

1. Shpakov A.O., Shpakova E.A.

## **Low-molecular regulators of polypeptide hormones receptors containing LGR-repeats.**

During the last years the low-molecular non-peptidic regulators of the polypeptide hormones receptors containing LGR-repeats were identified. In the review the data on the structure and the molecular mechanisms of action of these regulators as agonists and antagonists of the luteinizing, follicle-stimulating and thyrotropin hormones are analyzed and systematized. The regulators interact with the serpentine domain of LGR-receptor and trigger the signaling cascades coupled with the receptor. Low-molecular agonists and antagonists of the LGR-receptors are considered as a new generation of the drugs that regulates the functional activity of sensitive to pituitary glycoprotein hormones signaling systems with high efficiency and selectivity. These regulators are more accessible compared to the hormones and can be use orally.

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2. Hasanov A.G., Bershova T.V., Basargina E.N., Bakanov M.I.

## **Molecular mechanisms of genetic damages of the myocardium in cardiomyopathy.**

The review highlighted problems of reorganization of myocardial contractile and cytoskeletal proteins in cardiomyopathy (CM). The role of the genetic factors coding contractile proteins, proteins of thin and thick filaments, and also extracellular matrix proteins in processes of formation and development of hypertrophic (HCM) and dilated (DCM) cardiomyopathy are analyzed. The mechanisms responsible for the changes in cardiac proteins on regulation involved into force generation, its transfer, recycling ATP, impairments in transmembranal signals, that finally lead to cardiac cell dysfunction determining various manifestations of CM are considered.

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3. Fedchenko V.I., Kaloshin A.A., Medvedev A.E.

## **A novel vector for construction of cDNA library.**

A new original vector pEM-(dT)40(f+) has been prepared. It can be used for cDNA library construction from polyadenylated mRNA, isolated from various sources. The pGEM-(dT)40f(+) is initially transformed into single stranded and then into a linear form and its (dT)40 tail at 3'-end is used as the vector-primer for synthesis of the first strand cDNA. The use of a synthetic oligonucleotide complementary to the vector and recombinant DNA results in vector cyclization and synthesis of the second strand cDNA. This approach significantly simplifies cDNA library construction, it does not require PCR reaction (which can induce artifact mutations in cDNA sequences) and restrictase treatment.

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4. Guseva D.A., Prozorovskaya N.N., Shironin A.V., Sanzhakov M.A., Evteeva N.M., Kasaikina O.T., Rusina I.F.

## **Antioxidant activity of vegetable oils with different omega-6/omega-3 fatty acids ratio.**

Antioxidant activity and the oxidative stability were investigated in flax, sesame, silybum oils and oils with different  $\omega$ -6/ $\omega$ -3 fatty acid ratio. The content of antioxidants (AO) in crude oils and their reactivity towards peroxy radicals were studied using kinetic method for addition of oil in a model reaction of cumol oxidation. There were correlations between PUFA/ $\omega$ -9 and thermal stability (50°C); between  $\alpha$ -tocopherol content and resistance to oxidative changes after storage at (10±2)°C for 6 months.

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5. Zaporozhets T.S., Makarenkova I.D., Bakunina I.Y., Burtseva Y.V., Kusaykin M.I., Balabanova L.A., Zvyagintseva T.N., Besednova N.N., Rasskazov V.A.

## **Inhibition of adherence of corynebacterium diphtheriae to human buccal epithelium by glycoside hydrolases of marine hydrobiontes.**

