

AbstractID: 13640 Title: Comparison of Coplanar and Non-coplanar Intensity Modulated Arc Techniques for Treatment of Intracranial Multi-Focal Stereotactic Radiosurgery

Objectives: Intensity modulated arc therapy (IMAT) can potentially be a useful technique for the treatment of multi-focal intracranial stereotactic radiosurgery (SRS) with a single isocenter setup. This study compares the effects of coplanar and non-coplanar beams on IMAT SRS plans.

Methods: A Novalis TX linear accelerator system with a high-definition multi-leaf collimator (HDMLC, lead width 2.5 mm at isocenter) was used for treatment. RapidArc with beam modulation using HDMLC at each position along the arcs was used for treatment planning. Cone-beam CT (CBCT) images were used for precise localization prior to treatment delivery. Patients with 2 to 5 lesions that were treated with conventional SRS plans using dynamic arc and conformal beams were retrospectively planned with RapidArc. Single-arc IMAT plans are compared to 5-arc IMAT plans for target coverage, conformity index (CI), and the volume within the low dose (5 Gy) isodose line.

Results: The conformity index of non-coplanar 5-arc IMAT plans is better than that of the single-arc IMAT plans. The CI's for a four lesion SRS case are 1.38, 2.29, 1.33, 1.51 for the non-coplanar 5-arc IMAT plan and 1.82, 2.83, 1.62, 1.97 for the single-arc IMAT plan respectively. Figure 1 shows the comparison of the isodose distribution for non-coplanar 5-arc and single-arc IMAT plans. The volume within the 5 Gy isodose line of non-coplanar 5-arc IMAT plans is smaller than that of single-arc IMAT plans.

Conclusion: IMAT can be used for stereotactic radiosurgery of multiple intracranial lesions with a single isocenter setup to significantly reduce the treatment time. Non-coplanar IMAT plans are better than coplanar IMAT plans in terms of conformity and dose to the normal tissue.