



*veterinary studies*

## **Experience of neutron capture therapy for malignant tumors of cats and dogs and prospects for the development of the method**

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Malignant tumors show radioresistance to varying degrees when using traditional methods of radiotherapy with low linear energy transfer. The use of ionizing radiation with high linear energy transfer in this aspect is considered more promising. One type of ionizing radiation with high linear energy transfer is neutron capture therapy. Considering the binary nature of the method, it is possible to use both different elements with a high neutron capture cross-section and different forms of drugs that differ in pharmacokinetic properties and selectivity of accumulation in tumor cells. To evaluate the effectiveness of neutron capture therapy, the most approximate model at the preclinical stage is spontaneous malignant tumors in cats and dogs, which largely repeat the nature of malignant tumors in humans.

We treated spontaneous soft tissue tumors in cats and dogs using neutron capture therapy using drugs enriched with boron-10 - sodium borocaptate (BSH) and boronophenylalanine (BPA), nanoparticles of elemental boron, as well as a drug with natural gadolinium content - gadopentetic acid. Therapy sessions were carried out at the Tandem-BNCT accelerator neutron source at the Budker Institute of Nuclear Physics (Novosibirsk) as well as on the horizontal channel "GEK-1", the IRT-T research reactor, Tomsk Polytechnic University. The selection of animals for treatment was carried out in accordance with the inclusion criteria. Animals with tumor recurrence after surgical treatment, chemotherapy, and also in cases where it was impossible to carry out alternative treatment options were subjected to neutron capture therapy.

After boron-neutron capture therapy, in most cases, a partial tumor response was noted, an improvement in the overall clinical condition and an increase in the expected duration and quality of life of the animals, while after gadolinium-neutron capture therapy there was no significant response of tumors to treatment. It was noted that toxic effects associated with drug infusion, as well as post-radiation reactions, were mild and reversible.

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