

AbstractID: 6720 Title: An estimation of relative output factors of 6 MV photon beam using Monte Carlo simulation

Purpose: To estimate the relative output factors of 6 MV photon beam using Monte Carlo simulation from a Varian Clinac 2100C accelerator.

Method and materials: The model of linear accelerator head was obtained using the Monte Carlo simulation. Each physical component of the accelerator head was modeled by the EGSnrc/BEAMnrc code according to the manufacturer's specifications. The absorbed dose in water phantom was calculated by the EGSnrc/DOSXYZnrc code. In the simulation, the free parameters were energy and radial Gaussian width (FWHM) of an intensity distribution for an incident electron beam on x-ray target. Optimal values of the beam parameters were determined by a comparison of local doses between the measurement and the calculation. The absorbed dose comparison was done on central axis depth dose and profiles at depth of 10 cm of 20x20 cm² photon field at 100 cm SSD. The beam parameters were adjusted systematically so that the absolute differences of the local dose were within 1.0 %. The investigation of the relative output factors at 5.0 cm in depth were determined in the simulation for five field sizes; 5 x 5, 10 x 10, 15 x 15, 20 x 20, and 30 x 30 cm².

Results: Our optimal parameters of the incident electron beam for 6 MV photon beam were 6.2 MeV in energy and 1.0 mm in FWHM. The calculated relative output factors, in which the backscatter effect was included, were in good agreement within 1.0 % with the measurement values.

Conclusions: In conclusion, Monte Carlo simulation was demonstrated to be an alternative tool for the relative output factors, accompanying the measurement.