

## AbstractID: 3846 Title: Intra-fractional and Inter/Intra-field Organ Motion and a Proposal for a New Patient Set-Up Protocol

**Purpose:** Current set-up protocols for prostate patients with gold markers receiving EBRT use orthogonal portal images acquired prior to treatment to position the patient. Times between image acquisition and treatment delivery for different gantry angles range from one to seven minutes, even longer for IMRT. During this time the prostate can shift from its corrected position.

**Method and Materials:** An a-Si flat panel EPID was used to acquire pre-treatment portal images for positioning purposes. The panel was also used in fluoroscopic mode, acquisition rate of 3.5 frames/second, during treatment delivery. Movies of treatment delivery, 10-70 frames/movie, were acquired. Intra-fractional and inter-/intra-field (between treatment delivery/during treatment delivery) organ motion was evaluated.

**Results:** To date 83 of 125 days of treatment data have been processed. Initial results indicate that intra-fractional/intra-field organ motion is rare, only 4% of days exhibit marker center-of-mass moves greater than 2 mm. Intra-fractional/inter-field motion greater than 2 mm does however occur for a significant portion of treatment days, 31% of the processed population, appearing to occur during 45-90 second intervals. Qualitative analysis indicates that a large portion of prostate shifts occur due to gas in the colon and/or rectum. Respiration does not seem to be a significant cause of prostate motion. Voluntary global patient motion appears to contribute slightly to organ motion.

**Conclusion:** The prostate is fairly stable for time periods comparable to treatment delivery times, yet is less stable for longer times. A new setup protocol is proposed utilizing a step-and-shoot method of treatment. The method of patient positioning would acquire a portal image, adjust the patient based on the image and then treat that single field. This process would be repeated for each gantry angle until treatment is completely delivered, thus reducing the time between portal image acquisition and treatment delivery for a particular gantry angle.