

Purpose: To compare the electron beam data for Siemens and Varian accelerators.

Method and Materials: Beam data for the electron beams for at least 4 linear accelerators are compared in seven categories: (1) percent depth dose for open beam and small circular cutouts, (3) phantom scatter factor, (4) head scatter factor as a function of cone size and SSD, (5) cone factors, (6) distance factor and (7) virtual source position.

Results: PDD for broad beams is in good agreement among all accelerators. However, PDD for small circular cutouts of the two Siemens Oncor accelerators are different from the other accelerators with their mean energy shifted by 2 MeV. The phantom scatter factor, defined as the ratio of blocking factor in water at reference depth and head scatter factor in air, for the same cone size and radius, is a function of radius and nominal electron energy only, regardless of linac makers with a maximum and standard deviation of 10% (for the smallest cutout of 1cm) and 2.3%, respectively. The head scatter factor H is defined as the ratio of in-air energy fluence between circular cutout with radius r and open cone for the same cone size and source-to-detector distance. The renormalized H is a function of electron energy and cutout radius. The cone factor for all energies, among all accelerators agreed within 1.9% among the Varian accelerators and 1.7% within the Siemens accelerators. The distance factors varied up to 10% for the smallest energy (6e) and up to 3.4% for the 21e. The virtual position varied by 3.8cm and 6.5cm for the Siemens and Varian accelerators, respectively.

Conclusion: Accelerators from the same manufacturer, with the same nominal energy, can be treated as “identical” for conventional treatment except for small circular cutouts and large SSDs, where variations of 10% are observed.