

AbstractID: 1854 Title: IMRT Delivery Accuracy as a Function of Segmentation Intensity Levels and Dose Rate

IMRT can be delivered by either SMLC or DMLC. The dose rate (DR) is also variable, as are the planning intensity levels (IL) for SMLC. The purpose of this study is to compare accuracy of IMRT clinical delivery for varying delivery methods, DR and IL. Two fields per plan for three prostate IMRT plans were analyzed using Helios planning system (Varian). For the same intensity profile, dose and MLC patterns were calculated, for DMLC and SMLC with 5- or 10-intensity levels. For these calculations, plans were generated with 300 or 600MU/min. The number of SMLC segments ranged from 10-35. Measurements were performed on a Varian 23EX accelerator, 120-leaf MLC, 18MV, with X-V film within solid phantom. Leaf tolerance was 1mm. The Rit film dosimetry system was utilized to compare imported plan and film dose distributions. Differences between calculated and delivered plans were evaluated by measuring the number of pixels (area) that deviate >3% and >5%. The 600MU/min plans had 6.1% more pixels outside the 3% range than the 300cGy/min plans. Differences in area >5% was <2.0%. Also, the delivery time was ~40% less with the 600cGy/min than with the 300cGy/min DR. There were no significant differences observed for delivery method or IL option (<1%). Of all the variables compared, only delivery rate had an impact on accuracy. This can attributed to the leaf tolerance and the feedback between MLC controller and the leaves (50ms). We have chosen to maintain 300MU/min for IMRT delivery rate.