

AbstractID: 3486 Title: Radiation leakage from the electron applicators in the Varian 21 EX linear accelerator

Purpose: Radiation dose leakage from the applicator is a well-known phenomenon in the electron radiotherapy. This study was to measure such scattered dose and find out its dependences with the angle of obliquity, cutout and applicator size using our clinical 4 MeV electron beam. A piece of lead foil wrapped around the lower part of the applicator could eliminate the dose. The increase of output due to the application of lead can be solved by a simple output correction factor measurement.

Method and Materials: Calibrated Kodak TL film was used to measure the surface dose and dose at 1 cm depth in a solid water phantom using our Varian 21 EX linear accelerator with 10 x 10 cm² applicator and cutout. A film scanner was used to determine the dose. The film measurement was verified with ionization chamber and MOSFET detector. A lead foil of 1 mm thickness was used to wrap the applicator up when needed.

Results: Peripheral scattered dose was found at about 12 cm away from the field central axis of a 10 x 10 cm² cutout. The surface dose was determined to be about 1.5 cGy when 150 cGy was given at 1 cm depth in the phantom (SSD = 100 cm). It is found that the surface dose increased with the angle of obliquity, and with the square cutout size. By warping the lower part of the applicator up with lead foil, such dose was not detectable.

Conclusion: Peripheral scattered dose outside the applicator of 4 MeV beam was measured and located. Such dose depends on the angle of obliquity, applicator and cutout size. We suggested using a lead foil to wrap the applicator up with an output correction factor to eliminate the dose during the clinical treatment as and when required.