

AbstractID: 11418 Title: Response of TLD and OneDose™ Dosimeters Over a Range 6MV to Pd-103 Equivalent

Purpose: Two widely available *in vivo* dosimeters are TLD and MOSFET detectors. Both detectors are significantly energy dependent, especially in the keV energy region. The purpose of this work is to measure the energy dependence of LiF:Mg,Ti TLD-100 and OneDose™ (Sicel) MOSFET detectors with particular emphasis on low energy x-rays and gamma-rays.

Methods: Eleven beams, covering an energy range 6MV down to equivalent of ^{103}Pd x-rays have been employed for this work. All detectors were irradiated in air to ~50 cGy water-equivalent dose. Other than the ^{60}Co , beams were calibrated with Farmer ionization chambers just prior to detector irradiations. Dose rate for ^{60}Co was based on clinical calibration data. For the ^{60}Co and ^{137}Cs beams, detectors were “sandwiched” between 5mm and 1.2mm buildups respectively. Thicknesses of the detectors were adequate to establish electronic equilibrium for the lower energy beams. To reduce uncertainty in the mean response, twelve samples were irradiated with each beam. The OneDose™ detectors have dimensions 6x33x1mm. TLD samples in the form of flat packs (10x10x0.3mm) were made by sealing ~22mg powder in thin (0.06mm) polyethylene.

Results: Since OneDose™ detectors were factory-calibrated with ^{60}Co , both OneDose™ and TLD responses were normalized to ^{60}Co . For OneDose™, over-response relative to ^{60}Co is observed to be largest (3.50 ± 0.04) at 100 kVp beam (HVL 4.14 mmAl), and negligible at high energies (^{137}Cs to 6MV). For TLD, over-response at 75kVp beam (HVL 2.09 mmAl) is observed to be 1.53. More data at lower energies and at ^{192}Ir energy are in progress.

Conclusion: Response of TLD and OneDose™ relative to ^{60}Co has been measured over a wide energy range (6MV down to equivalent of ^{103}Pd x-rays). For TLD, our measured results agree with the recently published values fairly closely. OneDose™ results appear reasonable when compared with other type of MOSFET detectors.