

AbstractID: 12588 Title: Dosimetric advantages of online adaptive replanning for radiotherapy of the prostate and seminal vesicles

Purpose: To investigate the dosimetric benefits of online adaptive replanning for prostate and seminal vesicle radiotherapy. Plans generated with standard image guided radiotherapy (IGRT) online repositioning were compared with online replanning.

Method and Materials: A previously developed online adaptive replanning process was implemented in a commercial treatment planning system (RealART™, Prowess) and used for this investigation. Contours of the target and critical structures were generated on daily CT images acquired for six prostate cancer patients who received radiotherapy to the prostate and proximal seminal vesicles. Daily IGRT images had been obtained for each of these patients using a CT-on-Rails (CTVision, Siemens). Two IMRT plans were generated using the initial planning CT: the first used a planning target volume (PTV) generated with a 5mm margin around the prostate and proximal seminal vesicles to represent the current clinical treatments. The second plan used only a 3mm margin to generate the PTV. These two plans were then applied to each of the daily images, both as a “repositioning” (IGRT aligned) treatment and as an “adaptive” treatment. Comparison between these methods was made using Dose Volume Histogram parameters D100%, D95%, D50%, V110%, V100%, V95%, V90%, V50%, and V70Gy. Thirty-nine daily fractions for a single patient and five daily fractions for an additional five patients were analyzed.

Results: The benefit of online adaptive replanning for treating the prostate and proximal seminal vesicles is demonstrated most clearly by the ability to use smaller (3mm) PTV margins for the adaptive plans and by the corresponding decrease in parameters such as V70Gy for the critical structures.

Conclusion: Online adaptive replanning can improve target coverage as well as bladder and rectum sparing compared to IGRT repositioning for prostate and seminal vesicle radiotherapy.

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