Morones, J. R., Elechiguerra, J. L. , Camacho, A., Holt, K., Kouri, J. B., Ramirez, J. T., Yacaman, M. J. (2005). The bactericidal effect of silver nanoparticles / Nanotechnology. – 16 (10), 2346 – 2353.

Lin, W., Stayton, I., Huang, Yu-W., Zhou, X.-D., Ma, Y. (2008). Cytotoxicity and cell membrane depolarization induced by aluminum oxide nanoparticles in human lung epithelial cells A549 / Toxicological & Environmental Chemistry. 90, 5, 983–996.

Ankamwar, B., Lai, T. C., Huang, J. H., Liu, R. S., Hsiao, M., Chen, C. H., Hwu, Y. K. (2010). Biocompatibility of Fe_3O_4 nanoparticles evaluated by in vitro cytotoxicity assays using normal, glia and breast cancer cells / Nanotechnology. 21(7), 075102.

Borysevych, V. B. (2009). Nanotehnologii' u veterynarnij medycyni / V. B. Borysevych, B. V. Borysevych, V. G. Kaplunenko ta in. – K.: TOV Nanomaterialy i nanotehnologii', 232. (in Ukrainian).

Borisevich, V. B. (2012). Nanomaterialy i nanotehnologii v veterinarnoj praktike / V. B. Borisevich, V. G. Kaplunenko, N. V. Kosinov [i dr.] pod red. V. B. Borisevicha, V. G. Kaplunenko. – K.: Avicena, 512. (in Russian).

Zhiharev, I. V., Ljashenko, V. I. (2007). Nanotehnologii v mire i Ukraine: problemy i perspektivy / I. V. Zhiharev, // Ekonomichnij visnik Donbasu. 1, 117–145. (in Russian).

Shherban', N. G. (2004). Laboratornye metodiki dlja izuchenija sostojanija antioksidantnoj sistemy organizma i urovnja perekisnogo okislenija lipidov: metodicheskie rekomendacii dlja doktorantov, aspirantov, magistrov, ispolnitelej NIR / [Sost. N. G. Shherban', T. V. Gorbach, N. R. Guseva i dr.]. – Har'kov: HGMU, 36. (in Russian).

Kondrahin, I. P. (2004). Metody veterinarnoj klinicheskoj laboratornoj diagnostiki / [Kondrahin I. P., Arhipov A. V., Levchenko V. I. i dr.]: pod red. I. P. Kondrahina. – M.: KolosS, 520. (in Russian).

Metodicheskie rekomendacii po primeneniju immunohimicheskih, citologicheskih i gistomorfologicheskih testov dlja ocenki immunobiologicheskogo statusa u krupnogo rogatogo skota / Har'kov, 1985. 31. (in Russian).

Gabrieljan, N. I., Lipatova, V. I. (1984). Opredelenie soderzhanija srednemolekuljarnyh peptidov krovi pri ostryh formah ishemicheskoj bolezni serdca / Laboratornoe delo. 3, 138–140. (in Russian).

Grinevich, Ju. A., Alferov, A. M. (1981). Opredelenie immunnyh kompleksov v krovi onkologicheskih bol'nyh / Ju. A. Grinevich, // Laboratornoe delo. 8, 493– 495. (in Russian).

Masljanko, R. P. (2001). Metodychni rekomendacii' dlja ocinky ta kontrolju imunnogo statusu tvaryn: vyznachennja faktoriv nespecyfichnoi' rezystentnosti, klitynnyh i gumoral'nyh mehanizmiv imunitetu proty infekcijnyh zahvorjuvan' / [Masljanko R. P., Oleksjuk I. I., Padovs'kyj A. I. ta in.]. – L'viv: L'vivs'ka derzhavna akademija veterynarnoi' medycyny im. S. Z. Gzhyc'kogo. – L'viv: LDAVM im. S. Z. Gzhyc'kogo, 86. (in Ukrainian).

Zvereva, G. V. (1989). Metodika akusherskoj i ginekologicheskoj dispanserizacii korov i telok / [Zvereva G. V., Homin S. P., Oleskiv V. N. i dr.]. – L'vov: L'vovskij zovet in-t, 39. (in Russian).

Lakin, G. F. (1990). Biometrija / M.: Vysshaja shkola, 351. (in Russian).

Стаття надійшла до редакції 30.04.2016

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MONITORING OF RATS WEIGHT AND GROWTH AFTER PROLONGED CADMIUM TOXICOSIS

The article presents data changes increases body weight and weight ratios of rats in chronic cadmium toxicosis. Found that when asking cadmium chloride in body weight gain in rats and reduced weight change ratios of internal organs. Interest in this problem is also determined by the available reports in the literature regarding the ability of cadmium in the body cause the development of state of hypoxia. So important is the study of the metabolic effects of cadmium ions and hypoxia and clarify gain body weight and weights of rats under cadmium stress on the body of experimental animals.

