порожнини носа і приносових пазух. Щоб уникнути більшості патоморфологічних помилок, лікар-діагност повинен чітко розумітися на морфологічних особливостях матеріалу дослідження. Тому для якісної біопсійної діагностики необхідна деталізація будови слизової оболонки різних стінок клиноподібної пазухи людини в нормі. В даному дослідженні гістоморфологічними методами оцінювались однорідність клітинного складу псевдобагатошарового війчастого циліндричного епітелію слизової оболонки, що вистилає різні стінки клиноподібної пазухи людини. Було встановлено, що кожна стінка має свою цитологічну картину, яка, на нашу думку, залежить від певних функціональних обов'язків.

Ключові слова: клиноподібна пазуха, слизова оболонка, війчастий епітелій.

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слизистой оболочки полости носа и околоносовых пазух. Чтобы избежать большинства патоморфологических ошибок, врач-диагност должен четко разбираться в морфологических особенностях материала исследования. Поэтому для качественной биопсийной диагностики необходима детализация строения слизистой оболочки различных стенок клиновидной пазухи человека в норме. В данном исследовании морфологическими методами оценивались однородность клеточного состава псевдомногорядного мерцательного цилиндрического эпителия слизистой оболочки, которая выстилает разные стенки клиновидной пазухи человека. Было установлено, что каждая стенка имеет свою цитологическую картину, которая, по нашему мнению, зависит от определенных функциональных обязанностей.

Ключевые слова: клиновидная пазуха, слизистая оболочка, мерцательный эпителий.

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INFLUENCE OF NANOPARTICLES OF LEAD ON THE ORGANIZM OF SUSPICIOUS ANIMALS WHEN USING WATER WITH CONTENT OF SODIUM AND SUNPATE STEARATES

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In our time, the important and urgent problem is the influence of heavy metals on the organism of an animal and people. It is known that their presence in nature is a normal phenomenon. However, due to the active human activity, the concentration of various xenobiotics increases rapidly. Particular danger is lead compounds, which have a high ability to move on tropic chains and accumulate in different organs. At present, special attention is being given among scientists to questions about the impact on the body of nanomaterials of heavy metals and, including, of lead. In modern conditions, in various sources of water of economic, drinking and cultural and household water use, in addition to heavy metals, there are also significant amounts of surface-active substances, which include sodium stearates and potassium. The purpose of the study was to investigate the effect of lead nanoparticles on the background of water use of animals with sodium stearate and potassium stearate on the bone marrow and peripheral blood of white rats. Thus, with the combined effect of lead nanoparticles in a dose of 70 mg / kg and sodium and potassium stearates on the body of the experimental rats, there was a more significant increase in the bone marrow of the number of pro-myelocytes, rodenuclear and segmental neutrophils, lymphocytes, normo-cytes, and a more significant decrease in myelocytes and meta-mylocytes than with a separate effect of nanoparticles of lead. Lead nanoparticles against the background of drinking water of various compositions caused an increase in the number of rodenuclear neutrophils, eosinophils, monocytes, lymphocytes and a decrease in the number of segmental neutrophils in the blood of experimental animals. When introducing nanoparticles, there were phenomena of anisocytosis, pocillocytosis and hypochromia of red blood cells. In animals that consumed water with sodium stearate followed by oral administration of lead nanoparticles, the amount of leukocyte blood cells was significantly higher compared to animals that consumed water with potassium stearate.

Key words: lead nanoparticles, drinking water, sodium stearate, potassium stearate, bone marrow, peripheral blood.

The work is a fragment of the research project "Biochemical mechanisms of toxicity of nanoparticles of different nature and other anthropogenic and biogenic toxicants in biological systems", State registration No. 0112U000542.

During the last decades, lead and its compounds have become frequent causes of ecologically determined and occupational pathology of chemical genesis. Lead and its compounds are widely used in the industry: machinery and instrumentation, radio electronics, battery, cable, printing, non-ferrous metal smelting, ferrous metallurgy, crystal production, paints and enamels for the porcelain industry, and others. [2, 10]. It enters the body by inhalation in the form of dust, aerosol, and vapors and through the gastrointestinal tract [3, 5, 6, 9, 12, 13].

