

Purpose: To evaluate the dosimetric impact of the Varian Exact Couch top and rails on dose and relative volume coverage to target and critical structures for 6 MV IMRT and Arc Therapy.

Methods: Five prostate patients were planned with both 6 MV 8-field IMRT and 2-field RapidArc per clinical practice at MDACC for target and normal tissue constraints using the Eclipse treatment planning system. The dose distributions were then re-calculated with inclusion of the couch top and rails in varying configurations. DVH analysis of the target and critical structures for dose and relative volume coverage loss were evaluated and compared to MDACC clinical plan requirements (98% and 95% coverage of prostate and PTV, respectively, at prescription dose). To isolate the effects of the couch top and rails individually, the dose distribution was re-calculated for the treatment plans with the couch top only. Calculated dose perturbations were verified through measurements in an IMRT QA phantom.

Results: The average dose loss to the prostate and relative volume coverage (at prescription dose) were: 3.2 Gy/35% and 1.5 Gy/84% for IMRT with rails out and in, respectively, and 2.4 Gy/18% and 2.2 Gy/17% for RapidArc with rails out and in, respectively. The couch top accounted for 1.5 Gy/84% for IMRT and 1.5 Gy/40% for RapidArc, the remainder was from the rails.

Conclusions: Dose and volume coverage loss for IMRT plans is primarily due to the rails while the couch top is the primary cause for RapidArc. Both the couch top and rails contribute to dose and coverage loss to a degree that, if included, would cause the plan to fail clinical approval. Therefore, the couch top and rails should be accounted for in treatment planning.