

1. THE LEVEL OF FACTORS OF REPARATION AND EPIGENETIC MODIFICATION OF DNA AND HISTONES IN MONONUCLEAR LEUKOCYTES OF PERIPHERAL BLOOD ON THE BACKGROUND OF LOW-INTENSIVE MICROWAVE IRRADIATION OF THE WHOLE BLOOD

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Abstract. The study discusses the content in mononuclear leukocytes (MNCs) of the individual components involved in epigenetic regulation and DNA repair. The article presents content in the MNCs of healthy individuals and convalescent pneumonia protein RAD50, DNMT3A, deacetylase histones, GADD45A, acetylase of histones, and particularly of the influence on their level of low-intensity electromagnetic radiation with a frequency of 1 GHz. Patients in the post-clinical phase of infectious-inflammatory process, as well as in healthy individuals, demonstrate the sensitivity of the content of the investigated factors to the effects of low intensity microwave radiation with a frequency of 1 GHz. It was shown potential ability of microwaves to modulate a variety of processes through epigenetic modification of DNA and histones.

- 2. EFFECT OF LOW-INTENSITY ELECTROMAGNETIC RADIATION ON DEHYDRATION SELF-ASSEMBLY OF LINCER HISTONE H1** Brill G.E., 1Egorova A.V., 1Bugaeva I.O., 2Dubovitsky S.A., 2Vlaskin S.V, 3Postnov D.E. 1Saratov State Medical University n.a. V.I. Razumovsky, Saratov, e-mail, meduniv@sgmu.ru; 2«Telemak» Inc., Saratov; 3Saratov State University. n.a. N.G. Chernyshevsky, Saratov The analysis of influence of low-intensity electromagnetic radiation on the processes of self-assembly of lincer histone H1 was performed. To study the structure formation of histone H1 wedge dehydration method was used, based on a study of the structural trace (facies), which is formed by drying drops in standard conditions. Image-facies analysis included their qualitative characteristics, as well as the calculation of quantitative indicators, followed by statistical analysis. It was established that UHF-Radiation (1GHz, 0,1 $\mu\text{W}/\text{cm}^2$, 10 min) significantly modifies the process of self-assembly of lincer histone. Facies control and irradiated samples differed on most qualitative and quantitative parameters. This determines the possibility of the involvement of the genetic apparatus of the cell in the effects of this type of radiation on biological objects.
- 3. INTERRELATION OF CASPASE-3 ACTIVITY, APOPTOSIS REGULATORS AND AUTOPHAGIA IN PRACTICALLY HEALTHY YOUNG PEOPLES UNDER THE INFLUENCE OF LOW-INTENSIVE RADIATION OF FREQUENCY 1 GHz**

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Abstract. The study discusses the relationship between the activity of caspase - 3 and molecular regulators of differentiation and programmed death and autophagia of mononuclear cells of whole blood at the exposure of low-intensity microwave radiation at frequency of 1 GHz. By enzyme immunoassay in MNCs the authors investigated caspase-3 activity, the protein DAXX, RASSF5, RNF125, HIPK2, MDM2, ASK1, and ATG12. A study of the effect of regulatory proteins on caspase-3 activity was carried out by linear regression analysis. **Result.** The study found that the activity of caspase - 3 is directly dependent on the level of protein ASK1 and MDM2 and negative on the level of DAXX. At the same time, it was found a significant effect on the activity of caspase-3 protein DAXX, RASSF5, RNF125, ATG12 and antioxidants. The authors revealed that the strongest positive effect on the activity of caspase-3 renders the protein MDM2, whereas a negative – RASSF5. At the same time, according to the results of the study, it was found that the protein kinase HIPK2 does not have a statistically significant effect on the activity of caspase-3. Low-intensity microwave radiation with a frequency of 1 GHz is associated with a decrease in activity of caspase-3, against the background of an increase in the level of DAXX, RASSF5, RNF125, HIPK2, MDM2, ASK1, and ATG12, of which the level of ATG12 increased most significantly, whereas the content of MDM2 and ASK1 changed to the smallest extent. **Conclusion.** Low-intensity irradiation MNK microwave frequency of 1 GHz generally associated with the inhibition of caspase-3, suggesting that the limitation of apoptosis, stimulation of MNC survival and acceleration of updates of cellular structures, due to the increase in cell protein ATG12. The results indicate possible antioncogenic activity of microwaves with a frequency of 1 GHz, explaining the previously identified effects of growth inhibition and regression of malignant tumors under the influence of microwaves.