In modern conditions, industrial pollution of the environment is quite significant and has a negative impact on the body. It has pronounced cumulative properties and accumulates in the bones. However, under the influence of certain conditions, its reserves in the bones become mobile; it transits into the bloodstream and can cause acute poisoning [11]. A powerful source of lead in the human body is drinking water, which, as a rule, causes an increase in its concentration in the blood [1, 4, 7, 8].

Recently, scientists are interested in the influence of nanoparticles (NP) lead on biological objects, because they are characterized by small size and a large total surface area. NP possesses a complex of physical, chemical properties and biological action, often radically different from the properties of the same element in the form of macroscopic dispersions [1, 4].

In modern conditions, in various sources of water, household, drinking and cultural and household water use in significant amounts are surface-active substances, which include sodium stearates and potassium. Knowing about their negative effect on the function of the liver, kidneys, metabolic processes in the body of experimental animals [8], it was interesting to study the effect on the body of NP lead in sub toxic doses against the background of drinking water with the content of stearates.

The purpose of the study was to investigate the effect of low-frequency lead on the background of the use of white rat water containing sodium stearate and potassium stearate on their bone marrow and peripheral blood.

Material and methods. Selection of animals for research. To study the effect of NP lead isolated, as well as in combination with sodium stearate and potassium stearate under acute experiments, nonlinear white female rats weighing 160-200 grams were used. Animal care and all manipulations were carried out in accordance with the provisions of the «European Convention on the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes» (Strasbourg, 1986), as well as «General Ethical Principles of Animal Experiments» adopted by the First National the Congress on Bioethics (Kyiv, 2001) and the requirements of the appendix to the «Rules for conducting works using experimental animals», approved by the order of the Ministry of Health of Ukraine No. 755 of August 12, 1977, «On Measures submitted the improvement of organizational forms of work with the use of experimental animals». The Bioethics Commission of the State Medical University «Ternopil State Medical University named after I. Ya. Gorbachevsky of the Ministry of Health of Ukraine» (Minutes No. 25 dated 7.10.2014) did not reveal violations of moral and ethical norms during experimental research on experimental animals. In order to investigate the effect of NP lead in isolation and in combination with stearates in conditions of subacute sanitary-toxicological experiment, animals were divided into four groups: the 1st group of animals was control, the 2nd group of animals used dechlorinated water from the urban water supply (water + NCHRb). Animals of the 3rd and 4th groups also used dechlorinated water from the urban water supply, but with admixture of sodium stearate (Group 3 StNa + NCHPb) and potassium stearate (group 4 StK + NCHPb) at a dose of 1/250 LD50. After 30 days of application of the specified waters to animals of 2nd, 3rd and 4th groups, oral LH lead was administered in a dose of 7 mg / 100 g of body weight (1/110 LD_{50}). Receiving NP Lead. Lead nanoparticles used in the experiment were manufactured by «Nanomaterials and Nanotechnologies Ltd» by the method of gas phase synthesis by evaporating the metal at a controlled temperature in an atmosphere of inert gas and low pressure with subsequent steam condensation. According to the quality certificate, the nano-veins had the appearance of a homogeneous clear liquid, light dark color, odorless, pH of the solution – 2.5-7.2 units, size – 20-70 nm, lead concentration – 1500.00 mg / dm^3, density – 1.00015 g / cm^3. The products meet the requirements of TU U 24.6-35291116-001: 2007. Bone marrow research. To investigate bone marrow, a puncture of the udder was performed; smears for cytological examination were made from punctulone.

In the study of bone marrow, the absolute content of myelocaryocytes, megacarocytes, prominucleotides, myelocytes, strain-cells and segmental neutrophils, eosinophils, lymphocytes, normocytes, monocytes and their percentage ratio were determined. To evaluate myelogram, it is not so much the determination of the number of bone marrow elements and their percentage content, as their mutual ratio. Judging by the composition of the myelogram is required by specially calculated bone marrow indices that determine these relationships [13]. Peripheral blood studies. The content of leukocytes was determined by counting sound cells in 100 squares of the camera Goryev.

