

Russian regional scientists project proposals for participation in FP7

THEME 1: Health

[FP7-HEALTH-2010-single-stage](#)

[FP7-HEALTH-2010-two-stage](#)

[2.4. TRANSLATIONAL RESEARCH IN OTHER MAJOR DISEASES](#)

[3.5. SPECIFIC INTERNATIONAL COOPERATION ACTIONS FOR HEALTH SYSTEM RESEARCH](#)

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1) *Is interested in participation in a project that will be prepared and submitted in the following topics:*
Research of the oxidative status and oxidative metabolism enzymes activity in mammals tissues at pathologies, connected with oxidative stress, and protectors action

Call identifier: FP7-HEALTH-2010-single-stage, FP7-HEALTH-2010-two-stage

Short description of the organization:

VSU is a state recognized institution of Higher education in Russia, the largest intellectual, scientific and academic centre of the Central Black Soil Region. It was founded in 1918. More than 20,000 students are taught by 1,300 academic staff, including 261 professors. VSU offers various post-graduate **education programmes**, including various forms of post-graduate and post-doctoral studies, as well as continued learning. There are 76 domains for post-graduate and 7 academic domains for post-doctoral research, 23 Scientific Boards for public thesis defense work at the VSU. VSU is one of the leading institutions of the Central Black Soil Region in the sphere of **fundamental research**.

The **structure of VSU research departments** includes 17 faculties, 5 research institutes, 14 joint laboratories with the Russian Academy of Sciences, 10 joint research and production centres with the key industrial enterprises of the region, the Centre of Nanosystems and Material Industry, Technopark, the Shared Research Equipment Centre, Botanical Gardens, a nature reserve Galichya Gora, etc.

Expertise offered:

The activity is directed on the decision of a fundamental problem of biochemistry connected to research of functioning of antioxidant system (AOS) and oxidative metabolism enzymes, capable to limit free-radical oxidation (FRO), at pathologies, connected with oxidative stress (experimental models of liver toxic defeat, myocardium and brain ischemia, hyperthyroidism at rats), and also at action of substances-protectors (thioctic acid, citrate, melatonin and several synthetic substances, received at Voronezh State University Chemical Faculty). Estimation of free-radical processes intensity in analysed tissues is realised by biochemiluminescence method, giving the integral characteristic of a FRO level, definition of the contents of lipid peroxidation primary products – diene conjugates, and DNA fragmentation as index of apoptosis development degree. Activity of AOS enzymes (superoxide dismutase, catalase, glutathione reductase and glutathione peroxidase) and level of some antioxidants (α -tocopherol, citrate, glutathione) in liver, myocardium, brain and blood serum at pathologies and protectors action are investigated. The research of aconitase (AH), succinate dehydrogenase (SDH), citrate synthase (CS), NAD- and NADP-isocitrate dehydrogenases (NAD-IDH and NADP-IDH), NAD- and NADP-malate dehydrogenases (NAD-MDH and NADP-MDH), glucose-6-phosphate dehydrogenase (G6PDH) and 6-phosphogluconate dehydrogenase (6PGDH) functioning with application of purified enzyme preparations is also spent. The research of these enzymes expression and repression regulation is planned.

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The investigation of biochemical bases of reactive oxygen species formation regulation with the help of substances-protectors promotes clarification of molecular mechanisms of FRO intensity increase, which is a universal non-specific link in various diseases pathogenesis, prevention.

Problems to be solved and results

- ✓ Estimation of FRO intensity in rats liver, heart, brain and blood serum at an experimental toxic hepatitis, myocardium infarction, brain ischemia and hyperthyroidism and also at introduction of substances-protectors.
- ✓ Definition of AOS components activity at pathological conditions and at introduction of protectors (melatonin, thiocetic acid, citrate, several synthetic substances).
- ✓ Definition of activity of some central metabolic pathways enzymes (CS, AH, NAD- and NADP-IDH, SDH, NAD- and NADP-MDH, G6PDH, 6PGDH) in conditions of a pathology and at action of substances-protectors, and research of these enzymes properties with purified enzyme preparations use.
- ✓ Study of peculiarities of oxidative metabolism enzymes expression and clarification of their induction and repression possibility at oxidative stress development and protectors action.

