AbstractID: 11454 Title: Dosimetric comparison among 3D conformal, IMRT, and phase-average compensators for SBRT treatment planning

Purpose: To obtain a dosimetric comparison for 3D conformal, and compensator based IMRT for AIP and MIP volumes obtained from 4D CT series.

Methods and materials: A single breathing cycle was programmed into the CIRS dynamic tissue equivalent phantom which contains a 3 cm diameter target and 4DCT study performed. The AIP, MIP were derived directly from the 4D CT study. 3D conformal and compensator based IMRT plans were generated for the AIP, MIP. IMRT plans were also created for each of the 10 image sets corresponding to the various phases of the respiratory cycle. Using the optimized fluence map of every beam of the 10 phases, an average compensator was generated per beam. These phase-averaged compensators were used to generate additional plans on the AIP and MIP image sets. A conformity score (CGIc) and gradient score (CGIg) were used to compare the plans.

Results: The compensator based IMRT plan on the AIP image set and the one based on all the phases were equivalent (approximately 1 point variation in both CGIc and CGIg). When compared with the 3D conformal plan, CGIc increased by approximately 11 points with an insignificant CGIg variation. Clearly for the AIP and MIP, the IMRT-compensators improved the conformity and coverage of the target volume (CGIc of 84 and 87 respectively). The gradient score for the MIP was much lower (approximately 33 points lower).

Conclusions: This study demonstrates that the IMRT-compensator technique based on the AIP and the averages of the phases applied to the AIP provide the better dosimetric results in a moving target. The same technique based on the MIP provides almost the same coverage without significant improvement on the conformity compared with the 3D conformal plan.