

1. Okorochenkov S.A., Zheltukhina G.A., Nebol'sin V.E.

**Antimicrobial peptides: mode of action and perspectives of practical application.**

This review is devoted to antimicrobial peptides (AMPs) that demonstrate activity against bacteria, viruses and fungi. It considers structure and mechanism of AMP interaction with lipid membrane and intracellular targets of pathogens. Special attention is paid to modern state and perspectives of AMP practical application and also to approaches that increase efficacy and reduce toxicity of AMP by chemical modification of their structure.

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2. Buzanovskii V.A.

**Electrochemical sensors based on carbon nanotubes and their use in biomedical research. Part 2: sensors manufactured by dispersion of carbon nanotubes by means of polyethyleneimine, organic dyes, cyclodextrins, chitosan, proteins, room-temperature ionic liquids, gels, and thiols. Sensors manufactured by dispersion of carbon nanotubes by electropolymerization process. sensors manufactured by dispersion of carbon nanotubes by layer-by-layer deposition.**

Electrochemical sensors based on carbon nanotubes are widely distributed in biomedical researches. One group of these sensors contains the sensors manufactured by dispersion of carbon nanotubes on an electrode surface by means of polyethyleneimine, organic dyes, cyclodextrins, chitosan, proteins, room-temperature ionic liquids, gels, thiols, by electropolymerization process, and by layer-by-layer deposition. The development directions of such sensors are analyzed. The general information on manufacturing techniques of these sensors is submitted. The opportunities of these sensors for carrying out biomedical researches are demonstrated.

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3. Zinov'eva V.N., Spasov A.A.

**Mechanisms of plant polyphenols anti-cancer effects I. Blockade of carcinogenesis initiation.**

Mechanisms of anti-cancer effects of polyphenols, found in fruits, vegetables, spices and representing parts of daily nutrition, have been considered. These compounds may be the basis for development of cancer preventive preparations. They can block carcinogenesis initiation by inactivation of exogenous or endogenous genotoxic molecules including reactive oxygen species. Another mechanism consists in inhibition of activity and synthesis of carcinogen-metabolizing enzymes. Plant polyphenols also induce expression of antioxidant and detoxification enzymes genes.

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4. Balashova M.V., Lyutova L.V., Rudenskaya Yu.A., Isayev V.A., Andina S.S., Kozlov L.V., Rudenskaya G.N.

**Anticoagulative and anticomplementary activity of endogenous inhibitor preparation from hepatopancreas of red king crab (paralithosed camtschaticus) towards human blood.**

Serpins (SERPINE Protease INhibitors) - is large and diverse group of proteins with similar structures, which can inhibit both serine and cysteine proteases by an irreversible suicide mechanism. A novel serpin from hepatopancreas of Red King Crab (Paralithosed camtschaticus) was obtained and was studied its effect on the process of human blood plasma clotting. The investigated serpin shows a noticeable anticoagulative activity, which increases dramatically in the combined action with heparine. Though the inhibitor has almost no effect on thrombin, it inhibits C1s (C1-esterase). We studied the action of the serpin from P. camtschaticus on C1s via its competitive inhibition by C1 inhibitor and the novel enzyme. The calculated inhibition constant of the serpin from P. camtschaticus towards C1s is  $2,02 \pm 0,71$  Dø. Unlike C1 inhibitor, the novel serpin from P. camtschaticus doesn't suppress fibrinolysis and at the same time prevents blood clotting. These features may be of interest for medical purposes.

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5. Krivoshapko O.N., Popov A.M., Artyukov A.A., Kostetsky E.Y.

**Particularities of corrective action of polar lipids and bioantioxidants from sea hydrobionts at imbalances of lipid and carbohydrate metabolism.**

A total mixture of phospho- and glycolipids from sea macrophytes *Sargassum pallidum*, *Ulva fenestrata*, *Zostera marina* was separated and the fatty acid composition was determined. Biological activity of the mixtures of polar lipids and natural antioxidants echinochrome A from flat sea urchin *Scaphechinus mirabilis* and polyphenolic complex from sea grass *Zostera marina* was studied in rats with experimental model of atherosclerosis and diabetes. These experiments revealed optimal compositions for mixtures of polar lipids and antioxidants, which possess high medical-corrective activity. Proposed mechanisms of action of the polar lipids (containing different polyunsaturated fatty acids) and antioxidants studied are presented. These compositions may be used for creation of new biologically-active additives and drugs.

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6. Limanskaya O.Yu., Fesenko T.N., Pokrovskiy V.A., Mukhina T.N., Stepanshina V.N., Shemyakin I.G., Limanskii A.P.

