

## AbstractID: 5197 Title: MR Imaging for Improving IMRT Targeting of Prostate Cancer

**Purpose:** To evaluate the role of magnetic resonance imaging (MR) in improving prostate and seminal-vesicles (SV) target localization as well as penile bulb (PB) tissue avoidance in IMRT for prostate cancer.

**Method and Materials:** CT and MR planning data for 16 patients treated with IMRT were analyzed retrospectively. The prostate, SV, and PB volumes were delineated on both the CT and MR images while rectum, bladder, femurs and other normal tissue volumes were delineated only on CT images. CT and MR scans were acquired over a 4 hour interval and, the MR scans were registered with the 3D planning CT scans, and consequently the IMRT dose distributions. Dosimetric parameters and DVHs for the prostate, SV, and PB volumes based on CT-outlined and MR-outlined contours were compared. Furthermore, the areas for potential geometric target underdosing based on MR information were calculated to evaluate the quality of the CT-based plans.

**Results:** Analysis revealed that the prostate MR-delineated volumes were smaller than the CT-delineated volumes by 10%-40%. The SV-MR-delineated volumes were larger than the SV-CT-delineated volumes by 25%-100% and, PB-volumes in CT and MR varied up to +/-50%. The prostate mean-dose for CT- and MR-based volumes was within 3%. However, in 4 patients, the minimum-dose to 4-10% of the MR prostate-volume was lower by up to 15% when compared to the CT plan. In 3 of these patients, there was an anterior movement of the prostate because of rectal expansion. The SV-CT-volumes mean- and minimum-dose were lower than the MR-volumes by a maximum of 5%. The PB-CT-volume mean-dose was higher than the PB-MR-volume by a maximum of 10%.

**Conclusion:** The quality of the dose delivery can be improved by identifying patient-specific margins based on the CT and MR imaging data thereby potentially allowing further gain in the therapeutic ratio for prostate cancer.