

**AbstractID: 4973 Title: Properties of unflattened photon beams shaped by a multi leaf collimator**

**Purpose:** Several studies have shown that removal of the flattening filter from the treatment head of a clinical accelerator increases the dose rate and changes the lateral profile in radiation therapy with photons. However, the multi-leaf collimator (MLC) used to shape the field was not taken into consideration in these studies. We therefore investigated the effect of the MLC on flattened and unflattened beams.

**Method and Materials:** To do this, we performed measurements on a Varian Clinac 21EX and MCNPX Monte Carlo simulations to analyze the physical properties of the photon beam. We compared lateral profiles, depth dose curves, MLC leakages, and total scatter factors for two energies (6 MV and 18 MV) of MLC-shaped fields and jaw-shaped fields.

**Results:** Our study showed that flattening filter-free beams shaped by an MLC differ from the jaw-shaped beams. Similar differences were also observed for flattened beams. Although both collimating methods produced identical depth dose curves, the penumbra size and the MLC leakage were reduced in the softer, unflattened beam and the total scatter factors showed less field size dependence.

**Conclusion:** Our findings suggest that, when commissioning a treatment-planning system, one should use the profiles of the MLC-shaped fields in addition to profiles of the jaw-shaped fields.

**Conflict of Interest (only if applicable):** No.