**Characterization of oligonucleotides with LNA-monomers for PCR detection of point mutations in mycobacteria tuberculosis genome.**

Point mutations associated with isoniazid resistance in *Mycobacterium tuberculosis* (MTB) have been analyzed in codon 315 of the *katG* gene by conventional polymerase chain reaction (PCR) using primers containing locked nucleic acid (LNA) modified nucleotides. Purity and structure of primers containing 5 LNA monomers of 17 nucleotides in length were characterized by matrix assisted laser desorption ionization time of flight mass spectrometry (MALDI-TOF MS) and a 17-mer duplex formed by two complementary oligonucleotides was characterized by the method of thermal denaturation. The duplex containing five LNA monomers per each strand was characterized by a higher melting temperature than it was expected using extrapolation of theoretical calculation for nucleotide modification of one strand of the duplex. Detection of any of six possible mutations in *katG* codon 315 (i.e. discrimination between sensitive and resistant MTB) requires just one PCR employing a set of two primers with one LNA-modified primer; this is an important advantage of oligonucleotides containing LNA over unmodified nucleotides: employment of multiplex PCR would require up to 12 primers. Problems of control of oligonucleotide modification by LNA monomers are discussed.

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7. *Gribovskaya O.V., Shutova I.V., Tsyganova O.V., Martinovich V.P., Golubovich V.P.*

**New bioaffine sorbents for selective elimination of autoantibodies against human thyroperoxidase in autoimmune thyroid diseases.**

New bioaffine sorbents containing bioselective ligand, synthetic analog of the human thyroperoxidase antigenic determinant - tetrapeptide H-Glu-Gln- $\dot{\text{I}}^2$ Ala-Lys-OMe, immobilized on two polymeric matrixes - a polyacrylamide gel and CNBr-activated sepharose 4B were synthesized. The offered immunosorbents were shown have high selectivity in relation to autoantibodies against thyroperoxidase and can find an application for medicine and experimental biochemistry for selective elimination of autoantibodies from serum or plasma of the patients suffering from autoimmune thyroid diseases.

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8. *Zharkova N.V., Potapov P.P., Stelmach A. Yu.*

**The effect of acute alcohol intoxication on some parameters of nitrogenous metabolism in rats with alloxan diabetes.**

Acute alcohol intoxication in rats with alloxan diabetes is accompanied by the increase of urea and uric acid and by the decrease in free fatty acids in serum. In the liver of experimental animals the increase of activity of glutamate dehydrogenase, AMP deaminase, and tyrosine transaminase was found.

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9. *Mikaelyan N.P., Terentyev A.A., Maxina A.G., Mikaelyan A.V., Novikova S.V.*

**Lipid-protein interaction in erythrocytic and placental membranes in women with insulin resistance.**

Disturbances of erythrocyte and placental membrane function have been studied in placenta of pregnant women with obesity and diabetes mellitus type 2. The results of this study demonstrate significant metabolic impairments in women with insulin resistance. Changes in lipid spectrum of erythrocyte membranes and decreased activity of antioxidant enzymes obviously contribute to the development of fetoplacental insufficiency. This changes point to necessity of the antioxidant therapy in pregnant women with obesity and diabetes mellitus type 2.

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10. *Meshcheryakova M.G., Trilis Ya.G., Kirillova N.V., Alpatova A.T., Muhin I.A., Kozhevnikov A.A.*

**Some biochemical parameters of the synovial liquid for estimation of effectiveness of the treatment of the knee joint osteoarthritis.**

The knee joint osteoarthritis is accompanied by activation of the oxidative stress in the synovial liquid. Specific treatment decreased or even normalized such biochemical parameters of the synovial liquid as the carbonyl groups, thiobarbituric acid reactive substances (TBARS) and total protein content. The most demonstrative changes were found for early and late markers of the oxidative modification of proteins. These parameters may be used in laboratory diagnostics of the depth of the degenerative-dystrophic process in the knee joint and for the estimation of the effectiveness of the treatment.

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11. *Pogarskaya I.V., Kontarov N.A., Balaev N.V., Yuminova N.V.*

**The study of structural changes in influenza virus hemagglutinin (ha) after interaction with liposomes by the fluorescence method.**

Using the method of self fluorescence quenching influence of phospholipids on conformational state of HA has been studied. Interactions of HA with model phospholipids membranes are accompanied by changes of structure-dynamic protein organization. This method could be used for controlling the structure organization of proteins after receiving by virus the influenzal virusosomal vaccine.

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