Evaluation of sensitivity and uniformity of new radiochromic film with two commercial scanners

PURPOSE The purpose of this study was to investigate the sensitivity and the uniformity of EBT3 film and to assess the relative utility of the Epson ES-10000G flatbed scanner and the Vidar DosimetryPRO Advantage (Red) scanner.

MATERIALS AND METHODS A sheet of EBT3 film was inserted in a solid water phantom and irradiated with doses ranging from 1 to 1600 cGy using a 15-MV photon beam. All of the irradiated films were then digitized using either the Epson scanner or the Vidar scanner, and the following parameters were calculated: (a) sensitivity of the film, (b) local fluctuations of the film response. Local fluctuations were defined as the relative (percent) standard deviation of the film response in ROIs (3×3 cm²).

RESULTS The sensitivity and the gradient are shown in Fig. 2 and 3. The Vidar scanner with EBT3 film exhibited higher sensitivity for low dose range (below <400 cGy). For the Epson scanner, the red color channel had the higher system sensitivity at low dose range. At high dose range (above >400 cGy), the green color channel had the higher system sensitivity. The relative standard deviation is shown in Fig. 4. The Vidar scanner exhibited the lower relative standard deviation than the Epson scanner at all doses. For the Epson scanner, the red color channel had the lower relative standard deviation than the green and blue color channel at all doses.

CONCLUSIONS This study shows the characteristics of the new EBT3 films, in conjunction with the Epson ES-10000G flatbed scanner and the Vidar DosimetryPRO Advantage (Red) scanner.