

## AbstractID: 3575 Title: A technique for non-coplanar helical Tomotherapy cranial radiosurgery treatment

**Purpose:** To demonstrate a new technique for non-coplanar helical Tomotherapy cranial radiosurgery treatment. Evaluation of the improvement, in terms of minimizing the dose to healthy tissue, of the non-coplanar technique over the conventional coplanar treatment.

**Methods & Materials:** The proposed technique for non-coplanar helical Tomotherapy cranial radiosurgery is demonstrated using an anthropomorphic phantom (Rando phantom). Obtaining a composite dose distribution of the optimized non-coplanar plans is not possible with the current helical Tomotherapy planning system. For comparison of the dose coverage, conformality and dose volumes between the non-coplanar and the conventional coplanar treatment techniques, film dosimetry is used to obtain isodose distributions. A calibrated Welhofer scanner was utilized for the film dosimetry.

**Results:** The results show significant reduction in the volumes receiving 60% or less of the prescribed dose. There is no appreciable change in volumes receiving 70% or more of the prescribed dose. Dose volume ratios, DV20/80 and DV30/70 (defined as the ratio of the volumes receiving 20% and 80%, and the ratio of volumes receiving 30% and 70% of the prescribed dose, respectively) are used to quantify the improvement of a non-coplanar helical Tomotherapy cranial radiosurgery technique. The DV20/80 and DV30/70 dose volume ratios obtained for the non-coplanar technique are 9.33 and 4.57, respectively, whereas ratios obtained for the standard coplanar technique are 11.33 and 5.01, respectively.

**Conclusion:** The results of the study clearly demonstrate that the dose to healthy tissue can be minimized by using three non-coplanar angular orientations for helical Tomotherapy cranial radiosurgery. More marked improvements can be obtained by utilizing more than three non-coplanar angles, but at a high cost in terms of planning and treatment times. Balancing the improvements in DV20/80 and DV30/70 ratios and the required treatment and planning times entails making proper clinical judgment for each case.