

## AbstractID: 8569 Title: Comparison of Dose Gradient in The Critical Normal Structures Between CyberKnife and IMRT Treatment of Prostate Cancer

**Purpose:** This study aims to investigate dose gradient or fall-off with distance on the critical normal structures using CyberKnife and IMRT delivery for hypofractionated stereotactic prostate radiotherapy.

**Method and Materials:** Eight cases of prostate cancer patient treated with the CyberKnife (CK) were used in this study. Based on the identical contour sets, treatment plan for each patient was generated on IMRT system. To calculate dose fall-off, CTV (where CTV was prostate itself) contour was expanded 30 mm posteriorly and 50 mm uniformly for all patient cases with CK and IMRT planning systems. Plans were normalized such that 95% of the CTV received 100% of the prescribed dose. DVH parameters were used to analyze and compare doses to CTV and its posterior and uniform extension, bladder, rectum and urethra.

**Results:** All plans satisfied the specified requirements with an exception in CTV dose conformity indices (CI). A number of IMRT plans show prescribed CTV isodose curve bulged out transversely. CI value for Cyberknife plans is  $1.18 \pm 0.08$  and  $1.44 \pm 0.11$  for IMRT. Dose fall-off study showed that percent dose fall-off/mm (pdf/mm) are  $3.75 \pm 1.58$  and  $3.15 \pm 1.88$  posteriorly, and  $3.60 \pm 3.97$  and  $3.62 \pm 4.30$  in 20 mm uniformly expanded region for CK and IMRT, respectively. An attempt was made to recalculate pdf/mm for 5 mm split regions. For (0-5), (5-10), (10-15), and (15-20) mm regions, pdf/mm are  $5.71 \pm 1.02$ ,  $4.49 \pm 0.56$ ,  $2.77 \pm 0.35$ ,  $2.05 \pm 0.19$ , and  $5.61 \pm 1.26$ ,  $3.81 \pm 0.53$ ,  $2.07 \pm 0.46$ ,  $1.13 \pm 0.16$  posteriorly, and  $9.01 \pm 4.91$ ,  $2.67 \pm 0.59$ ,  $1.58 \pm 0.21$ ,  $1.13 \pm 0.11$ , and  $9.62 \pm 5.08$ ,  $2.47 \pm 0.71$ ,  $1.32 \pm 0.16$ ,  $1.06 \pm 0.03$  uniformly for CK and IMRT, respectively.

**Conclusions:** CyberKnife and IMRT plans produced equivalent target dose coverage while CyberKnife plans show CTV dose is more conformal than IMRT. Dose fall-off is slightly faster posteriorly for CyberKnife plans than IMRT plans.

**Conflict of Interest:** Data was presented in CyberKnife User's Meeting 2008, Scottsdale, AZ.