

AbstractID: 6590 Title: Monte Carlo Flattening Filter Free MIMiC based IMRT planning

Purpose: The aim of this study is to investigate the feasibility of developing treatment plans without a flattening filter for serial tomotherapy treatments using Varian 600C linac. Since the flattening-filter reduces the dose rate, the removal of the flattening filter may decrease treatment time significantly by the reduction of MUs and the number of arcs per treatment.

Method and Materials: A Monte Carlo, PEREGRINE[®] 1.6b, which is interfaced with Corvus 5.0 (NOMOS, PA) and integrates the serial tomotherapy (MIMiC) delivery device, was first commissioned for the Varian 600C with the flattening filter. The flattening-filter was then removed from the phase-space file. Several plans were generated on with and without the flattening filter in place for the MIMiC. The number of monitor units and plan quality were compared.

Results: Results show that there is a significant decrease in MUs by a ratio of 1.7 to 2 for IMRT plans developed without the flattening-filter. Since the maximum deliverable dose rate is 10 MU /deg for arc therapy on the Varian 600C, the number of arcs required to deliver the same dose without the flattening-filter is also halved. The DVHs for the target and critical structures are similar for plans generated with and without the flattening-filter since the optimizer employed for the generation of both the plans is the same.

Conclusion: The removal of the flattening-filter for MIMiC based plans reduces the number of MUs and treatment arcs thus, reducing treatment delivery time without affecting the plan quality. This is especially beneficial when large doses per fraction (SRS or SBRT) are employed and several arcs on the same index have to be delivered to achieve the desired prescribed dose.