



**National Academy of Sciences of Ukraine
Institute for Problems of Cryobiology and
Cryomedicine of NAS of Ukraine
UNESCO Chair in Cryobiology**

IMET2000

Abstract book

**46th Annual international Conference of
Young Scientists**

**"COLD IN BIOLOGY AND MEDICINE:
CURRENT PROBLEMS IN CRYOBIOLOGY,
TRANSPLANTOLOGY, AND
BIOTECHNOLOGY"**

May 25th, 2022

The conference is supported by the The Council of Young Scientists jointly with the Administration of the Institute for Problems of Cryobiology and Cryomedicine of the National Academy of Sciences of Ukraine.

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46th Annual International Conference of Young Scientists "Cold in biology and medicine: current problems in cryobiology, transplantology, and biotechnology", Kharkiv, May, 25 2022 / The Institute for Problems of Cryobiology and Cryomedicine of the NAS of Ukraine – Kharkiv, 2022. – 41 p.

The abstract book contains materials of scientific works on topical studies of the effects of low temperatures on various biological objects, the problems of modern cryobiology and cryomedicine.

Materials are given in the author's edition.

‘Cold in Biology and Medicine: Current Problems in Cryobiology, Transplantology, and Biotechnology’ is the conference of young scientists, organized by the Council of Young Scientists mutually with administration of IPC&C and UNESCO Chair in Cryobiology. Conference is held annually in May.

Conference is organized to encourage the young scientists’ creative and intellectual initiative, shearing their research, making an insight for academic community into scientific activity of young scientists, making the contacts between scientists.

The participants of the conference can be young scientists, PhD- and university students.

The working languages of the conference are Ukrainian and English.

The conference covers the investigations devoted to various aspects of low temperature effect on biologicals:

- mechanisms of damage to biological objects under the influence of low and extremely low temperatures;
- low temperature storage of biological objects (human, animal or plant cells, tissues, organs), including preparation for storage, thawing;
- cultivation of cells and tissues, etc.
- the response of biological objects to low temperature;
- the mechanisms of natural resistance of living systems to the cold and the process of recovery from cold exposure
- cold adaptation of animals and plants;
- low temperature in medicine;
- experimental and clinical transplantation;
- cryobiological and cryomedical devices;
- low temperature banks and depositories *etc.*

Conference program

Opening

Welcome speech

25th May
10:00

Prof. **Aleksandr Petrenko**

Foreign guests:

prof. **Colin Green**, prof. **Barry Fuller**,

prof. **Christiani Amorim**, prof. **Roland Fleck**,

prof. **Estefanía Paredes**, prof. **Glyn Stacey**, *et al.*

‘Cryobiology’ Session chairman: *Dr. Olena Rogulska*

10:30	A. Bogdaniuk , N. Shapovalova, O. Marchenko, E. Paredes	Fertilization rate and larvae abnormalities rate of the sea urchin <i>Paracentrotus lividus</i> after the use of cryopreserved sperm <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine; V.N. Karazin KNU, Kharkiv, Ukraine; Universidade de Vigo, Vigo, Spain</i>
10:42	A. Lago , E. Paredes	Evaluation of physico-chemical factor interactions in the cryopreservation of <i>Paracentrotus lividus</i> pluteus larvae. <i>Centro de Investigación Mariña CIM, Universidade de Vigo, Grupo ECOCOST, Vigo, Spain</i>
10:54	S. Campos , D. Costas, J. Troncoso, E. Paredes	Stablishing key factors for successful mussel Biobanking <i>Laboratorio ECOCOST, Dept. Ecología e Bioloxía Animal, Centro de Investigación Mariña CIM, Universidade de Vigo.</i> <i>Centro de Investigación Mariña, Universidade de Vigo, ECIMAT, Vigo 36331, Spain</i>
11:06	O. Hubenia , Yu. Kot, N. Trufanova	Human Mesenchymal Stromal Cells alginate encapsulation beneficial effect for storage at ambient temperature under hypoxic conditions <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine; V.N. Karazin KNU, Kharkiv, Ukraine</i>
11:18	D. Khayyat , T. Rittinghaus, B. Glasmacher	Cryopreservation of water-based suspensions by the floating process for blood storage <i>Leibniz Universität Hannover, Institute for Multiphase Processes, Garbsen, Germany; NIFE, Lower Saxony Center for Biomedical Engineering, Implant Research and Development, Hannover, Germany</i>
11:30	S. D. Hammond , J. Zamecnik, M. Faltus, B. Panis, I. Viehmannová	Development of a PVS3 plant vitrification method for cryopreservation of yacon (<i>Smallanthus sonchifolius</i>) genetic resources <i>Plant Physiology and Cryobiology Laboratory, Crop Research Institute, Prague, Czech Republic; Bioversity International c/o KU Leuven, Leuven, Belgium; Department of Crop Sciences and Agroforestry, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Prague, Czech Republic</i>

