

AbstractID: 7231 Title: The influence of scanner parameters on the accuracy of film dosimetry: A comparison of the Epson Expression 1680 flatbed and the Vidar VXR-16 Dosimetry PRO film scanners

Purpose: To investigate the properties of Vidar VXR-16 Dosimetry PRO™ and Epson Expression 1680 film scanners with Gafchromic EBT and EDR2 radiographic films for dosimetry applications.

Method and Materials: The EDR2 and EBT films are irradiated with 10 x 10 cm² 6 MV X-ray beams in solid water. Dose calibration curves are obtained using an MLC generated stepwedge.

Each EDR2 or EBT film is scanned in both vertical and horizontal orientation with Vidar and Epson scanners in transmission mode and analyzed using FilmQA™ (3cognition LLC) software. The RIT (Radiological Imaging Technology, Colorado Springs) software is used with the Vidar only. Epson scans are done without color correction in the 48-bit RGB mode, resolution 75 dpi. The R channel image is used for analysis. Vidar scans are done with resolution 71 dpi, logarithmic and linear translation tables, and the 16-bit grayscale image is analyzed.

Results:

For the EDR2 film no differences are observed for different scan orientations on either Epson or Vidar scanners with both RIT and FilmQA software.

The EBT scans show no difference for different scan directions on either scanner. However, artifacts are associated with different translation tables with the Vidar while up to 2% differences are observed in the penumbra with Epson.

Scanning measurement, calibration, and background films in the same direction estimates doses on central axis with 2% accuracy for both film types and scanners. However, inconsistent scan directions result in errors up to 10% on Epson and 41%-45% on Vidar scanner.

Conclusion: Calibration curve differences depend on the type of scanner, scanning mode, scanning software, and film orientation. The EDR2 on either scanner reproduces relative profiles and dose to better than 2% regardless of orientation. For the EBT the scanner parameters, orientation, and software corrections become important for accurate dosimetry results and to avoid artifacts.