عنوان مقاله:

Validation of Monte Carlo Model for Dose Evaluation outside the Treatment Field for Siemens 6MV Beam

محل انتشار:

مجله فیزیک پزشکی ایران, دوره 17, شماره 6 (سال: 1399)

تعداد صفحات اصل مقاله: 11

نویسندگان:

.Sinousy M. - *Specialist of Medical Physics at Meet Ghammr Oncology Center;Egypt*

Attalla M. - *Prof. of Medical physics ; National Cancer Institute, Cairo university &Egypt*

.Ibrahim F. - *Associate Prof. of Physics;Physics department;Faculty of Science;Cairo university;Egypt*

.Elhussiny A. - *Associate Prof. of biophysics;Physics department,Faculty of Science; Tanta university;Egypt*

.Elmekawy F. - *Lecturer of Biophysics;Physics department;Faculty of Science; Tanta University, Egypt*

خلاصه مقاله:

Introduction: There has been a concern about the unintended doses to critical structures outside the treatment field due to the increased risk of radiation-induced second cancer following radiotherapy treatments. Today, Monte Carlo (MC) simulation is considered the most accurate method for dose calculations in different domains of medical physics. Material and Methods: The Geant4 Application for Tomographic Emission (GATE) code was used to create an MC model of 6MV Siemens Primus linac. Measurements were taken in a water phantom using an ion chamber to validate the MC model. Dose profiles outside the treatment field at 1.5 (dmax), 5.0 and10.0 cm depths for field sizes from 5×5 to 20×20 cm2 were measured in the present study. Out-of-field percentage depth dose (PDD) curves at 0.0, 5.0, and 7.5 cm off axis for field size 10×10 cm2 were investigated for both measurements and simulation. However out-of-field PDDs from 10 to 15 cm off axis for field size 10×10 cm2 were studied only by simulation. Results: The comparisons showed agreement between the measured and simulated doses for the out-of-field profiles along the in-plane direction for all considered field sizes and depths, as well as for the PDDs at 0.0 and 5.0 cm off axis, but with less agreement at 7.5 cm off axis. All the simulated out-of-field PDDs at distances ≥ 10 cm off axis had similar trend shapes. Conclusion: The developed MC model is considered a good representation of 6 MV Siemens Primus linac for .the out-of-field dose calculation in lieu of measurements

کلمات کلیدی:

Out, of, Field Dose Monte Carlo Method Linear Accelerator Radiotherapy