

AbstractID: 1143 Title: The Large Number of Delivery Angles of Helical Tomotherapy and Dose Uniformity

Inherent to helical tomotherapy is a relatively large number of beams delivery angles per rotation. For most situations this is sufficient. However, the extreme case of a small avoidance structure imbedded completely within the target serves as a test case for the exploration and discussion of the dose uniformity relative to the number of beams. The example of a dose delivery to the lumbar bones with central avoidance of the spine illustrates the streaks that develop even with the 51 angles of helical tomotherapy (10% peak to trough). An illustrative fluence ray-tracing calculation used to calculate the dose modulations in the target and streaks due to phased delivery from each successive slice. It is argued that one could reduce the presence of such streaks by de-phasing the dose for each rotation. This de-phasing works because the typical tomotherapy pitch is less than unity and therefore the de-phasing acts to add more delivery angles. This ring target possibly represents a rare case clinically, but it serves as a representation of a high spatial frequency situation to test the process of reoptimization.

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