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IMPACT OF CADMIUM CHLORIDE ON ANTIOXIDANT SYSTEM IN THE LIVER OF RATS

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The features of the antioxidant system of rats with chronic cadmium toxicosiare disclosed. It was researched that cadmium chloride in toxic doses reduces enzyme activity of antioxidant system, as indicated by the decrease in enzyme glutathione peroxidase, hlutationreduktazy, superoxide dismutase, catalase and restored glutathione in the liver and blood of rats. The results indicate that chronic cadmium toxicosis leads to enhanced activation of lipid peroxidation.

Key words: *toxicology, cadmium, antioxidant system enzymes, rats.*

Statement of the problem. To date, a large number of scientific reports about critical role of lipid peroxidation (LPO) in the development of many toxicosis were accumulated [1, 2]. A necessary condition for the functioning cell is to maintain normal levels of LPO processes. Speed regulation are controlled by a multicomponent antioxidant system (AOS), which provides binding and modification of free radicals, prevent the formation and destruction of peroxides. It should be noted that this system is composed of enzymatic and not enzymatic link. A special role in the functioning of natural enzymes play an AOS - antioxidants, which include superoxide dismutase, catalase, glutathionereductase, glutathioneperoxidase [3].

Analysis of recent studies and publications which discuss this issue. In our previous studies found that the cadmium intoxication enhanced lipid peroxidation, on the one hand, due to the activity radical formation, and the other - the buffer capacity of antioxidant system that determines the adaptive capacity of the cells and the organism as a whole. Therefore, the aim of our study was to determine the influence of cadmium chloride at a dose of 4.4 mg / kg on the activity of antioxidant defense system in the body of rats to develop an antidote for the treatment of animals in this intoxication.

Research methods. Experiments were conducted on male rats Wistar, weighing 200 - 220 g, which were formed from two groups of animals: 1 - control group (injected with drinking water through a metal tube in a volume which is equivalent to the volume of aqueous salt Cd2 +); 2 research group - injected 0.029% aqueous solution of cadmium chloride at a dose of 4.4 mg / kg.

Results of the studies. Important in the antioxidant defense system is glutathione link of this system, which includes enzymes - glutathioneperoxidase and glutathionereductase, and rate not enzymatic link - reduced glutathione. As can be seen from Table 1, under the influence of cadmium chloride of liver glutathione peroxidase activity decreased throughout the experiment. The lowest activity of the enzyme was investigated, it was found on the 8th and 16th day of the experiment, where the relative values of the control group animals, values were higher by 39 and 45%. On the 24th day of the experiment found

increased activity of GP, where the preceding day of the experiment, it increased by 42%. On the 30th day of the experiment the activity of GP liver was 21,41 ± 0,45 mmol / (min ·kg).

Activity of the glutationreduktasa in liver of animals poisoned by cadmium chloride, also underwent some changes. Thus, the figure antioxidant significantly decreased on the 1st day of 19% on the 8th day of the experiment - 27% on the 16th and 24 th day of study - 32 and 17% compared to the group of intact animals.

1. Antioxidant system of rats under cadmium toxicosis (M ± m, n = 12))

Index	Groups					
	control	day of the experiment				
		1	8	16	24	30
GP of liver mmol/(min/kg)	23,29± 0,21	17,29± 0,38 **	14,19± 0,35 **	12,90± 0,36 **	18,24± 0,46 **	21,41± 0,45 *
GR of liver mmol/(min/kg)	11,25± 0,25	9,11± 0,22 **	8,20± 0,24 **	7,68± 0,19 **	9,38± 0,25 **	10,14± 0,32 *
G-SH of liver mmol/(min/kg)	3,45± 0,07	3,11± 0,07 *	2,90± 0,05 **	2,31± 0,06 **	2,43± 0,05 **	2,78± 0,08 **
SOD of liver arb/un/mg	0,615± 0,014	0,521± 0,013 *	0,497± 0,014 **	0,450± 0,014 **	0,560± 0,014 **	0,582± 0,015 *
Katslase of liver mkmol/min mg protein	0,125± 0,005	0,119± 0,005	0,104± 0,004 *	0,092± 0,005 **	0,098± 0,003 **	0,110± 0,005 *

Almost similar to the dynamics found in the study of the content of reduced glutathione in the liver tissue. In the body of the rat cadmium chloride G SH content in the liver was reduced by 9.9% to 1 day in the study group compared with the control group of animals, 16% - on the eighth day of research. On the 16th day of the experiment the content of reduced glutathione in the liver of experimental animals was the lowest, which was respectively 2,31 ± 0,06 mg / kg on the 24th day of the experiment the content of reduced glutathione and increased slightly relative values of the control group animals decreased 30%. On the 30th day of the experiment reduced glutathione content reached values of eighth day of the experiment, which was 2,78 ± 0,08 mmol / kg. Thus, the direction of change glutathione level of antioxidant in cases of poisoning animal by cadmium chloride was opposite to the direction of change indicators that reflect lipid peroxidation. SOD activity in the liver of the body under cadmium chloride decreased, relative to the control group of animals on the 1st day of the experiment at 15%, the eighth day of the experiment - 19%. The lowest enzyme activity was observed on the 16th day of the experiment - 27%, compared with a group of intact rats. The next day research activity of SOD decreased by 9% (24 th day) and 5% (and 30 days) compared with that of a group of control animals. Reduced activity of SOD probably a sign of inhibition of enzyme synthesis under the influence of cadmium chloride poisoning. It

is known that the activity superoxiddismutase in animals is closely connected with the activity of catalase, which protects the body from highly toxic oxygen radicals. These enzymes must be in balance to each other, as too drastic increase in activity of SOD, catalase without proper activation by itself is cytotoxic. Changes in catalase activity in bulls during the development of cadmium toxicity are shown in Table 1. The activity of catalase in the liver as the control and experimental groups at the beginning of the experiment were within normal physiological values. After asking cadmium chloride katalazna activity of the liver began to decline from the first days of the study, which according to the beginning of the experiment, it decreased by 4.8%.

Conclusions. The results of the studies indicate that cadmium toxicosis leads to enhanced activation of lipid peroxidation and an imbalance between the activity of the antioxidant system and lipid peroxidation intensity.

Subsequent studies. The research helped to uncover deeper pathogenesis of toxic effects of cadmium in rats and use this information for developing an antidote for cadmium intoxication.

REFERENCES

1. *Абрагамович О. О.* Процеси ліпідної пероксидації при хронічних ураженнях печінки / О. О. Абрагамович, О. І. Грабовська, О. І. Терлецька [та ін.] // Медична хімія. — 2000. — Т. 2, № 1. – С. 5–8.

2. *Боріков О. Ю.* Вплив хлориду кадмію та пероксиду водню на процеси пероксидного окислення і фракційний склад ліпідів у гепатоцитах щурів / Боріков О.Ю., Каліман П.А. // Український біохімічний журнал. – 2004. – Т. 76., № 2. – С. 107-111.

3. *Коршун М. М.* Експериментальне вивчення механізмів комбінованої дії малих доз пестицидів, нітратів, солей свинцю та кадмію / Коршун М.М., Колесова Н.А., Веремій М.І., та ін. // Современные проблемы токсикологии. – 2001. – № 3. – С. 46-50.