

AbstractID: 3350 Title: A dosimetric evaluation of a new MOSFET radiation dosimeter for total body irradiation

Purpose: To evaluate the use of a new metal oxide semiconductor field effect transistor (MOSFET) as an in vivo dosimeter for patients receiving total body irradiation (TBI).

Method and Materials: The dose responses of the MOSFET dosimeters are compared to that of thermoluminescent dosimeters (TLDs) during TBI treatments of 4 patients. Each patient is treated AP/PA with ^{60}Co irradiation, a field size of $44 \times 44 \text{ cm}^2$ at isocenter, and an SAD of 338.2 cm. One MOSFET dosimeter and 4 TLD crystals are placed at the entrance and exit of five anatomical sites: head, chest, lung, umbilicus, and pelvis. Additionally, the dosimeters are positioned at a calibration point in air to normalize the dosimeter readings. The MOSFET dosimeters are read instantaneously with a digital hand held reader, and the TLDs are measured with a TLD reader.

Results: The measured midline dose rates and calculated treatment times of the MOSFET dosimeters and TLDs are compared. The average deviations of the MOSFETs from the TLDs are 6% at the head, 7% at the chest, 3% at the lung, 1% at the umbilicus, and 4% at the pelvis. The maximum deviation of the MOSFETs from the TLDs is 11.5%, and the minimum deviation is 0.94%. The MOSFET calculated treatment times are within 5% of the TLD calculated treatment times. Three dosimeters failed during the treatments.

Conclusions: These results show that the new MOSFET dosimeters are an adequate and efficient measurement system for TBI treatments. The cause of dosimeter failure has not been determined as further analysis and experience with the MOSFET dosimeters are necessary. It is recommended that more than one MOSFET dosimeter is used per site for TBI treatment in case of dosimeter failure.