

AbstractID: 5445 Title: Estimating Dose to ICD Outside the Treatment Fields Using Skin QED Diode

**Purpose:** To determine calibration factors for several diodes and TLD as a function of distance from the field edge. These can then be applied to measure dose at any out-of-field point.

**Method and Materials:** Skin QED Diode has been used to estimate the radiation dose to patient's ICD outside the treatment fields. The ICDs from three major manufacturers have an outer case made of Titanium (Ti) ranging from 0.4-0.6 mm thickness. With the correction of mass attenuation coefficients of Ti and tissue at 6-MeV, it is estimated that 0.5-mm Ti is equivalent to 2.4-mm tissue. The manufacturers recommend that the ICD be implanted subcutaneously underneath skin at 3-4 mm depth. Therefore, a 5-mm bolus with skin diode 1-mm inherent buildup is close to the true depth of the electronic device. The responses of the skin diode with and without bolus, an ISORAD photon diode, and TLD were measured per unit dose to water at off-axis distances up to 10-cm from the field edge. Dose at each point was measured by an ionization chamber located at 0.5-cm and 1.5-cm depth.

**Results:** The calibration factor as a function of distance from the field edge, relative to its central axis value, changed very little for TLD and for the QED skin diode with 0.5-cm bolus; decreased by a factor as large as 2 for the photon diode; increased by a factor as large as 3.4 for the QED diode without bolus.

**Conclusions:** The use of diodes for out-of-field dose measurements requires knowing the calibration factor as a function of off-axis distance. This can be readily done at each institution or the manufacturer can provide the pertinent relative response data. The skin QED diode is easy to use as an in-vivo dosimeter, and, with 5-mm bolus, its behavior is similar to TLD.