AbstractID: 9424 Title: Investigation of electron beam collimated by motorized electron multi leaf collimator (eMLC) designed for fixed and modulated electron beam therapy.

Purpose: Investigate the electron beam characteristics after been collimated by a motorized eMLC and study its feasibility for modulated electron radiation therapy. In addition we aimed at accurately simulating the eMLC and verify dose calculations for the inverse treatment planning system for MERT.

Material and method: A motorized eMLC was developed for beam delivery for fixed beam delivery and MERT. The eMLC leafs are positioned at 82 cm source collimator distance. Film and ion chamber measurement were conducted in this study to investigate the characteristics of electron beam collimated by the eMLC. Measurement was done at 89 cm source surface distance allowing for 5cm gap between the eMLC and the surface of the phantom .Leakage from the eMLC was measured. Abutments of fields formed by eMLC were investigated. Comparison is also done between this new generation of motorized eMLC and our first generation of manually driven eMLC. Monte Carlo simulation was performed to accurately model the eMLC

Results: Profiles from the eMLC shows very close penumbra to that from the applicator for all energies. Film measurement showed that one leaf is still distinguished in a cross profile. In addition the leaf width is shown to be appropriate for defining a beamlet. Leakage from 16MeV beam through the eMLC was found to be 1.8%.The abutment fields showed enhancement at junction point which is blurred with depth. Good agreement was achieved between Monte Carlo simulations and measurements for profiles collimated by both electron applicators/cutouts and by the eMLC for all electron energies.

Conclusion: The electron beam characteristics from the motorized eMLC were examined. Measurement done for this motorized eMLC showed promising results and a potential for modulated electron therapy. Monte Carlo code with the source represented by phase space files is capable of accurately modeling electron beam delivery with the eMLC.

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