beam cat scan (MV CBCT) and megavoltage helical fan-beam computed tomography (TomoTherapy).

**Method and Materials:** A Siemens MVCB QA phantom was utilized for all image acquisitions. Sections 2 and 4 of this phantom contain low contrast objects, and section 3 contains a line pair array for spatial resolution determination. The phantom was imaged on a 20-slice Siemens SOMATOM® Sensation Open (CT-Sim) as the “gold standard” for image quality. The phantom was also imaged on a TomoTherapy machine utilizing the three available imaging modes of fine, normal, and coarse. The imaging was repeated on a Siemens OnCor Avant-Garde linear accelerator utilizing the MVCB-CT option. Five observers were asked to score each image modality. A scoring scheme and rules were developed to allow all of the observers to use the same criteria to judge these image attributes. Each image was processed using a constant region of interest (ROI) and fixed window and level to reduce scoring bias.

**Results:** The outcome was consistent among the observers concerning spatial resolution. There was a decrease in perceived resolution in the z-axis compared to the x-y directions for all three imaging units. The Siemens MVCB scored higher compared to TomoTherapy in the z-axis, but scored lower in the x-y plane. The observer scoring for low contrast detection was most consistent in the phantom containing high-density objects (1.56-1.02 g/cc) compared to lower density (1.09-1.02 g/cc). A comparison was made between low contrast scoring and quantitative contrast ratio.

**Conclusion:** The results show consistent scoring of image spatial resolution by multiple observers regardless of modality. The largest variation occurred when scoring the lowest density objects. A noticeable trend was established between contrast ratio and observer scoring.

**Conflict of Interest:** Partially supported by Siemens