AbstractID: 10582 Title: HU and Dosimetric Comparison of Six Cone-beam CT Acquisition Techniques for Radiation Therapy Planning

Purpose: It has been shown that cone-beam computed tomography (CBCT) can be used in dose calculation for treatment planning. This study investigates the HU and dosimetric properties of six CBCT techniques in comparison with conventional CT to determine which techniques are proper for planning. **Method and Materials:** HU of material disks in Catphan and HU profiles for homogeneous and inhomogeneous phantoms for six different CBCT techniques (Low-Dose Head, Standard-Dose Head, High Quality Head, Pelvis Spotlight, Pelvis, and Low-Dose Thorax) were compared to CT images. Plans with a single photon beam based on CBCT techniques and conventional CT of phantoms were compared using dose values at the isocenter, isodose distributions, and dose volume histograms. **Results:** HU values of all the CBCT techniques are very close to those of CT in Catphan and in homogeneous phantoms except for Low-Dose Thorax (LDTH) technique, which overestimates HU by 85. However, the LDTH CBCT showed the HU profile in the lung area matched well with the CT compared to the other five techniques. The dose distribution based on all CBCT techniques in the homogeneous phantoms matched well with the CT except for LDTH, which underestimated the dose. For the lung area, the LDTH dose distribution matched well with CT and the other CBCT techniques did not. For the spine area, the dose distribution of the Pelvis technique matched best with CT, but the other techniques matched relatively well with CT too except for LDTH. **Conclusion:** This study illustrates HU values and dose calculation based on six different CBCT techniques compared to conventional CT for the purpose of radiation therapy treatment planning. The dose calculation accuracy depends on combination of CBCT acquisition technique and treatment site. A CBCT technique should be properly selected for a treatment site if CBCT-based dose calculation is to be performed.