Key words: *toxicology, rats, cadmium chloride, body weight, chronic cadmium toxicosis.*

Chronic liver disease is among the most common diseases of the digestive system. Cadmium compounds - one of the heavy metals that are widely used in industry, are among the main environmental pollutants [1]. When the body is allowed cadmium causes a number of toxic effects, affecting various organs and systems, including toxic effect on the liver [2].

Once in the body, depending on the metal present routes of administration are localized to a greater or lesser extent in the brain and bone marrow, lungs, heart, liver, kidneys and spleen.

The toxicity of cadmium is that it is accompanied by metabolic disorders, physiological functions, lower resistance, productivity and reproductive capacity [3]. According to some authors cadmium ions inhibit the activity of white blood cells and thus reduce the phagocytic component of the immune response [2, 4].

Introduced in the experiment intravenously or intraperitoneally metal damage primarily the liver and other organs are the future. The toxicity of cadmium is associated with the property of the peroxidase reaction cause lipid membrane of hepatocytes, reducing the activity of certain enzymes in the body tissue, including glutathione reductase, glutathione peroxidase, glucose-6-phosphatase, which may be prognostic test of liver tissue damage [2].

Interest in this problem is also determined by the available reports in the literature regarding the ability of cadmium in the body cause the development of state of hypoxia [1, 2]. So important is the study of the metabolic effects of cadmium ions and hypoxia and clarify gain body weight and weights of rats under cadmium stress on the body of experimental animals.

The aim of our study was to determine changes in body weight and increases weight ratios of rats in chronic cadmium toxicosis next to develop an antidote for the treatment of animals in this intoxication.

Objects and methods of research.

Experiments were conducted with male rats Wistar, weighing 200 - 220 g, which were formed in 2 groups of animals: 1 - control group (injected with drinking water through a metal tube in a volume which is equivalent to the volume of an aqueous solution of salts Cd2 +); 2 research group - injected 0,029% aqueous solution of cadmium chloride at a dose of 4.4 mg / kg (corresponding 1/20 DL50).

The calculation of the weighting coefficients were performed by methods [5].We were given the absolute mass values of the weights determined with the formula:

$$K = m1 : m2,$$

where m1 - mass of the organ, g; m2 - mass of the animal's body, kg.

Results. It should be noted that animals with chronic cadmium toxicosis are very difficult to diagnose. One of the earliest clinical symptoms of cadmium toxicity is the rejection of animal feed, depression and weight loss.

As a result of the research groups of experimental animals, which were administered intragastric solution of cadmium chloride, marked downward trend of increases in body weight of rats (Fig. 1).

In rats, which were fed with cadmium chloride, body weight throughout the experiment was lower relative weight of rats in the control group animals. So, on the 4th day of the experiment rats mass in experimental group was lower by 1,4 %, the eighth day of the experiment, respectively, 2,2 %, on the 16th day of the experiment by 2,6 % compared to the control group indices. After 24 days, the greatest difference found between weight control and experimental rat groups where rats who asked cadmium chloride mass was lower by 3,3 % compared to the mass of the rats in the control group.

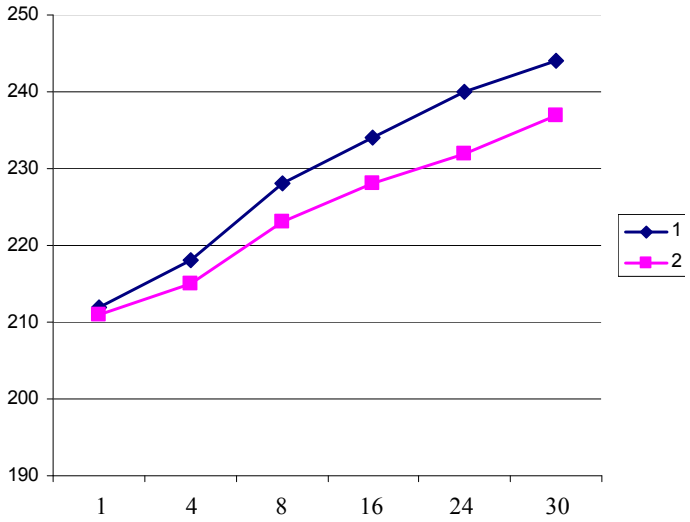

Figure. 1 Increases in body weight in rats at thirty daily cadmium toxicosis; 1 - control group; 2 - group is affected by cadmium.

According to Table 1, the total increase in body weight of rats in the control group was 193 g, whereas in rats, which asked cadmium chloride, total weight gain was 154 g, that is below 20 %.

