AbstractID: 11341 Title: An Efficient Planning Technique for Tomotherapy Based Stereotactic Radiosurgery

Purpose: To develop a planning technique for stereotactic radiosurgery using the TomoTherapy treatment planning system that consistently produces optimal plan results in minimal planning time. By creating a formulaic approach to planning, it becomes feasible to acquire a planning image and complete treatment within a single day, as required for more invasive head fixation techniques.

Method and Materials: CT scans and contours for 20 patients with 1 to 6 metastatic brain tumors, treated in our clinic using a linac based approach, were used to develop a planning technique and test for robustness. Target volumes ranged from 0.1cc to 10.5 cc with prescribed doses ranging from 15Gy to 24Gy. First, effects of changing pitch and modulation factor on workflow and plan quality were determined. Next, planning volumes and optimization constraints were identified to predictably shape the dose distribution to allow flexibility in planning to meet any desired clinical criteria.

Results: It was found that a pitch between 0.13 and 0.18 could be used for over the range of prescribed doses to minimize beamlet computation time while allowing for delivery in a single treatment fraction. A maximum modulation factor between 1.5 and 1.8 can be used to achieve gradients comparable to linac radiosurgery without undue increase in delivery time. A small central contracted sub-volume can be used for quick plan scaling and to specify the maximum dose to the target. Intra-target dose inhomogeneity combined with a ring surrounding the target can be used to increase peripheral dose gradients.

Conclusion: It is possible to generate a class solution for radiosurgery planning on the TomoTherapy treatment planning system to produce plans that compare favorably with cone based radiosurgery plans within a planning time that is compatible with a one-day radiosurgery workflow.

Conflict of Interest: Planning resources provided by TomoTherapy, Inc.