AbstractID: 7210 Title: Characterization of the dose response of a new implantable MOSFET detector

Purpose: To investigate the response of the newest commercial implantable MOSFET detector (ASIC) for in vivo dosimetry under photon irradiation.

Method and Materials: A new, smaller version of the implantable MOSFET detector (Sicel Technologies, Morrisville, NC) was investigated in this study. Measurements were performed in a solid water phantom at room temperature under 6 and 18 MV photon beams to the calibration dose of 200 cGy/fraction for 10 fractions. Additional measurements were performed under a 6 MV photon beam for doses outside the manufacturer's specified dosimeter functionality range: 100, 150, 250, 400, and 600 cGy. Separate detectors were studied for each energy and dose. Calibration and temperature correction factors were provided by the company and were applied as they would be when used in the field as intended.

Results: At the calibration dose of 200 cGy/fraction, the average detector response was -0.9% ± 1.8% for the 6 MV beam, and -1.1% ± 2.5% for the 18 MV beam. The maximum error was -5.2% for the 6 MV irradiation and -4.6% for 18 MV. Smaller 6 MV doses of 100 and 150 cGy led to slightly larger positive errors of 2.2% and 3.3%, respectively, while larger doses of 400 and 600 cGy led to slightly larger negative errors of -2.2% and -4.0%, respectively.

Conclusion: The response of these new implantable detectors will be presented and discussed in light of appropriate dose level tolerances for in vivo patient dosimetry that can reasonably be achieved at the present time. New developments in hardware and software design have made this system easy to use in a clinical environment.

Conflict of Interest: Research sponsored by Sicel Technologies.