

AbstractID: 11068 Title: Dosimetric Characterization of Whole Brain Radiotherapy (WBRT) using Helical Tomotherapy

**Purpose:** To investigate the dependency of pitch and field width on the quality of whole brain radiotherapy (WBRT) treatment plans using helical tomotherapy and to compare the dosimetric quality of tomotherapy to conventional WBRT techniques.

**Method and Materials:** Five (n=5) previously irradiated patients were retrospectively planned using the helical tomotherapy (TomoTherapy, Inc. Madison WI) treatment planning system (TPS). For each patient, four plans were generated with the following field width (FW) and pitch (P) parameters: (i) FW:5.0cm/P:0.86 (ii) FW:5.0cm/P:0.433 (iii) FW:5.0cm/P:0.287, and (iv) FW:2.5cm/P:0.433. Conventional lateral field plans were generated using Pinnacle<sup>3</sup> TPS. All treatment plans were prescribed and normalized so that 95% of the PTV received at least 30.0Gy in 10 fractions. Dose calculations were performed with a nominal 4.0 x 4.0 mm<sup>2</sup> dose grid. Plan comparison metrics utilized were dose sparing to the OARs and the PTV homogeneity index (HI).

**Results:** Significant sparing to the left and right eyes occurs when using tomotherapy. For the left eye, a mean reduction among all patients of 41.7% and 32.2% for the D<sub>2%</sub> and D<sub>mean</sub>, respectively, was noted. Similarly, for the right eye, a mean reduction among all patients of 38.1% and 16.9% for the D<sub>2%</sub> and D<sub>mean</sub>, respectively, was noted. PTV homogeneity improved by 2.3 and 4.9 times relative to conventional plan when using a 5.0cm and 2.5cm FW, respectively. Mean treatment times using a FW of 2.5cm and 5.0cm were 462.1s and 253.0s, respectively.

**Conclusion:** Our results indicate that tomotherapy, on average, reduces the mean (~25%) and maximum (~40%) dose to the eyes as well as improves the homogeneity to the PTV by a factor of 2.3 relative to conventional WBRT. Using a FW of 5.0cm and pitch of 0.86, plans may be generated and treated quickly by reducing the beamlet calculation and radiation delivery times.