

AbstractID: 9428 Title: Correlation Between Number of Beams and Monitor Units, in the Context of VMAT and RapidArc, in IMRT

Purpose: Reduction in treatment time and monitor units (MU) are desired for an optimum intensity modulated radiotherapy (IMRT) plan. We investigated the relationship between increasing field numbers and the total number of monitor units and segments in IMRT plans of prostate cancer tumors, and its impact on arc techniques such as intensity modulated arc therapy (IMAT) and volumetric modulated arc therapy (VMAT).

Method and Materials: Ten prostate cancer patients treated to the same clinical protocol of 79.2 Gy were investigated. Individual plans that consisted of 5, 7, 9, 18 and 36 equally spaced, 15 MV beams were created for each patient. The effect of beam numbers on each plan was analyzed for 1) PTV Uniformity Index, 2) Segments, 3) Monitor Units (MU) and 4) DVH of all organs.

Results: MU changes were most significant when number of fields increased from 5 to 9. Number of segments showed similar trends, where maximum increase in segment numbers occurred when field numbers increased from 5 to 9. The UI results showed both increasing and decreasing trends when field numbers increased between different patients, but were not significant. DVH comparison of organs at risk showed maximum changes in volume dose when the number of fields increased from 5 to 7.

Conclusion: Increasing the field numbers from 9 to 36 fields did not result in dramatic changes in MU, segments, uniformity or DVH. Our study showed that for traditional IMRT step and shoot arrangements, to achieve similar homogeneous coverage of deep seated tumors, significant increases in the number of fields did not result in similar increases in monitor units or segments. Provided the continuous beam-on and segment changes do not affect the overall treatment delivery speed, techniques based on modulated arc therapy should deliver dose distributions similar to IMRT techniques in considerably less time.