AbstractID: 13946 Title: Validation of the commissioning of an optically stimulated luminescence (OSL) system for remote dosimetry audits

Purpose: Validate an Optically Stimulated Luminescence (OSL) dosimetry system based on the microStar® reader and a batch of nanoDot dosimeters from Landauer for use by the Radiological Physics Center (RPC).

Materials and Methods: The factors involved in the calculation of dose from OSL, the calculation algorithm and the results of the commissioning were previously presented (AAPM 2009). The steps for determining dose from OSL were designed to resemble those used by the RPC for the TLD remote dosimetry audit program. As with TLD, the OSL dosimeters are irradiated in acrylic miniphantoms under standardized geometric conditions. The steps for a reading session, criteria for the number of dosimeters, readings per dosimeter, interspersing of "standard" and "control" dosimeters, and quality control steps have been determined. A method was developed and tested for the determination of the individual OSL correction factors used for the large number of OSL dosimeters (4,000) employed by the RPC. Validation of the process and assessment of the accuracy of the OSL system were performed through comparisons against TLD results. TLD and OSL were irradiated sequentially multiple times with photon and electron beams of varying energies at MD Anderson and at several other institutions and the results were compared.

Results: Under reference conditions (^{60}Co beam), the ratio of the OSL dose, read as described above, to ion chamber dose had a mean value of 0.997 ± 0.5% (1 SD). TLD versus OSL comparison based on irradiations at MD Anderson were within ±2%. The results from eleven institution agreed to within 1.1% for photon energies (^{60}Co-23MV) and electrons (5-23MeV).

Conclusion: The OSL system has been commissioned and validated as an RPC remote audit tool for verification of beam output of photons and electron beams and electron energy.

Work supported by PHS CA010953 (NCI, DHHS)

Conflict of Interest: NA