boron compounds

New Compounds for Boron Neutron Capture Therapy of Cancer

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Compounds suitable for boron neutron capture therapy (BNCT) of cancer must have the ability to selectively accumulate in malignant tumor cells. Such selectivity can be achieved by obtaining conjugates of boron-containing compounds with molecules that are prone to selective binding to cancer cells, the so-called “tumor-seeking” molecules. The types of such compounds were previously considered [1, 2]. So far, the two molecules that have been the most studied in the world are boronophenylalanine (BPA) and borocaptate (BSH). A new ^{10}B drug, 3-borono-L-tyrosine (BTS) was created, that improves on the characteristics of the main historical BNCT drug 4-borono-L-phenylalanine (BPA) [3]. The production of carborane-containing derivatives of natural molecules intended for the targeted delivery of boron to tumor cells was realized [4].

In this lecture are presented our latest results on the synthesis of conjugates of polyhedral boron compounds with some porphyrins. For the first time, a conjugate of aminoamide chlorin e_6 with bis(dicarbollide) of iron was obtained and characterized, and its biological properties were studied on a culture of rat glioblastoma cells [5].

The use of liposomes is the high-tech methods for targeted delivery of drug compounds to cancer cells. Due to the high permeability of the blood vessel walls inside the tumor, liposomes have the property of passive targeting and are able to penetrate into the tumor. In addition, the possibility of using vector molecules in the composition the surface of liposome membrane increases the targeted properties for the tumor. Liposomal transport can also be actively used to penetrate into the tumor a wide variety of types of boron polyhedral hydrides, which by themselves are not able to penetrate through cell membranes. A series of bis(dicarbollide) cobalt and other derivatives of carboranes with cholesterol were synthesized for the purpose of their further transformation into boron-containing liposomes [6]. The new boronated cholesterols can be used for liposomal drug delivery for boron neutron capture therapy of cancer.

References:

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