

AbstractID: 5385 Title: Comparison of Patient Positioning Corrections For Prostate IMRT Patients Using Competing Image Guided Radiation Therapy Technologies

We compared prostate position corrections using ultrasound and megavoltage CT image guided systems following initial patient positioning with lasers. Internal prostate movements between the two patient cohorts were assumed to be equivalent given a sufficient number of measurements, so we hypothesize the image guided shifts should average out to the same magnitude. Therapists adjusted patient positions with physician supervision based on daily imaging prior to each treatment. A total of 17 prostate patients were studied. Ten patients (Group I) were scanned in 3-D mode using an ultrasound system. Contours (prostate/bladder/rectum) from the treatment planning system were transposed on the image set to register the ultrasound image. Therapists shift the contours to match the ultrasound image set and then adjust the patient by these same shifts. The number of shifts recorded from Group I was 432. Group II patients (seven subjects yielding 315 recorded shifts) were treated using Tomotherapy. Patients were scanned over the prostate region and the megavoltage CT image was registered with the treatment planning CT and contours. Shifts were produced for each axes and in roll. The patient table is adjusted to match the registration shifts. Roll corrections were minor and deemed insignificant for this study. The average prostate size from Group I was 104.9cc with a standard deviation of 42.1cc while Group II was 104.2cc and 54.8cc. A panel of four was formed to evaluate the quality of images to check possible operator bias due to image quality. Group I showed an average shift magnitude of 6.1mm with a standard deviation of 3.4mm. The average shift from Group II was 10.6mm with a standard deviation of 6.1mm. Tomotherapy imaging averaged 43% larger shifts compared to ultrasound. Possible explanations for this difference include operator laxity in initial tomotherapy positioning while depending on imaging and auto-adjustment to compensate.