AbstractID: 8277 Title: Daily On-line Target Positioning of Prostate External Beam Radiotherapy with Implanted Markers and an Electronic Portal Imaging Device

The prostate is a mobile organ such that its location may not correlate with external marks on the patient's skin, or with bony pelvic anatomy. This coupled with the target proximity to dose-limiting normal structures suggests improved localization methods for conformal radiotherapy of the prostate are needed. An efficient treatment protocol has been developed which uses an EPID and implanted gold markers to measure and correct three-dimensional (3D) target displacements relative to the treatment field. Markers were placed in the prostate and patients underwent CT treatment planning, allowing digitally reconstructed radiographs to indicate marker location for reference. At treatment, after 3-point setup, two portal images were acquired using the anterior and right lateral treatment beams. The quantitatively analyzed misalignment values for each of the fields was recorded in a spreadsheet, which calculated 3D target displacement relative to isocenter and a couch correction to adjust the setup if the displacement exceeded 5 mm. The remainder of the planned dose was then delivered and portal images acquired during each beam were analyzed off-line to determine the accuracy of target position after adjustment. Forty-seven percent of the 239 fractions treated were adjusted (range 30% - 62.5% in 6 patients), indicating the significance of misalignment. The average 3D displacement after initial patient setup of 5.2mm was reduced to a value of 2.9mm after correction. This effective protocol enhances the quality of care for individual patients and is suitable for highly conformal or dose escalated radiotherapy.