AbstractID: 3047 Title: IMRT with MLC Rotation – Dose Volume Benefits of High Precision Treatment Planning

Purpose: To evaluate a new method of treatment planning that incorporates collimator rotation into MLC based fluence segmentation.

Method and Materials: A set of treatment plans were generated using a new technique for fluence segmentation where the collimator is rotated in between each MLC sub-field. It was previously shown that this technique has improved spatial resolution, increased flexibility in generating aperture shapes and decreased systematic error due to interleaf effects. Unfortunately these studies were limited to single fields. In this study we evaluate the ability of the rotating collimator technique to generate conformal dose distributions by comparing to conventional IMRT plans. Plans for a simple geometric phantom as well as a prostate and nasopharynx carcinoma recurrence were generated. One set of plans was generated with a conventional step-and-shoot delivery method (no MLC rotation) while a second set was generated with the collimator rotation segmentation method.

Results: 3D dose comparisons as well as DVH analyses show that target coverage is equivalent or better with collimator rotation. Healthy tissue sparing is improved with collimator rotation, although more so for the smaller, more complex, nasopharynx target. It is also shown that increasing radiation efficiency (decreasing monitor units) will increase healthy tissue sparing. A decrease in the number of monitor units is seen with collimator rotation for both clinical cases.

Conclusion: By incorporating MLC rotation into IMRT planning it is possible to improve target conformity and healthy tissue sparing. These benefits are more significant for smaller targets of higher complexity. The number of monitor units will also decrease, providing less transmission and total body scatter dose.

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