

Dynamics Of Changes Of Inflammation Markers Depending On The Duration Of Toxicosis

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The aim of the research was to study the changes in the dynamics of inflammation during exotoxicosis. The study was conducted on 16 chinchilla rabbits. The model of exotoxicosis was made in a special chamber by inhalation with HCl vapors. The blood taken from the animals of the experimental group was examined to determine the content of peptide molecules, total bilirubin, creatinine and the amount of thymol. It has been revealed that exogenous intoxication primarily causes inflammation in the body, and then this process turns into endogenous intoxication.

Keywords: *Toxicity, exogenous intoxication, total bilirubin, creatinine*

INTRODUCTION

Currently, the accelerated rate of environmental changes has a toxic effect on the living organism. And this creates an inadequate environment for the normal functioning of cells. In the atmosphere, the concentration of certain substances, including heavy metals (Berezin, 2014; Guskova et al., 2014; Kazimov, 2014), has been increased. Some chemical substances, as well as chemical compounds that enter the body through the respiratory tract, create a toxic state. The liver reacts first to this condition, so the number of hepatitis increases (Agzamova and Aliyeva, 2009; Baymatov et al., 2014; Kiselyova et al., 2009). Despite the numerous scientific works in this field, the pathogenesis of functional and structural changes in the liver under exogenous intoxication has been studied by inaccuracy (Bryukhin et al., 2004; Khrebetovskiy, 2007; Baymatov et al., 2014).

The purpose of our study was to study the process of development of liver involvement in exotoxicosis.

MATERIALS AND METHODS

The study was conducted on 16 rabbits of the Chinchilla breed in 4 groups (in each 4 rabbits) weighing 3.0-3.5 kg.

The first group was intact and control animals. The remaining 12 rabbits were interrupted in a special chamber, they breathed with hydrochloric acid vapor during 7 days for 30 minutes.

On the 10th day, 4 rabbits (the second group) were taken out of experiment. The remaining 8 rabbits, beginning the 21st day of the experiment for 4 days, again breathed with vapors of hydrochloric acid. On the 30th day another 4 rabbits (3 group) were taken out of the experiment.

The 4th group of rabbits, beginning on the 50th day of the experiment for 4 days, again breathed with vapors of hydrochloric acid and 60 days were taken out of experiment.

On the 10th, 30th and 60th day of the experiment, the concentration of medium molecular weight peptides (MMWP), the amount of total bilirubin and creatinine, as well as the level of thymol in the blood taken from ear veins of the rabbit, were determined in intact animals.

The concentration of medium molecular weight peptides (MMWP) was determined by the method of V.S.Kaminshikov, the amount of total bilirubin and creatinine and the level of thymol by using the reactive sets manufactured by Human - Bioscreen MS-2000 microanalyzer.

The obtained quantitative indices were statically processed by a nonparametric method - the Wilcoxon (U) test (Manna-Witni).

The calculation was carried out using the EXEL electronic table compiled in the AMU.

In carrying out the experiment on animals, the rules 86/09 EEC of the adopted Bioethical League of Europe and UNESCO (Paris) were strictly observed.

RESULTS AND DISCUSSION

The concentration of medium-molecular peptides in the blood obtained in intact animals was varied in the range 0.23-0.26 cu. On average, the concentration was 0.243 ± 0.003 cu.

The total amount of bilirubin was 7.7-20.5 $\mu\text{mol/l}$, creatinine 58.4-78.1 $\mu\text{mol/l}$, and thymol level 1-5. The average arithmetic parameters were 13.9 ± 1.2 $\mu\text{mol/l}$, 67.8 ± 1.8 $\mu\text{mol/l}$, and 2.69 ± 0.36 , respectively.

The results were accepted as a norm and were compared with the results obtained from experimental animals.

In the second group of experimental animals, after 3 days of cessation inhalation with hydrochloric acid vapor, the concentration of MMP in the blood was 8% ($p < 0.001$) and the mean score was 0.263 ± 0.003 cu.

