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# Photonuclear method of 161Tb production

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$^{161}$Tb is a medical isotope that is considered in therapy as an alternative to the widely used $^{177}$Lu. Currently, the main way of production of this radionuclide is the reactor method based on the neutron capture reaction followed by β-decay: $^{160}$Gd(n,γ)$^{161}$Gd→$^{161}$Tb. However, in this case it is necessary to use expensive enriched targets. This disadvantage is the reason why the development of alternative methods for production of the radioisotope $^{161}$Tb is an important issue.
Theoretical analysis of the possibility of producing the radioisotope $^{161}$Tb by the photonuclear method was performed. Using cross sections calculated on the basis of a combined model of photonuclear reactions, the yields and activities of reactions $^{162}$Dy(γ,p) and $^{163}$Dy(γ,pn) on electron beam at energies up to 70 MeV were estimated. The side reaction activities of $^{161}$Dy(γ,p), $^{162}$Dy(γ,pn), $^{163}$Dy(γ,p2n) and $^{163}$Dy(γ,p) were also analyzed. The optimal conditions for the production of $^{161}$Tb were chosen on the assumption that the activity of the main reaction should be more than 1MBq, and the activity of the side reactions should be 4 orders of magnitude less than it. The obtained results indicate the possibility of using the monoisotopes $^{162}$Dy and $^{163}$Dy at energies of 19-21 MeV and 25-27 MeV, respectively, to produce $^{161}$Tb radionuclide.

## The speaker is a student or young scientist

Yes

## Section

1. Nuclear technology and methods in medicine, radioecology

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