

AbstractID: 13972 Title: CBCT image guidance for head and neck IMRT radiation therapy—a study on the tumor coverage and critical structure avoidance

Purpose: Cone beam computed tomography (CBCT) is becoming more prevalently used for image-guided radiation therapy (IGRT). The ideal CBCT frequency and protocol will limit patient imaging dose, while insuring the accuracy of the radiation therapy (RT). We herein examine the effects of a possible CBCT imaging protocol on the delivered RT.

Methods and Materials: The intensity modulated radiation therapy (IMRT) plans for 6 head and neck cancer patients undergoing IGRT with CBCT were retrospectively studied. The CBCT protocol called for daily IGRT for the first treatment week, followed by twice-weekly imaging for the remaining RT fractions. The statistics of the IGRT patient set-up shifts throughout the treatment course was used to create the treatment dose for non-IGRT days using our in-house TPS PlanUNC. The cumulative dose from the entire treatment course is the sum of the non-IGRT daily doses and the planned daily doses for IGRT days. The resulting cumulative doses to the clinical target volume (CTV) and critical structures were examined.

Results: The delivered treatment plans maintained the CTV treatment planning goals for 6 patients. Incorporating the IGRT shift statistics caused the CTV of one patient to be under dosed. The hotspots for the optic chiasm, cord, and brainstem were all within the treatment goals, and the absolute doses were within 5% of the planned RT. The dose constraints for the larynx and parotids were all maintained in the delivered treatment plans.

Conclusions: The proposed CBCT protocol is sufficient for accurate RT delivery to the target volumes and critical structures of head and neck IMRT patients.