عنوان مقاله:

A Monte Carlo study on Photoneutron Spectrum around Elekta SL75/25 18 MV linear accelerator

محل انتشار:

مجله بین المللی تحقیقات پیشرفته زیست شناختی و زیست پزشکی, دوره 4, شماره 1 (سال: 1394)

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خلاصه مقاله:

Medical linear accelerators are one of the most widespread methods for cancer treatment. Despite their advantages, unwanted photoneutrons are produced by high energy linacs. This photoneutrons are as undesired doses to patients and a significant problem for radiation protection of the staffs and patients. Photoneutrons radiological risk must be evaluated because of their high LET and range.in order to achieving this aim, photoneutron spectrum are calculated. The head of linac and a common treatment room was simulated by the MC code of MCNPX. Photoneutron spectrum was calculated in different field sizes, distances from isocenter and different cases (with and without structures and materials such as flattening filter, compensator, air and treatment room walls). The inclusion of the flattening filter and compensator had not any effects on shaping the photoneutron spectrum but neutron fluence and the average neutron energy are reduced obviously. Also effect of air on photoneutron spectrum was negligible. The calculation of photoneutron spectrum with concrete walls show that the component of fast neutrons is decreased and thermal neutrons are increased due to the room-return. In this case, with increasing distance from isocenter, fast neutrons are decreased and thermal neutrons are increased. As the field size is increased from 5×5 to 15×15 cm2, the neutron flux is increased clearly in isocenter. The neutrons flux are decreased near the door due to maze effect. The photoneutron spectrum investigation and risk estimation due to inclusion of neutron contamination in treatment room prevent from secondary cancer mortality. © 2016 Published by CASRP publishing company Ltd. UK. Selection and/or peer-review .under responsibility of Center of Advanced Scientific Research and Publications Ltd. UK

کلمات کلیدی:

Photoneutrons, Medical linear accelerators, Monte Carlo