Statistical processing of the obtained data was processed using the software package Statsoft STATISTICA using non-parametric Wilcoxon criterion. Reliability was estimated using Mann-Whitney U-test. Differences were considered reliable when the probability of a zero hypothesis is not more than 5% ($p \leq 0.05$).

Results of the study and their discussion. Lead in the form of nanoparticles refers to hazardous environmental pollutants that negatively affect the body and the functioning of its organs and systems: heart, liver, kidneys, nervous system, as well as blood. Therefore, our task was to study the effect of NP lead in conjunction with sodium and potassium stearates on the state of the bone marrow of animals, their peripheral blood and liver. Investigation of the NP leads effect in combination with stearates on animal bone marrow.

Data on the effects of NP lead in combination with stearates on animal bone marrow are presented in the table. As can be seen from the table, with the combined action of sodium and potassium stearates and low-frequency lead, an increase in the number of pro-myelocytes in the bone marrow myelogram of white rats was observed in comparison with the control group. Thus, in the animals of the 2nd and 4th experimental groups, the number of prominuclear cells was 2.2 times higher than in intact animals ($p = 0.0009$): ($3.7 \pm 0.3\%$) and ($3, 7 \pm 0.1$) %, respectively, against (1.7 ± 0.0)% in the control. In animals of the 3rd group, the number of pro-myelocytes was almost 2.0 times higher than in the control animals ($p = 0.0008$): (3.7 ± 0.3) % vs. (1.7 ± 0.2) % in control.

Table

Indicators of bone marrow of rats compared to control in the use of water of different composition and with the addition of NP leadь (M±m; n=102)

Blood cells	Comparison Groups			
	1 group	2 group	3 group	4 group
Pro-Myelocytes	1.7±0.2	3.7±0.3***	3.7±0.3***	3.7±0.1***
Myelocytes	10.3±0.3	3.9±0.3***	4.0±0.4***	1.3±0.2***
Metaemyelocytes	4.7±0.3***	2.7±0.1***	2.7±0.4***	1.3±0.2***
Pouchnuclear neutorphils	4.7±0.2***	4.7±0.2***	11.0±0.7***	15.7±1.4***
Segment-Nuclear neutrophils	13.7±0.4	26.7±1.4***	13.6±0.4***	28.6±1.6***
Eosinophils	1.7±0,2	2.7±0.2**	1.3±0.2	2.3±0.4
Lymphocytes	2.7±0,6	53.1±2,2***	48.6±0.8***	18.1±2.5***
Monocytes	1.9±0.3	1.7±0.3	1.7±0.3	1.7±0.3
Normocytes	5,7±0.4	10.7±1.8**	9.6±0.7*	24.7±1.4***
Megacarocytes	1.0±0.0	1.1±0.1	2.0±0.0*	1.6±0.2

Note: * - marked values that statistically significantly differ from the control ones (* – p<0.05; ** – p<0.01; *** – p<0.001).

A combination of sodium and potassium stearates and low-grade lead showed a lower number of myelocytes than intact animals. Thus, in animals of the 2nd group, the number of myelocytes in the bone marrow myelogram of white rats was 2.7 times less than in the control (p = 0.0007): (3.9 ± 0.3)% vs. (10.3 ± 0,6)% in control; in animals of the 3rd group – 2.6 times less (p = 0.0008): (4.0 ± 0.4)% vs. (10.3 ± 0.6) % in control, and in animals 4- group - 8.0 times less (p = 0.0009): (1.3 ± 0.2)% vs. (10.3 ± 0.6)% in control. A combination of sodium and potassium stearates and low-frequency lead also showed a smaller amount of methymilocytes. Thus, in animals of the 2nd and 3rd groups, the number of meta-myelocytes in the myelogram was 1.6 (p = 0.0006): (2.9 ± 0.1)% and 1.7 (p = 0.0007): (2.7 ± 0.4)% times less than in intact animals (4.7 ± 0.3%). In animals of the 4th group, the number of metamyelocytes was 3.7 times smaller than that of control animals, which is statistically significant (p = 0.0007): (1.3 ± 0.2) % vs. 4.7 ± 0,2)% in control. With a combination of sodium and potassium stearates and low-frequency lead, the number of strayed neutrophils was higher compared to intact animals. In the bone marrow myelogram of white rats of the 2 nd group, the number of stray neutrophils was close to the level of intact animals. In animals of the 3rd group, the number of rodenuclear neutrophils was 2.3 times greater than that of control animals ((11.0 ± 0.7)% vs. (4.7 ± 0.2)% in control), and in animals of the 4th group – more than 3.3 times ((15.7 ± 1.4)% against (4.7 ± 0.2)% in control). When comparing the effect of the combined action of sodium stearates and potassium and low-dose lead on the number of segmental neutrophils in the animal's bone marrow myelogram, changes in different directions were observed. In the rats of the 2nd group (Table. 1) the number of segmental neutrophils in the bone marrow myelogram was 2.0 times higher than in the control group rats, which is statistically significant (p = 0.0008): (26.9 ± 1.4) % vs. (13.9 ± 0.4)% in intact animals. In animals of the 3rd group, the number of segmental neutrophils was almost the same as in intact animals. In animals of the 4th group, the number of segmental neutrophils was 2.1 times greater than that of control animals (p = 0.0009): (28.6 ± 1.6) % compared with (13.7 ± 0.4) % in control.

