AbstractID: 3630 Title: Dosimetric Study of Grid Therapy Using a Multileaf Collimator

**Purpose:** The purpose of this work is to show the feasibility of using multileaf collimators (MLCs) for grid therapy.

**Method and Materials:** A Varian 21EX linear accelerator equipped with a 120-leaf MLC was used to shape multiple openings of either $0.5x0.5cm^2$ or $1x1cm^2$ in a hexagonal pattern over an area of $10x10cm^2$ or $20x20cm^2$, respectively (at 100cm from the source). The total field was delivered in a sequence of 5 beams each defining two columns of the opening at a time. The dose profiles at various depths in a solid water phantom were measured using Kodak EDR2 films and analyzed with RIT dosimetry system. The dose profiles were then compared to those obtained with conventional grid collimators of similar holes and grid sizes. To evaluate the role of MLC leakages on the dose distribution, Monte Carlo simulations were performed to establish the physical dose limit in the blocked area.

**Results:** At the depth of 1.5 cm, the blocked area receives at most 10% of the peak dose in the exposed area for the 1cm grid, and 21% for the 0.5cm grid. These are comparable to the 13% and 18% obtained using the grid collimators. The theoretical values for a hypothetical leakless MLC are found to be 5% and 12%, respectively. At the depth of 10cm, the relative dose in the blocked area increase to 18% and 25% with the MLC grids and 19% and 29% with the grid blocks, respectively. The respective output factors as normalized to open fields are 80% and 65%.

**Conclusions:** The MLC grids give the valley-to-peak dose ratios and output factors that are comparable to those of cerrobend grid collimators. The advantages of MLC are clear: the grid field can be obtained easily and quickly by simply programming the leaf positions, and it is cost-effective.