вплив ДЕФ має виражені нефротоксичні ефекти [3].

Отже, підвищення рівнів креатиніну та сечовини в сироватці крові після введення ДЕФ свідчить про його нефротоксичний ефект, що порушує функцію нирок, знижуючи їх здатність до фільтрації та виведення продуктів метаболізму, особливо при високих дозах і тривалому надходженню ксенобіотика в організм.

Список літератури

1. Al-Eitan L. N., Aljamal H. A., Alkhatib R. Q. Gas chromatographic-mass spectrometric analysis of sunscreens and their effects on mice liver and kidney enzyme function. Clin Cosmet Investig Dermatol. 2018. 12. P. 11-21.
2. Gutiérrez-García A. K., Torres-García D. A., De Leon-Rodriguez A. Diethyl phthalate and dibutyl phthalate disrupt sirtuins expression in the HepG2 cells. Toxicol Res (Camb). 2024. 13(4). tfae103.
3. Jeong S. H., Jang J. H., Cho H. Y., Lee Y. B. Risk assessment for humans using physiologically based pharmacokinetic model of diethyl phthalate and its major metabolite, monoethyl phthalate. Arch Toxicol. 2020. 94(7). P. 2377-2400.
4. Petejova N., Martinek A., Zadrazil J., Teplan V. Acute toxic kidney injury. Ren Fail. 2019. 41(1). P. 576-594.
5. Weaver J. A., Beverly B.E.J., Keshava N. et al. Hazards of diethyl phthalate (DEP) exposure: A systematic review of animal toxicology studies. Environ Int. 2020. 145. P. 105848.

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THE COMPOSITION OF PROTEINS IN BLOOD SERUM OF RATS BY POISONED OF XENOBIOTICS

Kalinin I. V.[1], Hrubinko V. V.[2], Tomchuk V. A.[1]

[1]National University of Life and Environmental Sciences of Ukraine
[2]Ternopil Volodymyr Hnatiuk National Pedagogical University

E-mail: kalininihor@gmail.com

The effect of heavy metals on a living organism is a powerful

stress factor that exists in the environment. The blood unites all the tissues and organs of the whole organism, an important component of which are proteins. The amount of proteins in the blood and their qualitative diversity reflects the state of various metabolic processes, protein metabolism, in particular, the immune status, other protective and adaptive abilities of the body [1].

Electrophoretic studies of blood proteins in electrophoretic systems with high resolution (in particular, in PAAG) are becoming relevant and promising. For this, it is necessary to establish the nature and physiological role of various protein components of blood. It is also important to ascertain the different variants of protein spectra characteristic of the normal state of the body.

The study was conducted on white male rats of the same age, weighing 180-200 g, kept under standard conditions of vivarium, with free access to food and water. Five groups of animals were studied: the first was intact (control), the second was orally administered with a solution of copper sulfate at a dose of 3 mg/kg, which is 1/10 of LD_{50}, and the third with a solution of zinc sulfate administered orally to rats which is 1/20 of LD_{50}, the fourth - cadmium sulfate solution was orally administered to animals at a dose of 1.5 mg/kg, which is 1/30 of LD_{50}, the fifth - lead solution of nitrate at 1.7 mg/kg was orally administered to animals, which is 1/50 of LD_{50}. Intoxication was carried out for 14 days. The work was carried out in accordance with the Council of Europe's Convention on the Protection of Animals, which are used for scientific purposes.

The fractional composition of serum proteins in rats was performed by DS-Na-PAG electrophoresis on a 14% polyacrylamide gel (0.75 M tris pH 8.9; SDS 0.2%, TEMED, PSA) according to Laemmli (1970). The protein concentration was determined using biuret reagent. Samples were prepared in a buffer containing 0.5 M tris pH 7.2; 2% SDS and β - mercaptoethanol. Electrophoresis was performed at a voltage of 100V. Gels were stained with 0.1% Coomassi R-250 in 7% CH_3COOH and 25% aqueous methanol. The unbound protein dye was washed with 7% CH_3COOH in 25% aqueous methanol. A protein Protein WM mixture was used as a molecular weight marker. The obtained gels were scanned and processed using Tabl Lab 4.01.

The study of serum proteins showed changes in the qualitative

and quantitative composition of the protein fractions in the control and under heavy metal intoxication rats. In rats after intoxication with heavy metals, the directivity in the redistribution of protein fractions on electropherograms was changed. In the second experimental group, the albumin fraction decreased by 17.3% compared with the control group. The fraction of γ - globulins increased by 2 times compared with the control group. β -, α_1 - and α_2 - globulin fractions did not change significantly. In rats of the third experimental group, changes in the ratio of low molecular weight protein fractions were found. The fraction of γ - globulins increased by 1.5 times compared with the control group. In experimental animals of the fourth and fifth groups, a decrease in the content of the albumin fraction by 25.7 and 21.2%, respectively, was found, compared with the control group. The fraction of γ-globulins increased 2.5 times in both groups compared with the control group. Stability relative to the effect of metals on the content of α_1 - and α_2 - globulins should be noted in all experimental groups of animals. Such an amount of the α-globulin fraction in the blood serum of animals is probably related to the adaptive functions of these proteins, primarily their well-known role in the processes of energy supply.

Thus, to assess the response of the protein system in the blood of animals to intoxication with heavy metal ions, an integral approach should be used, taking into account the possible causes of changes in the fractional composition of proteins. Indicative changes in the relative content of γ-globulins can be considered.

References

1. Balali-Mood, M., Naseri, K., Tahergorabi, Z., Khazdair, M.R. and Sadeghi, M. (2021). Toxic Mechanisms of Five Heavy Metals: Mercury, Lead, Chromium, Cadmium, and Arsenic. Frontiers in *Pharmacology,*12:643972. doi: 10.3389/fphar.2021.643972.