

AbstractID: 4600 Title: Comparison of different image-guided setups for radiotherapy of prostate cancer

Purpose: To compare different methods of image-guided daily setup for prostate cancer treatment.

Method and Materials: 10 CTs were acquired on non-consecutive treatment days for 20 patients receiving radiation therapy of their prostate cancer under an IRB approved protocol. One physician contoured the prostate, rectum and bladder for all scans. 3 different patient setup methods were compared dosimetrically: 1) laser-skin mark alignment; 2) 2D bony landmark alignment; and 3) prostate center-of-mass alignment. A commercial planning system (Panther, Prowess, Inc.) based on the Direct Aperture Optimization was used for the initial and subsequent planning and analysis. For each patient, the original plan using the first CT set was copied to the subsequent 9 CT sets in 3 different ways based on the setup methods. Dose distributions and DVHs were compared using simple averaging of 9 samples.

Results: So far we have completed the analyses for 6 patients. Average patient shifts needed after laser alignment were: Left-Right(Lt-Rt): 0.37 ± 0.27 cm, Superior-Inferior(Sup-Inf): 0.33 ± 0.25 cm and AP-PA: 0.08 ± 0.09 cm with bony landmark-based alignments. The shifts based on the center of mass were: Lt-Rt: 0.4 ± 0.29 cm, Sup-Inf: 0.08 ± 0.11 cm and AP-PA: 0.2 ± 0.21 cm. Three measures were used for the comparisons: 1)PTV getting the prescription dose of 75.6Gy; 2) rectal volume getting 60Gy; and 3) bladder volume getting 65Gy. These measures averaged 100%, 13.2% and 16.6% in the original plans. With lasers alignment, these measured changed to 88%, 17.0% and 20.7% respectively. With 2D bony landmark alignment, these three measures were 90.3%, 20.9% and 24.8% respectively. With volumetric image guidance, they were 93.0%, 16.6%, and 17.8% respectively.

Conclusion: Significant plan degradations by reducing target coverage (up to 12%) and increasing normal tissues dose were observed with conventional skin mark-based alignment. Daily bony landmark-based setup only improved marginally. Rigid-body volumetric alignment of the PTV showed the least degradation of the original plan.