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# CONTRIBITION OF PHOTOELECTRIC EFFECT TO THE DOSE ENHANCEMENT FACTOR IN PHOTON ACTIVATION THERAPY

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Radiation therapy is fundamental method for treating cancer, however depositing precise dose to the target and preventing damage of vitally important healthy tissue surrounded by cancer cells remains challenging. Potential solution for this might be to inject high-Z containing elements into a tumor just before radiation therapy. In our research, we quantitatively evaluated the potential of biocompatible elements with different atomic numbers (Z) to act as radiation dose enhancers. Among these, Ag utilized in the form of nanoparticles to robust antimicrobial properties. Ag nanoparticles exert their antimicrobial effects through multiple mechanisms: they disrupt microbial cell membranes, induce apoptosis, and exhibit synergistic effects when combined with other antimicrobial agents. Sm in the form of a pharmacological drug (Sm-153 preparations) have been used for a long time in the radiation therapy of metastases. Gd contrast agents, as Magnevist®; Au nanoparticles are useful for contrast imaging, drug delivery, or radiation therapy enhancement. Bi metallic nanoparticles having preclinical proofs for theranostic applications [1-3].

Evaluating the contribution of the photoelectric effect to the dose enhancement factor (DEF) is calculated via the analytical approach developed in [4]. The photoelectric effect depends on the accumulation of radiosensitizer nanoparticles with a certain concentration and nanoparticle dimensions on the surface of the cells. The X-ray spectrum is generated by SpecPy, a tool for modeling X-ray tube spectra in [5]. The calculation is derived by taking into account the interaction of Ag, Au, Bi, Gd, and Sm nanoparticles with incident photons produced by the X-ray tube (1 mA current, 100 kV voltage, 3 mm thick aluminum filter, rhodium anode (W) with a 12° angle, and a 1 m distance from the tube focus).

## Section

Applications of nuclear methods in science, technology, medicine and radioecology

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