AbstractID: 10288 Title: Dosimetric Evaluation of Image Guided Radiation Therapy for Prostate Cancer

**Purpose:** This work is aimed to evaluate the dose distributions delivered by image-guided radiation therapy (IGRT) for prostate cancer using the in-room CT technique.

**Methods and Materials:** A Siemens CT-on-rails system was used for image-guided target localization for intensity-modulated radiation therapy (IMRT) of prostate cancer. Fifteen previous treated prostate patients were selected for this study. CT-on-rails scans were performed before and after the IMRT treatment once a week under local IRB approval. A total of 15 original simulation CT scans and 98 post-treatment CT scans were contoured by the same oncologist to delineate the prostate target, bladder and rectum. IMRT plans were generated on the original simulation CTs and the same MUs and leaf sequences were used to compute the dose distributions for post-treatment CTs. These dose distributions represent what the patients have actually received by the IGRT procedure. For some dose distributions that showed poor target coverage, isocenters were shifted to match the prescription isodose surfaces with the target volumes and the dose distributions recalculated.

**Results:** The results showed that using the standard IGRT procedure based on anatomy matching, 7.1% of the treatment fractions exhibited poor target coverage ($D_{min}$<65Gy) while 27.6% and 26.5% of the treatment fractions violated our rectal criteria of $V_{65}$<17% and $V_{40}$<35%, respectively. After matching the prescription isodose surfaces with the target volumes, all the fractions delivered >65Gy to the target, and the percentages of fractions that violated the rectal criteria ($V_{65}$<17% and $V_{40<}$35%) were reduced to 14.3% and 18.4%, respectively.

**Conclusions:** The current IGRT procedure for prostate cancer is still not ideal if only anatomy matching is used for target localization due to poor soft-tissue contrast and organ deformation (rectal and bladder filling). Improvements in target coverage after matching prescription isodose surfaces with target volumes indicate our current margins are adequate with optimal target localization.