

## AbstractID: 10201 Title: Dosimetric and delivery advantages of a new 160-leaf MLC

**Purpose:** To conduct a measurement and treatment planning study on dosimetric and delivery advantages of a new 160 leaf MLC (160MLC, Siemens).

**Methods and Materials:** The uses of 160MLC were compared with a commonly used 58-leaf MLC (Siemens) and Cerrobend blocks. Radiation leakages and penumbra were measured using films and using a small-size ionization chamber. A treatment planning system (Xio, CMS) was used to generate (1) isodose distributions for a series of single circular and square fields defined by the MLCs or blocks, and (2) 3DCRT plans for a pituitary adenoma case with a small target volume and closely adjacent organs at risks. Static IMRT plans for a variety of prostate and head and neck cases using Xio and another planning system (Panther, Prowess) were generated and delivered.

**Results:** The 160MLC has lower radiation leakage (0.5% for 160MLC vs. 2% for 58MLC) and narrower penumbra (5-6 mm for 160MLC vs. 9-14 mm for 58MLC calculated between 80/20% isodose lines for a  $10 \times 10 \text{cm}^2$  field with various MLC rotations), and slightly wider penumbra (within 1 mm) than the blocks. The dose conformity between using 160MLC and blocks determined for a series of circular fields is similar, and higher than that 58MLC. The 3DCRT plans for 160MLC and blocks are comparable and more conformal than that for 58MLC as assessed by DVH parameters. The use of 160MLC reduces the numbers of segments and MU by 13% versus the 58MLC. The average delivery time for the Prowess IMRT plans with 160MLC was 5 minutes.

**Conclusion:** The 160MLC offers several dosimetric and delivery advantages including low leakage, narrow penumbra, conformal dose distributions similar to divergent blocks, reduced numbers of IMRT segments and MU, and reduced IMRT delivery time. These advantages lead to reduced normal tissue doses, without need of Cerrobend blocks, and improved treatment delivery.