When comparing the effect of the action of sodium and potassium stearates in combination with NP lead on the number of eosinophils in the bone marrow animal myelogram, changes in different directions (tab.) Also occurred. Thus, the greatest number of them was in animals of the 2nd group, who consumed ordinary drinking water: 1.6 times more compared with intact animals (p = 0.007): (2.7 ± 0.2) % vs. (1.7 ± 0.2) %. In animals of the 4th group - 1,3 times more ((2.3 ± 0.4) % against (1.7 ± 0.2) %). In animals of the 3rd group, the number of eosinophils was 1.3 times lower than that of control animals ((1.3 ± 0.2) % vs. (1.7 ± 0.2) %).

With a combination of sodium and potassium stearates and low-pressure lead, there was a rapid increase in the number of lymphocytes compared to intact animals. Thus, in animals of the 2nd, 3rd and 4th groups, the number of lymphocytes in the animal's bone marrow myelogram was 19.6 (53.1 ± 2.2)%, 17.9 (48.6 ± 0 , 8) % and 6.7 (18.1 ± 2.5) % times higher than in control animals (2.7 ± 0.6)%, which is statistically significant (p = 0.0006).

When comparing the influence of NP lead in combination with sodium and potassium stearates on the number of monocytes in the animal's bone marrow myelogram, changes in different directions were observed. In animals of control and 3rd group of animals, the number of monocytes in the myelogram was the same. In rats of group 2, the number of monocytes was 1.4 times higher compared to

intact animals ((1.9 ± 0.3) % vs. (1.3 ± 0.3)%. In animals of the 4th group, the number of monocytes was somewhat lower than in control animals and 3rd groups ((1.1 ± 0.1) % vs. (1.3 ± 0.3) %).

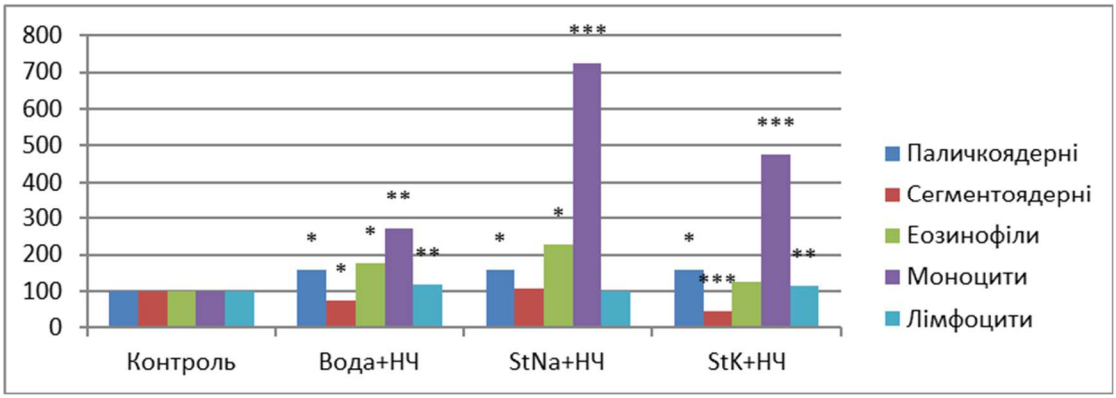
A combination of sodium and potassium stearates and low-pressure lead showed an increase in the number of normal cells compared to intact animals. The number of normal cells in the bone marrow myelogram in animals of the 2nd, 3rd and 4th groups was 1.9 (p = 0.05), 1.6 and 4.2 (p = 0.0007) times greater in compared with animals of the control group ((10.9 ± 1.8) %, (9.6 ± 0,7) % and (24.9 ± 1.4) % against (5.9 ± 0.4) % in control).

