

AbstractID: 9306 Title: Rotational Intensity-Modulated Therapies: Can Conventional Arcs Match Tomotherapy?

Purpose: To investigate the potential of dynamic arc therapy delivered by a conventional linac to match tomotherapy both in terms of plan quality and efficiency.

Methods: For a series of different clinical cases, four treatment plans each were generated: a conventional fixed-beam IMRT plan, an intensity-modulated arc plan (IMAT), an IMAT plan restricted to one arc (AT) and a tomotherapy plan for the Hi-Art system.

All treatment plans were generated by the same optimization algorithm using EUD-based cost functions and Monte-Carlo dose calculation for each modality. The IMRT and IMAT plans were obtained by optimizing MLC segment shapes directly.

Results: In general, the intensity-modulated techniques were all capable of producing comparable plan qualities, sometimes at the price of a large number of beam directions or a reasonably large number of arcs (up to 8). The single arc technique could never match these results fully if normal structures became dose limiting. In general, the trade-off between target dose homogeneity and organ sparing was worst with AT. In terms of efficiency, IMAT plans were limited by gantry speed, while IMRT plans were limited by MLC constraints.

Conclusion: Intensity modulation cannot be replaced fully by rotational delivery, but multiple modulated arcs are more efficient in terms of delivery than fixed beam IMRT when MLC constraints require frequent beam interrupts.