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Usage of Herbal Preparations for Ecology Protection as Ecoprotectors

Key words: *ecotoxicants, ecoprotektors, biochemical status, ecdysteroids*

Annotation: *Impact ecotoxicants (sodium nitrate and potassium nitrite) induces intensification of adaptive processes of bone marrow cells, spleen and liver of experimental animals which is manifested in increasing intracellular levels of glucose, cholesterol, and HDL-cholesterol. We have discovered that the use of ecdysteroid 50 mg/kg reduces the negative effects of environmental toxicants: intracellular glucose and cholesterol in the bone marrow, spleen and liver of the experimental animals remained at similar levels of the control group of intact animals. It should be also note that the increased ecotoxicants in the environment is anti-atherogenic factor for cells of the bone marrow, spleen and liver, which can induce pathological processes in these organs, including carcinogenesis.*

Introduction

The increased incidence of malignant neoplasms of the population in most areas of the world is largely associated with man-made global transformations that lead to environmental

pollution. Ecological problems of large cities associated with excessive concentration on comparatively small areas of population, transport and industry, resulting in the disruption of the ecological balance.

The successful solution of the problem of cancer prevention is possible based on the modern conception of oncological and ecological situation in a particular area, a comprehensive analysis of the demographic situation, taking into account peculiarities of climatic and environmental conditions. Therefore, of particular importance, environmental monitoring and the study conditioned carcinogenic factors genetic and biochemical abnormalities in the human body.

Ecdistenum - natural compound of steroid structure, extracted from roots and rhizomes of Rhaponticum carthamoides. 20-OH ecdysone, which is part of Ecdistenum binds to heterodimeric nuclear receptor consisting of the ecdysone receptor (EcR) and ultraspirakla (USP). In the absence of ecdysone, this heterodimeric receptor forms a complex with corepressors (N-CoRi SMRT), regulating histone deacetylase (Sin3A/Rpd3). When ecdysone reacted with receptor, complex already binds with coactivators, which utilize histone acetyltransferase, and thus activate various genes, including transcription factors, chaperones, apoptotic genes and catalase (1, 2).

Purpose of this research was to study the possibility of correcting the negative impact of toxicants from the group of nitrates and nitrites in the biochemical status of a number of experimental animals by drug of natural origin Ecdistenum.

Materials and methods

Mice BALB/c line were conducted administering for 30 days ecotoxicants NaNO3 (1,2 mg/kg, Group I), KNO2 (1,3 mg/kg, group II), Group III made the control animals, which were carried out coadministration NaNO3 (1,2 mg/kg) and KNO2 (1,3 mg/kg) group IV - intact animals without any impact to be administered a solvent (physiological saline) in a volume mode and experimental groups. Together with the administration of the drug was carried out ecotoxicants Ecdistenum at a dose of 50 mg/kg per os. At 40 BALB/c mice were selected tissue samples of organs (bone marrow, liver, spleen) for monitoring biochemical changes. After lysis of the cell membrane, was performed in the biochemical analysis hyaloplasm cells using commercial kits CYPRESS Diagnostics, Belgium.

All the painful manipulations made after giving the ether narcosis according to the Helsinki declaration on humane attitude to animals (World Med, Association, Edinburg, 2000).

Results and Discussion

Fig. 1 shows the results of determination of glucose in the cells hyaloplasm examined organs.

As can be seen from the data, ecdysteroids therapy reduces the negative impact of environmental toxicants against cells of several organs of experimental animals. In group III, wherein ecdysteroids correction was not carried out, the level of glucose in the investigated organs cells was greatest - 8.5-9.0 mmol/l. Co-administration of the drug to animals and toxicants "Ecdistenum " led to a decrease of this indicator to the level of the control group IV - 7,5-8,0 mmol/l.

Increasing the glucose in the cytoplasm of cells after exposure ecotoxicants indicates intensification process of energy metabolism in the bone marrow, spleen and liver. Effects of sodium nitrite and potassium nitrite induced excess glucose transport into the cell, which may

serve as a marker of adaptation and increasing the resistance of cells to external adverse conditions.

In the last decade attracted the attention of researchers with the role of cholesterol in the development of diseases.

