

AbstractID: 10854 Title: Dosimetric impact of bladder contrast on prostate helical tomotherapy treatments

Purpose: To quantify the effect of bladder contrast on helical tomotherapy prostate dose distributions

Method and Materials: Five anonymous early-stage prostate patients consecutively treated with hypofractionated helical tomotherapy were retrospectively analyzed. All patients were planned at 4.3 Gy per fraction for 12 fractions. Contrast was used in the bladder at the time of simulation, but was not converted to water at the time of planning and not used during treatment. The mean density within the contoured bladder was 1.1 g/cm^3 averaged over all patients, and bladder volumes ranged from 176.7 cm^3 to 341.5 cm^3 . Matlab® software was used to retrospectively override the density of the bladder contents on the planning image to that of water (1 g/cm^3). Original treatment plans were recomputed on the density-overridden planning images using Planned Adaptive® software. Fractional dose distributions of original plans were compared with the treatment plans recomputed on density-overridden images. Dose difference maps were created by subtracting the original plan distributions from the density-overridden distributions and normalizing to the prescribed fraction dose.

Results: Differences in dose distributions of up to +3% were observed in all patients, with maximum values ranging from +2.6% to +3.4%. These differences were located primarily within the bladder and along the superior edges of the prostate bordering the bladder.

Conclusion: Planning with bladder contrast but treating without contrast can cause dose distribution differences of up to 3% for helical tomotherapy prostate treatments. This effect should be considered at the time of planning. It should also be taken into account as a possible factor when assessing dose distributions on daily images for the purposes of adaptive radiotherapy.