

## AbstractID: 4982 Title: Evaluation of six dosimetric indices for Cyber Knife stereotactic radiosurgery treatment planning

**Purpose:** To evaluate effectiveness of using six dosimetric indices in evaluating Cyber Knife SRS treatment plans. To investigate the dependence of these indices on the target volume and the histology of the treated tumor. To examine the effect of treating large volume lesions on the dosimetric properties of a treatment plan.

**Method and Materials:** 154 treatment plans for Cyber Knife SRS of acoustic neuroma (AN), melanoma, meningioma, NSCLC and pituitary adenomas (PAs) were analyzed using six dosimetric indices: prescription isodose line PI, tumor isodose and volume coverage indices  $TI_{100}$  and  $TV_{100}$ , homogeneity index HI, conformity index CI and a modified CI (mCI). These indices and their averages for each tumor type were examined for dependence on the size of the treated tumor and its histology.

**Results:**  $TV_{100}$ , PI and  $TI_{100}$  showed a decrease with tumor size, HI showed a slight increase with tumor size, while CI and mCI showed little dependence on the tumor size. CI for all five treated tumor types was closely clustered about 1.44, while HI showed greater dispersion for melanomas and NSCLC, but closer clustering about 1.39 for PAs, meningiomas and ANs.

**Conclusion:** AN and melanoma plans showed the best on average tumor coverage while NSCLC showed the worst. Modified CI and CI indices were the lowest for the ANs and meningiomas, while HI performance was the best for ANs, intermediate for melanomas and PAs, and the worst for NSCLC. Modified CI showed very little dependence on the tumor size. PI and  $TV_{100}$  showed a trend towards rapid decrease with tumor size and therefore less coverage beyond 10 cc volumes for melanoma, meningioma and PA and beyond 100 cc for NSCLC. All six indices were found to be a useful tool for routine use in evaluating stereotactic treatment plans at our institution.