AbstractID: 11036 Title: Monte Carlo Based kV CBCT Modeling and Dose Calculations Involving Anatomical Phantom

Purpose: To model and validate the Varian OBI kV CBCT scanner and to assess radiation dose to the anatomical patient phantom. **Method and Materials:** Monte Carlo code, MCNPX, was used to simulate the x-ray source including the energy spectrum, filter, and scan trajectory. The scanner with full-fan and half-fan scan modes was validated by comparing simulated peripheral doses against measured peripheral doses. The validated scanner model was then involved with the phantom of an anatomical patient phantom to calculate the organ doses. **Results:** Comparison between simulated and measured peripheral results performed on OBI kV CBCT with body and head phantoms shows good agreement in terms of the discrepancy between the simulated and measured $D_{central}$, as well as simulated and measured $CBCTDI_w$. The nuances were ranged 1% - 8%. It was found that, during the IGRT CBCT imaging procedure in low dose mode with total 252 mAs used, that eye lens received the largest dose around 6 cGy for head-neck scan, and thymus received the largest dose around 7 cGy for lung-chest scan,. **Conclusion:** This work demonstrates the ability of modeling and validating kV CBCT scanner by using Monte Carlo technique, as well as rapidly and accurately assessing organ doses by combining the kV CBCT scanner model and the patient phantom.