

AbstractID: 13545 Title: Comparison of treatment planning systems in Elekta Volumetric Modulated Arc Therapy (Elekta VMAT) - prostate cancer study

Purpose: To compare the performance of treatment planning systems (TPS's) for prostate cancer with Elekta VMAT.

Method and Materials: Five prostate cancer patients at low risk (LR) and two prostate cancer patients at high risk (HR) were randomly selected for this study. Single-arc VMAT plans with D₉₅ prescription (dose to 95% of target volume) of 76Gy in 38 fractions have been created by using three commercial TPS's; Monaco v2.03beta (Elekta CMS), ERGO++ v1.7.2, (Elekta CMS), and Pinnacle v9.0 SmartArc (Philips). Effort was made to maintain the rectum dose volume histograms (DVHs) almost identical among the three plans. The resulting plans were compared in terms of total monitor unit (MU), the dose homogeneity defined by D_{max}/76Gy, and dose in organ at risk (OAR). All plans were delivered three times on Elekta Synergy. The dynamical parameters of dose rates, gantry angles, multi-leaf collimator (MLC) positions and jaw positions have been recorded with 0.25 sec interval in the controller.

Result: All rectum DVHs for LR were similar for doses more than 40Gy, while for HR, ERGO++ provided somewhat higher dose in rectum and also a cold spot in seminal vesicle. The averaged MU was 595, 411, 430, and the averaged dose homogeneity in target volume was 1.08, 1.07, and 1.05 for Monaco, ERGO++, and SmartArc, respectively. Delivery time was less than 3 minutes for all plans. Monaco and ERGO++ needed a longer delivery time, mainly due to the creation of move-only segments. Observed errors in the gantry angle, MLC position, and jaw position were small and reproducible. They did not impact the dose distribution significantly.

Conclusions: All TPS's used in this study provided satisfactory VMAT plans for prostate cancer. The dynamical parameters were sufficiently well controlled.