11:42	A. Jesus, A. Paiva, A. Duarte	Natural Deep Eutectic Systems: Efficient alternative cryoprotectant agents for the cryopreservation of cells <i>Departamento de Química, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516, Caparica, Portugal</i>
11:54	M. Jandová, P. Měřička, J. Gregor, M. Lánská, <i>et al.</i>	Influence of the Me ₂ SO removal on key parameters of cryopreserved autologous peripheral progenitor cells (HPC) concentrates a retrospective study in patients with primary or secondary amyloidosis <i>University Hospital Hradec Králové; Charles University, Czech Republic</i>
12:06	O. Chabanenko, N. Yershova, N. Shpakova	Testing the state of erythrocytes under hypertonic and posthypertonic shock <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
12:18	D. Ostras, H. Honcharov, K. Mikson	Lampreys of Ukraine as a prospective object of cryobiological research <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine; V.N. Karazin KNU; Research Institute of Biology, V.N. Karazin KNU, Kharkiv, Ukraine</i>
break		
‘Cryomedicine/ Biotechnology’ Session chairman: Dr. Nadiia Chernobai		
13:00	H. Nesteruk, E. Legach	Uterine contractility in aged rats after administration of conditioned media from cryopreserved glial cell culture <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
13:12	T. Deeb, L. Zeh, T. Rittinghaus <i>et al.</i>	Cryopreservation of dendritic cells for cancer therapy <i>Institute for multiphase processes, university of Hanover, Hanover, Germany; PetBioCell GmbH, Osterode am Harz, Germany</i>
13:24	L. Batyuk, N. Kizilova, T. Kocharova	Dielectric characteristics of erythrocytes of patients with ischemic and hemorrhagic stroke under conditions of therapeutic action of hypothermia <i>Kharkiv National Medical University, Ukraine, Kharkiv V.N. Karazin KNU, Kharkiv, Ukraine</i>
13:36	A. Pexaras, O.O. Kofanova	Learning from cryobiology to improve biopreservation quality in a biobank <i>Integrated BioBank of Luxembourg (IBBL), Luxembourg Institute of Health (LIH), Dudelange, Luxembourg</i>
13:48	L. Remark, O.O. Kofanova	Induced pluripotent stem cells biobank perspective: from unresolved barriers to stable production <i>Integrated BioBank of Luxembourg (IBBL), Luxembourg Institute of Health (LIH), Dudelange, Luxembourg</i>

