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Comparison between different Monte Carlo codes in the modeling of an Elekta Precisa linac head

Several Monte Carlo (MC) codes are available for performing radiotherapy dose calculations, with acceptable accuracy. The objective of this work is to analyze the differences in the calculations obtained by different MC codes and their impact on the absorbed dose evaluations. In order to evaluate the possible systematic differences, a comparison was made between different electromagnetic physics packages of the Geant4 application for tomographic emission (GATE) 8 versus Monte Carlo N-Particle eXtended (MCNPX) 2.6 and Gamma electron shower (EGSnrc). To do this, we used a similar geometry for the three codes based on the linear accelerator (linac) head of an Elekta Precise for 6 MV photon beams used in standard therapies. Field sizes of 3 x 3 cm^2, 5 x 5 cm^2, 10 x 10 cm^2, 15 x 15 cm^2 and 20 x 20 cm^2 were considered. The reference values of the percentage depth dose (PDD) and the beam profiles were obtained in the water phantom and in the ionization chamber.

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