Research of structural and functional state of DNA and antioxidant status in mammals myocardium at action of substances – potential precursors of medical products - under pathologies, associated with oxidative stress

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Expertise offered:

The activity is directed on the decision of problems of biochemistry, medicine and pharmacology, connected to investigation of the biochemical bases of reactive oxygen species formation regulation with the help of substances-protectors and development of cardiovascular system various pathologies early diagnostics methods, search and introduction to a clinical practice of new highly effective medical products of various purpose. Research of structural and functional state of DNA and functioning of antioxidant system (AOS) and oxidative metabolism enzymes, capable to limit free-radical oxidation (FRO), in animals heart at pathologies, connected with oxidative stress (experimental models of myocardium ischemia, hyperthyroidism, apoptosis induction by tumor necrosis factor α at rats), and also at action of substances-protectors (thiocetic acid, citrate, melatonin and several synthetic substances, received at Chemical Faculty of Voronezh State University) is carried out. As an index of apoptosis development degree the method of estimation of DNA, extracted from analysed samples, fragmentation is used. Estimation of free-radical processes intensity is realised by biochemiluminescence method and definition of the contents of lipid peroxidation primary products. Activity of AOS enzymes (superoxide dismutase, catalase, glutathione reductase and glutathione peroxidase) and level of some antioxidants (α -tocopherol, citrate, glutathione) in myocardium and blood serum at pathologies and protectors action are investigated. The research of aconitase (AH), NAD- and NADP-isocitrate dehydrogenases (NAD-IDH and NADP-IDH), NAD- and NADP-malate dehydrogenases (NAD-MDH and NADP-MDH) functioning with application of purified enzyme preparations is also spent. The research of these enzymes expression regulation in tissues of animals of experimental groups has been begun.

Problems to be solved and results

- Research of extracted from heart of animals DNA fragmentation degree at pathology and action of substances - potential precursors of medical products.

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- Estimation of FRO intensity in rats heart and blood serum at myocardium ischemia, hyperthyroidism, apoptosis induction by tumor necrosis factor α and also at introduction of substances-protectors.
- Definition of AOS components activity at pathological conditions and at introduction of protectors (melatonin, thiocetic acid, citrate, several synthetic substances).
- Definition of activity of some central metabolic pathways enzymes (AH, NAD- and NADP-IDH, NAD- and NADP-MDH) in conditions of a pathology and at action of substances-protectors, and research of these enzymes properties with purified enzyme preparations use.
- Study of peculiarities of oxidative metabolism enzymes expression and clarification of their induction and repression possibility at oxidative stress development and protectors action.

Publications on the topic:

- ✓ Medvedeva L. V., M.A.A.Pinheiro de Carvalho, T.N.Popova, Artujkhov V. G., Matasova L.V.The influence of Phentone reaction participants and glutatione on NADP-specific isocitric dehydrogenase of rat cardiomyocytes at normal and ishemical condition // Proceedings of the 27th Meeting of the Federation of European Biochemical Societies. Lisbon. Portugal. 30 June-5 July 2001. European J.Biochemistry. Special issue. P.165. Abstr. PS 6-136.
- ✓ Shikhaliev Kh.S. Hetarylguanidines in reactions of heterocyclization / Kh.S. Shikhaliev [et al.] // Nitrogen-containing heterocycles and alkaloids. Editors: V.G. Kartsev, G.A. Tolstikov. - M.: Iridium Press, 2001. - V. 1. - P. 498-503.
- ✓ Popova T., Pinheiro de Carvalho M.A.A., Medvedeva L., Matasova
- ✓ L. Regulation of mitochondrial NADP-isocitrate dehydrogenase in rat heart during ischemia / Mol. and Cell. Biochem. – 2007. – 294:97-105, DOI: 10.1007/s11010-006-9249-9 [IF=1,681] ([http://www.springerlink.com/\(xdfdu55stfvfcfd2zikvxyk\)/app/home/contribution.asp](http://www.springerlink.com/(xdfdu55stfvfcfd2zikvxyk)/app/home/contribution.asp)).

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