

AbstractID: 8600 Title: High precision GafChromic based clinical dosimetry using standard flat bed scanner

Purpose: To describe the methodology to use a commercially available flatbed document scanner to digitize GafChromic[®] EBT radiochromic film (RCF) to be used in a clinical environment for highly accurate and reliable all purpose two-dimensional absolute dosimeter. We propose a methodology that yields high precision dosimetry measurements without significant post-irradiation correction as has been proposed in the literature.

Method and Materials: Epson Expression 1680 Professional scanner was used to digitize the RCF. The scanner was also retrofitted with an inexpensive commercial diffusion glass to minimize the effects of Newton rings. A small strip of films was made from the calibration film and a known dose was delivered. Subsequently, the measurement films were positioned and irradiated with 10 cm and 20 cm build up solid water and 5 cm back scatter solid water. No particular bowing effect correction and/or significant image processing were carried out. The calibration films were used to compute an analytical function to convert optical density to dose. The profiles were compared with CC04 water tank measurements. Additionally, preliminary study of IMRT fields was also done and evaluated using gamma test.

Results: The overall agreement of RCF with CC04 is $\pm 3\%$. For $10 \times 10 \text{ cm}^2$ field size at 10cm build up, the agreement for central axis percent dose difference and mean of the difference for RCF with respect to CC04 is 2.24% and 1.84%, respectively. For 20cm build up with same field size, the agreement was 0.98% and 1.97% for central axis percent dose difference and mean of the difference, respectively. The preliminary results of the IMRT fields yielded a mean passing rate of 92.5%. Repeated film measurements yielded reproducibility of results to within 2%.

Conclusion: This work demonstrated that RCF in conjunction with a commercially available flatbed scanner can be used as a highly accurate and precise absolute dosimeter.