Purpose: To investigate the feasibility of using the Irregular Surface Compensator (ISC) planning feature of the Eclipse treatment planning system (TPS) for Total Body Irradiation (TBI)

Methods: TBI treatments require that the whole body receives within ±10% of the prescribed dose. Different body parts with different thicknesses compared to the umbilicus separation may receive higher or lower doses compared to the prescribed dose. Another challenge is to keep the lung dose below 10Gy to avoid complications. To mitigate this problem, physical compensators and blocks are used during the treatment for different body parts and lungs. This method presents a challenge during the treatment delivery and prolongs the treatment time due to patient setup, in-vivo on-line dosimetric monitoring and the adjustment of the compensators frequently during the treatment.

We investigated the use of ISC planning feature of Eclipse TPS which is an electronic compensation method that calculates a fluence map based on the body contour from the CT image. The fluence map is delivered with dynamic MLCs.

This TBI treatment technique was tested using a Rando phantom in Head First Supine position with lateral beams at SSD=250cm. The calculated fluence were edited so that the lung received <~10Gy for 12Gy prescription. A single fraction of 2Gy was delivered and the in-vivo measurements were performed in the neck, lung and the umbilicus by using OSLDs.

Results: OSLD measurements and the Eclipse TPS predictions were 200.4/195.0, 162.2/168.9, and 196.1/208.9 cGy for the neck, lung and the umbilicus respectively.

Conclusions: The feasibility of using the Irregular Surface Compensator feature of Eclipse TPS for TBI treatment planning was demonstrated. Good agreement (<6%) between the predicted and measured doses was obtained. The proposed planning and delivery simplifies the compensation and blocking to achieve uniform dose distributions and reduces the treatment time.