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In articles presented in the book problems of investigation of nanosystems and nanobiotechnologies are studied.

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"INVESTIGATION OF AN INFLUENCE OF CYTOTOXICITY OF ZIRCONIUM OXIDE (ZRO_2) AND A SOLID SOLUTION ($Zr_{0.98}Eu_{0.02}O_{1.98}$) ON THE BASIS THERE OF, WHICH HAS NANOCRYSTAL STATE ON L-41 CELL LINE"

V.V.Gusarov[1], O.V.Almyasheva[1], A.V.Garabadzhiu[2], Yu.V.Kozina[2], L.F.Litvinchuk[3], V.P.Dobritsa[4].

[1] *I.V. Grebenshchikov Institute of silicate chemistry Russian Academy of Sciences*

[2] *St. Petersburg State Technological Institute, 198013, St. Petersburg, Moskovsky prosp., 26 gar@sitecs.spb.ru*

[3] *State Research Institute of flu Russian Academy of Medical Sciences*

[4] *State Research Institute of Highly Pure Biopreparations*

An object of the present investigation is a study of biological characteristics of the preparation in the form of suspension of the zirconium oxide (ZrO_2) nanoparticles and the solid solution (ZrO_2 – 1 mol.% Eu_2O_3) on the basis thereof. A method of dehydrotation of a precipitated hydroxides in the hydrothermal condition has been used in order to produce nanocrystals such as ZrO_2, ZrO_2-Eu_2O_3. As a result of the method, the nanocrystals with average size about 10-18 nm were produced from an initial amorfic material. Each preparation consists of two fractions – suspension of nanocrystals having size less then 10 nm, wherein this suspension was highly diluted with water and a precipitate comprising agglomerated nanocrystals having size about 10-18 nm.

Tests have been carried out on cell line L-41 monolayer in respect of all four fractions in a broad range of concentrations, which were differed from each other hundredfold almost. The following characteristics were studied: cytotoxicity, prolifirative activity and a metabolic activity level, which was determined spectrophotometrically by a method of MTT-test.

96-wells plastic plates with inoculated cells were used for determining the cytotoxicity. The changes were registered visually within 1-10 days under the staining by intravital stain on the cytological preparations.

A proliferative index has been calculated as a relation of a harvest of the test-cells to a harvest of the base-cells.

MTT-test was carried out by the monolayer of the test-cells and base-cells, which have been grown on the 96-wells plastic plates. A concentration of substances and terms of contacts between the cells and preparations were varied.

The following has been established. Distinct cytotoxicity lacks both in structure of a confluent monolayer and in the cells, including exposure to high level concentrations (relation of nutrient medium to tested fractions was 10:3). Even in the case of presence of a significant amount of solid phase fractions of studied nanocrystal compounds, the changes of general morphofunctional characteristics of the cells were not observed.

A stimulating effect of small homeopathic quantities of the zirconium oxide nanocrystals in respect of the prolifirative activity of the cells was demonstrated. A value of the proliferative index for the cells which were cultivated in the presents of the zirconium oxide was more then value for base-cells in 1.26-1.7-fold. For the nanocrystals based on solid solution $Zr_{0.98}Eu_{0.2}O_{1.98}$, these values were comparable with base ones.

Using the MTT-test the following was found: all studied fractions not only depressed metabolic activity of the cells L-41, but small concentrations were increased the metabolic activity in 1.4-1.6- fold.

In such a way the following conclusion may be done. Nanocrystals $Zr_{0.98}Eu_{0.2}O_{1.98}$ exerts a positive influence to the cells *in vitro*. The absence of cytotoxicity, stimulation of the metabolic and proliferative activity evidences about it. The compounds are perspective as candidates for further investigations of them biological properties and pharmacology using.