14:00	S.-A. Barker, O. Gryshkov, B. Glasmacher	Cryopreserving tissue engineered scaffolds within cryobags <i>Institute for Multiphase Processes, Leibniz University Hannover, Germany</i>
14:12	S. Leal-Marin, K. Hölte, A. Lopera, C. Garcia, B. Glasmacher, O. Gryshkov	Improvement of scaffold cryopreservation by use of magnetic NPs <i>Institute for Multiphase Processes, Leibniz University Hannover, Garbsen, Germany; Lower Saxony Center for Biomedical Engineering, Implant Research and Development, Hannover, Germany; Universidad Nacional de Colombia, La Paz, Colombia</i>
‘Cryobiology/Cryomedicine/Biotechnology’ Session chairman: <i>Dr. Yuliia Akhatova</i>		
14:24	Y. Hvozdiuk, A. Kompaniets	Study of biological additives effect on cryoprotective action of multicomponent media based on combinations of glycerol and polyvinyl alcohol when freezing human erythrocytes <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
14:36	O. Perepelitsina, B. Kopyak, E. Yastrebova, M. Sydorenko	Development of effective hematopoietic stem cell freezing protocols <i>Department of Biotechnical Problems of Diagnostics of the IPC&C NAS of Ukraine, Kyiv; Okhmatdyt National Children's Specialized Hospital, Ministry of Health of Ukraine, Kyiv.</i>
14:48	K. Vozovyk, N. Chernobai, N. Kadnikova, L. Rozanov	Toxicity of cryoprotectants to <i>Chlorococcum dissectum</i> microalgae cells <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
15:00	O. Perepelytsina, B. Kopyak, S. Bezugliy, M. Sydorenko	Development of protocols for the observation and preservation of mesenchymal stem cells for a further clinical examination <i>Department of Biotechnical Problems of Diagnostics of the IPC&C NAS of Ukraine, Kyiv; Okhmatdyt National Children's Specialized Hospital, Ministry of Health of Ukraine, Kyiv.</i>
15:12	D. Vvedenskyi, N. Volkova, M. Yukhta, A. Goltsev	Influence of cryopreserved multipotent mesenchymal stromal cells on regulation of immuno-inflammatory process in adjuvant arthritis <i>IPC&C NAS of Ukraine Kharkiv, Ukraine; V.N. Karazin KNU Kharkiv, Ukraine</i>
15:24	S. Vsevolodska, O. Sukach, O. Ochenashko	Characteristic of migration in the culture of newborn and fetal rat neural cells <i>IPC&C NAS of Ukraine Kharkiv, Ukraine; H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine</i>
15:50	Discussion of reports Closing of the conference	

Poster presentations (posters will be available on the [conference website](#))

1	Z. Michalová, E. Szekiová, Z. Dzurjašková, I. Vanický	Paclitaxel induced peripheral neuropathy in vitro <i>Institute of Neurobiology, Biomedical Research Center, Slovak Academy of Sciences, Šoltésovej 4-6, 040 01 Košice, Slovakia</i>
2	A. Kaverinska, A. Tkachenko, V. Prokopiuk	Search for methodological approaches of organotypic cultivation for following cryopreservation <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i> <i>Kharkiv National Medical University, Ukraine, Kharkiv</i>
3	T. Mykhalchuk, M. Shevchenko, V. Prokopyuk, O. Prokopyuk	Study of cryopreserved placental cells biological effect on organotypic uterine culture <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
4	Y. Chyzh, L. Marchenko, T. Govorukha, N. Repin	Effect of placental tissue freeze-thawing modes on composition and biological activity of its cryoextracts <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
5	H. Shkarlat, Ya. Cherkashyna, L. Stepanyuk, S. Sevastianov	Antagonistic activity of immobilized symbiotics after lyophilization and storage at different temperatures <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
6	A. Popovičová, K. Fabianová, M. Martončíková, A. Raček, E. Račeková	Neurons of the olfactory neurogenic region of the rat: a morphological study <i>Institute of Neurobiology, Biomedical Research Center, Slovak Academy of Sciences, Šoltésovej 4-6, 040 01 Košice, Slovak Republic</i>
7	K. Fabianová, J. Babel'ová, A. Popovičová, D. Fabian, <i>et al.</i>	Maternal nutrition and neurogenesis <i>Institute of Neurobiology, Biomedical Research Center, Slovak Academy of Sciences; Institute of Animal Physiology, Centre of Biosciences, Slovak Academy of Sciences, Košice, Slovak Republic</i>
8	T. Miroshnichenko, N. Bashtan, H. Mozgovska, T. Ivchenko, <i>et al.</i>	Yield of table beets (<i>Beta vulgaris</i> var, <i>conditiva</i>) after pre-sowing treatment of seeds by ozonation and freezing <i>Institute of Vegetable and Melon of the National Academy of Agrarian Sciences of Ukraine;</i> <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>
9	M. O. Chyzh, I. V. Koshurba	Comparative evaluation of antiulcerogenic action of cryoconserved placenta extract under different modes of introduction <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i> <i>Communal non-profit enterprise "Chernivtsi Regional Perinatal Center", Chernivtsi, Ukraine</i>
10	O. Osetsky, S. Sevastianov, V. Potapov, D. Bilyi, I. Piliugina	Technology of cryosublimation fractionation in the production of biologically active liquor-table waters <i>State Biotechnological University,</i> <i>IPC&C NAS of Ukraine, Kharkiv, Ukraine</i>

