

Purpose: Intensity modulated arc therapy (IMAT) can result in superior plan quality and delivery efficiency. As part of the treatment planning optimization process the impact of the treatment couch is not always considered leading to treatments not being delivered as planned. In this work the dosimetric differences between plans calculated with and without the couch are studied using a phantom and then the clinical impact of delivering IMAT plans without the treatment couch outlined assessed.

Method and Materials: Single and dual arc IMAT plans, obtained using Oncentra MasterPlan v3.3sp1 (Nucletron, BV), were planned and recalculated on a CT scan set of a 2D ionization chamber array (IBA MatriXX Evolution) positioned between slabs of 30x30cm solid water. The couch was either not considered or modeled as a 2.2cm thick object of density 1.02. A constant dose-rate was assumed during the planning process and a Varian 600CD with 120 leaf millennium MLC at 6MV used. Calculated and measured plans were compared using a gamma criteria of 3%/3mm. Using data from a prostate cancer patient, single and dual arc plans were created using both constant and variable dose-rate IMAT without the couch outlined and then recalculated with the couch outlined.

Results: When not considering the treatment couch, the percentage of pixels passing the 3%/3mm gamma criteria was 77.62% and 70.65% for single and dual arc IMAT plans respectively. When the couch was included, the percentage of pixels passing increased to 96.54% and 99.18% for single and dual arc plans. IMAT prostate plans created without the couch but recalculated with the couch resulted in plans that were not considered to be clinically acceptable.

Conclusion: It is essential that the treatment couch is properly accounted for in the IMAT planning process otherwise the delivered treatment will not match the treatment as planned.