A possibility of adhesion inhibition of *Corynebacterium diphtheriae* to human buccal epithelium by glycoside hydrolases of marine hydrobiontes was investigated using  $\beta$ -galactosidase from marine bacterium *Pseudoalteromonas* sp.  $\Delta$ 701, total enzyme preparation and  $\beta$ -1,3-glucanase from marine fungi *Chaetomium*, total enzyme preparation and  $\beta$ -1,3-glucanase from marine mollusk *Littorina kurila*, and total enzyme preparation from crystalline style of marine mollusk *Spisula sachalinensis* were used. The enzymes were added to test-tubes containing buccal epithelial cells and/or the toxigenic bacterial strain *C. diphtheriae*  $\Delta$ , -1129, v. *gravis*. All the investigated enzymes were able to abort *C. diphtheriae* adherence to human buccal epithelocytes. Inhibition of adhesion was more pronounced in the case of treatment of epithelocytes with highly purified enzymes of marine hydrobiontes in comparison with total enzyme preparations. The significant inhibition of *C. diphtheriae* adhesion was observed when the enzymes were added to the epithelocytes with the attached microorganisms. The results obtained show that glycoside hydrolases of marine hydrobiontes degrade any carbohydrates expressed on cell surface of bacterium or human buccal epithelocytes, impair unique lectin-carbohydrate interaction and prevent the adhesion.

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6. Maltsev A.N., Grekova A.A., Kits E.A.

## **Influence of emotional-painful stress on affinity of blood to oxygen, the state antioxidant system and physical properties hepatocyte**

#### **microsomal membrane.**

The emotional-painful stress causes a more pronounced decrease in affinity of hemoglobin to oxygen in portal blood compared with mixed blood. This contributes to increased oxygen pressure in hepatocytes and activates free radical processes in liver microsomes. Activation of lipid peroxidation is accompanied by changes in physical properties (microviscosity, polarity) of microsomal membranes. However, the increase in duration of stress treatment changes in the studied parameters become adaptive; this is accompanied by gradual normalization in blood affinity to oxygen, physical properties of membranes and the increase in antioxidant defence. Possible mechanisms of interaction of these systems during adaptation and regulation of free radical oxydation are discussed.

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7. *Somova L.M., Plekhova N.G., Goncharuk Yu.N., Drobot E.I.*

#### **Comparative characterization of oxide-dependent and nitroxide-forming enzymatic systems of macrophages under staphylococcus aureus and listeria monocytogenes infections.**

The reactivity of oxide-dependent and nitroxide-forming enzymatic systems of macrophages infected by bacteria, characterized by intraphagosomal (*Staphylococcus aureus*) and intracytoplasmatic (*Listeria monocytogenes*) localization in the phagocyte has been investigated. The correlation analysis revealed links between indices of the activity of oxide-dependent and nitroxide-forming enzymatic systems of infected macrophages.

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8. *Razumovskii S.D., Konstantinova M.L., Grinevich T.V., Korovina G.V., Zaitsev V.Ya.*

#### **Brutto-law of ozone decomposition in physiologic solutions and a method of evaluation of ozone dose really introduced to patients together with solution volume.**

Ozone solutions in water and in NaCl solutions found are widely used in technology and medicine. Some times ozone employment meets difficulties due to instability of ozone in solution. The paper describes the results of study of ozone decomposition prepared using solutions in distilled water, solutions of NaCl in water, including physiologic solutions from different manufacturers. Also it was proposed the reaction mechanisms explained influence of OH- and Cl- ions on the decomposition rate. Experimental follow the monomolecular law and are described by a straight line in  $\lg(C_t/C_0) = f(t)$  coordinates. It can be used as a basis for a new method of evaluation of real ozone doze introduced to patients.

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9. *Byruak A.K., Sribnaya O.S., Purygin P.P.*

#### **Studying peptides of antibacterial fractions methods of the liquid chromatography and mass spectrometry.**

The fractions containing antimicrobial peptides have been purified from a haemolymph of caterpillars *Galleria mellonella* by chromatographic methods and studied by mass spectrometry.

