

AbstractID: 5621 Title: Comparison of Prostate Implanted Fiducials with CT and Ultrasound for Prostate Target Localization: Initial Results

Purpose: To compare prostate localization methods of implanted fiducials, CT-guided, and ultrasound-guided (US) techniques.

Method and Materials: Data were collected from an on-going institutional review board approved protocol for comparing different target localization techniques for image-guided prostate cancer radiotherapy. The protocol is designed to have CT scans with an in-room CT-on-rails three times a week; US-guided localization twice a week for the initial two weeks, then weekly; and orthogonal electronic portal imaging for fiducial measurements daily. Patients will have three gold seed implanted fiducials for prostate localization. The NOMOS BAT system and MedTec's Acculoc software are used for US and fiducial localization, respectively. All shifts reported by the three methods are relative to the same daily reference point set on patient's skin during the entire imaging session. The differences in the three methods were compared and the mean and standard deviation were computed in each of the orthogonal shifted positions: anterior-posterior (AP), superior-inferior (SI), and laterals (RL). Correlation coefficients were determined relative to the CT localization method.

Results: We report the results for the first patient who had just completed treatment. The mean differences (one standard deviation) (in cm) between the implanted fiducials and CT were -0.03 (0.18), 0.0 (0.12), -0.03 (0.15), while US and CT were 0.14 (0.68), -0.21 (0.68), and 0.32 (0.28), in AP, SI, and RL directions, respectively. The Spearman's correlation coefficients relative to the CT registration were 0.83, 0.60, and 0.81 for the implanted fiducial method ($p < 0.003$ for all directions) and -0.18, -0.09, and 0.90 for the US localization technique ($p > 0.05$ for AP and SI directions). Note that simultaneous measurements were 22 for CT and fiducials while only 9 for CT and US.

Conclusions: Implanted fiducial registration correlates better than the US relative to the CT-guided approach. More patients are needed to make a firm conclusion.