Most literary data shows a decline of cholesterol in the plasma membrane of tumor cells while reducing microviscosity its lipid bilayer (3). We have investigated the content of total cholesterol in the cells of some organs under the influence of ecotoxicants (Fig. 2).

Incubation of cancer cells with ecotoxicants (Group III) induced a statistically significant increase in the concentration of cholesterol: 9,0±0,28 mmol/l in the bone marrow; 9,2±0,35 mmol/l in the spleen; 8,6±0,46 mmol/l in the liver. Usage of Ecdysteroid allowed neutralize the negative effects of toxicants: in the experimental groups I and II the cholesterol content in the examined organs, on statistics, did not differ significantly from those in the control group of the experimental animals. Increasing, the cholesterol levels in cells after exposure can be explained by ecotoxicants adaptive processes in response to the impact studied chemicals.

Fig. 3 shows the results of changing the content of HDL-cholesterol (high-density lipoproteins), cells of several organs of experimental animals after exposure ecotoxicants.

Statistically significant increase in HDL-cholesterol in the cells investigated organs were found in all the experimental groups - as in the sharing of sodium nitrite and potassium nitrite, and the combined administration of ecdysteroids with ecotoxicants - the concentration of HDL reached 89,0-98,0 mg/dal returned, whereas that of the control was within 70,5-72,0 mg/dal.

Lipoproteins is carried out transport in the blood is poorly water-soluble lipids, including cholesterol, from one cell population to another. Unlike other lipoprotein fractions, high-density lipoprotein (HDL) cholesterol carried by the transfer of cells of peripheral organs (including the blood vessels of the heart, arteries in the brain, and others.) To the liver where it can be excreted from the body as bile acids. Increased HDL cholesterol considered as antiatherogenic factor, i.e. increased rate of these substances indicating the activation of the adaptive processes and increasing the resistance of cells in response to adverse environmental conditions.

Conclusion

Impact ecotoxicants (sodium nitrate and potassium nitrite) induces intensification of adaptive processes of bone marrow cells, spleen and liver of experimental animals which is manifested in increasing intracellular levels of glucose, cholesterol, and HDL-cholesterol. We have discovered that the use of ecdysteroid 50 mg/kg reduces the negative effects of environmental toxicants: intracellular glucose and cholesterol in the bone marrow, spleen and liver of the experimental animals remained at similar levels of the control group of intact animals.

It should be also note that the increased ecotoxicants in the environment is anti-atherogenic factor for cells of the bone marrow, spleen and liver, which can induce pathological processes in these organs, including carcinogenesis.

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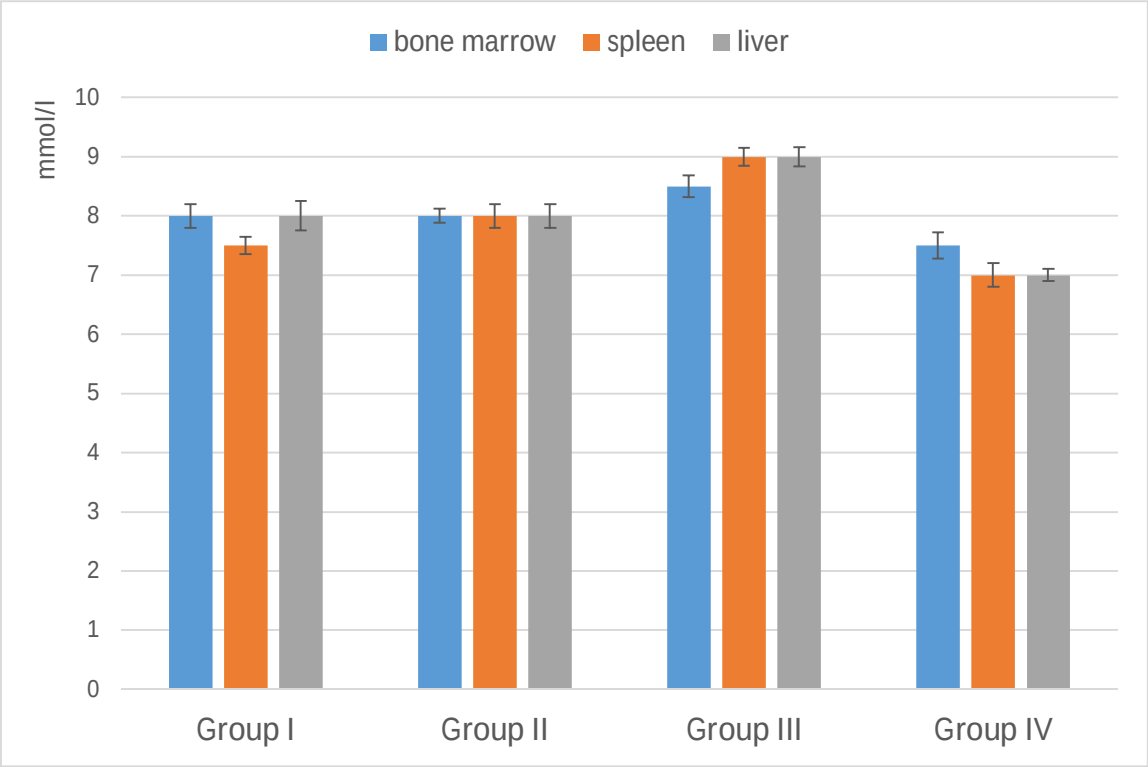