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10. *Popov S.S., Pashkov A.N., Zolodov V.I., Popova T.N., Rakhmanova T.I.*

#### **The antioxidant status at patients with a thyreotoxicosis syndrome at the combined therapy with epifamin.**

The work purpose was research of degree of free-radical processes intensity and catalase activity in blood serum of patients with a thyreotoxicosis syndrome at traditional treatment and the combined therapy with epifamin. Patients (n=25) have been divided into 2 groups: the first group of patients - 12 persons who are on traditional treatment (antithyreoid drugs,  $\beta_2$ -adrenoblockers); the second group - 13 persons, are padding to basic therapy received epifamin on 1 tablet (10 mg) 3 times a day 10-15 minutes prior to meal within 7 days. Patients with thyreotoxicosis syndrome had an intensification of free-radical oxidation that was traced at measurement of biochemiluminescence parameters in blood serum. At the combined therapy with epifamin less expressed intensity of free-radical processes, and also increasing of the general antioxidant activity of an organism that did not descend at traditional treatment was observed. At carrying out of standard therapy of thyreotoxicosis syndrome, including application of antithyreoid drugs and  $\beta_2$ -adrenoblockers, catalase activity decreased, that unfavorable affected antioxidant potential of an organism. At the combined therapy with epifamin level of catalase activity, on the contrary, increased, that could influence positively on antioxidant protection of an organism.

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11. *Rakhmetova S.Yu., Radko S.P., Gnedenko O.V., Bodoev N.V., Ivanov A.S., Archakov A.I.*

#### **Comparative thermodynamic analysis of thrombin interaction with anti-thrombin aptamers and their heterodimeric construct.**

Aptamers interacting selectively with the anion-binding exosites 1 and 2 of thrombin were merged into dimeric oligonucleotide constructs with use of a poly-(dT)-linker of 35 nucleotides (nt) long. Complexes of thrombin with the aptamers and their hetero- and homodimeric constructs were measured using the optical biosensor Biacore-3000. KD values measured for the hetero- and homodimeric constructs were correspondingly 25-30- and 2-3-fold lower than those for the primary aptamers. Analysis of temperature dependencies of KD values within the temperature interval of 10 $\text{\AA}$ C-40 $\text{\AA}$ C has shown that the values of enthalpy change  $\Delta H$  upon formation of complexes of thrombin with the aptamers and the hetrodimeric construct are close. The value of the entropy change  $\Delta S$  upon complex formation of thrombin with the aptamer heterodimeric construct was 1.5-2-fold higher than  $\Delta S$  values for the complexes with the aptamers. The complex formation and dissociation rates increased with the elevation of temperature from 10 $\text{\AA}$ Dj to 37 $\text{\AA}$ Dj. However, the dissociation rate for the complex of thrombin with the heterodimeric construct was evidently lower that that for the complexes with the aptamers.

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12. *Rotanova T.V., Melnikov E.E.*

### **Novel view of the architecture of the non-catalytic n-terminal region of ATP-dependent lona proteases.**

ATP-Dependent Lon proteases are components of the protein quality control system, which maintains a keeping of cellular proteome. Lon family consists of two subfamilies A and B, differing in subunit architecture and intracellular location. The reinterpretation of the domain organization of the non-catalytic N-terminal region of ATP-dependent LonA proteases is proposed. Using *Escherichia coli* LonA protease (EcLon) as an example it has been shown that a fragment ( $\hat{I}_{\pm}N$ -domain), which is located between the N-terminal domain and the  $\hat{D}\bullet\hat{D}\bullet\hat{D}\bullet+$  module of that protein, is similar to the  $\hat{I}_{\pm}1$ -domain of the first  $\hat{D}\bullet\hat{D}\bullet\hat{D}\bullet+$  module of chaperone-disaggregase ClpB. A coiled-coil ( $\hat{D}_i\hat{D}_i$ ) region included in the  $\hat{I}_{\pm}N$ -domain of LonA is similar to the M domain of ClpB chaperones, which is inserted into the  $\hat{I}_{\pm}1$ -domain. This region is suggested to adopt the structure similar to the propeller-like (PL) domain. The typical architecture of the N-terminal region of LonA proteases is postulated to be characterized by the obligatory presence of a PL domain, included in the  $\hat{I}_{\pm}N$ -domain, but may vary in the length and topology of the preceding N-terminal domain.

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