

AbstractID: 8933 Title: Performance of dual layer micro MLC versus standard single layer MLC for IMRT delivery

Purpose

To evaluate the performance characteristics of a first-of-its-kind dual layer micro multi-leaf collimator (DmMLC) and compare it dosimetrically with standard, single layer MLCs for use in intensity modulated radiation therapy (IMRT).

Method and Materials

The DmMLC performance was studied using a cross shaped field generated by both a single layer MLC and the DmMLC. The DmMLC by Initia Medical Technologies was mounted on a Varian 600C linac unit. Film measurements were obtained using a 6 MV x-ray beam and EDR2 film at a depth of 5 cm in solid water at 100 cm source to film distance. Film analysis was performed using the RIT V5 software. The leaf-end transmission of the single bank and dual bank of mMLC was measured. The maximum and average leaf-end transmissions for the cross pattern were compared for both modes of operation of the mMLC and for the standard Varian MLC.

Results

The leaf-end transmission for the single layer of the DmMLC was at its maximum 22.4% with an average value of 15.4%. The transmission was reduced to a maximum of 2.4% and an average of 2.1% when both layers of the DmMLC leaves were used. Dual layer MLC provided more conformal field edge as compared to the standard single layer MLC with approximately ten fold less transmission at the leaf end.

Conclusion

The results of this study indicate that the DmMLC provides more precise field shaping at field edges than the standard MLC. The DmMLC reduces the leaf-end transmission to about 2.1%. The dual layer MLC offers more accurate IMRT delivery to the planned target volume and spares the underlined surrounding health tissue from increased transmission and leakage dose.

Conflict of Interest

The work was partially supported by a research grant from Initia RT.