

AbstractID: 93 Title: Dosimetric Analysis of Abutting Multileaf Collimator Matchline in Three-Field Breast Treatment

Multileaf collimator (MLC) matchline dosimetry between tangential and supraclavicular fields is clinically important. Superior edge of tangential field was simulated with 0-30 degree MLC angles that was matched with supraclavicular field. Siemens Oncor and Varian 2300 MLCs with 10 mm and 5 mm leaf width were used. Matchline dosimetry was performed using an ion-chamber detector array (LA-48) in a water tank. To represent three-field treatment, the collimator was rotated to align the MLC edge with the LA-48 and gantry was rotated such that the beam was non-divergent at the chamber-array. Data was collected at various depths for clinical matchline offsets of 0, ± 1 , ± 2 , ± 3 , ± 5 and ± 10 mm. The cross-sectional dose profile along the matchline for MLC-MLC was found to have large dose undulation. With matchline at 0, ± 1 mm, dose is within $\pm 20\%$, however at ± 2 mm this is significantly large ($\pm 80\%$). The values of the dose ranges at the matchline for MLC-MLC were greater than the values at the 1 mm overlap. It appeared that for both linear accelerators, having a millimeter overlap may be beneficial to improve dose uniformity at the field junction. Abutting leaves were shown to produce dose undulation with significant ($\pm 20\%$) hot and cold spots at the junction. This is more pronounced for Siemens compared to the Varian unit. Due to randomness of hot and cold spots at the matchline, dose smearing can be achieved within ± 2 mm setup and positional uncertainty. If a perfect match is desired, MLC-MLC match should be avoided.