Figure I. Determination of glucose in cells of experimental animals after exposure ecotoxicants: Group I - introduction of NaNO3 (1,2 mg/kg) and Ecdistenum (50 mg/kg); Group II - KNO2 (1,3 mg/kg) and Ecdistenum (50 mg/kg); Group III - coadministration NaNO3 + KNO2 (1,2 mg/kg + 1.3 mg/kg); Group IV - control (cells without exposure).

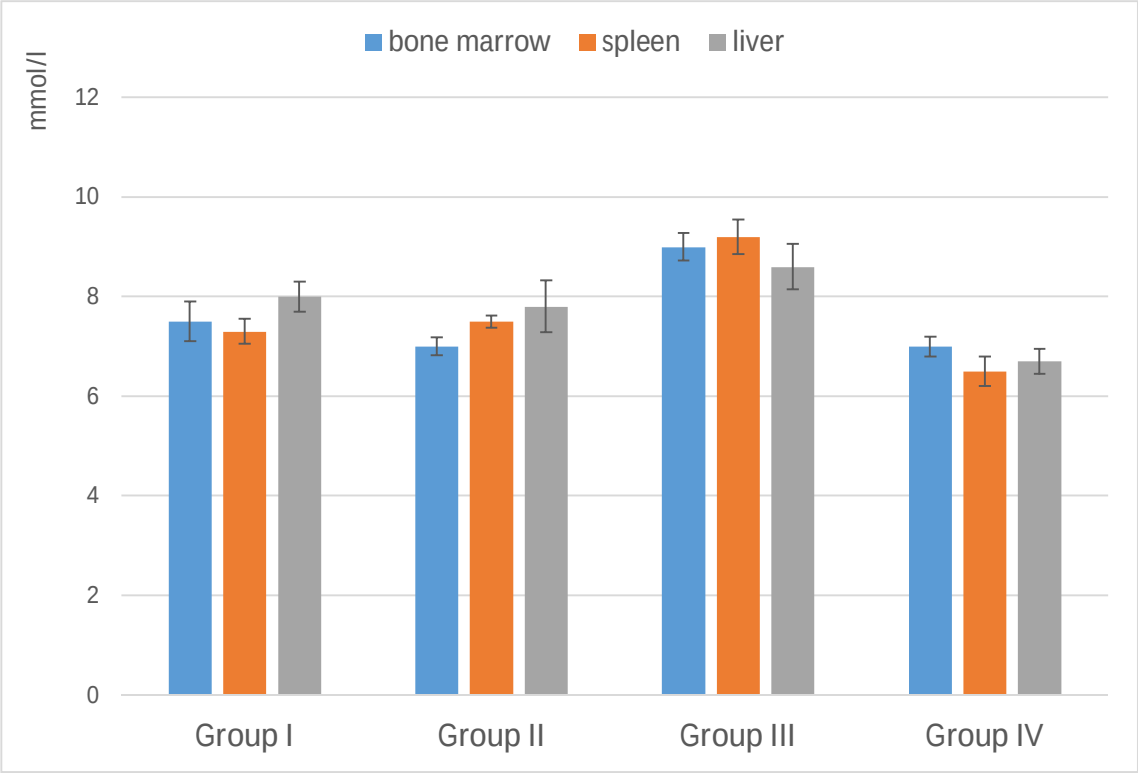

Figure 2. Determination of cholesterol in the cells of experimental animals after exposure ecotoxicants: Group I - introduction of NaNO3 (1,2 mg/kg) and Ecdistenum (50 mg/kg); Group II - KNO2 (1,3 mg/kg) and Ecdistenum (50 mg/kg); Group III - coadministration NaNO3 + KNO2 (1,2 mg/kg + 1.3 mg/kg); Group IV - control (cells without exposure).

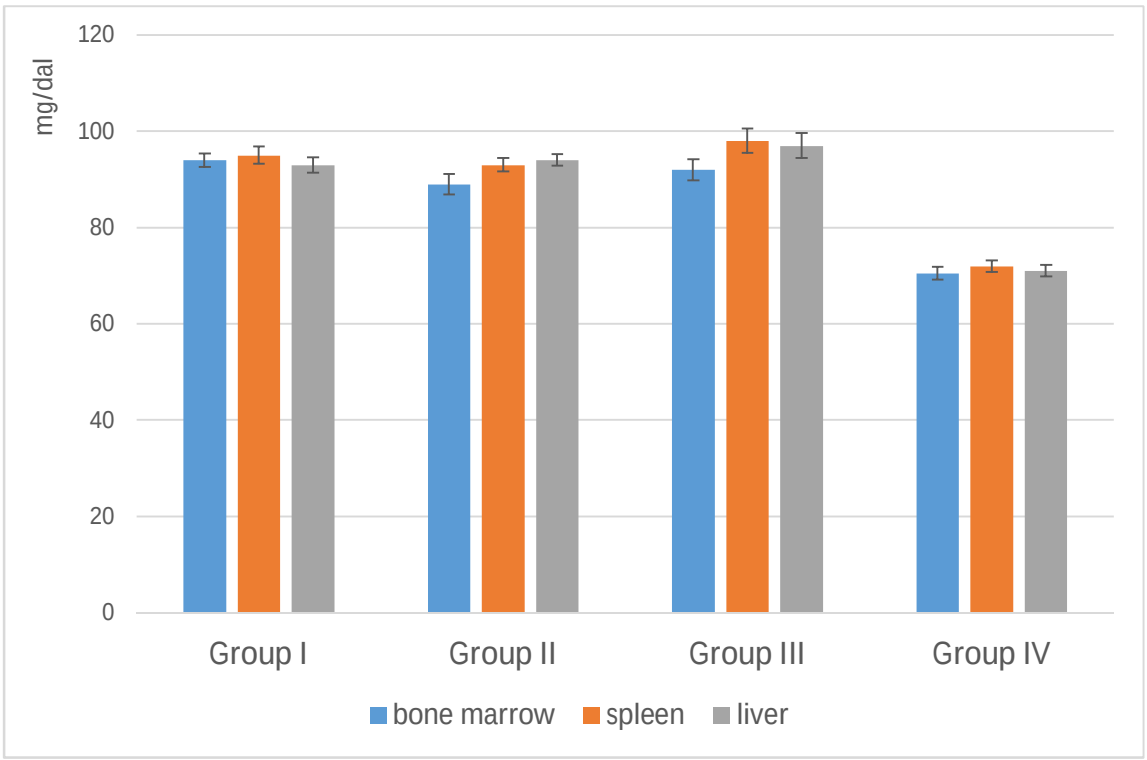

Figure 3. Determination of HDL-cholesterol (high-density lipoproteins) in the cells of experimental animals after exposure ecotoxicants: Group I - introduction of NaNO3 (1,2 mg/kg) and Ecdistenum (50 mg/kg); Group II - KNO2 (1,3 mg/kg) and Ecdistenum (50

mg/kg); Group III - coadministration NaNO3 + KNO2 (1,2 mg/kg + 1.3 mg/kg); Group IV - control (cells without exposure).

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