

Purpose: GRID Therapy is an effective technique in treating large tumors and involves large doses in single fractions. This work is to present some dosimetric characteristics of MLC-based GRIDs, and patient-specific QA procedures at our institution based on film and diode dosimetry;

Methods and Materials: 14 patients received GRID therapy treatments of 1500-2000 cGy at Dmax(1.5cm) in a single fraction with 6 MV photons from January 2006 to February 2007. The treatments were planned on the Pinnacle TPS using a step-and-shoot technique to generate chess-board-like patterns consisting of abutting opened-and-closed cells of 1cmx1cm. The treatments were delivered on a Varian Clinac 21EX with 120MLC. QA for each patient was performed with Kodax EDR2 film placed in a solid water phantom irradiated with the GRID field at normal angle and treatment SSD. Based on the measured optical density and QA MU, the MU to deliver the prescribed dose is calculated and compared with that given by the TPS for the same irradiation geometry. Similar measurements were also carried out with a diode detector in a water phantom;

Results: MU derived from film measurements were consistently lower than those given by the TPS, from 1%-7%. Possible causes may be: (1) film over-response due to high-Z material and low energy photons in the tail region of dose profile; and (2) small variations in MLC leaf positions having measurable effect on the output of small GRID beamlets. The MUs derived from diode measurements are generally higher than and within 2% from those obtained with films. The valley-to-peak ratio ranged from 22%-29%, primarily depending on the number of segments in the beams.

Conclusion: With the understanding of their advantages as well as limitations, both film and diode can be effectively used in routine plan verification for GRID therapy.