

AbstractID: 13967 Title: On improving the accuracy of EBT2 film dosimetry using a flatbed scanner

Purpose: To investigate the effects of flatbed scanner red-blue ratio and non-uniformity corrections on the accuracy of EBT2 film dosimetry. **Method and Materials:** EBT2 film was exposed to a 40x40 6MV field with 10 cm buildup in a 30x30cm solid water phantom for a range of doses from 0.85 cGy to 400.16 cGy. The films were scanned on an Epson Expression 10000XL flatbed scanner. The resulting images were first corrected using the ratio of the scanner's red-blue channel. The difference between the expected dose from a Varian Eclipse planning system and the measured dose distributions was then used to generate a correction in scanner space to compensate for the non-uniform response of the scanner. The red-blue ratio and the non-uniformity corrections were applied to open-field, MLC pattern, and patient RapidArc images. Uncorrected results were compared to the red-blue ratio correction and to both red-blue ratio and non-uniformity corrections. **Results:** The effects of scanner non-uniformity were found to vary with dose applied to the film. The maximum relative discrepancy for doses below 10 cGy was as high as 40% for areas close to the film edge. This non-uniformity decreases rapidly with increasing dose and for scanning locations towards the center of the scanner. The effects of applying the red-blue ratio correction reduced the high frequency noise observed on the raw images. The relative noise of the film was reduced from 0.96% to 0.65%. The red-blue ratio correction was unable to compensate for low dose errors towards the film edges. Application of the non-uniformity correction reduced the number of pixels failing 3%/3mm gamma by up to 75% depending on the dose level and complexity of the dose distribution in the image. **Conclusions:** The application of both a red-blue density ratio correction and a non-uniformity correction improves the accuracy of EBT2 film dosimetry.