Initial Beam Energy Determination for Monte Carlo Simulation

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Monte Carlo Treatment Planning (MCTP) needs accurate electron beam parameters. The initial beam energy used in the Monte Carlo accelerator simulation can influence the resultant dose distribution of clinical photon beam significantly. The purpose of this work is to develop a practical method to determine the initial electron beam energy for Monte Carlo simulation using the electron beam Bending Magnetic Current Setting (BMIS). The Siemens accelerators use a 270^0 bending magnet. The bending magnet current setting corresponds to the initial beam energy. In this work, we investigated the relationship between the BMIS and the initial electron beam energy. Based on this relationship we predicted the initial beam energy used for Monte Carlo simulation of 6, 10 and 18MV clinical photon beams. The derived initial beam energies were used to calculate the dose distributions in a water phantom. The calculated results were in good agreement with measured data (less than 2% or 2mm). We also studied the influence of the initial beam energy on dose distributions in Monte Carlo simulations for 6, 10 and 18MV clinical photon beams. A significant influence of the initial beam mean energy on lateral dose profile's shoulder portion was found and analyzed. Investigations of different photon beams from different linac models are being carried out.