

AbstractID: 8916 Title: On the Dosimetric Characterization of Inclined Target Geometries using Helical Tomotherapy

Purpose: To investigate whether the overshoot effect or “ballooning” of isodose lines into the rectum observed in tomotherapy patient treatment plans is caused by the sharp inclination of the posterior border of the prostate.

Method and Materials: Cylindrical target and OAR volumes were segmented in a solid water phantom and placed adjacent to one another in an anterior-posterior orientation at the center of the phantom. Individual treatment plans were created for the following angular orientations with respect to the y-axis (IEC coordinates): Target0/OAR0: 0° above y-axis, Target15/OAR15: 15° above y-axis, Target30/OAR30: 30° above y-axis and Target45/OAR45: 45° above y-axis. Separation between the target and OAR remained fixed at 5 mm for all angles. Treatment plans were generated with a field width of 2.5cm, pitch of 0.287, and modulation factor of 2.5. For all plans, dose prescription was 98% of the target volume to receive at least 6.0Gy. Four additional treatment plans were created in which the target extended into the OAR.

Results: None of the phantom plans showed any overshoot of the isodose lines into the adjacent OAR. In the phantom plans with the target extended into the OAR, the effect was not clearly seen however a slight indication of minimal ballooning was indeed observed. Additionally, it was noted that as the inclination angle increased the mean dose to the OAR increased.

Conclusions: This study served to investigate the dependency of the target inclination on the isodose ballooning effect seen in prostate patients. Our phantom study results show that the angle of inclination does not produce a ballooning of the isodose lines but does lead to an increase in mean dose to the OAR as the angle is incremented. Future studies will investigate whether the extension of the target volume into the OAR is the cause.