

AbstractID: 13617 Title: Are constant dose rate VMAT plans clinically acceptable? – A site-by-site plan comparison study

Purpose: To evaluate the adequacy of constant dose rate (CDR) VMAT plans for clinical use of commonly treated sites. The clinical acceptability of CDR VMAT plans was evaluated based on plan quality comparisons against clinically used IMRT plans.

Methods: Several patient treatments planned using IMRT were considered for the study and replanned using Pinnacle 9.0 (SmartArc) treatment planning system. Several clinical sites were considered for this study – prostate and prostate bed (4 patients), pelvis (1), breast (1) and head and neck (H&N) (2). The quality of CDR plans normalized to PTV mean dose was compared against static field IMRT plans based on dose conformity, planning target volume (PTV) coverage and dose volume histograms (DVHs) of organs at risk (OAR).

Results: Plan qualities of prostate, prostate bed and pelvis plans were evaluated based on rectum and bladder DVHs, PTV coverage and dose conformity. *Prostate and prostate bed:* CDR plan was found to be clinically acceptable with better OAR sparing and delivery time. *Pelvis:* CDR plan was lacking coverage and conformity and didn't have a significant advantage over the IMRT plan. *Breast:* Plan quality was evaluated based on PTV coverage, isodose conformity and DVHs generated for OARs – lungs, heart and cord. The CDR plan was clinically unacceptable, primarily due to low doses (<10Gy) covering a large volume of the lungs. *H&N* plans were evaluated based on PTV coverage, dose conformity and dose to parotids, cord and submandibular glands. The CDR plans were clinically unacceptable and didn't show significant advantage over IMRT plans beyond the reduced treatment time.

Conclusion: The CDR plans for prostate and prostate bed were clinically acceptable and found to be equivalent, if not superior to IMRT plans. For the other sites investigated - pelvis, breast, and H&N, static field IMRT plans proved to be superior to CDR plans.