AbstractID: 10181 Title: Clinical implementation of the OneDosePlus^{TM} MOSFET detector for in vivo dose measurement

Purpose: To demonstrate the clinical implementation of the OneDose*Plus*™ MOSFET detector for *in vivo* dose measurement.

Method and Materials: The ratio of the mean dose reported by OneDosePlus™ MOSFETs placed on the surface of a 90 cm × 30 cm × 9 cm water-equivalent plastic phantom to the mean dose measured by an ionization chamber placed at d_{max} within the phantom, was determined as a function of (*i*) gantry angle and detector orientation, (*ii*) square-field size, (*iii*) SSD, (*iv*) wedge angle, (*v*) monitor units, and (*vi*) dose rate, over clinically relevant ranges, and separately for the 6 MV and 15 MV beams of our clinical linear accelerator. A least-squares straight-line fit was performed to the response ratio as a function of each of these parameters in turn, and normalized to the ratio evaluated under reference conditions ((*i*) 0°, (*ii*) 10 cm, (*iii*) 100 cm, (*iv*) 0°, (*v*) 100, (*vi*) 400 MU min^{-1}). From these, a formalism was derived to predict the dose reading by OneDosePlus™ and its uncertainty for arbitrary treatment fields for comparison with the treatment planning system prediction.

Results: At 6 MV (15 MV), in order to achieve agreement with the ionization chamber, corrections of <3.5% (<11.5%) to the reported OneDosePlus™ dose are required at 0° gantry angle across the full clinical range of all other variables, increasing rapidly as the gantry rotates beyond 50° to 27.5% (22.1%) at 80°. For non-zero gantry angles, OneDosePlus™ was found to exhibit a stronger angular dependence when its contacts pointed towards the linac head.

Conclusion: The OneDosePlus™ MOSFET is well-suited to *in vivo* dose measurement, providing a highly convenient alternative to TLDs and diodes. Provided that appropriate corrections are made, verification of the expected dose should be possible to within 3.3% (6 MV) and 3.7% (15 MV) for arbitrary treatment fields.