Purpose:

Gafchromic film for quantitative analysis was renewed from EBT2 to EBT3 film in November 2011. The purpose of this study is to investigate the relevant characteristics of EBT3 film for its application in dosimetric verification for IMRT/VMAT or proton therapy.

Method:

We investigated the characteristics of EBT3 film with comparison of previous EBT2 film. The experiments in this study composed two categories. At first, the photo spectroscopy for the irradiated film was compared between EBT2 and EBT3. The film 1 day after the irradiation was analyzed by a photo spectrometer (SR520: JASCO Corporation, Japan). Secondly, we investigated several calibration curves which obtained by same batch. The films were calibrated by irradiation the films to 13 dose steps. The irradiated films were scanned by a flatbed scanner (ES-10000XL, Epson-Seiko Corporation, Japan). The difference on scan orientation was evaluated alternate portrait and landscape directions. The photon and proton beams were delivered from Clinac 21EX (Varian) and Mitsubishi machine, respectively.

Results:

The peak absorption wavelength of EBT3 film and its response at all active range were basically same with that of EBT2 film. The peak wavelength of photo absorption in EBT3 was observed at 585 and 634 nm. The fog optical density was increased due to the hazy matte polyester for active layer. However, there is no change the tendency of the calibration curve responding to megavoltage photon and proton beams. The scan orientation dependency of EBT3 film was observed with similar to EBT2 film. The optical density of portrait orientation was 10% higher than that of landscape orientation.

Conclusion:

The dosimetric characteristics of EBT3 film were basically same with EBT2 film. With regard to the matte polyester, the creation of Newton’s rings during scanning procedure was reduced. However, the suitable scan protocol should be used for accurate film dosimetry.