AbstractID: 7646 Title: Dosimetric Characterization of a Prototype eMLC for Fixed Beam Therapy

A prototype electron multileaf collimator (eMLC) has been developed for a Siemens Primus accelerator. The eMLC has 21 leaves that project 1-cm width at isocenter. The downstream edge of the leaves are 10 cm above isocenter, and each leaf can cross the entire field allowing any field shape within a 21 x 20 cm^2 area. The aim of the present work was to evaluate the eMLC dose output and dose distributions in water by comparing them to similar data for the fixed and variable applicator beams. eMLC dosimetry was measured using film/solid water and diode/water phantom systems for the 8 and 15 MeV beams for multiple SSDs and field sizes. Comparisons of central-axis percent depth dose show small differences (4% in buildup region, 1 mm in falloff). Output and air gap factors agree within 2% for field sizes greater that 4x4 cm^2. Beam penumbral width varies insignificantly as the leaf edges cross the field. Accuracy of fits by the pencil beam algorithm to measured 2-D dose distributions is similar to those for other electron beams. Isodose curves calculated for the eMLC agree within 0.1 cm of those calculated for existing collimating systems, which have equal field size and air gap (final collimator to water phantom distance). We conclude that the prototype eMLC can provide electron dose distributions that are clinically comparable with those of existing electron collimating systems.

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