

AbstractID: 3089 Title: Radiochromic EBT film characterization and applicability for IMRT QA Verification

Purpose: Characterization of ISP's new EBT radiochromic film for clinical dosimetry, with emphasis on the usefulness for routine QA of IMRT treatments.

Methods and Materials: EBT is a new formulation of radiochromic film by ISP. Sheets were exposed to 6 MV and 18 MV photons from a Varian 2300C/D accelerator over clinically useful dose ranges. Density was measured by scanning the film in a Vidar VXR-16 Dosimetry Pro scanner and the data analyzed using RIT113 v4 software. The reproducibility, stability, and temperature sensitivity were investigated. Dose distributions for IMRT treatments delivered with a Millinium 120 leaf MLC were measured with the EBT film and compared to those of Kodak EDR2 film and to the predictions of the Eclipse treatment planning system.

Results: EBT films from the same batch have a consistent response to doses ranging from 50 to 500 cGy for 6 MV and 18 MV photons. The density readings are stable from 1 to 75 hours post exposure when stored in the dark at room temperature. Beyond 75 hours, the density slowly increases. The film is insensitive to cold, but shows significant degradation when exposed to 60 C for as little as two hours. For IMRT dose distributions where the dose is below 200 cGy, the EBT film has similar responses as Kodak's EDR2 film and very close agreement to the Eclipse predictions. In regions of IMRT doses greater than 200 cGy, the EBT film loses sensitivity as compared to EDR2 film and to the Eclipse calculations.

Conclusions: ISP's EBT radiochromic film is reproducible and stable under normal clinical conditions. For IMRT dose verification, the EBT film is in close agreement with calculations and EDR2 film for doses less than 200 cGy. Further research is needed to understand the reduced response of EBT to IMRT doses above 200 cGy.