# Biomeditsinskaya Khimiya

ISSN 2310-6905 (online), ISSN 2310-6972 (print)

2014 volume 60 issue 6

*6. Marchenko M.M., Voloshchuk O.N.*

**The state of the mitochondrial energy-supplying system of blood leukocytes in the dynamics of guerin's carcinoma growth under the low-level irradiation conditions.**

Mitochondrial NADH-dehydrogenase, succinate dehydrogenase and cytochrome oxidase activities of peripheral blood leukocytes of rats with the grafted Guerin's carcinoma were studied in the dynamics of oncogenesis under the conditions of the preliminary low-level irradiation. Tumor growth was accompanied by a decrease in NADH-dehydrogenase activity, an increase of succinate dehydrogenase activity. Cytochrome oxidase activity of leucocytes remained at the control level up to the terminal stages of tumor growth. Preliminary low-level irradiation of the tumor bearing animals caused a tendency to the decrease of enzymatic activities studied. This tendency was observed from the initial stages of oncogenesis.

DOI: 10.18097/PBMC20146006631

*7. Kalinkevich O.V., Pogorielov M.V., Babich I.M., Deyneka V.N., Kalinkevich A.N., Danilchenko S.N., Tkach G.F.*

**In-vitro degradation of the chitosan membranes under various syntheses conditions.**

The hydrolytic degradation of polymer films, which were obtained by application of 2% and 3% chitosan solutions in 1% acetic acid on a base sheet has been investigated. As the solvent was removed, these firms were either treated with 0.5% NaOH for 3 min or with phosphate buffer (Ñ€Ð• 8) for 10 min. The degrees of degradation for the obtained samples were studied during 1-96 h in solutions with pH values of 5.0, 7.0 and 8.5. The results revealed resistance of the films within the first 6 h, followed by their subsequent degradation. The rate of degradation depended on pH of the solution, chitosan percentage and the treatment methods of films. The materials with the initial chitosan content of 3% were more resistant to the hydrolytic degradation, but the decreasing in pH accelerated the weight loss of the film. However, if the membranes were treated with phosphate buffer, the rate and degree of sample degradation were slowed down. Thus, the results are considered as a basis for the further development of biomaterials to treat the skin surface damages.

DOI: 10.18097/PBMC20146006636

*8. Maksimovich N.Ye., Dremza I.K., Troyan E.I., Maksimovich Ya.N., Borodinskii A.N.*

**The correcting effects of dihydroquercetin in cerebral ischemia-reperfusion injury.**

The dynamics of changes in the mitochondrial respiratory function, changes in the parameters of carbohydrate metabolism and some parameters of oxidative stress in the brain tissue have been investigated under conditions of ischemia-reperfusion and administration of dihydroquercetin. Dihydroquercetin (65 mg/kg) was administered per os 1 h before modeling of ischemia-reperfusion. Studies were carried 1 h after reperfusion. It was found that administration of dihydroquercetin caused a corrective effect to impairments of the respiratory function of mitochondria, indicators of carbohydrate metabolism and parameters of oxidative stress induced by ischemia-reperfusion.

DOI: 10.18097/PBMC20146006643

*9. Dutov A.A., Nikitin D.A., Lukyanova Yu.L., Sverkunova A.V., Martinova A.V., Ermolina A.V.*

**HPLC analysis of dehydroepiandrosterone sulfate in serum with use of solid-phase extraction on hyper cross-linked polystyrene (purosep-200).**

We have developed a simple HPLC method for analysis of the dehydroepiandrosterone sulfate (DHEA-sulfate) in serum with use a new procedure of solid-phase extraction (SPE) on hyper cross-linked polystyrene (Purosep-200) and fast chromatographic separation on the monolithic column under isocratic elution and UV detection at 200 nm. Complete SPE procedure lasts for about 7 min, chromatographic separation takes less than 6 min. Simplicity and high reproducibility of this method makes it attractive in routine clinical practice.

DOI: 10.18097/PBMC20146006651

*10. Yaglova N.V., Yaglov V.V.*

**Alteration of thyroid hormone secretion after long-term exposure to low doses of endocrine disruptor DDT.**

Endocrine disruptors are exogenous substances that exhibit hormone-like action and consequently disrupt homeostatic action of endogenous hormones. DDT is the most common disruptor. The objective was to evaluate changes in thyroid hormone secretion after long-term exposure to low doses of DDT. The experiment was performed on male Wistar rats. The rats were given DDT at doses of 1.89Â±0.86 Ð¼g/kg/day and 7.77Â±0.17 Ð¼g/kg/day for 6 and 10 weeks. Dose dependent increase of serum total thyroxine, total triiodthyronine, and thyroid peroxidase was revealed after 6 weeks exposure. After 10 weeks free thyroxine secretion was reduced. Such alterations of the thyroid status are typical for iodine deficient goiter. The data obtained indicate that the main mechanism of DDT action includes disruption of thyroxine secretion by thyrocytes, but not inhibition of deiodinase activity and decrease of blood thyroid binding proteins.

