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THE CHANGES OF BIOCHEMICAL AND MORPHOLOGICAL INDICES OF RATS' BLOOD UNDER CHRONIC CADMIUM TOXICOSIS

In the article we analysed biochemical and morphological indices of rats' blood under cadmium loading. We fixed the reduction of erythrocytes and leucocytes amount in blood of researching rats and increasing of aminotranspherases activity

Key words: *toxicology, rats, cadmium, blood, ferment.*

Cadmium compound of one of heavy metals are widely used in industry and are among the main pollutants of environment [1]. Getting to the animal organism cadmium has a row of toxic effects on different organs and systems, and on a liver. Cadmium toxicity results violation of metabolism, physiological functions, lowing of resistance, productivity and reproductive activity. According to the articles of some authors the cadmium ions opress leucocytes activity and low the phagocytaris component of immunity system.

This problem is also very important and interesting because there are many reports in literature that cadmium can result hypoxia [1, 2]. That's why it is topical to research metabolical effect of cadmium ions and hypoxia and find out the biochemical and morphological changes of blood indices of rats under cadmium loading as blood is a substance of organism that reacts on irritation from environment very quickly.

The object of our research was to determine biochemical and morphological changes of blood indices of rats under chronic cadmium toxemia. We try to understand better the pathogenesis of the poisoning and to elaborate an effective treatment of animal after the poisoning taking into account biochemical and morphological blood indices of animal.

The Method of Researches. We explored male-rats on Vistar line, they weigh from 200 to 220 gr. and were taken into two groups: the first control group was given water through metal probe equal in cubic capacity to aqueous salt solution Cd^2; the second group was given 0,029% aqueous solution of cadmium chloride that is equal 1/20 DL50 .

Results of researches. The amounts of erythrocytes and leucocytes and contents of hemoglobin are important indices of organism reaction on toxic action of cadmium chloride. We found out that in rat's blood who were given cadmium chloride there amount of erythrocytes diminished to 36% (tab.1). The results of table shows the reduction of erythrocytes amounts don't influence on changes of haematocrit of experimental group according to control group.

Table 1.

Hematological Indices of Rats on the 30th day of cadmium stress. (M ± m, n=6)

Indices	Animal groups	
	Control	Research
Erythrocytes	7,51±0,05	4,79±0,20
Overage capacity of erythrocytes, mkm³	56,69±2,01	89,62±1,26
Overage amount of hemoglobin in erythrocytes,	14,8±1,30	28,7±2,25
Hemoglobin, gr/L	111,1±1,00	140,0±1,25
Hemoglobin, %	42,59±1,35	43,20±0,51
Leucocytes, 10 /L	8,73±0,80	6,12±1,06

Such changes of haematocrit are connected with the increasing of erythrocytes capacity. The average of erythrocytes in blood of researching group of rats is 90,2 ± 1,26 mkm³ and is 58% higher than the indices of rats in control group. The increasing of erythrocytes capacity can be connected with hyperchromia. We also found out that that hemoglobin in erythrocytes of rats' blood who had been fed by cadmium control group and was 28,7 ± 2,25.

The contents of hemoglobin of rats' blood in research group on the 30th day was 140,0 ± 1,25 gr/L, and was 26% higher than the indices of control group. We want to note that feeding rats by cadmium chlorides results the damage of blood production organs that's why there is a low amount of leucocytes in blood. So, on the 30th day of researches the amount of leucocytes was 6,12 ± 1,06 10 /L. The research results given in Table 2 find out the structure violation. The table has the research results of cytosol and ferment activities (alanine aminotransferase and aspartate aminotransferase) in blood serums of healthy and sick animals. The research sources show us that the activity of Al AT and As AT in blood serum and out cellular range of tissue is rather low. They can determine the degree of toxic lesion of liver according to activity of aminotransferase in blood serum. After increasing of the ferment activity the degree of liver lesion depends on the degree of hepatocytes destruction.

The results of table 2 find out the activity of Al AT and AT in blood serum of research group of rats. The activity increase after the eight day it was 66,81 ± 2,34 and 167,5 ± 11,3 mk mol/ (L × λ). After the 16th day of research the ferment activity to 49 and 23 % comparatively to control group of rats. On the 24th research day the activity Al AT and As AT continued to the rise and research the highest quantity. Al AT was 99,80 ± 6,10 mk mol/(L × λ) and As At was 190,9 ± 10,1mk mol/(L × λ). On the 30th research day the activity of aminotransferases in rats' blood fed by cadmium chlorides lowered but was higher then in control group on 62% and Al AT on 20%.

Table 2.

The Activity of Al AT and As AT in blood serum of rats under cadmium toxicosis.

Indices	Group of animal				
	Control	Research			
		Day of research			
		8	16	24	30
Al AT mk mol/(L × λ)	53,34± 7,05	66,81± 2,34	79,45± 3,16	99,80± 6,10	86,55± 6,86
As At mk mol/(L × λ)	147,4± 69,5	167,5± 11,3	181,4± 10,6	190,9± 10,1	185,4± 9,9

The high activity of As At along the whole research period was absolutely lower then Al At, but the changes were credible ($p< 0,001$). This difference between Al At and As AT can be connected with the fact that Al AT is found in cell cytoplasm and its increase shows the state of plasma in cell membranes. As At is located as in cytoplasma as is mitochondria and the change of its activity doesn't provoke visible changes of outer mitochondrial membranes.

Conclusion. The receiving research results find out that poisoning of rats by cadmium results into changes of morphological and biochemical composition of rats, increasing of erythrocytes and leucocytes and rising of aminotransferase activity, increasing of hemoglobin in blood of researched animals.

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