AbstractID: 7686 Title: An electronic compensator for total body irradiation

Purpose: Dose equalization along the long axis of the patient for total body irradiation requires the use of a compensator. At our institution the compensator consists of multiple layers of lead strips and is based on measurements along the patient's mid-sagittal plane. In this study, we examine the feasibility and limitations of replacing the lead compensator with a one-dimensional electronic compensator using fluence management tools available in our treatment planning system.

Method and Materials: The patient compensator was based on body thickness, SSD and off-axis distance of 12 mid-sagittal patient specific points. A phantom was modeled using these measurements from a previously treated patient. A fluence map of the transmission values for the compensator used at treatment was created. Dose calculated on the phantom was compared with patient surface dose measurements. Physical limits and software limitations of this method were evaluated.

Results: The maximum patient height accommodated by our treatment room and setup is 225 cm. Using a fluence map with the largest transmission factor gradient is not an issue, nor is the use of any reasonable field width that would be seen in a clinical setting. Calculated dose to the phantom using the electronic compensator was found to be on 3.4% lower (range: +2.6% to -7.8%) than diode dose measurements taken on the patient skin surface time of treatment.

Conclusion: It is feasible for most patients that an electronic compensator be used. Discrepancies between calculated and measured dose can reasonably be accounted for. Further study is planned to measure the dose using an anthropomorphic phantom and also to automate the construction of patient-specific virtual phantoms and patient-specific optimal fluence.