

AbstractID: 5864 Title: Image-Guided Helical Tomotherapy for Localized Prostate Cancer: Technique and Initial Clinical Observations

Purpose: The purpose of this study was to develop a technique for daily CT based IGRT, and to report clinical observations on treatment planning, imaging and delivery based on the first two years of experience.

Method and Materials: Patients with previously untreated stage T1 through T3 biopsy-proven adenocarcinoma of the prostate were considered eligible for treatment with daily CT guided helical tomotherapy. The prostate was targeted daily using megavoltage CT (MVCT) images that were fused with treatment planning CT images based on anatomical alignments. All patients were treated at 2 Gy per fraction to 76 to 78 Gy (mean 76.7 Gy).

Results: Thirty-three prostate patients were planned, imaged, and treated as part of this study for a total of 1266 CT guided fractions. The prostate, rectum, bladder, femoral heads, and pubis symphysis were visible in one or more slices for all 1266 MVCT image sets. The typical range of measured prostate displacement in this study was 2-10 mm (3.4 mm standard deviation) in the anterior-posterior direction, 2-8 mm (3.7 mm standard deviation) in the lateral direction, and 1-6 mm (2.4 mm standard deviation) in the superior-inferior direction. The obese patients in this study had a substantially larger lateral variation (8.2 mm standard deviation) due to mobility of the external skin marks.

Conclusions: A technique has been developed, and clinical implemented for daily MVCT based image-guided radiation therapy. The level of conformal avoidance increased with treatment planning experience, and the level of conformal avoidance can be greater than fix-gantry based intensity modulation.