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The Advantages of Using Pegylated Liposomes for Delivery of Boron-containing Drugs

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Various carriers of boron compounds are used to improve bioavailability. The potential benefits of liposome use can be conceived as their high cell-penetrating ability. Liposomes are able to include hydrophilic and hydrophobic substances which can be used as carriers of various boron-containing compounds. Furthermore, this type of support may be used in the treatment of brain tumors, since liposome formulations allow transport through the blood brain barrier. Polyethylene glycol, which is included in the structure of liposomes, limits their recognition and capture of cells of the reticuloendothelial system, resulting in the accumulation of liposomes in tumor tissue due to passive targeting effect. Encapsulation of boron-containing substances into liposomes can improve the effectiveness of treatment and reduce the standard dose of drugs, due to which the toxicity of therapy, as well as its cost, decreases.

There are enough ways to determine the presence and the amount of boron in the tumor, but intracellular penetration of the boron can only be detected using various tags.

Considering the need to confirm the intracellular tumor-seeking import of boron-containing medications a fluorescent label, which is the part of the liposome, can be used.

The results of the conducted studies demonstrated the efficacy of fluorescent and confocal microscopy to determine subcellular localization of substances contained in liposomes with fluorescent label.

The simultaneous presence of two different dyes in different parts of the liposomes allows separately identify the localization of substances injected both in the composition of the lipid membrane of the liposomes and as part of their aqueous phase. Thus the ability to control the delivery of boron medications into a tumor cell is kept, thereby increasing the accuracy of determining the location of medications at the cellular level. Determination of quantitative proportions of the luminescence of the intracellular and extracellular space becomes possible.

The proposed medications delivery method may be conducted at the stage of research in vitro, in vivo, to determine the optimum values of a boron concentration of the preparation and to select the time interval within which the maximum drug concentration above at the cellular level and conducting BNCT to be most effective.