In contrast to the concentration of MMP, the increase in the level of total bilirubin was higher. Since, on the 10th day of the experiment, the average level of bilirubin in the blood ($M \pm m = 26.1 \pm 0.8$), in comparison with the first group, increased 87% or 1.9 times.

The amount of creatinine in the blood compared to the control group increased 25% or 1.3 times ($p < 0.001$) and reached 84.9 ± 1.3 $\mu\text{mol/l}$. As a result, the level of thymol, which characterizes the toxic state of the body, increased sharply. The level of thymol in comparison with the first group is increased 95% or 1.9 times ($p < 0.001$) ($M \pm m = 5.17 \pm 0.63$ $\mu\text{mol/l}$).

Thus, in rabbits breathing hydrochloric acid vapor for 7 days, according to the indicators of intoxication (total bilirubin, creatinine and thymol), the concentration of MMP, which is a characteristic marker of inflammation, is increased.

On the 30th day of the experiment, the concentration of MMP continued to increase in the blood of the 3rd group of animals. The average concentration was 0.268 ± 0.003 cu. Compared with the first group, this indicator is increased 10% ($p < 0.001$), compared to the second group only 2%.

It is clearly seen that as the number of breaths increases with hydrochloric acid vapor, the process of inflammation becomes more organized.

Despite a 14 day break between the first and second 7 day inhalation with hydrochloric acid vapor, breathing with hydrochloric acid vapor creates

a second wave of inflammation. Therefore, the developed pathological process becomes chronic.

On the 30th day of the experiment, in addition to increasing the MMP in the blood, and increases the amount of total bilirubin. Its average level, in comparison with intact animals, is increased 114% or 2.1 times ($p < 0.001$) and is reached to 29.8 ± 1.0 $\mu\text{mol/l}$. In comparison with the second group, the growth was not so high, it was only 14%. The results show that, in animals inhaled with hydrochloric acid vapor, the detoxification function of rabbits was severely impaired.

Also, the amount of creatinine in the blood is increased significantly. This increase in comparison with intact animals is increased 39% or 1.9 times ($p < 0.001$). And in comparison with the second group, this indicator is increased 11%.

Thus, in the blood of rabbits, inhaled with hydrochloric acid vapor (on the 30th day of the experiment), the average amount of creatinine is increased 94.4 ± 1.7 $\mu\text{mol/l}$. The obtained data show the transition of the inflammatory process to the kidneys.

The level of thymol, characteristic for general intoxication process, continued to increase. The mean quantitative index of thymol on the 30th day of the experiment, compared with intact animals, increased 2.9 times or 193% ($p < 0.001$) and became 7.88 ± 0.67 , and in comparison with the second group, the level of thymol also is increased. But by comparing with intact, this increase was 52%.

Continued increase in the level of thymol in the blood indicates the involvement of the body in general intoxication.

On the 60th day of the experiment, the mean concentration of MMP in the blood continued to increase. This increase, in comparison with intact group was 14%, compared with the second group 5%, and in comparison with the third group 3%.

Table. The dynamics of changes in inflammation and intoxication markers in the blood of rabbits breathing with HCL steam

№8	Marker	Statistic information	Intact station n=16	Time of investigation		
				10 days n=12	30 days n=8	60 days n=4
1.	MMP	Min	0.23	0.244	0.258	0.270
		Max	0.26	0.278	0.283	0.284
		min±max	0.243 ± 0.003	0.263 ± 0.003	0.243 ± 0.003	0.277 ± 0.003
2.	Common bilirubin	Min	7.7	21.0	25.0	29.0
		Max	20.5	30.2	33.6	35.0
		min±max	13.9 ± 1.2	0.261 ± 0.008	29.8 ± 1.0	32.8 ± 1.3
3.	Kreatinin	Min	58.4	78.6	88.6	92.7
		Max	78.1	91.4	100.0	105.6
		min±max	67.8 ± 1.8	84.9 ± 1.3	94.4 ± 1.7	100.8 ± 2.9
4.	Timol	Min	1	2	5	9
		Max	5	9	11	12
		min±max	2.69 ± 0.36	5.17 ± 0.63	7.88 ± 6.67	10.5 ± 0.65

Note: In all cases $P < 0,001$

In the fourth group of animals inhaled with hydrochloric acid vapor for the third time, the inflammatory process continued to develop.

