

## AbstractID: 12670 Title: Variation of MOSFET Calibration Factor as a Function of Dosimeter Age

**Purpose:** The purpose of this study was to examine the variation of the calibration factor (mV/cGy) as a function of the dosimeter age in diagnostic and therapeutic MOSFET dosimeters. **Method and Materials:** Two of each diagnostic and therapeutic MOSFET dosimeters (TN-1002RD and TN-502RD, Best Medical Canada) were used in the study. They were irradiated side by side next to a 0.18 cc MDH RadCal 9015 ion chamber. An AGFA X-RAD 320 Orthovoltage x-ray irradiator was used with the beam quality of HVL 7.9 mm Al equivalent to a typical CT beam at 120 kVp. The desired beam quality was achieved by adding a filter (2.5mm Al and 0.1 mm Cu) to the tube. The diagnostic MOSFETs with a high sensitivity bias setting were exposed at 120 kVp over the lifetime of MOSFET, i.e., the age of 0 to 20,000 mV and calibration factor obtained as specified by the manufacturer. Similarly, the therapeutic MOSFETs, using a standard sensitivity bias setting, were exposed at 250 kVp (commonly used in small animal dosimetry) over the lifetime of MOSFET. **Results:** It was observed that the diagnostic MOSFET calibration factor remained within  $\pm 4\%$  from the initial value from 0 mV up to the age of 12,000 mV (corresponding to a dose of  $\sim 450$  cGy), and then, the calibration factor decreased on average by 19% from 12,000 mV to 18,000 mV. The therapeutic MOSFETs calibration factor decreased linearly by approximately 3% every 3,000 mV up to the age of 18,000 mV. **Conclusion:** The diagnostic MOSFET detectors (TN-1002RD) maintain their initial calibration up to 12,000 mV (approximately 450 cGy), and thereafter, a larger percentage uncertainty was seen; therefore, we recommend a recalibration after the age of 15,000 mV. The therapeutic MOSFET (TN-502RD) should be recalibrated every 5,000mV over the life of the MOSFET.