AbstractID: 6877 Title: Off-axis dose measurement using new high sensitivity radiochromic film: Potential application to pacemaker dosimetry in a clinical setting

Purpose: To study the feasibility of using new high sensitivity radiochromic film, GAFCHROMIC® Low Dose Film, in measuring the doses to off-axis points for pacemaker.

Method and Materials: Each experimental radiochromic film (ISP) was positioned at various off-axis points from the field edge of a 6MV beam of a Varian Clinac-iX. The off-axis points were at x=3,5,8,10,15 cm from the field edge, and at depths of 0, 0.5, 1.5cm. Calibration films were positioned at the central axis of the beam at 1.5cm depth of a 10x10 cm field. Dose was calibrated against the ion chamber measurement (Standard Imaging Exradin A-12 with ADCL calibration) at the same location and depth. All experimental, calibration, and background films were scanned at the same location and orientation of an Epson Perfection 4870 flatbed scanner with reflection mode, 48 bit color, and 150 dpi spatial resolution. The ImageJ software from NIH was used to extract and analyze the data for red and green channels. For each film, a 1cm circular area at the film center was sampled and the mean value in this circle was obtained. Calibration curves for red and green channels were established from the calibration films. Conversion from net optical density readings to doses was achieved based on the polynomial fit to the calibration curve established for each light channel.

Results: The doses at the off-axis measurement points were determined, and compared with those obtained using ion chamber at respective locations. The ratio of the radiochromic film dose to that from ion chamber measurement at each measurement point was obtained.

Conclusion: It is feasible to accurately measure off-axis doses of megavoltage photon beams using the new high sensitivity radiochromic film. This fast and inexpensive method can be applied in a clinical setting for dose measurement to pacemaker and other critical organs.