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1. Moysa A.A., Kolesanova E.F.

Synthetic peptide vaccines.

This review considers the stages of the development of synthetic peptide vaccines against infectious agents, novel approaches and technologies employed in this process, including bioinformatics, genomics, proteomics, large-scale peptide synthesis, high-throughput screening methods, the use of transgenic animals for modelling human infections. An important role for the development and selection of efficient adjuvants for peptide immunogens is noted. Examples of synthetic peptide vaccine developments against three infectious diseases (malaria, hepatitis C, and foot-and-mouth disease) are given.

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2. Ivanov A.S.

Basic principles of protein conformational diversity for medical biologists.

The major factors defining protein backbone flexibility and conformation diversity are described in the lecture. The main principles of protein conformation analysis are considered. The given lecture is included in theoretical course way from gene to drug; for students of Medico-biological faculty of Russian State Medical University and can be recommended also for other students and post-graduate students of medical and biologic specialization.

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3. Tikhonova O.V., Skvortsov V.S., Raevsky O.A.

Molecular modeling of acetylcholinesterase interaction with irreversible and reversible organophosphorous inhibitors.

Three-dimensional Quantitative Structure-Activity Relationship models were designed for irreversible and reversible acetylcholinesterase inhibitors by molecular modeling methods. In case of irreversible inhibitors CoMFA (the comparative analysis of molecular fields) or CoMSIA (the comparative analysis of indexes of molecular similarity) descriptors together with HYBOT 3D fields provide more statistically valid 3D-QSAR models. This indicates importance of donor-acceptor interactions for irreversible acetylcholinesterase inhibition. In case of reversible organophosphorous inhibitors good quality model for structure-activity relationships was developed using CoMFA fields. The obtained models have good predictive power and can be used for estimation of new organophosphorous compounds inhibitor activity that in turn correlates with toxicity of these compounds.

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4. Morozevich G.E., Kozlova N.I., Ushakova N.A., Preobrazhenskaya M.E., Berman A.E.

Implication of integrin $\alpha_5\beta_1$ in human breast carcinoma apoptosis and drug resistance.

Doxorubicin-resistant MCF-7Dox line, which is a derivative of the drug-sensitive MCF-7 human breast carcinoma line, differs from the latter by a strongly reduced expression of the $\alpha_5\beta_1$ integrin and a highly increased expression of the $\alpha_5\beta_1$ receptor. Silencing of this integrin in the MCF-7Dox cells by transfection with α_5 -specific siRNA markedly stimulated anoikis and increased sensitivity of the cells to doxorubicin. $\alpha_5\beta_1$ silencing also leads to significant inhibition of the activity of kinases Akt and Erk2 in MCF-7Dox cells. Our results suggest that integrins $\alpha_5\beta_1$ -induced signals, controlling distinct aspects of cell behavior, are conducted through the common signal pathways.

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5. Plekhova N.G., Somova L.M., Puzdaev V.I., Drobot E.I.

The metabolic activity of neutrophils and monocytes as the model for the study of the organism biocompatibility with different materials.

In stimulated status neutrophils and monocytes in the foci of introduction the different materials are capable to excrete of biologically active substances by means of which if influence on processes of reparation. The express changes of blood leukocytes activity in response on the introduction of stimulated agents are assume as a basis of the proposed model of the organism biocompatibility with different materials. On example of the influence of different materials (ceramics, titanium, latex, surgical steel and copper), from which can be made implant and surgical instruments it was showed that the leukocytes were showed the different reaction of enzyme systems. This model allows the completely and objectively to study the influence of different materials on the neutrophils and monocytes - the effected cells of the inflammatory process. Moreover, the activity of cation proteins and plasma membrane enzymes of leukocytes is the most expressed factor.

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6. Beloborodova N.V., Bairamov I.T., Olenin A.Yu., Fedotcheva N.I.

Exometabolites of some anaerobic microorganisms of human microflora.

Some exometabolites produced by basic representatives of human anaerobic microflora were investigated, detected by gas chromatography - mass spectrometry (GC-MS). In vitro besides lactic acid Bifidobacterium and Lactobacillus generate substantial amounts of phenyllactic and p-hydroxyphenyllactic acids. Clostridium produced 2-hydroxybutyric acid and to a lesser extent lactic and phenyllactic acids. In contrast to D_1 .

perfringens, *C. sporogenes* generates substantial amount of phenylpropionic and p-hydroxyphenylpropionic acids and less p-hydroxyphenyllactic acid. *E. coli* produced minor amounts of 2-hydroxyglutaric acid. Bacteroids are potent producers of succinic and fumaric acids; they also contribute to production of significant portion of lactic acid. *E. lentum* generate lactic, phenyllactic and succinic acids and form a characteristic only for ones (from studied microorganisms) 2-hydroxyhexanic and 2-hydroxy-3-methylbutyric acids.

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7. Zorina V.N., Zorina R.M., Zorin N.A.

Peculiarities of interactions between proteins of the macroglobulin family and with the endocytic receptors (a possible mechanism of transmembrane transfer).

