AbstractID: 8352 Title: Dosimetric Effect of Setup Errors on NPC IMRT Treatments

Purpose: To investigate the resulting dosimetry error, change in TCP and NTCP from random and systematic setup errors for IMRT treatment of NPC.

Method and Materials: The IMRT plans of 16 NPC patients treated with SIB technique were analyzed. Random setup errors were simulated by convolving the fluence of each field with Gaussian distributions of σ equal to 2 or 3 mm. Leaf motion calculation was then performed on the convolved fluence and the corresponding dose calculated. Translational setup errors were simulated by translating the isocenter in the x, y and z direction by 2 and 3 mm respectively. Patient pitch, yaw and roll of up to 3^{o} were simulated by collimator, couch and gantry rotations. The dose distributions were computed after the change. For the original plan and altered plans, DVHs were generated for GTV and the following: L/R optic nerves, brainstem and spinal cord. Dosimetric indices, such as EUD, TCP and NTCP were computed and compared.

Results: TCP is not significantly affected by setup errors. For 3 mm random error, the average decrease in TCP was 1.1%. For systematic errors, the average decrease in TCP was <1%. Average change in NTCP for brainstem and spinal cord was found to be with ±1% for both random and systematic setup errors. However, systematic setup errors results in a substantial increase in NTCP for the optic nerves, especially when isocenter is shifted craniocaudally. The average increase of NTCP from 3 mm shift is 22.2%. Patient yaw also resulted in the greatest increase in NTCP amongst rotational setup errors.

Conclusions: Our results indicate that both random and systematic setup errors have little effect on TCP. Change in NTCP for brainstem and spinal cord were also negligible for our cases. Nevertheless, the optic nerves are very sensitive to systematic setup errors.