

AbstractID: 6837 Title: Image-Guided Helical Tomotherapy to Treat Advanced Cancers of the Scalp: Prospects for Dose Conformity and Clinical Outcome

Purpose: to demonstrate the improved target-dose uniformity of helical tomotherapy over IMRT and electron techniques to treat scalp lesions, to summarize our institution's scalp-treatment outcomes using tomotherapy, and to estimate the required expansion margins for non-image-guided scalp treatments.

Method and Materials: helical-tomotherapy planning and delivery was done using the TomoTherapy Hi-Art System (TomoTherapy, Inc., Madison, WI). The prescribed dose for the tomotherapy plans (average 50.4 Gy) covered 95% of the PTV. For two patients, we also generated a seven-field photon IMRT plan and a single-field electron plan, scaling the monitor units so that the tumor DVH passed through the corresponding tomotherapy plan's prescription point. We followed up 15 patients with advanced cutaneous scalp lesions (average length 5.2 cm) treated with tomotherapy, noting the incidence of subsequent local recurrences. Using the systematic and random deviations among the MVCT-guided pre-treatment shifts, we calculated disease-site specific expansion margins for non-image-guided scalp treatments.

Results: the tumor DVH fell off more sharply for the tomotherapy plans than for either the IMRT or electron techniques. The electron plans yielded a better brain DVH than either tomotherapy or IMRT; however, the brain DVH was clinically acceptable ($V_{20} < 10\%$ and V_{30} negligible) for all three techniques. Among the 15 patients reviewed, a local recurrence arose only for a palliative angiosarcoma case. Among vertex-scalp cases, an overall margin of approximately 4 mm was obtained. The margin was approximately 5 mm for forehead and neck treatments, and within 2 mm for auricular cases.

Conclusions: our dosimetric comparisons demonstrate that helical tomotherapy provides superior tumor dose uniformity over IMRT or electrons, with adequate region-at-risk sparing. Curative-intent treatments with helical tomotherapy indicate favorable short-term local control of advanced scalp lesions. Data from the MVCT-guided patient shifts illustrate the appropriate expansion margins, for non-image-guided scalp treatment techniques.