The combination of sodium and potassium stearates and low-grade lead also showed an increase in the number of megakaryocytes compared to intact animals. Thus, in animals of the 2nd, 3rd and 4th groups, the number of megakaryocytes in the bone marrow myelogram was 1.1, 2 and 1.6 (p = 0.006) times higher than that of control animals ((1.1 ± 0.1) %, (2.0 ± 0.0) %, (1.6 ± .2) % vs. (1.0 ± 0.0) %.

Thus, with the action of NP lead in a dose of 70 mg / kg and stearates, there was an increase in the bone marrow of the number of promyelocytes, stem cells, segmental neutrophils of lymphocytes and normocytes. The number of myelocytes and metamylocytes decreased.

Study of the effect of NP lead in combination with stearates on the state of peripheral blood of animals. As it can be seen from the figure, with the combined action of sodium and potassium stearates and low-frequency lead, an increase in the number of rodent neutrophils in the peripheral blood of white rats was observed compared to the control group. Thus, in animals of the 2nd, 3rd and 4th experimental groups, the number of rodenuclear neutrophils was 1.5 times greater than in intact animals (p = 0.005) and was (4.3 ± 0.5)%.

When comparing the effects of the combined action of sodium and potassium stearates and low-frequency lead on the number of segmental neutrophils, changes in different directions were observed.



Note: * - marked values that statistically significantly differ from the control ones (* – p<0.05; ** – p<0.01; *** – p<0.001).

Fig. Number of rodenuclear neutrophils, segmental neutrophils, eosinophils, monocytes and lymphocytes in peripheral blood of white rats at drinking water and water containing sodium and potassium stearates in combination with NP (% of total).

In animals of the 3rd group, the number of segmental neutrophils in 1.1 times (p = 0.007) exceeded the amount of cell data in the control group ((14.3 ± 1.0) % vs. (12.6 ± 0.8)). In animals of the 2nd group, the number of segmental neutrophils was 1.3 (p = 0,006) and 2.1 (p = 0.0008) times less, respectively, compared to intact animals ((9.7 ± 0.8)% and (5.9 ± 0.7)% respectively).

The results of the studies showed that the number of eosinophils in the peripheral blood of white rats with a combination of sodium, potassium and low-grade stearates was statistically significantly increased (Fig.). As can be seen from the figure, in animals of the 3rd group, the number of eosinophils in the peripheral blood (3.9 ± 0.8%) was by 2.5 times higher than in the control group (p = 0.008), by 1.3 times - than in animals of the 2nd group and in 1,8 times - in comparison with the 4th group of animals. In animals of the 2nd group, which consumed normal water without stearates, the number of eosinophils in peripheral blood was almost 2.0 times higher than in intact animals (p = 0.007) and was (3.0 ± 0.4)%.

As the study showed, the amount of monocytes in peripheral blood of white rats at the combined action of sodium and potassium and low-grade sodium lead stearates has the same character as the number of eosinophils (Fig. 1). In animals of group 3, the number of monocytes was by 7.6 times higher (8.7 ± 1.7)% versus control animals (1.1 ± 0.1%) in the control group, which is statistically significant (p = 0.0009). In animals of the 4th group, the number of monocytes in peripheral blood ((5.7 ± 0,5)%) was by 5.0 times higher than intact animals (p = 0.0008).

