

AbstractID: 7574 Title: A CT Based Total Body Irradiation Technique using Intensity Modulated Beams

Purpose: To report experience with a novel total body irradiation (TBI) technique. 3D planning techniques are used to deliver a uniform dose to a patient using a conventional linear accelerator in a standard bunker. Manually segmented intensity modulated fields are employed to provide dose compensation for contour variation, tissue heterogeneity, inverse square law effects and junction dose stability.

Methods and Materials: The technique uses a conventional Elekta Synergy linear accelerator together with a custom designed floor couch. The couch, positioned 102.5 cm below the machine isocentre, provides treatment distances near 180 cm SSD. The couch is oriented in the gantry rotation plane, with couch motion along the cranial-caudal axis enabling a match of beam divergence through patient translations and gantry rotations. Treatment is delivered by a set of 2 to 3 divergence matched abutting fields, with field modulation feathering junctions through 4 cm on the patient. Treatment plans are created using conventional beam models in Pinnacle 7.6C and whole body CT scan data. Independent plans for supine and prone orientations are constructed to deliver a uniform dose at mid-separation throughout the patient and create a composite uniform dose. Segmentation is used to adjust the dose at mid-plane, correcting for effects of patient thickness, inverse square law, and lung density.

Results: A total of 11 patients have been treated with this new technique. Dosimetry measurements in phantom at extended distance and in-vivo measurements have demonstrated an accurate dose delivery. Composite AP-PA dose assessments based on contributions to uniquely identified anatomical points have shown that a dose within 10% of the prescribed dose is achieved throughout the treatment volume.

Conclusions: A new TBI technique has been implemented which employs modern imaging and delivery methods to achieve a uniform patient dose. The technique utilizes standard equipment, and does not require specialized bunker design.