

AbstractID: 10654 Title: Applications of optically stimulated luminescent detectors in patient dosimetry

Purpose: Provide some clinical applications of optically stimulated luminescent detectors (OSLDs) in radiation therapy. These include measurements of in-vivo absorbed doses to patients receiving total body (TBI) and total skin electron irradiation (TSEI), and measurements of output factors for clinical irregularly shaped electron fields.

Method and Materials: The OSLDs used are 0.7 cm diameter, 0.02 cm thick, plastic disks containing $\text{Al}_2\text{O}_3\text{:C}$ encapsulated in a light-tight plastic holder with dimensions $2.4 \times 1.2 \times 0.2 \text{ cm}^3$. TLD 100 LiF thermoluminescent detectors (TLDs) are used to compare the in-vivo measurements with the OSLD measurements. A diode is used to measure the electron blocked field output factors (BFFs) to compare with those measured with the OSLDs. A Varian CL 2100 provided the 18 MV photons and the 6 MeV high dose rate electrons for the TBI and TSEI irradiations, respectively, and the 6, 9 and 12 MeV electrons for measurement of the BFFs for the patients' blocks.

Results: The TBI patient dose measurements are made at the head, umbilicus, and feet, and for the TSEI patients dose measurements are made at eight anatomical sites from the forehead to the shin. The TLD and OSLD measured doses agreed within 1% for the TBI patients and within 3% for the TSEI patients. The electron BFF measurements ranged from 0.55 to 0.94 for 96 to 83% blocking of the open fields at source to surface treatment distances of 113 cm.

Conclusion: The agreement between the OSLD and TLD measured patient doses for the TBI and TSET patients show these detectors provide accurate patient dose measurements which can be obtained 8 minutes post radiation. The agreement between the OSLDs and diode for measurement of BFFs, demonstrates that they provide an accurate and convenient method for obtaining BFFs.

Conflict of Interest (only if applicable):