AbstractID: 11064 Title: Calibration of Lot 47207-01I GAFCHROMIC EBT Film Using the Xoft Axxent X-ray Source

Purpose: To determine the absolute dose delivered for a given exposed optical density of GAFCHROMIC[®] EBT film over a range of 0.25 to 14 Gy and over a range of distances from 1cm to 4cm in water for a Xoft Axxent[®] Model S700 X-ray Source.

Method and Materials: GAFCHROMIC film is used for dose delivery validation for the Xoft x-ray source and associated applicators used to deliver prescription dose distributions. Custom Gammex RMI 457 Solid Water[™] film fixtures were designed to locate both a PTW34013 ionization chamber and a film coupon at precise distances from the x-ray source. The fixtures complete integral rotations around the x-ray source during exposures to minimize azimuthal effects. Three sets of 12 exposures were performed for the dose range at each distance. Film coupons were scanned with an Epson[®] Expression[®] 10000XL scanner and the maximum pixel value was determined for each coupon corresponding to the calibrated ionization chamber measured dose.

Results: The measured maximum pixel values for each data set were fit to a 5th order polynomial. Calibration coefficients were determined at different distances from the x-ray source to investigate spectral differences. All fits were well behaved with residuals within $\pm 4\%$. Differences between the fitted dose as a function of distance were small, indicating little sensitivity of the film to the range of source spectra. This calibration was applied to Xoft Axxent Vaginal Applicator validation study films, producing good agreement with the isodose contours predicted by BrachyVisionTM treatment planning software.

Conclusion: A precise calibration of GAFCHROMIC EBT film was performed for the Xoft x-ray source using a PTW 34013 ionization chamber. It showed no significant difference in the measured optical density for a given measured dose over a distance range of 1 cm to 4 cm.

Conflict of Interest:

Research sponsored by Xoft, Inc.