

AbstractID: 11581 Title: Evaluation of Positioning and Margin Selection in Image-Guided Whole-Pelvis Prostate IMRT

Purpose: To evaluate the interplay of margin selection and alignment strategies on image-guided whole pelvis prostate IMRT using serial CT image studies and deformable image registration.

Method and Materials: Forty-two CT scans of 7 patients are studied – each patient has one initial and 5 serial CT scans. Three PTVs are created on the initial CT scan using three different margins ranging from 3 to 13mm. Each PTV is used to create a unique IMRT plan, which is registered to the serial CT scans, by bony alignment or by prostate-based alignment. The dose computed on the 5 serial CT image sets is accumulated onto the initial CT using deformable image registration with mesh method (Pinnacle 8.1x).

Results: Prostate-based alignment introduces statistically significant increase of dose to rectum, prostate and seminal vesicles (SV), and reduction of dose to bladder, for all the three planning margins. There is no statistically significant difference in doses to vascular spaces expanded by 7mm or 10mm under either alignment. IMRT plans with small margins and soft tissue alignment compared to large margins with bony alignment show marginal statistically significant difference in rectal DVHs, prostate or SV coverage, and statistically significant increases in doses to bladder and vascular spaces. The reduction of margins around prostate and SV with soft tissue alignment will result in statistically significant reduction of dose to rectum, bladder, prostate and SV, but no statistically significant difference of dose to LN.

Conclusion: Comparing the recommended planning strategies –(a) tight margins with prostate-based alignment and, (b) large margins with bony anatomy alignment- we find that similar doses to rectum and targets are achieved, and a slight reduction in bladder doses occurs under strategy a. From these we recommend small margins with prostate-based alignment to maximize sparing and target coverage.

Conflict of Interest (only if applicable): None.