The number of lymphocytes in peripheral blood of white rats has some differences from the number of monocytes. In the peripheral blood of white rats in group 2, the number of lymphocytes was 1.2 times greater than in control animals (p = 0.0007): (82.7 ± 1.6) % vs. (70.6 ± 0, 4)% in control. In

animals of the 4th group, the number of lymphocytes was 1.1 times higher than in intact animals (p = 0.0008): (81.7 ± 1.1) % vs. (70.6 ± 0.4%) in control In animals of the 3rd group, the number of lymphocytes was the same as in animals in the control group.

Thus, sub-toxic doses of low-frequency lead in combination with sodium and potassium stearates caused an increase in the number of rodenuclear neutrophils, eosinophils, monocytes, lymphocytes and a decrease in the number of segmental neutrophils in the blood of experimental animals. In contrast to intact animals in the 2nd, 3rd and 4th groups, there were observed events of functional failure of the erythrocyte system, such as anisocytosis, poikilocytosis and hypochromia [7, 8, 13].

Conclusions

1. Thus, with a combined effect of NP lead in a dose of 70 mg / kg and sodium and potassium stearates on the body of experimental rats, a more significant increase in the bone marrow was observed in the number of promyelocytes, rodenuclear and segmental neutrophils, lymphocytes, normoglycides, and a more significant reduction in myelocytes and metaemocytes , than at a separate influence of NP lead.

2. Low-level lead with the use of drinking water of various composition caused an increase in the number of rodenuclear neutrophils, eosinophils, monocytes, lymphocytes and a decrease in the number of segmental neutrophils in the blood of experimental animals. At the introduction of NP, there were phenomena of anisocytosis, poikilocytosis and hypochromias of erythrocytes. In animals that consumed water with sodium stearate followed by oral administration of low-dose lead, the amount of leukocyte blood cells was significantly higher compared to animals that consumed water with potassium stearate.

The prospect of further research is to study the effect of NP lead on the background of water use by animals with sodium stearate and potassium stearate on the liver of white rats.

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Реферати

ВПЛИВ НАНОЧАСТИНОК СВИНЦЮ НА ОРГАНІЗМ ПІДДОСЛІДНИХ ТВАРИН ПРИ ВЖИВАННІ ВОДИ ІЗ ВМІСТОМ СТЕАРАТ НАТРІЮ І КАЛІЮ

Федорів О.Е., Копач О.Є., Мельник Н.А., Лотоцька О.В., Лотоцький В.В.

У наш час важливою і актуальною проблемою є вплив важких металів (ТМ) на організм тварини і людини. Відомо, що наявність їх в природі – нормальне явище. Однак за рахунок активної діяльності людини концентрація різних ксенобіотиків швидко збільшується, включаючи і солі важких металів. Особливу небезпеку становлять сполуки свинцю, які мають високу здатність рухатися по трофічних ланцюгах і акумулюватися в різних органах.

ВЛИЯНИЕ НАНОЧАСТИЦ СВИНЦА НА ОРГАНИЗМ ПОДОПЫТНЫХ ЖИВОТНЫХ ПРИ УПОТРЕБЛЕНИИ ВОДЫ С СОДЕРЖАНИЕМ СТЕАРАТОВ НАТРИЯ И КАЛИЯ

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В наше время важной и актуальной проблемой является влияние тяжелых металлов (ТМ) на организм животного и человека. Известно, что наличие их в природе – нормальное явление. Однако за счет активной деятельности человека концентрация различных ксенобиотиков быстро увеличивается, включая и соли тяжелых металлов. Особую опасность представляют соединения свинца, которые обладают высокой способностью двигаться по трофических цепях и аккумулироваться в различных органах. Сейчас

Зараз особливе місце серед вчених займають питання впливу на організм наноформ важких металів, в тому числі, і свинцю. В сучасних умовах в різних джерелах води господарського, питного і культурно-побутового водокористування крім важких металів у значних кількостях знаходяться і поверхнево-активні речовини, до яких відносяться стеарати натрію і калію. Метою дослідження було вивчити дію НЧ свинцю на тлі вживання тваринами води з вмістом стеарату натрію і стеарату калію на кістковий мозок і периферичну кров білих щурів. Таким чином, при комбінованому впливі НЧ свинцю в дозі 70 мг / кг і стеаратів натрію і калію на організм піддослідних щурів відзначалося більш значне підвищення в кістковому мозку кількості промієлоцитів, паличкоядерних і сегментоядерних нейтрофілів, лімфоцитів, нормоцитів і більш значне зменшення мієлоцитів і метамієлоцитів, ніж при роздільному впливі НЧ свинцю. НЧ свинцю на тлі вживання питної води різного складу викликали збільшення кількості паличкоядерних нейтрофілів, еозинофілів, моноцитів, лімфоцитів і зменшення кількості сегментоядерних нейтрофілів в крові піддослідних тварин.

