AbstractID: 7200 Title: DVS MOSFET dosimeter response to kilovoltage radiation

Purpose: To determine the dose response of implantable DVS MOSFET dosimeters to kilovoltage x-ray radiation compared to the response to irradiation from a ^{60}Co source.

Method and Materials: Sicel Technologies, Inc. has developed a Dose Verification System (DVS®), using implantable MOSFET dosimeters that are read telemetrically by an inductively coupled antenna. Three Virtual Water™ phantom cassettes, each containing four DVS dosimeters, were irradiated in a Virtual Water phantom with a ^{60}Co source for five doses of 200 cGy. These were used as controls to compare to a fourth cassette that was similarly irradiated by the ^{60}Co source before it was exposed to kV energy at NIST-equivalent beam qualities of M80, L100, M100, M120, and M150. The dose delivered was determined following TG-61 protocol (in-phantom method at 2 cm depth), substituting Virtual Water for liquid water. Following the x-ray exposures, the cassette was exposed again to ^{60}Co to confirm device stability.

Results: Before correcting for temperature, energy, and isotropy, the ^{60}Co cassettes demonstrated a slight and consistent under-response. After appropriate scaling, the overall ratio of corrected dose measured to dose delivered was 1.002 ± 0.004. The dosimeters irradiated with the kV beams, however, exhibited an over-response. The overall ratio of corrected dose measured to dose delivered for the kV beams was 2.428 ± 0.043, whereas the same cassette demonstrated nearly the same response to the ^{60}Co source as the other three cassettes, with a ratio of corrected dose measured to dose delivered of 0.9755 ± 0.0113.

Conclusion: This data shows the DVS dose response for the examined kV beams at 2 cm depth is ~2-3 times greater than the response at MeV energies from the ^{60}Co source due to the shift in dominance from Compton to photoelectric events.

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