We have conducted a series of experiments, for specification of mechanisms which proteins of the macroglobulin family deliver regulatory substances inside of a cells. We have shown that all members of the family are not only compete for binding to proteinases, but also can interact with each other. We have confirmed that only a complex of alpha-2-macroglobulin (α_2 -MG) with proteinase is capable to react with the major endocytic receptor (low-density lipoprotein receptor-related protein, LRP). For the first time we have demonstrated, that interaction of α_2 -MG firstly with proteinase, and then with LRP provokes a progressive conformational consolidation of the multicomplex, which is accompanied by a paradoxical increase of the electrophoretic mobility in comparison with native α_2 -MG. We suggest that such stepwise conformational consolidation, together with earlier demonstrated charge neutralization (versus pI of internal environments) after interaction firstly with proteinase, and then with LRP, components of is the key moment of the mechanism of transmembrane transfer. Taking into account, that α_2 -MG transfers a broad spectrum of protein regulators, and interacts not only with LRP, but also with a signal receptor (grp78), and also can regulate (under certain conditions) both own synthesis, and synthesis of LRP and its blocker (receptor - associated protein, RAP), we suggest that this main member of the macroglobulin family plays a leading role in the regulation of intercellular interactions and in the transmission of signal inside of a cell.

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8. Smirnova K.V., Diduk S.V., Gurtsevitch V.E.

Functional analysis of epstein-barr virus latent membrane proteins (LMP1) in patients with limphoproliferative disorders.

Latent membrane protein1 (LMP1) encoded by the LMP1 gene of the Epstein-Barr virus (EBV) is a transmembrane protein, which can activate a number of cellular signal cascades and transcriptional factors leading to cell transformation. In the present study the sequencing of full-length LMP1 variants isolated from Russian patients with Hodgkin's lymphoma (HL), non-Hodgkin's lymphoma (NHL) and infectious mononucleosis (IM) has been carried out. The phylogenetic analysis of obtained sequences revealed dominance of the LMP1 variants belonging to proteins of low-divergent group LMP1-B95.8b characterized by minimal set of mutations. Investigation of biological properties in the Russian representatives of this group revealed that expression of studied LMP1 variants in embryonic kidney 293 cells was accompanied by insignificant increase in transcriptional factor NF- κ B activation and had minor influence on activation of transcriptional factor AP-1. It was also detected that all investigated low-divergent LMP1 variants expressed in Rat-1 cells induced activation of inducible NO-synthase (iNOS) and intracellular production of nitric oxide (NO). At the same time the level of NO accumulation was lower than that induced by the low-transforming prototype variant LMP1-B95.8. The data obtained indicate that the LMP1 variants, which are the most common among Russian patients with EBV-associated lymphoproliferative diseases, are characterized by minimum number of mutations and rather low ability to activate basic cellular signaling pathways regardless the nature of pathological process, benign (IM) or malignant (HL, NHL). It is suggested that in addition to the modest activation of NF- κ B and iNOS induction by LMP1 other factors are involved in the cell transformation process.

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9. Aidyraliev R.K., Igemberdieva O.A., Dadabaev M.Kh., Murataliev T.M., Aitbaev K.A., Aldashev A.A.

Investigation of peroxide modification of low- and very low-density lipoproteins in patients with coronary heart disease by the method of fluorescent spectroscopy.

In the total fraction of low and very low density lipoproteins (LDL+VLDL) isolated from serum by precipitation in the presence of heparin-Mn the copper-induced lipid peroxidation was accompanied by accumulation of LPO products, a decrease ANS fluorescence intensity (FANS) and an increase in probe - cation DSP-6, a fluorescence intensity decrease of intrinsic in the ultraviolet area (Fuv) and an increase in the visible area (Fvis). The degree of lipoprotein modification was estimated by calculating the Fvis / Fuv and FDSP-6 / FANS ratio. Strong positive correlation was found between these ratios and concentration of thiobarbituric acid-reactive substances (TBARS) of LDL+VLDL samples isolated from sera of 49 donors and incubated at 37°C in the presence of 50 M CuSO₄ during 0, 3 and 24 hr (Fvis / Fuv ($r=0,75$; $p<0,001$) and FDSP-6 / FANS ($r=0,73$; $p<0,001$)). Very strong positive correlation was also found between both fluorescent parameters Fvis / Fuv and FDSP-6 / FANS ($r=0,95$, $p<0,001$). Changes in the values of Fvis / Fuv, FDSP-6 / FANS, concentration of TBARS in 75 patients with documented coronary heart disease (CHD) and 49 apparently healthy donors were studied. No significant differences of these parameters in LDL+VLDL of patients with CHD and donors were found.

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10. Gorodetskii V.K., Tochilkin A.I., Belayeva N.F., Kovelman I.R., Korovkin B.F.

Synthesis and hypoglycemic activity of bis(L-malato)oxovanadium(IV).

In order to create new oral vanadyl organic complexes-based drugs for the treatment of diabetes mellitus biligand vanadyl derivative of L-malic acid (bis(L-malato)oxovanadium(IV)) was prepared and its potential as a novel hypoglycemic agent was studied in the streptozotocin-diabetic rats. We show that the oral administration of bis(L-malato)oxovanadium(IV) with drink water significantly reduced glucose concentration in blood and urine, as well as the level of glycated proteins in the streptozotocin-diabetic rats.

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