عنوان مقاله:

Thermoluminescent Characteristics of GR-۲۰۰, TLD-۷۰۰H and TLD-۱۰۰ for Low Dose Measurement: Linearity, Repeatability, Dose Rate and Photon Energy Dependence

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خلاصه مقاله:

Background: The dose values obtained from procedures of diagnostic radiology are relatively low. To accurately and precisely measure the dose values in this dose range, it is necessary to know the characteristics of dosimeters.Objective: The aim of this study was to evaluate several thermoluminescent characteristics of GR-۲۰۰, TLD-۷۰۰H and TLD-۱۰۰ for low dose measurement.Material and Methods: In this experimental study, linearity, repeatability, dose rate and photon energy dependence of different TLD materials were investigated in a ۰.۰۵-۱۰ mGy range dose. It is noteworthy that the data obtained from TLD-۱۰۰ were considered as reference and the data obtained from two other types of TLDs were compared with them. Results: For all three types of TLD materials, there are linear relations between absorbed dose values to TLDs and their responses. TLD-۱۰۰ and TLD-۷۰۰H have very low sensitivity than GR-۲۰۰. For GR-۲۰۰ and TLD-۱۰۰, the coefficients of variation values (%) are ۳.۰۰% and ۲.۰۱%, respectively, that these values are within the tolerance limit (<۷.۵%). However, this value for TLD-۷۰۰H is ۱۰.۸۵% which it is more than the reported tolerance limit. Furthermore, remarkable effects of dose rate and photon energy dependence on the responses of GR-۲۰۰ are not observed in a ۰.۵-۴ mGy dose range; nevertheless, remarkable effects of dose rate and photon energy dependence on the responses of TLD-۱۰۰ and TLD-۷۰۰H are found in this dose range. Conclusion: The evaluated thermoluminescent characteristics for GR-۲۰۰ are better than two other types of TLDs (TLD-۱۰۰ and TLD-۷۰۰H) for low dose values.

کلمات کلیدی:
Thermoluminescent Dosimetry, Radiology, Radiation Dosage, GR-۲۰۰, TLD-۱۰۰, TLD-۷۰۰H