AbstractID: 8424 Title: Quantifying the Dosimetric Trade-Offs when Treating Targets with Concavities Using IMRT

Purpose: To quantitatively assess the relationship between intensity-modulated radiotherapy (IMRT)-driven sparing of dose to normal tissues located "*within*" concave targets with (1) heterogeneity in dose delivered to the target and (2) redistribution of dose to normal tissue beyond the concavity.

Method and Materials: Idealized volumes resembling mesothelioma and prostate cancer were considered, both with concave targets containing normal tissue. Multiple IMRT plans were generated with progressive dose restriction to the normal tissue within the concavity. We quantified the impact of such sparing on the heterogeneity of dose within the target tissue itself, and the dose received by normal tissues beyond the concavity.

Results: As the dose to the normal tissue within the concavity is reduced, the heterogeneity in dose delivered to the target increases in an exponential fashion. Further, there is a rapid increase in redistributed dose to other normal tissue regions, particularly to the other normal tissues immediately adjacent to the outside edges of the concavity (i.e. adjacent to the "free margin" of the target).

Conclusion: For targets with concavities, there are dosimetric consequences associated with reducing dose to normal tissue located within these concavities. There appears to be a trade-off between the heterogeneity in dose delivered to the target, the mean dose to the concavity, and the redistributed dose to other normal tissues. Understanding the interaction between these dosimetric factors can aid the planner in assessing the feasibility of a desired dose distribution.