

AbstractID: 11541 Title: Planning Dose Comparison of EBT Films and 2D Diode Array at Different Gantry Angles

Purpose: To evaluate the measured dose distributions using radiochromic EBT films and a 2D diode array as compared with treatment planning (TP) data at different gantry angles.

Method and Materials: Radiochromic EBT films (ISP) were irradiated with 6MV photons on a Varian Cl-iX linac at 10cm depth (100cm SAD, polystyrene phantom, 25x25x20cm³). The films were exposed, one at a time, at gantry of 0°,30°,60°,70°,80°,90° with a 10x10cm² field and an IMRT field at collimator of 45°. The calibration films were irradiated at d_{\max} (1.5cm) for doses up to 10Gy. All films were scanned using an Epson 10000XL flatbed scanner with 48-bit color (RGB) and 75dpi. The pixel values were converted to doses using the established calibration curve. The 2D dose distributions were generated from the film data analysis. Similar experiments, with the same settings, were performed using a diode array (MapCheckTM). An in-house software was used to compare the measured doses from films and the diode array with the TP data at each gantry angle.

Results: With the TP data as a reference (100%), the measured doses for 10x10 cm² field at the isocenter were 100±2% from EBT film dosimetry for all the gantry angles studied. The diode array data showed a trend of angular dependence, decreasing from 100% at 0° down to 90% at 80° gantry angle. 1D dose profiles along the diagonal line in the cross-plane and 2D dose distributions were compared. A gamma index analysis was also performed to evaluate comparisons of measurements and TP data.

Conclusions: The quantification of 2D dose distributions for 10x10 cm² and IMRT treatments at various gantry angles using EBT films was demonstrated. The results were compared with diode array data and TP. The EBT films could potentially be a useful dosimeter in patient-specific QA, including IMRT, RapidArc, VMAT, and Tomotherapy.