

Beam compensation for total body irradiation by dynamic delivery

The feasibility of intensity modulation for TBI treatments has been investigated with the use of phantom studies and treatment planning. In total body irradiation, the beam compensator, bolus or complex beam arrangements are currently used to obtain homogeneous dose distribution. However, modern linear accelerators with independent jaws furnish the capability to modulate intensity along the direction of jaw motion and create any arbitrary beam intensity in that dimension. This one dimensional intensity modulation is suitable for use in TBI treatment where the dominant variation in patient thickness is from superior to inferior. Our Varian 2100 C/D linear accelerator is equipped with the dynamic delivery research software which permits us to input parameters such as jaw positions and amount of dose per jaw position. The input parameters to achieve a uniform dose distribution were calculated with our in-house treatment planning system. The calculation is based on 3D treatment planning of a humanoid phantom with CT scans. The calculation and dynamic delivery was performed for AP/PA and lateral beam arrangement. TLD measurements show the dose inhomogeneity of less than 5 % between the prescription point, umbilicus, and the head and neck region.