



**ЭКСПЕРИМЕНТАЛ ЎТКИР ПАНКРЕАТИТЛИ КАЛАМУШЛАРДА Е  
ВИТАМИНИНИНГ ЛИПИДЛАР ПЕРОКСИДЛАНИШИ ВА  
АНТИОКСИДАНТ ҲИМОЯСИГА ТАЪСИРИНИ ЎРГАНИШ**

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**ИЗУЧЕНИЕ ВЛИЯНИЯ ВИТАМИНА Е НА ПЕРЕКИСНОЕ  
ОКИСЛЕНИЕ ЛИПИДОВ И АНТИОКСИДАНТНУЮ ЗАЩИТУ У  
КРЫС С ЭКСПЕРИМЕНТАЛЬНЫМ ОСТРИМ ПАНКРЕАТИТОМ**

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**STUDY OF THE EFFECT OF VITAMIN E ON LIPID PEROXIDATION AND  
ANTIOXIDANT PROTECTION IN RATS WITH EXPERIMENTAL ACUTE  
PANCREATITIS**

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**Annotation**

To the article Shukurov I.B. "Effect of tocopherol on lipid peroxidation and antioxidant defense in rats with acute pancreatitis"

This article presents data on the effect of tocopherol on a number of biochemical parameters, in particular, on the state of lipid peroxidation and AOP in dynamics in rats with OP. Animals are divided into 4 groups. The results obtained are compared with those of group 1 (healthy animals). Experimental OP in mice was characterized by an increase in lipid peroxidation, as well as a decrease in the activity of AOD enzymes during all periods of the study. Preliminary saturation of the organism of animals of the 4th group (OP + E) with tocopherol (vitamin E) at a dose of 0.5 mg per 100 g of body weight for 14 days led to an increase in antioxidant protection and inhibition of LPO processes, which indicates the bioprotective and therapeutic effects of tocopherol in OP as a result of induction of AOD enzymes in experimental animals. Key words: experimental acute pancreatitis, antioxidant system, catalase, malondialdehyde, superoxide dismutase, vitamin E.





**Abstract:** On the article I. B. Shukurov "Learning the action of tocoferd in the condition of the hydrogen oxidation lipids and the antiocsidant protection in the rats with acute of pancreatities.

At present works were came the facts of influence tocoferol in the line of biochemical parameters in particular in the condition of HOI and AOP in the dynamic of rats with acute of pancreatities. The animals were devided into 4 groups. On receiving the results were defferenced with the facts of first group

(intactial animals). Experimental acute of pancreatities into rats were characterized strengthening HOL all the dates of investigation, as well the lower of activity of ferments AOP. Priliminary situation organism of animals 4 groups of tocoferol (vitamin E) in a doze 0,5 mg into 100 gr weight of body during 14 days were came into strengthening antiocsidant protection and the oppression of process HOL, that it is centificated about the bioprotector and the treatment of action tocoferol for AP, calling to the experimental animals.

This article presents information on the effect of tocopherol on a number of biochemical indicators, in particular, on the state of lipid peroxidation and AOH in dynamics in rats with O'P. Animals are divided into 4 groups. The obtained results are compared with the data of group 1 (healthy animals). Experimental OP in mice was characterized by an increase in lipid peroxidation, as well as a decrease in the activity of AOH enzymes in all periods of the study. Pre-saturation of animals of group 4 (OP + E) with tocopherol (vitamin E) at a dose of 0.5 mg per 100 grams of body weight for 14 days led to increased antioxidant protection and inhibition of LPO processes, which indicates that the bioprotective and therapeutic effects of tocopherol in OP as a result, induction of AOH enzymes increased in experimental animals.

**Key words:** experimental acute pancreatitis, antioxidant system, catalase, malondialdehyde, superoxide dismutase, vitamin E.

It is known that lipid peroxidation products (LPM) - hydroperoxides - play an important role in the development of endogenous intoxication in acute pancreatitis (OP), and also have a cytotoxic effect when their amount in the body increases (1,4,6). An uncompensated increase in lipid peroxidation reduces the body's antioxidant defenses (AOH), causes damage to the cell ultrastructure, and causes a pathological process (3).

Currently, it has been established that increased lipid peroxidation in the membranes of erythrocyte and hepatocyte mitochondria is one of the main links in the pathogenesis of OP, and vitamin E has a bioprotective and therapeutic effect in OP (2).





In connection with the above, we studied the effect of tocopherol on lipid peroxidation (LPO) and AOH status of the animal organism in the dynamics of OP development. Experiments were conducted on 80 adult male rats, weighing 150-180 g, kept on a normal laboratory diet. The animals were divided into four groups (20 in each group): 1. Healthy; 2. Control; 3. Experimental animals on OP; 4. OP+E. Experimental OP in rats P.S. It was elicited by freezing the pancreas with ethyl chloride according to the method of Simovarian et al. (1973). Control animals underwent laparotomy alone without freezing the pancreas. The animals of group 4 were fed daily with 0.5 mg of tocopherol (vitamin E) per 100 g of body weight. On the 15th day of the experiment, the animals were operated on and O'P was induced.

