

AbstractID: 13484 Title: Feasibility of Making In-vivo Peripheral Dose Measurements Using a Portable Dosimeter System – Beta testing of a novel device

Purpose: Peripheral Dose (PD) to structures such as testes, thyroid, or contra-lateral breast has important clinical implications regarding the health of a patient. The purpose of this study was to determine utility of a new Portable Dosimeter System for PD measurements to critical structures outside of radiation fields.

Method and Materials: Measurements were made using a pair of Portable Dosimeters, Model TN-RD-90 (Best Medical Canada Ltd.) At the time of the study, the device was going through the FDA approval process and this study was part of beta testing in a community hospital environment. The dosimeters were calibrated at high sensitivity of 3 mV/cGy as opposed to standard sensitivity of about 1 mV/cGy. Reproducibility and linearity of dose response were tested from a low dose range of 1-50 cGy. Peripheral dose measurements were made using solid water phantoms (100cm SSD; 10cm x 10cm field) on a 6MV (Novalis) and a 6/18 MV linac (Clinac-2100EX) and compared them to ion chamber values.

Results: Calibration of dosimeters showed both to have 3mV/cGy response. These MOSFETs were able to read a dose of 50 cGy or less with over 95% accuracy. Their dose linearity was excellent; R-sq value was near 1 for both. Accuracy of dose readout decreased with lower dose values. At 1 cGy, the error was about 10% when averaged over 2 dosimeters. At a dose level of 0.25 cGy, the dosimeters' reproducibility and accuracy suffered. However, even with a 50% uncertainty in measured dose, the absolute dose derived was still clinically useful.

Conclusion: The new mosfet dosimeters were easy to use, linear in response and reproducible. They will be clinically useful for in-vivo dosimetry.