

AbstractID: 7082 Title: Evaluation of a dual-level micro multileaf collimator in reducing dose undulation and leakage

Purpose: To evaluate the reduction of dose undulation at the field edge, gap leakage and interleaf transmission by utilizing a dual-level four-bank micro multileaf collimator (mMLC) and compare with standard MLC.

Method and Materials: A 6MV Varian 600C linear accelerator has been collimated with a dual-level four-bank mMLC. The dual mMLC consists of four banks of leaves with upper and lower levels. The two levels of leaves are perpendicular to the central axis and travel orthogonally to each other. It provides the capability of precise aperture shaping and high edge resolution by using micro leaves with widths of 2.1 mm and operating with two levels of leaves. The maximum field size of the dual mMLC is 97 mm x 108 mm formed by 96 leaves. To evaluate the reduction of dose undulation, dose leakage and transmission, radiographic films of a right triangle aperture generated by the two levels dual mMLC were compared with the aperture using only one level of leaves and the other level of leaves remained open. The parameters for comparison include 2D and 3D dose difference, isodose lines, gamma analysis, and dose profiles.

Results: The dual mMLC smoothes the dose undulation at the field edge and reduces gap leakage and interleaf transmission. The maximum dose reduction at the field edge is 39%. The gap leakage was reduced from 12% to less than 3.5%. The mean interleaf transmission was reduced from 6% to 3%.

Conclusion: This innovative dual mMLC has shown the advantage of reducing dose undulation, gap leakage and interleaf transmission. It offers the ability of better field-edge shaping, reduced gap leakage and interleaf transmission which are considered important characteristics in IMRT and SRT for target conformity and high dose delivery.

Conflict of Interest: Supported by Initia Medical Technology