4. INFLUENCE OF METHYLTRANSFERASE DNA 3A AND HISTONE DEACETYLASE ON THE CONTENT IN THE MONONUCLEAR CELLS OF THE WHOLE BLOOD IN PRACTICALLY HEALTHY PERSONS PHOSPHATES PTP1B AND PP2CA, AND ALSO PRODUCTION OF CYTOKINES

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Abstract. Epigenetic molecular mechanisms play an important role in the formation of adaptive responses at the intracellular level, providing fine-tuning of adaptive responses allowing the body to implement plasticity and flexibility strategies against external factors. Transcription activity is controlled by epigenetic mechanisms, which include DNA metylation and various modifications of histones, including the acetylation of

5. Metabolic changes in hypertensive patients treated by low-intensity microwave therapy

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Abstract Background. Hypertension (HTN) associated with metabolic syndrome is an important issue of preventive medicine. The modulation of biochemical activity of immune cells might be a solution, as immune cells play a crucial role in atherosclerosis progression and vascular inflammation. Among factors regulating molecular processes, e. g. activity of signaling pathways and cell proinflammatory sensitivity, low-intensity microwave (1GHz) therapy attracts attention. The purpose of this study was the assessment of the low-intensity microwave therapy in the management of hypertensive patients in order to influence the biochemical components of metabolic syndrome. **Design and methods.** In a randomized double-blinded controlled study, we included 60 patients with hypertension (HTN) aged 45–55 years old. The patients of the comparison group (n = 30) received medication therapy according to the current guidelines, while patients from the study group (n = 30) additionally underwent physiotherapy with the use of microwave therapy (frequency 1 GHz, device “Aquatone”). Control group included 15 otherwise healthy subjects. Serum insulin, glucagon, apoA1 and apoB100 were measured by immunoenzyme assay. High-sensitive C-reactive protein (hsCRP) was assessed to evaluate the inflammatory response. **Results.** HTN patients compared to the healthy group demonstrated higher levels of insulin by 23,0 % (p = 0,051), apoB100 by 35,1 % (p = 0,001), hsCRP by 43,4 % (p = 0,05), and lower levels of glucagon by 5,0 % (p = 0,8) and apoA1 by 32,8 % (p = 0,000002). Patients of the comparison group who received only medication therapy showed an increase in glucagon level by 2,2 % (p = 0,018), apoA1 by 0,96 % (p = 0,063), insulin by 3,5 % (p = 0,11) with the decrease in apoB100 by 2,7 % (p = 0,083) and hsCRP by 2,4 % (p = 0,18). Those who additionally underwent the low-intensity microwave therapy glucagon level increased by 1,3 % (p = 0,028), apoA1 by 11,1 % (p = 0,028), while insulin level decreased by 5,1 % (p = 0,06), apoB100 by 5,4 % (p = 0,015) and hsCRP by 5,3 % (p = 0,05). There was no significant impact of microwave therapy in the central hemodynamics. **Conclusions.** In patients who received low-intensity microwave therapy demonstrate higher apoA1 level and lower levels of insulin, apoB100 and hsCRP. The number of patients to be treated for the planned effect achievement was the following: the change in the levels of apoA1—2,0 patients, change in insulin level — 3,7, change in apoB100 level — 5,5, change in hsCRP — 5,8. Therefore, low-intensity microwave therapy positively affects metabolism in HTN patients without significant impact in central hemodynamics.