

AbstractID: 7040 Title: Dosimetric characteristics of GAFCHROMIC® EBT film for therapeutic electron beams

Purpose: To evaluate the dosimetric characteristics of GAFCHROMIC® EBT film when exposed by high-energy electron beams.

Method and Materials: Studies of the effects of the electron beam treatment parameters on dose calibration curves were performed with GAFCHROMIC® EBT radiochromic films. All films used in this study were from the same batch in order to remove any variability between batches. The films were irradiated in a multilayered 30 x 30 x 25 cm³ solid water phantom with source-to-surface (SSD) distance of 100 cm. The effects of electron beam energy, cone size, dose rate, depth, and MU end effect were studied.

Results: The dose response curve was found to be independent of the electron energy (-2.2% to 3.6% difference of the averaged scan value). The dose calibration curves of EBT films were independent of MU end effect (from -1.0% to 2.2%) as well as electron beam dose rate (within 1.7%). For the field size dependence due to different electron cones, it is possible to calibrate GAFCHROMIC® EBT films using 10 x 10 cm², cone size and then evaluate dose distributions resulting from various electron cone sizes. The EBT film did not show any impact of the depth on the dose response curve for electron beams.

Conclusions: There was no much influence on dose response curves of GAFCHROMIC® EBT films due to electron beam energy, cone size, dose rate, depth, and MU end effect. The independence of the GAFCHROMIC® EBT on these electron beam dosimetric parameters studied for this kind of newly developed radiochromic film makes it an accurate and versatile dosimetric detector for two-dimensional dose distribution measurements for therapeutic electron beams.