AbstractID: 12680 Title: Dosimetric impacts of rotational setup errors on head & neck IMRT treatments

Purpose: To investigate the dosimetric impact of the residual rotational setup errors on head&neck (HNC) IMRT with conventional clinical three translational setup corrections, and to evaluate the necessity of the full six degree (6D) setup correction.

Methods and Materials: A total of 66 kV CBCT image sets were acquired on the first day of treatment and weekly thereafter for 10 HNC patients. The CBCT images were registered with the planning CT images using two 3D rigid registration methods. Method1 determines the translational errors only and method2 determines 6D errors. To simulate the clinical setup correction, the 6D setup errors were simulated in the treatment planning system and then were corrected by using the corresponding translational data determined by method1. For each patient, dose distributions for 6 to 7 fractions with various setup uncertainties were generated, and plan sum was created to simulate the total dose distribution through an entire course and was compared with the original treatment plan. The first phase plan with prescription about 50 Gy was used in this study.

Results: Without rotational corrections and with only translational corrections, for PTV, the plan sum showed that the average V_p (prescription dose coverage) was decreased by 5.9%, D_{95} (dose that covers 95% of target) was decreased 1.8 Gy. For CTV, though the Vp could be decreased by 8% for treatments on selected days, the plan sum showed that the average V_p was decreased by 1.7% and D_{98} was decreased 0.1 Gy. The average dose increase to spinal cord was 0.7 Gy.

Conclusions: With conventional translational setup correction, the overall CTV prescription dose coverage decreases insignificantly because of the 5mm margin from CTV to PTV. The dose increase to spinal cord is not significant. So for HNC IMRT treatment with target margin, the six degree setup correction is not necessary.