

AbstractID: 9261 Title: Evaluation of Smoothing/Complexity Adjustment Feature for Three IMRT Inverse Treatment Planning Systems

Introduction

Commercially available IMRT treatment planning systems (TPS) often include a *smoothing function* which allows the user to vary the irregularity/complexity of delivered beam fluence patterns. The cost of reducing the complexity of inverse-planned optimal fluence patterns may be a reduction in plan quality. In this study we evaluated the behavior of 3 treatment planning systems when using varying smoothing parameters.

Methods

We evaluated three cases treated by IMRT in our clinic: a sinonasal carcinoma (SNL), a base of tongue carcinoma (BOT), and a glioblastoma multiforme (GBM). Varian Eclipse v6.5, BrainLab Brainscan v5.31, and Nomos Corvus v6.2 TPS were studied for the SNL and GBM plans. Only Eclipse and Corvus TPS were studied for BOT planning due to field size constraints of the MM3 collimator. For each TPS, plans were first optimized using the vendor recommended default “smoothing”. Treatment plans were then reoptimized with various smoothing levels being explored for each of the planning systems. Key metrics were recorded for each plan, including efficiency factors and conformity index.

Results

Results varied widely by vendor with regard to smoothing’s impact on both plan quality and delivery efficiency. The Corvus TPS allowed, as might be reasonably expected, increased OAR sparing for the majority of structures as smoothing was incrementally decreased. Both Eclipse and BrainScan also experienced an expected trend for decreased efficiency as smoothing was decreased. However, this increase in expected complexity did not result in appreciably improved OAR sparing for either TPS.

Conclusions

Depending on the treatment planning system, the potential benefits of optimizing fluence smoothing levels can be significant, allowing for increases in either delivery efficiency or plan quality. Because of the variability in behavior of smoothing functions by TPS vendor, it is important that users familiarize themselves with the effects of varying smoothing/efficiency parameters for their respective TPS.