

AbstractID: 10788 Title: Compensator-based IMRT re-planning using field-in-field technique and the original compensators

Purpose: Compared with MLC-based IMRT for moving targets, compensator-based IMRT has advantages in shorter beam-on time, less monitor units with decreased carcinogenesis risk, better optimization-to-deliverable dose conversion, and often better dose conformity. Some of the disadvantages include additional time for the compensators to be built and delivered as well as extra cost. Treatment of moving abdominal cancers with this technique introduces the clinical problem of weight change, which can occur at any time during treatment. Accounting for a change in weight with a new plan and a second set of compensators would result in treatment delays and more costs. A method to re-plan the patient using the same set of compensators would be advantageous.

Method and Materials: With abdominal cancers, most often the tissue change is reflective of weight loss. Since the reduction is usually small, a new 4D CT acquired in the treatment position with markers on the original iso-center tattoos can be registered to the first planning scan. The contours from the original scan can be copied to the new scan and edited as needed to reflect their new anatomical position. The original compensator set can be used together with a few field-in-field beams defined by MLCs. The weights of the beams with compensators are reduced so that the field-in-field MLC beams can be optimized to mirror the original plan and dose distribution.

Results: With this technique, the new plan usually restores the original plan on the new planning CT images. The target coverage and dose uniformity are improved compared to the plan without the field-in-field modification.

Conclusions: To save time and cost, the original compensators can be used in the new compensator-based IMRT plan when the patient's weight changes. Field-in-field modification to the plan is necessary to restore the original plan on the new planning CT.