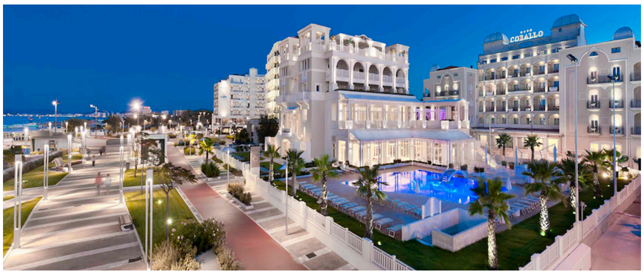

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Estimation of radiation exposure of human body in neutron-capture radiation therapy

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Particle and radiation beams are widely used for cancer therapy. In last decades neutron sources are becoming more and more popular for medical applications. One of the most advanced technique for cancer treatment is neutron-capture therapy (NCT). The main feature of this technique is using epithermal and thermal neutrons to create a powerful source of radiation in the human body and particularly in the tumour. For this purpose, a particular element with high cross-section of neutron initiated nuclear reaction is accumulated in the tumour and emits radiation under neutron beam. The most popular element used for this kind of radiation therapy is 10B emitted after nuclear reaction alpha particle, which further absorb in very short range [1]. The latter provides good localization of radiation dose in the tumour volume. Other elements which potentially may be used for NCT are 156Gd and 158Gd. These elements have a much larger nuclear reaction cross section, which is attractive for practical use. Another potential advantage of Gd using is the easier control of element distribution in the human body since Gd based drugs are widely used for Magnetic resonance imaging. However, unlike 10B, isotopes of Gd emits after neutron initiated nuclear reaction electrons and high energy gamma quanta that can cause high radiation exposure of healthy organs and tissues [2]. In this study relative level of dose exposure of tumor and healthy tissues are estimated using Monte Carlo based numerical simulation.
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