

AbstractID: 11212 Title: Adaptive Radiotherapy Treatment Re-Planning For Head And Neck Cancer Patients

Purpose: To demonstrate the need for adaptive treatment re-planning in Head and Neck (H&N) cancer patients undergoing Intensity Modulated Radiation Therapy (IMRT). Radiation induced anatomical changes can lead to significant variation of dose delivered compared to the initial planned dose distribution.

Methods and Materials: 3 H&N cancer patients with locally advanced stage IVA or IVB disease with large lymph nodes (4cm, 5.5cm, 7cm) underwent a second PET-CT scan at 36Gy for adaptive re-planning since they clinically had a partial response to definitive chemoradiation. We overlaid the initial CT scan into the new CT scan to accurately calculate dose delivered by the new IMRT plan to the initial CT scan. We evaluated the changes in the different volumes including critical organs. Further, we evaluated the changes in the dose-volume histogram (DVH) for the new ROIs (spinal cord, salivary glands, CT-GTV, PTV).

Results: Comparison between the two CT scans showed significant change in target and normal tissue volumes. For one study case, the left parotid volume decreased by 21% while the GTV decreased by 37%. The DVH analysis for the superimposed second CT with the initial IMRT plan showed small but meaningful underdosing to CT-GTV and PTV. Moreover, 1% of the new CT-GTV received <54Gy (prescribed dose: 58Gy); 1% of the new PTV received <46Gy (prescribed dose: 58Gy). The maximum spinal cord dose increased 27.1% from 27.7Gy to 35.2Gy. The mean left parotid dose was the same. The mean right parotid dose increased by 15.8%.

Conclusions: For H&N cancer, adaptive mid-treatment re-planning should be considered for more accurate dose delivery especially when significant clinical response is noted on physical exam or daily/weekly imaging. Significant changes in the DVH can take place for normal structure as well as the CTV and the CT-GTV due to anatomical changes during the course of treatment.