

AbstractID: 12827 Title: Investigation of the segmental- and dynamic-IMRT delivery performance for combination of Varian 21iX-S and CMS XiO treatment planning system

Purpose: The purpose of this investigation is to compare quality of plan, treatment time, monitor units (MUs) and dose delivery capability between dynamic and segmental IMRT for combination of Varian 21iX-S and CMS XiO.

Method and Materials: Head and neck (HN) and prostate IMRT were planned in both dynamic and segmental fashion using same dose objectives in the optimization process. Quality of plans was evaluated with isodose curves and dose-volume-histograms. Treatment time defined as time from the first beam-on to the last beam-off and MUs were compared. Dose rate of segmental and dynamic were 500 and 300 MU/min, respectively. Dosimetric verification was performed with 0.6 cc ionization chamber for point dose measurement and radiographic film for dose distribution.

Results: In HN cases, dose conformity for PTV were slightly superior, however doses to parallel organs (e.g. parotid gland) were higher in dynamic delivery. MUs with dynamic delivery were larger by 20% for HN and prostate cases. Therefore, larger MUs lead more transmitted dose from MLC to parallel organs. Some reports mentioned that with dynamic delivery using other than XiO, treatment time could be shortened by half. But our results showed only 20% reduction for HN and comparable for prostate. The MLC sequence file of dynamic delivery was fairly large (320 control points/port), on the other hand, that of segmental was 1/6 of dynamic. Therefore, beam was kept off while treatment console read MLC sequence file (approximately 20 s/port for dynamic and 5 s/port for segmental, respectively). For HN cases, dose delivery capability was better in both point dose and dose distribution for segmental delivery. Due to higher MUs, dynamic delivery needs precise modeling especially for MLC transmission is required.

Conclusion: Delivery performances are superior in segmental delivery, except for treatment time. To conclude, segmental delivery could be suitable for IMRT.