Testing the state of erythrocytes under hypertonic and posthypertonic shock

O. O. Chabanenko, N. A. Yershova, N. M. Shpakova

Institute for Problems of Cryobiology and Cryomedicine of the National Academy of Sciences of Ukraine, Kharkiv, Ukraine

To study the effect of the factors of erythrocytes cryodamage the model experiments were used. To investigate an impact on cells of damage factors acting at the freezing stage using hypertonic shock (HS), and the factors the action of those were realized at the thawing stage with posthypertonic shock (PHS). In the base of cell damage under action of temperature-osmotic shock there are the processes associated with transmembrane pores formation, therefore, the use of membranotropic substances is advisable.

Research aim was to study the development of hypertonic and posthypertonic hemolysis of human erythrocytes at 37 and 0°C in the presence of chlorpromazine (CPR) and trifluoperazine (TFP). Hypertonic shock was performed by transferring erythrocytes into 4.00 mol/L NaCl, while posthypertonic shock was initiated by transferring the cells from dehydration medium (1.65 mol/L NaCl) to rehydration one (0.15 mol/L NaCl) at 37 and 0°C. The level of erythrocytes hemolysis was determined spectrophotometrically ($\lambda = 543$ nm).

The erythrocytes are damaged under HS and PHS conditions. Hemolysis level of erythrocytes depends on temperature: at 0°C it was lower than at 37°C. The usage of CPR and TFP decrease of hypertonic hemolysis level of erythrocytes at temperatures 37 and 0°C, moreover antihemolytic (AH) activity of both amphiphilic compounds is about 2 times higher at 37°C. In contrast to the above, the efficacy of amphiphiles at PHS conditions of erythrocytes is observed only at 0°C.

Comparative analysis of CPR and TFP efficiency showed higher AH activity of CPR (70%) compared to TFP (60%) under PHS conditions of erythrocytes, and, conversely, under HS conditions (0°C) the values of AH activity for TFP (80%) exceeded similar index of CPR (70%). But for both types of shock, the effective concentrations of CPR are higher than the ones for TFP. It was found that under HS conditions of erythrocytes the effective concentrations of amphiphiles were significantly lower compared to the values obtained under PHS conditions.

The fact that to implement the protective effect of amphiphiles under PHS conditions of erythrocytes requires more substance may unlikely indicate the nature of hemolytic pores formation under action of the factors inherent to different stages of erythrocytes cryopreservation.

Since the protective effect of amphiphiles is realized under PHS conditions only at low temperature and under HS conditions the compounds are more effective at 37°C than at 0°C, the mechanism of action of amphiphiles under HS conditions can be assumed to be associated with perturbation of erythrocyte membrane, while under PHS this can be due to its stabilization.

Organizers:

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