

AbstractID: 13482 Title: Comparison of different onboard CT techniques for Image Guided Radiation Therapy (IGRT)

Purpose/Objective: To compare image quality of clinically available on-board CT techniques for image guided radiation therapy (IGRT): MV cone beam CT (CBCT), MV fan beam CT, and kilovoltage CBCT. **Materials and Methods:** Images were acquired using (1) The 6 MV treatment beam (TBL) of a Siemens ONCOR linac (2) The 4.2 MeV imaging beam line (IBL) of the ONCOR (3) The 3.5MV beam of a Tomotherapy unit (Tomo) (3) The 120kV beam of an Elekta XVI and (4) a Varian Trilogy OBI (both 125kV and 100 kV beams). A cylindrical water phantom of 16cm diameter and big water phantom of 50x38x18cm with eight tissue equivalent inserts were imaged. Contrast-to-noise ratio (CNR) and spatial resolution were obtained from phantom CT images. The dose at isocenter were measured for both phantoms and all imaging techniques. **Results:** With the same isocenter dose, CNRs for the cylindrical water phantom were generally highest for images acquired with the OBI. For dense bone, XVI images had higher CNR than IBL, followed by Tomo, then TBL. For lung and soft tissues, IBL, Tomo, and Elekta are comparable. For CNRs measured with the big water phantom, XVI and OBI have a higher CNR than IBL and Tomo, with the largest difference being for both dense bone and lung. IBL generally has a better CNR than TBL. The spatial resolution is higher for OBI, then followed by XVI, Tomo, IBL and TBL. **Conclusions:** At the same dose to isocenter, KV CBCT images have higher CNR and spatial resolution than those of MV beams. Work underway to be presented at the meeting will extend this comparison to other measures of greater clinical importance than isocenter dose, including surface dose and average dose to the central slice. **Research sponsored by Siemens OCS**