

AbstractID:9569 Title:IMRT beamlet match -line dose heterogeneities associated with Varian 120MLC s

**Purpose:** To measure the dosimetric consequences of a range of MLC leaf offsets, examining effects of leaf tip transmission and “scalloped” overshine from rounded Varian MLC leaves. In particular, this investigation focuses on how these effects influence the dose heterogeneity of the match-line between abutted beamlet fields that are often present in step-and-shoot IMRT. **Method and Materials:** Offset values from 0.0 to 1.0 mm were evaluated. For each offset, two abutted  $2 \times 2 \text{ cm}^2$  MLC-shaped fields were delivered sequentially using 6 MV photons from a Varian Platinum EX accelerator with a 120 leaf MLC. Four different techniques—Kodak EDR-2 film, GAF Chromic EBT film, CC01 Wellhofer ion chamber (1 mm radius), and  $1 \text{ mm}^3$  LiFTLD chips—were used to measure delivered dose at depths of 5 to 15 cm. Film data was taken at 10 OSAD. TLD and ion chamber data were collected at 400 cm SSD to increase their effective resolution. **Results:** Increasing the offset from 0.0 to 0.5 mm decreased the average overdose from 30 to 10% in the abutment region. For offsets greater than 0.5 mm, dose at the center of the match line decreased, but dose inhomogeneities became more pronounced due to effects of overshine, scatter, and leaf tip penumbra. At larger offsets, both over- and underdoses of 5 to 10% were present in the abutment region. **Conclusions:** The measured dose distributions suggest that an optimum offset provides, at best, a balance of over- and underdosing in abutment regions. Our data show that the choice of offsets significantly changes the dose distribution in a region approximately 6 mm wide at the match line. The width of this high-gradient area is sufficient to influence clinical IMRT doses delivered.