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# Development of numerical model for simulation dose distribution in Gd-based neutron-capture radiation therapy sessions

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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). In this technique, a particular element with high cross-section of neutron initiated nuclear reaction is accumulated in a tumour and irradiated by epithermal neutrons that causes radiation directly in its volume. This approach leads to powerful energy release in the tumor with less irradiation in healthy tissues. Currently 10B is considered as the most suitable element for this technique since it emitts after nuclear reaction alpha particle, which further absorb in very short range [1]. However, other elements, such as 156Gd and 158Gd, potentially may be used for NCT. These elements have much higher cross-section that potentially allows decreasing requirements for neutron beam intensity and, consequently, using wider range of neutron facilities. However, Gd emits electrons and high energy gamma quanta after neutron initiated nuclear reaction that can cause high radiation exposure of healthy organs and tissues [2]. In this study we propose Monte-Carlo simulation based numerical model for calculation of dose distribution in Gd-based neutron-capture radiation therapy sessions.

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References

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