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THE ENHANCEMENT OF X-RAY ABSORBED DOSE IN TUMOR CELLS VIA BISMUTH-BASED COMPOUNDS

Radiation therapy is currently in use for the treatment of cancer. For this reason, binary radiation therapy is one of perspective methods for curing cancer. In this type of therapy, the chief strategy for effectively destroying tumor cells is depositing dose as much as possible directly into the target (tumor cells), while preserving the life-sustaining tissues surrounding the tumor. Staple solution for this method is to inject high-Z containing elements, called radiosensitizers, into a tumor just before irradiating with X-ray source. In our research, as a radiosensitizer we chose Bi-based compounds that have studied before in preclinical researches both as nanoparticles and contrast agents [1]. Bi is the most stable high-Z leveled and biocompatible element that cause to enhance absorbed dose in the target. These Bi-based compounds have preclinical proofs for theragnostic applications.

Modeling the absorbed dose in the tumor cells is completed using GEANT4 program. The probability of interacting of incident photon with the radiosensitizer compounds is higher compared to biological tissue. This is due rate of mass absorption coefficients for bismuth is higher than light elements that constitute biological tissue. Contribution of photoelectrical effect accumulated in tumor volume is noticeable significant compared to other processes. This is evident because cross section of the photoelectric effect predominates at low energy diapason such as 50-150 keV. In our research, we investigated the proportion of occurred processes such as photoelectric, Auger electrons, characteristic X-rays within absorbed dose. This calculation implemented for both category radioactive sources and X-ray spectrum generated by SpecPy [2].

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Section

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