Table 1

Increases of body weight in rats during prolonged intragastric administration of cadmium chloride, g (M ± m, n = 6)

Animal group	Weight				Increase of weight		
	Start of research		The 30-th research day		Common along a month	Along one day	
	Common in group	Average of one animal	Common in group	Average of one group		All rats	One rat
I	1272	212,00±6,5	1465	244,10±4,8	193	6,43	1,07
II	1268	211,34±6,5	1422	237,00±6,2	154	5,10	0,86

The average increase in body weight of rats in the control group of animals was 6.43 g, and in rats of experimental group animals increase in body weight was lower by 1.33 g, that is 5.10 g

Reducing the increase in body weight in rats under the influence of cadmium chloride followed by hypo-and hypertrophy of the internal organs, which are characterized by different intensity of metabolism (Table. 2).

Table 2

Odds mass of internal organs of white rats on the 30th day after

Internal organs	Animals' group	
	Control group	Test group
heart	3,441±0,129	3,122±0,121
lungs	7,630±0,684	7,814±0,937
Both kidneys	6,480±0,070	6,338±0,337
Right kidney	3,228±0,037	3,151±0,158
Left kidney	3,252±0,041	3,187±0,185
spleen	4,107±0,349	4,033±0,082
liver	29,022±1,971	30,264±0,870
brain	5,893±0,583	6,980±0,425

In animal research groups noted a tendency to increase weight coefficient 2,41 % for lung, liver – to 4,28 % of the brain – by 18,4 % relative to control. It has also reducing weight ratio of 9,2 % of the heart, kidneys – 2,2 %, spleen – 1,8 % relative measure of control group animals.

Conclusion. Based on the research, found a downward trend increase in body weight of rats who asked cadmium chloride and changing weight coefficients of internal organs, possibly associated with a cumulative capacity and sorption of cadmium chloride.

Subsequent studies. Will be used to study the effect of cadmium on antioxidant and immune system of animals.

References

1 Biletska, E. M. (1999). Hygienic estimation of total daily intake of heavy metals in an organism in industrial cities // Environment and Health. 2, 2–6.

2 Borikov, A. U., Kaliman P. A. (2004). Effect of cadmium chloride and hydrogen peroxide on peroxidation processes and fractional composition of lipids in hepatocytes // Ukrainian Biochemical Journal. 76. 2, 107–111.

3 Zhulenko, V. N., Rabinovich, M. I., Talanov, G. A. (2002). Veterinary toxicology. – M .: Colossus, 120–129.

4 Kite, M. M, Kolesova, N. A., Veremiy, M. I., et al. (2001). Experimental study of mechanisms of combined action of small doses of pesticides, nitrates, salts of lead and cadmium // Modern Problems toksykolohyy. 3, 46–50.

5 Rykova, M. L. (1974). Certainly appreciate in toxicology for laboratorians. – M .: Medicine. 81.

Стаття надійшла до редакції 30.04.2016

УДК 619:615.9:619:612.015

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СТАН АНТИОКИСНЮВАЛЬНОЇ СИСТЕМИ ОРГАНІЗМУ ЩУРІВ ЗА ДІЇ НАНОКОБАЛЬТУ В ХРОНІЧОНОМУ ТОКСИКОЛОГІЧНОМУ ЕКСПЕРИМЕНТУ

В роботі досліджено в порівняльному аспекті вплив наночасток Кобальту та кобальт хлориду на деякі показники стану антиокиснювальної системи на моделі лабораторних тварин за умови хронічного токсикологічного експерименту.

З метою встановлення результатів довготривалого застосування дослідного зразка наночасток металу визначали інтенсивність процесів перекисного окиснення ліпідів та інтенсивність окиснювальної модифікації білків.

Дослідженнями встановлено, що в організмі щурів лише внаслідок хронічного потрапляння наночасток Кобальту в дозі 1,0 мг/кг маси тіла реєстрували зниження вмісту показників інтенсивності перекисного окиснення ліпідів, а саме: дієнових кон'югатів і малонового діальдегіду, починаючи з 30–ої доби досліду, в середньому на 30,0 % і 30,4 % ($p \leq 0,05$) відповідно відносно значень таких показників у контрольних тварин. В плазмі крові тварин, що отримували дозу наночасток Кобальту та кобальт хлориду 0,1 мг/кг маси тіла достовірних змін рівня досліджуваних показників не зареєстровано. Встановлено також, що на фоні відсутності надлишкового утворення продуктів ліпопероксидації в крові тварин, яким задавали наночастки Кобальту та кобальт хлориду в дозі 0,1 мг/кг маси тіла впродовж експерименту також не відбувалось вірогідних змін вмісту похідних окиснювальної модифікації білків, а саме: карбонільних похідних нейтрального і основного характеру.

За підсумком результатів дослідження антиокислювальної системи в