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A Thermoluminescent method for the evaluation of the 131i effective half-life in the Thyroid when treating Graves' disease

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When planning treatment for Graves' disease with 131I, the efective half-life (Tef) should be estimated individually as it depends on biological characteristics such as iodine uptake and excretion, which difer from an individual to another (Berg et al. 1996). All the methods to quantify Tef described in the literature are quite complex and are difcult to be used in clinical routine. With the aim of optimizing this process, a simplifed method is proposed here to evaluate Tef of 131I during treatment of Graves' disease. The present study suggests improving the method of determining Tef based on thermoluminescence dosimetry. This involves implementing a new method and includes reduction of TLD (Thermoluminescent Dosimeter) measurements. The proposed method was validated on patients with Graves' disease. The radiation dose delivered to the patients was determined using the MIRD (Medical Internal Radiation Dosimetry) formalism. The relative diference between Tef obtained based on seven measurement intervals at [0–24 h, 24–48 h, 48–72 h, 72–96 h, 96–120 h, 120–144 h, 144–168 h] and based on three measurement intervals at [0–24 h, 72–96 h, 144–168 h] and [0–24 h, 120–144 h, 144–168 h] was 1.9% and 3.81%, respectively. Comparison of doses obtained based on a general Tef and on a personalized Tef gave a statistically signifcant diference with a correlation coefcient R2 of 0.44. The Tef obtained from just three measurements was found to be sufciently accurate and easily applicable. The results obtained demonstrate the need to determine and use personalized Tef values instead of using a fxed value of 7 days.

Biography

Sabrine MEFTAH is a medical physicist who has been working for 7 years in the field of radiotherapy and nuclear medicine. His thesis subject focuses on internal dosimetry during the treatment of thyroid pathologies, in particular for Graves' disease. These main publications are in the field of medical physics and internal dosimetry.

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