

Purpose: Different treatment planning systems (TPS) use different treatment optimization and leaf sequencing algorithms. This work compares prostate IMRT plans optimized with three TPS to investigate the plan quality in terms of target conformity and delivery efficiency.

Method and Materials: Eleven prostate cases were planned with the Corvus, Xio and Eclipse TPS using appropriate optimization parameters and dose constraints to meet the acceptance criteria. Plans were normalized for at least 95% of PTV to receive the prescription dose D_p . Dose-volume histograms and isodose distributions were compared. Other quantities such as D_{min} (the minimum dose received by 99% of CTV/PTV), D_{max} (the maximum dose received by 1% of CTV/PTV), the volume of CTV/PTV receiving 110%, 105% and 95% of D_p ($V_{110\%}$, $V_{105\%}$, $V_{95\%}$), the volume of rectum and bladder receiving 65 and 40 Gy (V_{65} , V_{40}), and the volume of femur receiving 50 Gy (V_{50}) were evaluated. Total segments and MUs were also compared.

Results: While all plans meet target dose specifications and normal tissue constraints both XiO and Eclipse plans show less target dose heterogeneity (smaller D_{max} and $V_{110\%}$) and lower V_{65} and V_{40} for the rectum and bladder compared to the Corvus plans. The PTV D_{min} is about 2 Gy lower for XiO plans than Corvus and Eclipse plans while the XiO and Eclipse plans have slightly higher V_{50} than the Corvus plans. The Eclipse and XiO plans require significantly less MUs to deliver than the Corvus plans.

Conclusions: To deliver on a Varian Trilogy accelerator, the Eclipse and XiO plans have better target dose uniformity, slightly less rectal and bladder doses and faster beam delivery. The Corvus plans have less rectal volumes receiving low doses (5–20 Gy) while the XiO plans have slightly lower target doses. Overall, the Eclipse TPS is favored for our prostate IMRT planning.