

AbstractID: 6367 Title: Influence of Volumes of Prostate, Rectum and Bladder on Treatment Planning CT-Day on Inter-fraction Motion of Prostate During BAT Image-Guided IMRT

Purpose: To study the relationship between prostate volume/location, bladder and rectum volumes **on treatment-planning CT-day** and prostate shift in XYZ directions on treatment-days.

Method and Materials: Prostate, SV, bladder and rectum (rectosigmoid-flexure to anorectal-verge), were contoured on CT-images. Isocenter was 6 cm posterior to the tip of pubic-arch and 1 cm inferior to the pubic-brim. IMRT plans were prepared. Contours were exported to BAT-system. Patients were positioned on couch using skin marks. US-probe was used to obtain US-images of prostate, bladder and rectum and aligned with CT-images. Shifts in XYZ directions as recommended by BAT-system were made and recorded. 4698 couch-shifts for 42 patients were analyzed to study a correlation between prostate shifts vs. bladder and rectum volumes and prostate volume/location **on CT-day**. Spatial location of prostate was defined as distance of prostate base to isocenter. Dose to 50% of bladder vs. volume was also studied. Pearson's correlation coefficient r , and P values were used for statistical analysis.

Results: Mean and range of volumes (cc): bladder: 179, 42-582, rectum: 108, 28-223 and prostate: 55, 21-154. Mean prostate shifts (cm, \pm SD): R/L (X): -0.047 ± 0.16 , AP/PA (Y): 0.14 ± 0.3 and S/I (Z): 0.19 ± 0.26 . Lateral, AP/PA and S/I shifts were not correlated with volumes of bladder, rectum and prostate; bladder and prostate; and bladder and rectum, ($P>0.2$), respectively. Smaller the rectal volume ($P<0.001$) or diameter ($P<0.05$) of rectum, larger was the anterior shift and vice-versa. Smaller the prostate base distance to isocenter or volume, larger was superior shift and vice-versa ($P<0.05$). Dose to bladder decreased with increase in volume up to 300cc, reaching a plateau with further increase in volume ($P<0.001$).

Conclusions: Prostate location/volume and rectal-volume, but not bladder-volume on CT-day influence prostate position. Bladder with 200-300cc volume, but not full bladder, would be optimum for patient comfort, minimizing bladder dose and US-image quality.