In the blood taken from the fourth group of animals, the amount of total bilirubin is changed sharply, and it became $32.8 \pm 1.3 \mu\text{mol/l}$. In comparison of the first group, this indicator is increased 2.3 times or 134.9%, compared to the second group of 26%, compared to the third group of 10%.

The average amount of creatinine was $100 \pm 2.9 \mu\text{mol/l}$, and compared to the first group, 49% ($p < 0.001$), comparing the second group 19%, and comparing the third group 7%.

It should be noted that under the influence of hydrochloric acid vapors, the level of creatinine compared with bilirubin moderately increased. But, the inhalation with hydrochloric acid vapor sharply affects the level of creatinine and this effect becomes more pronounced on the 60th day of the experiment (table).

As can be seen, in rabbits inhaled vapors of hydrochloric acid, the antitoxic function of the liver and kidneys was disrupted.

On the 60th day of the experiment, in the blood of the fourth group of animals, the average level of thymol is reached the highest figure, and became 10.50 ± 0.65 . This increase, in comparison with intact groups, is increased 3.9 times or 291% ($p < 0.001$). Comparisons with other groups show continued increases in thymol levels. Since, the level of thymol, on the 60th day of the experiment, in comparison with the second group 103% and in comparison of the third group 33% is increased, (table).

Thus, according to the results of our research, it can be concluded that the inflammatory process that developed as a result of exogenous intoxication of the organism creates a focus of endogenous intoxication, and the development of a pathological process leads to toxicosis.

Toksikozun Müddətindən Asılı Olaraq İltihab Markerlərinin Dəyişmə Dinamikası

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Tədqiqatın əsas məqsədi ekzotoksikoz zamanı iltihab prosesinin inkişaf dinamikasını izləmək olmuşdur. Bu məqsədlə təcrübələr 16 baş şinşilla cinsinə mənsub olan dovşanlar üzərində aparılmışdır. Onlar 4 qrupa bölünmüşdür. Ekzogen intoksikasiya modeli: təcrübə heyvanları xüsusi hazırlanmış kameralarda HCL buxarı ilə tənəffüs etdirməklə yaradılmışdır. Təcrübə heyvanlarından götürülən qanda orta molekullu pepitlərin, ümumi bilirubin, keratinin və timolun miqdarını təyin etməklə ekzogen intoksikasiyanın orqanizmdə yaratdığı patoloji prosesin patogenezinin bəzi məqamları aydınlaşdırılmışdır. Müəyyən edilmişdir ki, ekzogen intoksikasiya orqanizmdə ilk əvvəl iltihab ocağı yara bilər və orada yaranmış toksiki maddələr hesabına endogen intoksikasiyaya keçid alır.

Açar sözlər: Toksikoz, ekzogen intoksikasiya, total bilirubin, kreatin

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Изменение Динамики Маркеров Воспаления В Зависимости От Времени Токсикоза

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Главной целью исследования являлось изучение изменения динамики воспаления при экзотоксикозе. Исследование проводилось на 16-ти зайцах породы шиншилла. Моделирование экзотоксикоза проводилось в особой камере путем ингаляции парами HCl. Взятая у животных экспериментальной группы кровь была исследована на содержание пептидных молекул, общего билирубина, креатинина и количества тимола. Было выявлено, что экзогенная интоксикация, в первую очередь, создает очаги воспаления в организме, а потом этот процесс переходит в эндогенную интоксикацию.

Ключевые слова: *Токсикоз, экзогенная интоксикация, тотальный билирубин, креатин*