

AbstractID: 12663 Title: Dosimetric comparison of the new Siemens 160 MLC and the Varian Millennium 120 MLC

Purpose: Recent models of multileaf collimators (MLC) have smaller leaf widths and increased target conformity. The new Siemens 160 MLC and the Varian Millennium 120 MLC models both have individual leaf widths of 5 mm projected at isocenter. This study quantifies and compares the physical penumbra and transmission of the Siemens 160 MLC and the Varian 120 MLC for 6 and 10MV photon beams.

Method and Materials: Penumbra was measured for $5 \times 5 \text{ cm}^2$ and $10 \times 10 \text{ cm}^2$ field sizes both on-axis and off-axis at depths ranging from 0.5 cm to 10 cm depth. Measurements were performed using the new Sun Nuclear Edge™ diode detector in a Scanditronix-Wellhoffer scanning tank and confirmed with Kodak EDR2 film. The average of interleaf and intraleaf transmission and end leaf transmission were measured with Kodak EDR2 film and confirmed with a 0.6cc farmer type ion chamber. The films were scanned using a Vidar VXR 16-bit scanner. The penumbra was determined for inplane and crossplane profiles.

Results: The average central and off-axis penumbra was 4.0 mm and 4.9 mm for the Siemens MLC and 4.3 mm and 4.5 mm for the Varian MLC, respectively. The penumbra increases with energy, field size, and depth for both MLC designs. The average of interleaf and intraleaf transmission was determined to be 0.7% for the Siemens MLC and 1.9% for the Varian MLC. End leaf transmission averaged 19.1% for the Siemens MLC and 30.3% for the Varian MLC.

Conclusion: The Siemens MLC demonstrates a sharper central axis penumbra while the Varian MLC demonstrates a sharper off-axis penumbra. Penumbra for the Siemens MLC is on average 0.5 mm sharper on one side of the inplane profile. Due to the design and role of the Siemens MLC as a primary collimator, transmission was less through the Siemens MLC leaves than the Varian MLC.