

عنوان مقاله:

Dosimetric Investigation of Six Ru-106 Eye Plaques by EBT³ Radiochromic Films and Monte Carlo Simulation

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خلاصه مقاله:

Background: Ophthalmic brachytherapy using radioactive plaques is an effective technique for the treatment of uveal melanoma. Ru-106 eye plaques are considered as interesting issue due to their steep gradient dose. The pre-planning evaluation of dosimetric parameters is essential for the treatment planning system. **Objective:** The current study aims at providing dose distributions of six Ru-106 eye plaques (CCA, CCB, CGD, CIB, COB and COD) using radiochromic EBT³ film, Geant⁴ Monte Carlo toolkit and the treatment planning software (Plaque Simulator). **Material and Methods:** In this experimental study, an in-house phantom was employed for depth dose measurements with EBT³ films. Also, Geant⁴.10.5 scoring mesh was implemented to obtain the 2D dose distribution of the plaques. The results were compared with Plaque Simulator software and the manufacturer's (BEBIG) data. The gamma index criterion (3%/3 mm) was used to evaluate dose distributions obtained by the film measurements and Geant⁴ simulation. **Results:** A good agreement was achieved between simulation and experimental results. Gamma index passing rate was 94.2%, 89.3%, 88.2%, 82.2% and 90.1% for CCA, CCB, CGD, CIB, COB and COD plaques, respectively. Absolute dose rate (mGy/min) obtained by EBT³ film at the depth of 2 mm was 79.4 mGy/min, 81.0 mGy/min, 78.6 mGy/min, 62.2 mGy/min, 75.2 mGy/min and 81.2 mGy/min for CCA, CCB, CGD, CIB, COB and COD plaques, respectively. **Conclusion:** The measured dose distributions and lateral dose profiles may be utilized in the treatment planning system to cover clinical volumes such as the clinical target volume and the gross tumor volume.

کلمات کلیدی:

Uveal melanoma, Ru-106 Plaque, Dosimetry, Brachytherapy, EBT³ Film, Monte Carlo Method

