

AbstractID: 10909 Title: A dosimetric study of the potential for margin reduction in prostate IMRT using image-guided target localization

**Purpose:** To evaluate the potential for planning target volume margin reduction using image-guided target localization for patients receiving IMRT for prostate cancer using on-line CBCT imaging.

**Method and Materials:** Eight patients being treated with IMRT were included in the study. Planning was performed with a conventional planning CT using an 8 mm planning margin everywhere except 6 mm posteriorly. Patient setup was performed by first aligning to skin markers and subsequently shifting to the actual treatment position determined using kV imaging of implanted fiducial markers in the prostate. Both setup positions were recorded for each fraction. CBCT images were obtained weekly of the patients in the treatment position at the time of treatment. The prostate and organs-at-risk (OARs) were contoured on each image by a physician and retrospective dose calculations were performed on each CT image by applying the original treatment plan to the image using the isocenters obtained via skin marker and image-guided localization. To study the effects of margin reduction, IMRT treatment fields were replanned for each patient with two reduced margins and applied to the CBCT images for dose calculation using both the skin marker and image-guided isocenters.

**Results:** The endpoint of the study was V98, the percentage of prostate volume that received 98% of the prescribed dose. This was calculated for each CBCT image of each patient. With image-guided localization V98 exceeded 98% for all treatments based on the actual treatment plan, 97% for plans based on a 6 mm margin (4 mm posteriorly), and 95% for plans based on 4 mm margin (3 mm posteriorly).

**Conclusion:** Image-guided localization may facilitate margin reduction without significant loss of dose coverage to the prostate.

**Conflict of interest:** This research is partially supported by a Varian research grant.