

AbstractID: 7568 Title: Characterization of buildup effects in OneDosePlus MOSFET-based dosimeters

Purpose: Evaluate the buildup cap used on OneDosePlus™ MOSFET dosimeters and study the field size, angular, and SSD dependency.

Method and Materials: OneDosePlus (ODP) dosimeters are single use, pre-calibrated MOSFETs used to measure entrance patient dose. ODP has an integrated 1.2 mm thick tin cap. Custom dosimeters were created with buildup caps of varied thicknesses to determine the approximate tin d_{max} thickness for 6, 15, and 18 MV. Non-calibrated ODP dosimeters were evaluated to assess the effect on response of the dosimeter as a function of field size, SSD, and anisotropy for different energies.

Results: PDD curves for 6, 15 and 18MV show broad maximum responses centered near cap thicknesses of 1.2, 2.6 and 2.8 mm for 6, 15, and 18 MV, respectively. Evaluation of the field size response showed that higher energies have an over- and under-response for larger/smaller field sizes as compared to 6 MV response, suggesting an increase in electron contamination dose contribution. Results of extended SSDs studies, typical of TBI treatments, show enhanced measurement precision, supporting these findings. For patient use, the dosimeter response is pre-calibrated and adjusted such that the reading corresponds to D_{max} in-tissue for each specific energy. In addition, the dosimeters are corrected for the 6 MV field size and SSD dependency. Therefore, for higher energies, a slight over- or under- response can be observed for larger/smaller field sizes but not in excess of the reported dosimeter accuracy ($\pm 5\%, 2\sigma$).

Conclusion: The buildup cap for ODP provides a partial buildup effect with results within the expected accuracy for different dosimetric parameters. The dosimeter factory calibration corrects the response from the partial buildup effect seen from the buildup cap. Extended SSD data suggests that ODP could be used to measure dose for TBI treatments.

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