

AbstractID: 9409 Title: Interfraction dose variations for head and neck cancer assessed using daily kVCT

Purpose: The interfraction variations during head and neck cancer radiotherapy can be significant due to the setup errors, neck rotation and organ shrinkage. We investigated the dosimetric consequence of these interfraction variations, so that the proper correction strategies can be considered.

Method and Materials: Daily kVCT images for 20 head and neck cancer patients treated with CT-guided repositioning using a linac and CT-on-Rails combo (CTVision, Siemens) were analyzed. Complete structure sets including multiple targets and critical structures were generated by deformable registration (MIMvista, OH) on each daily CT of the entire treatment course. Original plans were applied on each daily CT with and without the repositioning shifts recorded during the daily IGRT process. The daily doses were analyzed and compared to the planned doses.

Results: The rotation of neck is difficult to reproduce everyday for head and neck cancer treatments. Generally, the daily repositioning based on the rigid body registration can correct for most of the interfraction dosimetric deviations from the planned doses. For example, on average, D95 (dose covers 95% of the target volume) was 3% lower than that planned after repositioning. It was observed that, for certain treatment fractions, the targets were significantly underdosed (>5%), and/or the cord doses were increased by more than 5%. A margin of 0.5 cm for cord could ensure the cord dose does not exceed the dose limit.

Conclusion:

Although large interfraction variations in neck rotation, organ shrinkage, and setup errors during head and neck RT, the overall dosimetric impact can be corrected in majority of treatment fractions with the current standard of rigid-body repositioning during IGRT. More complex correction strategies are needed for a small portion of fractions.