AbstractID: 10583 Title: A Monte Carlo Study for Characterization of Solid Brass Compensators Used for IMRT

Purpose: A Monte Carlo study for characterization of solid brass compensators used for IMRT is performed, to investigate their dosimetric properties.

Method and Materials: A group various solid brass compensators with different shapes were constructed and simulated by Monte Carlo code EGSnrc (BEAMnrc/DOSXYZnrc). A Varian 2100Ex linear accelerator was commissioned prior to the simulation of the compensators. The simulation included five solid slab brass compensators with thicknesses ranging from 1 to 7cm and solid brass compensators of varying thickness within the field. The same fluences as the ones produced by the compensators were created using Varian Millennium MLC collimator. Phase-space files were scored after the compensators and after the MLC collimator. The phase space files were used as sources in DOSXYZnrc and the dose was calculated in a solid $30x30x30cm^3$ water phantom. Dose distribution profiles and PDD were obtained from the dose simulations. Particle fluence, energy fluence, energy spectrum and angular distributions were obtained from the phase space files.

Results: Dosimetric data analysis of the PDDs and profiles showed that beam hardening does not have a significant effect on the PDD as it does on the energy spectrum. The PDDs are more penetrating than their open-field counterparts. Comparing results from MLC-based IMRT fields and compensators, we find them to be consistently dosimetrically equivalent for all the fields we studied.

Conclusion: This study shows that the compensator is an inexpensive and reliable dose delivery device for IMRT and produces an optimized dose profile similar to the ones obtained with the MLC based IMRT delivery.

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