AbstractID: 10380 Title: On the comparison of Epson V700 and 10000XL scanners for GafChromic EBT film dosimetry

Purpose: This project investigated the differences between the Epson 10000XL and V700 flat bed scanners when used in EBT film dosimetry, to determine whether the cheaper model (V700) is suitable for clinical use.

Method and Materials: Based on existing literature, we investigated three basic characteristics of both scanners - the dose sensitivity curve of EBT film, the scanner uniformity correction, and the darkening of EBT film by the scanner lamp. Doses from 0.25 Gy to 8 Gy were delivered to 8 pieces of EBT film, and the same set of film was read by both scanners. Calibration curves obtained from both scanners were compared. Scanner lamp scattering effect (uniformity) was investigated in directions parallel and perpendicular to the scanner lamp. The geometric accuracy of both scanners were also verified using a test pattern consisting of a set of concentric rings. Scanner darkening effect was investigated by repeatedly scanning two pieces of blank film on both scanners.

Results: We observed a strong darkening effect on EBT films by the V700 scanner, while the 10000XL showed no permanent darkening. The two scanners show similar calibration curves (both in terms of sensitivity and signal-to-noise) and geometric accuracy. The V700 shows a significantly higher lateral uniformity variation compared to the 10000XL, and the correction can not be adequately described by a simple equation. In contrast, the 10000XL exhibits a smooth uniformity variation that can be accurately corrected for.

Conclusion: In our view, the darkening effect and irregular lateral uniformity correction are two significant drawbacks of V700 scanner that make it unsuitable for accurate EBT film dosimetry. These results are also applicable to other Epson consumer-level scanners, as they all use the same type of lamp as the V700. The 10000XL remains the scanner of choice from the current Epson lineup for EBT film dosimetry.