

AbstractID: 13566 Title: Prostate and Pelvic Lymph Node PTV Margins for Treatment of Pelvic IMRT followed by Proton Prostate Boost

Purpose: To evaluate the PTV margins for both prostate and pelvic nodes for patients treated with initial Pelvic-IMRT and prostate proton boost

Method and Materials: Total 15 prostate patients were treated with IMRT and proton therapy with rectal balloons. CBCT and 2D x-ray were used for pre-treatment alignments for IMRT and proton treatment, respectively. Shifts and rotations from bone-matching, seed-matching and seed-bone differences were obtained from CBCT with translation only, translation and rotation. Pre-treatment and post-treatment 2D x-ray images were analyzed for residual setup errors and intra-fraction organ motion. Translation-only Pelvic-LN PTV margins were calculated from bone-seed shift differences. Translation-only prostate margins were calculated from x-ray data. Similarly, PTV margins for bone-matching were also obtained. Bone to skin-mark rotations and prostate to bone rotations were also presented and evaluated for margin impact.

Results: PTV Margin was calculated using $2.5*\Sigma+0.7*\sigma$. For seed-matching, prostate margins are 1.5, 3.5, 2.7 mm for LR, SI, AP, respectively; Similarly, the margins are 2.3, 7.1, 7.0 mm for pelvic-LN. For bone-matching, prostate margins are 2.7, 7.8, 7.5 mm for LR, SI, AP, respectively; The margins are 0.7, 1.5, 1.3 mm for pelvic-LN. For skin-mark setup, prostate margins are 7.6, 13.5, 11.5 mm and pelvic LN margins are 8.3, 12.7, 12.5 mm. The bone to skin-mark rotations are 1.3 ± 1.4 , -0.5 ± 1.1 , -0.2 ± 0.7 mm for LR, SI, AP axes, respectively. The seeds to skin-mark rotations are -0.2 ± 3.4 , -0.8 ± 3.1 , 0.2 ± 1.5 mm for LR, SI, AP axes, respectively.

Conclusion: Prostate and pelvic LN PTV margins were both obtained from translation only setup using 2D and 3D x-ray imaging data. Seed-matching reduced prostate margins, which may reduce dose to bladder and rectum compared to bone-matching. However, pelvic-LN margins increased because of the inter-fraction prostate motion relative to pelvic bones. Rotations of bone and prostate will increase both prostate and pelvic-LN margins.