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Physics of cancer: interdisciplinary problems and clinical applications

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Book of Abstracts

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direct radiometric also showed higher accumulation of the radiopharmaceutical in the adenocarcinoma cell line BT-474 human breast cancer overexpressing Her-2/neu compared to the control group.

Conclusion: Preclinical studies demonstrated high in vitro stability study compound, as well as its accumulation in the cell group overexpressing Her-2/neu.

MODEL OF DYNAMICS OF DISTRIBUTION OF DRUGS OF BIOLOGICAL TISSUE

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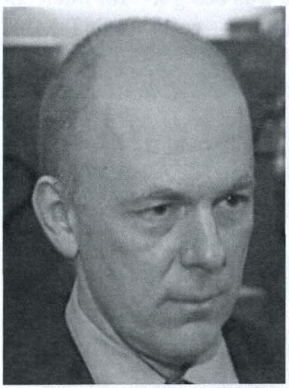
The dose distribution NRT follows the distribution of ^{10}B in the tissue. Modern models of pharmacokinetics of drugs describe the processes occurring in conditioned "chambers" (blood-organ-tumor), but also do not allow describing the spatial distribution of the drug in the tumor and in normal tissue.

Objective: the mathematical model of the dynamics of the spatial distribution of drugs in the tissue, depending on the concentration of the drug in the blood, was developed.

The modeling method is the representation of the biological structure in the form of a randomly inhomogeneous medium in which the ^{10}B distribution occurs. The parameters of the model, which can't be determined rigorously in the experiment, are taken as quantities subject to the laws of unconnected random processes.

The estimates of the distribution of ^{10}B preparations in tumor and healthy tissue, inside/outside the cells, are obtained.



PERSPECTIVES OF BORON-NEUTRON CAPTURE THERAPY OF MALIGNANT BRAIN TUMORS

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Boron neutron capture therapy (BNCT) is characterized by a selective effect directly on the cells of malignant tumors. The carried out researches have

shown perspectivity of the given kind of therapy concerning malignant tumors of a brain. However, the introduction of BNCT into clinical practice is hampered by the lack of a single protocol for the treatment of patients and the difficulty in using nuclear reactors to produce a neutron beam. This problem can be solved by using as a source of neutrons a compact accelerator, with the possibility of installation in a medical institution. Such a neutron accelerator for BNCT was developed at Budker Institute of Nuclear Physics, Novosibirsk. A neutron beam was obtained on this accelerator, which fully complies with the requirements of BNCT, as confirmed by studies on cell cultures and experiments with laboratory animals. The conducted experiments showed the relative safety of the method with the absence of negative effects on cell cultures and living organisms, and also confirmed the effectiveness of BNCT for malignant brain tumors.

BIODISTRIBUTION OF MODULAR NANOTRANSPORTER CARRYING AUGER ELECTRON EMITTER AND TARGETED TO MELANOMA CELLS IN MURINE TUMOR MODEL

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Recombinant modular nanotransporter containing α-melanocyte-stimulating hormone (MNT-MSH) as a ligand module was designed for nucleus-targeted delivery of cytotoxic agents into melanoma cells. MNT-MSH radiolabeled with Auger electron emitter (^{111}In-NOTA–MNT-MSH) showed a high antitumor efficacy in mice bearing syngeneic melanoma after intratumoral (i.t) injection. This study represents a biodistribution of ^{111}In-NOTA–MNT-MSH in C57Bl/6j mice bearing subcutaneously implanted B16-F1 murine melanoma cells. It was shown that ^{111}In-NOTA–MNT-MSH after i.t. administration provides a high local retention of radionuclide, ranged from 400 to 350 %ID/g within at least 48 hours post-injection. MNT containing Auger electron emitter and α-MSH peptide as vector ligand could be a promising basis for radiopharmaceutical preparations intended for melanoma treatment.