AbstractID: 2823 Title: Automated Dose Determination on the Midsagittal Plane Based on Skin Measurements during TBI

Purpose: To determine the patient dose in the midsagittal plane based on a series of MOSFET measurements on the patient's skin during total body irradiation (TBI).

Method and Materials: The patient is in the sitting position with her midsagittal plane perpendicular to the photon beam and covered with water-equivalent rice bags on the beam side during TBI. The rice bags simulate a box of water surrounding the patient. A plastic plate rests against the patient and the rice bags on the beam side (irradiated from both left and right). Eight to ten MOSFET dosimeters are placed under bolus pieces on the patient's skin on both sides of her body during each beam irradiation. Conversion of the MOSFET readings to midsagittal dose is necessary for the MU adjustments, if necessary. The reasons this is non-trivial and needs to be done quickly are, (a) the imitated box is not complete on the exit side of the beam, (b) the summation of both the entrance and exit beams need to be considered for dosimetry, (c) some irradiation sites such as the neck and legs have different thicknesses than that of the torso, and (d) MU adjustments need to be determined promptly, since a TBI patient is under tremendous stress.

Results: The midsagittal dose can differ from the skin dose by as much as -25% to 40% depending on the irradiation, measurement, and anatomical geometry. The automated code uses the pre-measured PDD for the TBI setup. The variables are the thickness of the torso, the thickness of the anatomical site (e.g. pelvis or neck), and the distance between the dosimeter and the plastic plate.

Conclusion: The automated code designed for TBI dosimetry is robust, accurate, fast, and displays the parallel-opposed beam geometry that is different for every patient and dosimeter placement.