

AbstractID: 5283 Title: A comparison between Intensity Modulated Arc Therapy (IMAT) and Tomotherapy

Purpose:

Intensity Modulated Arc Therapy (IMAT) has been proposed as an alternative to helical tomotherapy. IMAT can be delivered on a conventional linear accelerator and uses overlapping arcs to deliver a modulated intensity pattern from each beam direction. In this study, IMAT treatment plans were developed for ten patients previously treated with helical tomotherapy. The goal was to determine if IMAT could match the dosimetric capabilities of tomotherapy.

Method and Materials:

The IMAT planning process begins with an IMRT optimization performed using the Pinnacle³ planning system. In Pinnacle³, beams are placed at 10° increments along each arc path. After the optimization, an arc-sequencing algorithm is applied to the optimized fluence maps to create a deliverable IMAT plan. The treatment sites in this study included lung, prostate, pancreas, brain, and head-and-neck. The IMAT plans were created under the assumption that the dose rate can vary from one beam angle to the next in each IMAT arc.

Results:

For coplanar delivery, the plan comparisons reveal that IMAT can generally provide equivalent plan quality as compared with tomotherapy. An average of 5 arcs and 692 MUs were used for these cases. In some cases improved critical structure sparing was observed in the IMAT plans at the expense of target dose uniformity. For three cases, noncoplanar IMAT plans were developed. The results demonstrate that for select cases the ability to incorporate noncoplanar arcs serves as a distinct advantage for IMAT. For example, in one case IMAT reduced the brainstem mean dose from 1866 to 606 cGy and the mean dose to the optic nerve from 388 to 95 cGy.

Conclusion:

When only axial coplaner arcs are used, IMAT plan can achieve as conformal dose distributions as tomotherapy plan. The IMAT plan, however, can provide a much better sparing to critical structures with non-coplaner arcs.