

AbstractID: 6495 Title: Dose Measurement to ICD outside the Treatment Fields Using Optically Stimulated Luminescence

Purpose: To determine relative sensitivity factors for optically stimulated luminescence (OSL) dosimeters (microStarTM DOT, Landauer), as a function of distance from the field edge, to be applied when measuring dose at any out-of-field point.

Method and Materials: OSL dosimeters have been used to measure the radiation dose to patient's implantable cardioverter defibrillator (ICD) outside the treatment fields. ICDs have a thin outer case made of 0.4-0.6 mm thick titanium (~2-mm tissue equivalent) and are usually implanted 3-mm underneath skin. Approximate 5-mm bolus thickness is about the equivalent depth of the sensitive electronics. The responses of the dosimeters with and without bolus were measured per unit dose to water at off-axis distances up to 15-cm. Doses were measured by an ionization chamber located at various depths for 6 and 15 MV using a Varian Clinac-iX linear accelerator. The relative sensitivity of the OSL dosimeters was determined as the ratio of the sensitivity at each off-axis distance to that at central axis.

Results: The OSL results were compared with those of other detectors in our previous studies [1]. The detector sensitivity as a function of distance from the field edge changed little for LiF TLD (~2%) and OSL (~7%); decreased by 12% and 17% for the ISORAD photon diode (Sun Nuclear Corp.); increased 11% and 14% for the skin QED diode (Sun Nuclear Corp.) for 6 MV and 15 MV, respectively.

Conclusions: Compared to other detectors studied, OSL dosimeter has the closest out-of-field dosimetric characteristics to TLD. OSL dosimeters should be calibrated out-of-field and preferably with bolus equal in thickness to the depth of interest. This can be readily performed at each institution.

[1] Chan MF, Song Y, Meli J, Huang D, and Burman C. Estimating Dose to ICD outside the Treatment Fields Using Skin QED Diode. *Med Phys* 2006; 33(6):1970.