

We are currently investigating whether Monte Carlo simulations can be used to reduce the amount of electron dosimetry data measured as a part of the commissioning process of a medical linear accelerator. One of the most difficult parts of this process is determining whether the description of the linac treatment head, as provided by the manufacturer, and the incident electron beam description allow the computer simulation to reproduce the measured data. The EGS4/BEAM system was used to simulate a 20 MeV electron beam from a commercially available linac. For the largest open applicator (25x25 cm<sup>2</sup>), calculated and measured percentage depth dose matched, but calculated off-axis ratios were up to 10% lower than the measured values near the edge of the beam. To match measured data, we simultaneously adjusted electron energy and either the primary or secondary foil thickness. We found that doubling the thickness of the secondary foil in the Monte Carlo simulation resulted in significantly better agreement for the cross-beam profile with little effect on the percentage depth dose. In conclusion, it may be necessary to vary some of the treatment head geometry prior to using Monte Carlo calculations for electron beams, and the agreement for the largest field size is a good indicator for whether or not linac treatment head description may be adequate.

This work is supported in part by Varian Oncology Systems sponsored research agreement SR97-015.