

AbstractID: 3479 Title: Performance of two commercial MOSFET systems at low doses in and out of field

Purpose:

Some applications in clinical dosimetry require dose measurements in the 1-10 cGy range, such as in vivo dose verification measurements of critical structures that are near the field edge shielded by a jaw, block, or MLC leaf. Since such dose results from scatter, the spectrum is different than in the field. In IMRT, even infield measurements can be underneath an MLC leaf and therefore subject to a different spectrum for part of the irradiation.

The goals of this study were to investigate 1) the repeatability and reproducibility of MOSFET measurements in the 1-10 cGy range; and 2) the impact of the different energy spectrum outside the beam on the dose response.

Method and Materials:

Dose measurements were performed on an 18 MV clinical linear accelerator using two commercial systems (Thomson Nielsen AutoSense and mobileMOSFET) both operated in high sensitivity mode. Measurements were made on the central axis and out-of-field along a profile extending perpendicularly from the center of a field edge. Absolute dose was measured with a calibrated Farmer chamber.

Results:

The AutoSense device was able to measure doses down to 5 cGy with a repeatability of 5.8% (all numbers refer to 1 SD) using high sensitivity detectors. The mobileMOSFET device measured at 1 cGy with an average repeatability of 4.8 % for high sensitivity detectors and 7.7 % for standard detectors. Reproducibility was 3.8% and 4.2%, respectively.

MOSFET response outside the field increased with increasing distance from the field edge generally up to 8 % at 4.8 cm. Reproducibility for this location was also about 8 %.

Conclusions:

The commercial MOSFET devices AutoSense and mobileMOSFET have been shown to reliably measure doses down to 5 cGy and 1 cGy, respectively. MOSFET response outside the beam is increased close to the measurement uncertainty.