AbstractID: 6633 Title: Preliminary Evaluation of Optically Stimulated Luminescence (OSL) Dosimetry for Small Field High Energy Photon Beam

Purpose: Small field high energy photon beams, frequently used in stereotactic radiosurgery and intensity modulated radiation therapy, are characterized by steep dose gradient and lack of lateral electronic equilibrium. Small field dosimetry requires special detectors, such as diamond detector, micro-ionization chambers, or diode detectors. In the present study the feasibility of using Optically Stimulated Luminescence (OSL) dosimetry in small field 6MV photon beam was investigated.

Methods and Materials: The performance of the OSL in this study was evaluated using absolute and depth dose measurements for small fields of 1x1, 2x2 and 4x4cm^2 with detectors placed in a water tank at the central axis perpendicular to the beam. OSL detectors (Al_2O_3:C disks with diameter of 3mm) and an A16 Exradin microcylindrical ionization chamber (EMIC) were used to evaluate the depth dose distributions of smaller fields. The depth dose distributions for field sizes of 4x4 and 10x10cm^2 measured by EMIC were cross-compared and verified by Scanditronix CC13 ionization chamber for the Varian 21EX linear accelerator. Depth dose distributions measured by OSL for small field sizes of 1x1, 2x2 and 4x4cm^2 were then compared to those acquired by EMIC.

Results: For the 4x4 and 10x10cm^2 field sizes, the EMIC data are in excellent agreement with the CC13 ionization chamber data. When compared the depth dose curves obtained using the OSL techniques against the EMIC data, the difference was $\leq$ 1.9%, 0.9% and 1.9% for 1x1, 2x2, 4x4cm^2 respectively, for depths between 10 mm to 150 mm. The data are currently being analyzed and will be presented.

Conclusion: This is the first time that OSL dosimeters were investigated for small field dosimetry. Preliminary results indicated that the OSL dosimeters can be used to provide accurate dose estimates and could be a promising alternative detector for small field dosimetry.