

Institute of Molecular Biology and Genetics
NAS of Ukraine



**ALL-UKRAINIAN CONFERENCE
ON MOLECULAR AND CELL BIOLOGY
WITH INTERNATIONAL PARTICIPATION**

*dedicated to the heroic struggle
of the Ukrainian people against russian invaders*

June 15-17, 2022



CONFERENCE PROCEEDINGS

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24 th February 2022 Russia invaded Ukraine and this terrible war with destruction of civil infrastructure, including cultural, educational, and scientific objects interrupted the scientific work in our country. A lot of scientists were displaced within Ukraine or abroad. Our foreign colleagues immediately demonstrated great support and created a lot of opportunities for Ukrainian scientists in their countries. Despite this, most scientists stayed in Ukraine, some of them even in temporary occupied territories. Therefore, Young Scientist Council and in the Scientific Council of the Institute of Molecular Biology and Genetics NAS of Ukraine created the idea of All-Ukrainian conference with international participation with the aims to encourage Ukrainian scientists, to give the opportunity to colleagues from abroad to demonstrate their staunch support to Ukraine and to keep scientific process ongoing even on the background of the war.

The All-Ukrainian Conference on Molecular and Cell Biology with international participation was held as an online event on Zoom platform, from 15 th to 17 th of June 2022.

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DOSE DEPENDENCE OF HEPATOPROTECTIVE ACTIVITY OF MESENCHYMAL STEM CELLS EXOMETABOLITES

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Background. Mesenchymal stem cells (MSCs) are a self-sustaining population of cells that have the ability to divide and differentiate. They are located in many organs and are necessary for regeneration of damaged organs. Their biological activity allows them to be used in regenerative medicine. The most widely used MSCs from bone marrow, adipose tissue and cord blood. MSCs practically do not cause an immune response and tumors, but nevertheless, there are risks from the use of living cells. They secrete into the internal milieu or culture medium biologically active metabolites containing soluble peptides and lipid vesicles with microRNAs called a secretome. Both individual components and the whole secretome are being actively studied to obtain new pharmaceutical compositions. It is known about their immunomodulatory effect, as well as their stimulation of regional stem cells in many organs, including the heart, the CNS organs, pancreas, liver, etc. An important step towards the practical application of MSCs EMs in pharmaceutical biotechnology is the study of the effect of different doses of secretome or its different fractions on various organs and systems.

The **aim** of the research was to study the hepatoregenerative effect of three whole secretome concentrations of xenogeneic MSCs in an *in vitro* model.

Methods. MSCs EMs were obtained from the bone marrow of a healthy donor dog. Under aseptic conditions, the biopsy material was resuspended, fractionated by centrifugation, and inoculated on culture plastic to a growth medium (90% DMEM, 10% fetal bovine serum), the floating fraction was removed, and cells were incubated (37°C, 5% CO₂). At the 3rd passage, the secretome was collected. The growth medium without cells cultivation was a control. The study model was an organotypic culture of rat liver. Cylindrical fragments were excised from the liver using and inoculated into a culture medium (90% DMEM/F12, 10% fetal bovine serum), into which secretome samples were added. After 48 hours of incubation, the area index was taken into account, i.e. the intensity of the formation of the “zone of eviction and growth” by the cellular elements of the liver. Statistical analysis was carried out using the Scheffe method.

Results. Doses of 0 (control), 30, 60 and 120 µl/ml were studied. A significant increase of the area index experimental cultures by 1.25-2.30 times in comparing control was shown. At the same time, an almost linear dose dependence of the stimulating effect was observed in the studied dose range.

Conclusion. Thus, it has been shown that the whole secretion of xenogenic MSCs has hepatoregenerative activity in the range of 30-120 µl/ml. The dependence of the biological effect on the dose is almost linear. In the future, additional *in vitro* and *in vivo* studies are planned to elucidate the mechanisms of the observed effects.