

AbstractID: 1960 Title: Radiation Leakage and Scatter from Electron Applicators in Modern Accelerators

Electron beam treatments constitute nearly 10% of the radiation treatments and believed to have negligible radiation dose to normal tissues due to short electron range. The electron cones have been redesigned for all accelerators to provide uniform dose distribution at depths, and negligible lateral radiation. There is very little data for lateral scatter and leakage dose from electron cones and especially when cutouts are used and gantry is rotated to remain perpendicular to the target volume. Measurements were taken in a water phantom for all electron energies, with Elekta, Siemens and Varian machines. Lateral dose with cones and cutout combinations at surface and depths up to d_{max} were studied for various gantry angles. Results indicate that the lateral dose is dependent on the machine and cone design, electron energy, gantry angle, and cutout size. It is relatively insensitive to depths and falls off rapidly from the field edge with long exponential tail suggesting that the lateral dose is mainly due to bremsstrahlung radiation. Elekta unit has lowest lateral dose whereas Siemens unit has highest dose at any depth and energy. For the Varian and Siemens unit, there is an additional hump (1%) near 5 cm from the cone field edge. The magnitude of the lateral dose is higher for higher energy and large cutouts (small Rx field). It is concluded that lateral dose profiles could be clinically significant for the estimation of the radiation risk and should be available for all accelerators. Such data should be acquired during machine commissioning.