AbstractID: 14004 Title: Comparison of three optimization methods of BrachyVision™ for IORT using HDR and HAM Applicator

Purpose: 1. To compare the three optimization methods in BrachyVision™ (Varian Medical Systems, Palo Alto, CA) for flat surface implants using the HAM applicator; 2. To study the effect of curvature of a surface implant on dosimetry.

Method and Materials: Flat surface implants were generated in BrachyVision™ using three different optimization strategies offered in BrachyVision™: geometrical optimization normalized to a reference point (GO), volume optimization using reference lines (VO_RL), and volume optimization using a PTV concept (VO_PTV). For each plan, the following indices were computed: the coverage index V(x) (percentage of target volume receiving x% of the prescription dose or more) and the homogeneity index HI(x) (=V(100)-V(x), with x = 140). Two curved geometries, 9 and 20 cm radius, were considered. For each radius, 9 and 18 channels were planned first as if for a flat implant. The obtained dwell times were then directly transferred to corresponding channels in the curved geometry and dose distribution calculated. Another plan was generated using VO_PTV method based on the curved PTV. Plans were compared in terms of V(100) and HI(140) and DVHs for PTV and normal tissue.

Results: 1. For flat implants, GO achieves worse coverage index (86.5 %) than the two VO techniques (95.3% and 95.5%). PTV DVHs are comparable between the two VO techniques. While the VO methods use similar optimization time, VO_RL is easier and quicker to setup thus is the fastest method to use. For both 9 and 18 channel HAM and both radii, the difference between the V(100) and HI(140) is minimal between plans generated with flat dwell times and curved dwell times.

Conclusion: The VO_RL is the fastest method for planning a flat IORT HAM surface implant. For radius larger than 9 cm, a curved implant can be simplified as a flat implant with negligible dosimetric difference.