

عنوان مقاله:

Characterization of low, medium and high energy collimators for common isotopes in nuclear medicine: A Monte Carlo study

محل انتشار:

مجله پزشکی هسته ای ایران، دوره 25، شماره 2 (سال: 1396)

تعداد صفحات اصل مقاله: 5

نویسندگان:

Seyed Hossein Razavi - *Department of Oral and Maxillofacial Radiology, Shahid Sadoughi University of Medical Sciences, Yazd, Iran*

Faraz Kalantari - *Department of Radiation Oncology, UT Southwestern, Medical Center, Dallas, TX, USA*

Mahmoud Bagheri - *Department of Medical Physics, Shahid Sadoughi University of Medical Sciences, Yazd, Iran*

Nasim Namiranian - *Yazd Diabetes Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran*

خلاصه مقاله:

Introduction: In an ideal parallel-hole collimator, thickness of septal material should be sufficient to stop more than 95% of incident photons. However, some photons pass the septa without interaction or experience scattering before they reach the detector. In this study, we determined different contribution of collimator responses consist of geometrical response, septal penetration (SP) and scattering (SC) for low, medium and high energy collimators. **Methods:** A point source of activity with common energies in diagnostic nuclear medicine and three different collimators were simulated using SIMIND Monte Carlo code. **Results:** For Low Energy High Resolution (LEHR) collimator, SP was increased from 7% in 140 keV to 30% in 167keV and more than 75% in energies higher than 296keV. SC also was increased from 4% in 98keV to more than 15% in energies higher than 167keV and reached to its maximum (26%) in 296keV. For Medium Energy All Purpose (MEAP) collimator, SP was suddenly increased from 6% in 186keV to 28% for 296keV and more than 50% for higher energies. SC was also increased from 4% in energies below 186keV to 15% in 296keV and about 30% for higher energies. For High Energy (HE) collimator, SP was about 20% for 364keV photons. SC was 15% for 364keV photons and only 65% of photons were geometrically collimated. **Conclusion:** Our results showed that even by using nominally suitable collimators, there are considerable SC and SP that influence the quantitative accuracy of planar and SPECT images. The magnitude of geometrical response, SC and SP depend on collimator geometric structure and photons energy.

کلمات کلیدی:

Collimator responses, Monte Carlo, Geometric response, Septal penetration, Scatter

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/986546>



