

AbstractID: 1993 Title: The Effect of Ultrasound Guided Setup Shifts on External Beam Prostate Dose Distributions

Ultrasound guided radiation therapy of the prostate has enabled a decrease in treatment margins with concurrent dose escalation. The prostate is imaged just before treatment and corrections for prostate movement can be applied to re-align the PTV to match its location, relative to isocenter, in the planning CT. In this work, we study the dosimetric effects of the changes in the location of the PTV relative to the patient external contour brought about at each fraction in this re-alignment process. Individual treatment plans were developed for each fraction of a course of treatment for several patients. These plans were all based on the planning CT, with PTV contours and beam isocenters moved according to the shifts recorded for each fraction by the ultrasound system. The beam arrangements and normalizations were identical for all individual plans. The beam weights, however, needed adjustment to give the same MU for each beam during each fraction. Minor variations were found in the fractional treatment plans, likely brought about by SSD changes resulting from the patient setup shifts. The PTV was adequately covered in all fractions. The PTV DVH for a composite of all fractional plans did not differ significantly from the documented plan for each patient. DVHs for the bladder and rectum could not be analyzed since movements of these structures could not be predicted based on PTV shifts. This work affirms the practice of ignoring the minor dosimetric changes resulting from setup shifts necessary to re-align the PTV with beam isocenter.