Ключові слова: наночастинки свинцю, питна вода, стеарат натрію, стеарат калію, кістковий мозок, периферична кров.

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особое место среди ученых занимают вопросы воздействия на организм наноформ тяжелых металлов, в том числе, и свинца. В современных условиях в различных источниках воды хозяйственного, питьевого и культурно-бытового водопользования кроме тяжелых металлов в значительных количествах находятся и поверхностно-активные вещества, к которым относятся стеараты натрия и калия. Целью исследования было изучить действие НЧ свинца на фоне употребления животными воды с содержанием стеарата натрия и стеарата калия на костный мозг и периферическую кровь белых крыс. Таким образом, при комбинированном воздействии НЧ свинца в дозе 70 мг/кг и стеаратов натрия и калия на организм подопытных крыс отмечалось более значительное повышение в костном мозге количества промиелоцитов, палочкоядерных и сегментоядерных нейтрофилов, лимфоцитов, нормоцитов и более значительное уменьшение миелоцитов и метамиелоцитив, чем при раздельном воздействии НЧ свинца. НЧ свинца на фоне употребления питьевой воды различного состава вызвали увеличение количества палочкоядерных нейтрофилов, эозинофилов, моноцитов, лимфоцитов и уменьшение количества сегментоядерных нейтрофилов в крови подопытных животных.

Ключевые слова: наночастицы свинца, питьевая вода, стеарат натрия, стеарат калия, костный мозг, периферическая кровь.

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POSITIVE INFLUENCE OF ARTICHOKE EXTRACT ON STRUCTURAL AND METABOLIC PROCESSES IN BONE TISSUE OF RATS CONDITIONED UPON CADMIUM-NITRIC INTOXICATION

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The purpose of the study was to investigate the changes in the histological structure, bioelement compositionand markers of bone metabolism in the blood of white male rats with experimental cadmium-nitrite intoxication and the use of artichoke extract for correction of disturbances that arose under the influence of toxicants. It has been established that on the background of combined action of $CdCl_2$and $NaNO_2$in animal femoral bones, osteoclastic resorption processes over osteosynthesis predominate and ash content of the most important osteotropic elements (Ca, Zn and Cu significantly decrease), while cadmium content increases greatly. Indicators of phosphorous-calcium metabolism change in blood plasma, the activity of acid phosphatase increases and oxyproline concentration increases, alkaline phosphatase activity decreases. Artichoke extract positively influences on reparative processes in bones. With the administration of artichoke extract the balance of macro- and micronutrients is restored in the femur of the animals, cadmium is significantly reduced. Biochemical markers of bone metabolism are normal in the blood plasma, the values of which do not significantly differ from those of intact ones (with the exception of the concentration of oxyproline that remains higher) to the end of the experiment.

Key words: artichoke extract, cadmium-nitrite intoxication, histological structure of femoral bones, markers of bone metabolism.

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According to publications devoted to environmental monitoring [1,10],cadmium (Cd), nitrates and nitrites are considered to be the most common pollutants, and their content in the environment is constantly increasing.Sources and ways of receiving these xenobiotic in the body are well known [1, 8]. The cumulative properties of Cd [10] and, conversely, the rapid metabolism of nitrates and nitrites with the formation of more toxic metabolites have been proved [8]. Cd is a thiol poison: it binds to -SH groups of proteins, causes changes in their structure, blocks active centers of enzymes, which suppresses their catalytic action [2, 4]. Nitrites cause gemic hypoxia; when exposed to oxyhemoglobin, free radicals are generated, which activates free radical oxidation and damage to cell membranes [8].