Contribution ID: **466** Type: **Poster**

Synthesis and investigation of carborane containing coumarins as potential agents for cancer treatment

Boron-neutron capture of therapy of cancer is based on the selective accumulation of a non-radioactive isotope 10B in cancer cells and their subsequent processing of a thermal neutrons beam. This treatment mode of cancer can be divided into 3 steps. First step: Initially administering specific boron compounds, which are absorbed only by the cancer cells, the boron compounds will accumulate inside the cancer cells. Second step: Irradiating neutrons, obtained by the nuclear reactor or Accelerator, to these boron compounds. Third step: Boron compounds and neutrons collide and cause atomic fission, producing α-radiation. It destroys the cancer cells from the inside. Ideally, only the tumor cells are destroyed, including any amount of small metastases, without affecting sound tissue.

Requirements for potential drugs which could be used in BNCT are low-toxicity, high chemical and biological stability, high selectivity to the tumor cells, a maximum amount of boron in the molecule relative to other elements, solubility in water. Among the variety of potentially suitable boron compounds for the BNCT and actively investigated in many research centers, a special place belongs to carboranes.

In this research, different carborane derivatives of coumarins, nitroalkanes, hydrindones were synthesized. All compounds were characterization by FTIR, NMR 1H, 11B.

In vivo studies of anticancer activity of the synthesized carboranyl containing compounds have shown that the index of tumor growth inhibition of 1-(2',4'-dinitrophenyl)-2-phenyl-2-(methyl-o-carboranyl)-ethane for Walker carcinosarcoma (82%), Sarcoma-1 (76%), Pliss lymphosarcoma (65%). Ethyl 1-nitro-2-phenyl-2-(phenyl-o-carboranyl) propanoic acid showed activity against Walker Kartsiosarkomy (82%), lymphosarcoma Plissa (59%). At the same time, these compounds contain a large amount of boron, and have low toxicity (1-nitro-2-phenyl-2-(phenyl-o-carboranyl) propanoic acid LD50 = 3450 mg/ kg, and for example, cytotoxicity studies of 2-(p-methoxybenzylidene)-3-(phenyl-o-carboranyl)hydrindone showed LD50=5640 mg/kg, which also meets requirements for BNCT preparations. Thus, further study of the chemical and biological activity of carborane-containing nitroalkanes, nitronic acids and their esters, coumarin, hydrindones, chelate borate and nitrogen-containing derivatives is needed as potential drugs for chemotherapy and boron neutron capture therapy of cancer.

Author: Dr KOROLKOV, Ilya (Institute of nuclear physics of Kazakhstan)

Co-authors: Mr KAZANTSEV, Aleksander (Karaganda State University); Mrs LISOVSKAYA, Lana (Kazakh University of business and technology); Mr MUKHAN, Orynbasar (L.N. Gumilyov Eurasian National University); Mr GORIN, Yevgeniy (Institute of Nuclear Physic Republic of Kazakhstan)

Presenter: Dr KOROLKOV, Ilya (Institute of nuclear physics of Kazakhstan)

Track Classification: Life Science