DOI: 10.18097/PBMC20146006655

*11. Deryagina V.P., Ryzhova N.I., Krivosheeva L.V., Golubeva I.S.*

**Production of nitric oxide metabolites during transplanted tumors growth with different metastatic potential.**

The endogenous formation of metabolites of NO â€“ nitrite (NI), nitrates (NA) and volatile nitrosamines in the body, tumor tissue and by abdominal cavity by macrophages for dynamics was investigated in mice F1(C57BlxCBA), Balb/c and BDF with subcutaneous transplanted tumors (Erlich carcinoma â€“ EC and metastatic Lewis lung carcinoma â€“ LLC). It was shown that growth of EC was accompanied by a statistically significant increase in the concentrations of NI and NA in tumor tissue to (7.3Â±4.67)Â´10-6 â€“ (7.8Â±2.57)Â´10-5 (mol/kg) for the first three weeks and a sharp increase in urinary excretion of NI and NA. The maximum total concentration of NI and NA â€“ (3.,6Â±0.46)Â´10-5 in tissue LLC was registered during the early stage of the tumor growth (7 days); it later declined, negatively correlating with the mass of the tumor. NI secretion by abdominal cavity macrophages demonstrated statistically significantly decrease at the stage of intensive growth LLC (14, 21 days). The tissue of EC contained varied concentration of cancerogenic N-nitrosodimethylamine and N-nitrosodiethylamine at all investigated time points. Thus, the ability of different gistogenesis tumor tissue to

synthesize metabolites NO depended on time parameters and was more pronounced for EC, than LLC.
DOI: 10.18097/PBMC20146006661

*12. Sanzhakov M.A., Ignatov D.V., Prozorovskyi V.N., Druzhilovskaya O.S., Medvedeva N.V., Ipatova O.M.*

**Development of targeted drug delivery system: synthesis of conjugates of address fragment (ra-cooh) with ligand (r-nh2).**

One of the main ways to increase the effectiveness of well-known medical formulations well-established in clinical medicine â€“ development of delivery systems using new technological approaches and nanomaterials. Currently, much attention is given to targeted delivery systems. At the same time drug carrier has in addition to medication the so-called vector/address with a high affinity for binding to specific receptors on cells/tissue target. In this paper it is described the method for producing of address conjugates to over-expressed receptors on the tumor cells. As address fragment it was folic acid and as a linker was dodecylamine, causing inclusion the conjugate into lipid nanoparticles.
DOI: 10.18097/PBMC20146006713

*13. Shablinskiy M.A., Milentyev A.Yu., Lotosh N.Yu., Selischeva A.A., Badyshtov B.A., Besova N.V., Saveliev S.V.*

**Non-esterified fatty acids of blood serum in type 1 diabetic women during late pregnancy.**

Using gas chromatography a comparative study of the range and content of individual non-esterified fatty acids in serum of patients with diabetes mellitus type 1 in the third trimester of pregnancy, and healthy pregnant and non-pregnant women has been carried out. In groups of pregnant women there was activation of lipid metabolism, confirmed by corresponding changesinserum biochemical parameters, as well as in the content of non-esterified fatty acids. Intergroup differences in the non-esterified fatty acids were not found. However, there were significant differences between the examined groups in the quantitative content of non-esterified fatty acids.
DOI: 10.18097/PBMC20146006689

*14. Timoshenko O.S., Gureeva T.A., Kugaevskaya E.V., Solovyeva N.I.*

**Membrane type 1 matrix metalloproteinase (MT1-MMP) and the regulators of its activity as invasive factors in squamous cell cervical carcinomas.**

Membrane type 1 matrix metalloproteinase (MT1MMP) is one of matrix metalloproteinases (MMP), which play Đ° key role in tumor invasion and metastasis. The aim of this study was to elucidate the peculiarities of expression of MT1MMP and endogenous regulators of its activity: the activator â€“ furin and the inhibitor â€“ TIMP-2, as invasive factors of squamous cell cervical carcinomas (SCC). The study was carried out using 11 specimens of SCC and 11 specimens of morphologically normal tissue adjacent to the tumor. It was shown that the increase of MT1-MMP and furin expression and low of TIMP-2 expression makes the main contribution to the destructive (invasive) potential of SCC. Moreover, substantial expression of MT1-MMP was registered in the specimens of morphologically normal adjoining to tumor tissue. This expression was found to make an additional contribution to the destructive potential of the cervical tumor.
DOI: 10.18097/PBMC20146006683

*15. Zavialova M.G., Zgoda V.G., Kharybin O.N., Nikolayev E.N.*

**In vitro protein phosphorylation as a template for SRM method development.**

Phosphorylation is one of the most common posttranslational modification (PTM) of proteins. Main challenge of phosphoprotein detection is their low abundance comparing to abundance of unmodified proteins. The method of selected reactions monitoring (SRM) allows to perform very sensitive and selective analysis of desired PTMs. Using myelin basic protein (MBP) as a model we have developed a method for phosphoprotein detection by SRM. The method is based on obtaining of phosphoproteins in a reconstituted kinase system and following usage these phosphorylated protein as a template for the development of the SRM method. The developed method was successfully applied for detection of phosphopeptides of myelin basic protein in the samples of human brain glioma.
DOI: 10.18097/PBMC20146006668

*16. Rybina A.V., Skvortsov V.S., Kopylov A.T., Zgoda V.G.*

**A plain method of prediction of visibility of peptides in mass spectrometry with electrospray ionization.**

A new method for screening of essential peptides for protein detection and quantification analysis in the direct positive electrospray mass spectrometry has been proposed. Our method is based on the prediction of the normalized abundance of the mass spectrometric peaks using a linear regression model. This method has the folowing limitations: (i) selected peptides should be taken so that at pH 2.5 the tested peptides must be presented mainly as the 2+ and 3+ ions; (ii) only peptides having C-terminal lysine or arginine residues are considered. The amino acid composition of the peptide, the peptide concentration, the ratio of the polar surface of peptide to common surface and ratio of the polar volume to common volume are used as independent variables in equation. Several combinations of variables were considered and the best linear regression model had a determination coefficient in leave-one-out validation procedure equal 0.54. This model confidently discriminates peptides with high response ability and peptides with low response ability, and therefore it allows to select only the most promising peptides. This screening method, a plain and fast, can be successfully applied to reduce the list of observed peptides.
DOI: 10.18097/PBMC20146006707