

AbstractID: 7078 Title: Intra-Fraction Prostate Motion Evaluation with On-line Fluoroscopic Imaging

Purpose: This study attempts to quantify intra-fraction organ motion of prostate patients undergoing external beam radiotherapy.

Method and Materials: Lateral kV fluoroscopic images are captured on the first 3 days of treatment and then weekly thereafter for a total of 10 sequences per patient. The fiducial markers (FM) are located in the apex, posterior aspect and base of the prostate. Each fluoro sequence is taken after 3D setup correction. Images are acquired at 5.5 fps for a duration of 30 seconds at a technique of 120kVp, 64mA, 20ms per frame. A normalized cross-correlation provides 2D localization of the three FM's in each frame. Displacement metrics were computed using the magnitude of the Euclidean distance of each FM from its initial position. Four patients are included in the study for a total of 30 fluoro sequences. The 2D vector displacements for all patient fractions in the study was computed and compared.

Results: The standard deviation of the displacement distribution is (0.3, 0.9, 0.7) [mm] for the fiducial marker at the apex, posterior aspect and base of the prostate respectively. The posterior FM which is immediately adjacent to the rectum showed the largest motion. The 'institutional mean' (i.e. are all patients, on average, shifting in a particular direction) was quite small, with a max of 0.2 [mm] for the base FM.

Conclusion: On-line kV fluoro is a useful tool for characterization of intra-fraction prostate motion supporting "evidence-based" margin design.