AbstractID: 12584 Title: Comparison of Structure Contouring Efficiency and Dose-Volume Histograms (DVH) of Pinnacle3 and Eclipse Treatment Planning Systems for Prostate IMRT

Purpose: To test the hypothesis that structure contouring precision and DVH for Prostate-PTV, rectum and bladder would be the same for Pinnacle and Eclipse treatment planning systems (TPS).

Materials and Methods: DVH for **51 patients each** planned with Pinnacle^3 and Eclipse TPS and treated with Elekta-Synergy and Varian Linacs, respectively, was compared. Patients and treatment planners were different for Pinnacle and Eclipse. Beams numbers, angles, energy (6X) and Radiation Oncologists were the same. Prostate, SV, rectum and bladder were contoured from CT-images with 0.5 mm separation. Prescription was 45-Gy to prostate+SV (CTV) and 36-Gy boost to prostate. Margins for CTV and prostate were 0.5-cm superiorly and posteriorly, and 1-cm in other dimensions to create PTV and Prostate-PTV, respectively. Dose-volume constraints (DVC) were to cover 95% PTVs with 95% prescription dose and keep respective doses to 70%, 50% and 30% rectum and bladder to less than 30%, 50% and 70% of 81-Gy. Pearson's correlation coefficient '*r*' and two-sample '*t*' test were used for statistical analysis.

Results: Structure-contouring efficiency was the same between TPS. Mean-volumes (±SD, cm^3) of prostate (53.9±20.4 *vs*. 52.8±23.8), SV (13.3±6.6 *vs*. 11.5±6.6), prostate-PTV (159.7±42.4 *vs*. 144.9±46.6), rectum (106.6±34.8 *vs*. 120.5±47.7) and bladder (191.8±103.9 *vs*. 177.2±81.3) were the same for Pinnacle and Eclipse patients, respectively, ($P > 0.1$). Percent of 81-Gy delivered to 95% prostate-PTV was higher with Pinnacle (97.63±0.71) than Eclipse (96.12±0.997) TPS ($P<0.001$). Consequently, mean-dose (Gy) delivered to rectum (36.1±2.7 *vs*. 31.5±4.8, $P<0.001$) and bladder (32.9±7.5 *vs*. 29.7±7.5, $P<0.05$) was higher with Pinnacle than Eclipse TPS, respectively.

Conclusions: Structure-contouring efficiency, prescriptions and DVC-guidelines being the same, there is great potential for delivering significantly different doses to targets and normal tissues. Although these doses are within the DVC-guidelines, clinical outcomes and normal tissue toxicities could be different. This may also be true for RTOG trials where DVC-guidelines are general.