

# TL and OSL dosimetric characterization of different luminescent materials for clinical electron beams application in TSI treatments

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## ABSTRACT

Thermoluminescent dosimeters (DTLs) play an important role in radiotherapy for the dosimetry of ionizing radiation. This type of dosimeter presents advantages that makes them a useful tool, in particular, for measurements in anthropomorphic simulators and for dosimetry in vivo in patients. Several dosimetric materials have been used in the radiotherapy sectors such as LiF,  $\mu\text{LiF}$ ,  $\text{CaSO}_4:\text{Dy}$ <sup>(1,2)</sup>. The OSL dosimetry has also been widely used using Aluminum Oxide ( $\text{Al}_2\text{O}_3:\text{C}$ ). These dosimeters have advantages over DTLs due to their high sensitivity, extensive linearity in response to the dose, faster readability, possibility of multiple re-readings and the need to perform the heat treatment of the samples<sup>(3)</sup>.

The objective of this work was to characterize the TL and OSL techniques using different luminescent dosimeters (LiF,  $\mu\text{LiF}$ ,  $\text{CaSO}_4:\text{Dy}$  and  $\text{Al}_2\text{O}_3:\text{C}$ ) to be applied in clinical electron beam used to TSI (Total Skin Irradiation) treatments. Parameters such as dose response curve, that presented linear behavior in the dose range studied; mean sensitivity of the dosimeters, that demonstrated constant values in the dose range analyzed: 28,7 cGy to 382,8 cGy were evaluated. Other parameters also studied were the angular dependence of the TL and OSL response and the intrinsic efficiency of the materials. The  $\text{Al}_2\text{O}_3:\text{C}$  dosimeters presented variation of the OSL response greater than the other dosimeters, probably, due to their thickness 0,9 mm.

*Keywords:* Thermoluminescent dosimeters, Optically stimulated luminescence, Intrinsic efficiency, Angular dependence.

## Acknowledgements

The authors are thankful to CNPq and FAPESP for the financial support and the Hospital Israelita Albert Einstein for the irradiations and the support provided for the conclusion of this study.

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