

Purpose: 2D planar dosimeter, radiochromic film has commonly been used to perform patient quality assurance (QA). It is our aim to investigate the properties of new EBT2 film scanned in transmission and reflection scanning mode.

Method: We compared the transmission and reflection scanning mode of EBT2 (Lot No. A07160901) film with an EPSON expression 1680 pro flatbed scanner. Films were cut up into $3 \times 3 \text{cm}^2$ and irradiated from 20cGy to 700cGy using a $10 \times 10 \text{cm}^2$ field size with 6MV and 10MV photons for calibration. The red channel was confirmed to provide the greatest sensitivity and was used for all measurements. We investigated the effect of an absolute dose and film orientation using film pieces which were delivered 100cGy, 300cGy, and 500cGy at the depth of maximum dose in a phantom. The EBT2 films were irradiated with 6MV and 10MV photons for intensity modulated radiotherapy (IMRT) QA and compared with the films which have left under different room light conditions.

Result: A maximum dose variation was -9.7% in transmission mode and 6.6% in reflection mode respectively. The maximum standard deviation in a region of interest (ROI) was 2.2% in transmission and 3.6% in reflection mode. The transmission scanning readings show strong film orientation dependency compared with reflection readings. In addition to, readings in transmission scanning mode are more sensitive to room light than that in reflection mode.

Conclusion: Transmission scanning mode is conventionally used for the purpose of patient QA using EBT2 film. However, the mode is sensitive to the orientation of the film and room light. Reflection scanning mode has the long term stability of the film readings and a relatively low orientation effect on EBT2 film. On the other hand, the large standard deviation of absolute dose in reflection mode is a drawback in providing high-precision dosimetric information.