

AbstractID: 13940 Title: Effective MLC leaf width for RapidArc plans: Can coarse resolution give fine results?

Purpose: To determine the feasibility of using a multileaf collimator (MLC) with leaf widths of 1.0 cm, to obtain dosimetrically similar results to an MLC with 0.5 cm leaf widths, for RapidArc treatments.

Method and Materials: The CT data of 10 patients, who had recently completed treatment at our clinic, were loaded into the Eclipse treatment planning system. Two plans were generated for each patient: a single-arc plan using a 0.5 cm MLC leaf width, and a two-arc plan using a 1.0 cm MLC leaf width, with the isocenter of one field shifted by 0.5 cm in the direction perpendicular to leaf travel. The optimization parameters used were the same as those employed during the original patient treatment plan. Both plans were optimized by Eclipse's arc optimization algorithm, without any manipulation of constraints or other outside intervention once the process was underway. All plans were normalized such that 95% of the target volume received 100% of the prescribed dose.

Results: For all 10 patients, the two-arc 1.0 cm MLC plans were able to return at least equivalent results for PTV coverage; in all but one instance the two arcs had superior PTV coverage and homogeneity as compared to the single-arc 0.5 cm MLC plan. Dose to organs at risk (OARs) were not identical, but no trend for higher OAR doses for a particular leaf width can be established. On average, the number of monitor units used for the two-arc 1.0 cm MLC plans increased by 15%, when compared to the single-arc 0.5 cm MLC plans.

Conclusion: By using two arcs, with an isocenter shift of half a leaf-width, it is possible for centers using a 1.0 cm MLC leaf-width to plan RapidArc cases that are dosimetrically similar to those planned with a 0.5 cm leaf width.