

AbstractID: 8880 Title: Effects of Block Location on Dosimetry in the Total Body Irradiation (TBI)

Purpose:

Blocks are frequently used in TBI to protect critical organs such as lung. Among different cancer centers, the location of block varies significantly; for example, in the block tray, between the machine and patient, or directly in front of the patient. In this study, we investigate effects of block location on the dosimetry of blocked region.

Method and Materials:

Blocks at four source-block distances were studied, i.e. 65cm (block tray), 120cm, 200cm and 350cm (in front of patient). All blocks were 5 HVL thick and were made based on the same film to protect an area of 12.5x12.5 cm². Dosimetry of blocked area was measured using an ion chamber and film in a phantom at 10cm depth. All results were normalized to the open field dose.

Results:

Doses at the center of blocked area for source-block distances of 65, 120, 200, 350 cm are 18.1%, 15.7%, 13.9% and 13.5% respectively. The penumbra of blocked area decreases from 0.9 cm to 0.4 cm as the block moves from the block tray closer to the phantom. For a desired transmission dose of 20% (as a percentage of open field), the effective size of blocked area (i.e. area whose dose is under the desired transmission) is 7.2cm, 10.1cm, 10.9cm and 11.4cm respectively for blocks at 65, 120, 200, 350 cm source-block distances respectively. For a desired transmission of 30%, the effective size of blocked area is 11.7cm, 11.9cm, 12.1cm and 12.2cm respectively. For a 50 % level, it is 12.3cm, 12.5cm, 12.7cm and 12.7cm respectively.

Conclusion:

Dose under TBI blocks is significantly higher and the effective size of blocking is significantly smaller when block is located in block tray than directly in front of the patient. Hence, proper positioning of TBI blocks is critical to achieve the desired dose reduction.