Assessment of the main parameters of lipid peroxidation and AOH was carried out at -7, -10 days and 1 month after the operation.

The activity of lipid peroxidation processes was assessed by the amount of acylhydroperoxide (AGP) and malondialdehyde (MDA) in the liver microsomal fraction (JMF), and AGP in blood plasma. AOH status was assessed by enzymatic activity of superoxide dismutase (SOD) and catalase. The amount of MDA in the blood serum of experimental animals L.I. Andreev and others. (1988), the amount of AGP - V.B. Gavrilov and M.I. Mishkorudny (1983), SOD activity - Mkhitarian V.G. and others. (1988), catalase activity - Koraluk M.A. et al. (1988) methods.

As a result of research (Table 1), on the 7th day after surgery, an increase in LPO processes was found in the liver microsomal fraction (JMF). For example, in the control group, the amount of MDA increased by 1.4 times, and the amount of AGP by 1.5 times compared to the healthy group.

In group 3 (O'P) animals, there is a 1.9-fold increase in MDA and a 3.5-fold increase in AGP, indicating a dramatic increase in initial LPO products. On the 10th postoperative day, there is a tendency for the amount of MDA and AGP to decrease compared to the previous study period (Table 1).

A further decrease in the concentration of MDA and AGP is observed in the long (1-month) periods of the study, but it should be noted that these indicators were 1.5-2.1 times higher in group 3 animals than in healthy animals (Table 1).

Pre-administration of tocopherol to group 4 (OP+E) animals resulted in a decrease in MDA and AGP values in JMF compared to animals that did not receive tocopherol. On the 7th day of the study, the concentration of MDA in animals of this group decreased by 38.5% compared to group 3 (O'P). A similar situation is observed with an almost 2-fold decrease in the amount of AGP (Table 1).

In group 4, a further decrease in the amount of MDA and AGP was noted on the 10th day of the study -  $0.092 \pm 0.002$  n mol/mg protein and  $0.086 \pm 0.003$  rel.u/mg



protein, respectively. In the 4th group (O'P+E) 1 month after the operation, the amount of MDA and AGP was not statistically different from the data of the first group (healthy animals), that is, the normalization of the parameters under consideration was noted.

Table1 Dynamics of changes in lipid peroxidation processes of liver microsomal fraction of experimental animals in OP (M±m)

Group of animals	Number of animals	Experiment periods (day)					
		7		10		30	
		МДА нмоль/мг оқсил	АГП отн.ед./мг оқсил	МДА нмоль/мг оқсил	АГП отн.ед./мг оқсил	МДА нмоль/мг оқсил	АГП отн.ед./мг оқсил
Healthy	10	0,081±0,0007	0,076±0,0005	0,081±0,0007	0,076±0,0005	0,081±0,0007	0,076±0,0005
Control	10	0,110±0,0001 P<0,001	0,114±0,0005 P<0,05	0,101±0,012 P>0,05	0,128±0,0005 P<0,05	0,097±0,0034 P<0,05	0,092±0,0003 P<0,05
ЎП	10	0,156±0,0001 P<0,001	0,267±0,01 P<0,05	0,147±0,0003 P<0,001	0,145±0,0003 P<0,001	0,119±0,0006 P<0,05	0,160±0,0004 P<0,05
ЎП + α-токоферол	10	0,096±0,0001 P<0,001	0,150±0,0005 P<0,05	0,092±0,0002 P<0,001	0,089±0,00027 P<0,05	0,086±0,00027 P<0,05	0,083±0,00024 P<0,05

Determination of the amount of MDA in the blood plasma (Table 2) showed that it increased in the dynamics of the study in animals of the 2nd group compared to them ( $R * 0.001$ ). The highest MDA values in the blood plasma of animals with O'P (group 3) were found on the 10th day of the study. During the long-term follow-up, the amount of MDA also increased - 1.6 times compared to group 1 ( $R * 0.001$ ) (Table 2). The given data show that a large amount of lipid peroxidation products entering the blood can lead to high intoxication of the body on days -7, -10 of pathological pancreas.

Table 2. Dynamics of blood plasma MDA content changes in OP. (nmol/mg protein), (M \* m).

Ҳайвонлар гурухи	Ҳайвонлар миқдори	Таҷриба муддатлари (сутка)		
		7	10	30
Соғлом	10	0,161 ±0,004	0,161± 0,004	0,161±0,004
Назорат	10	0,393±0,005	0,364± 0,008	0,201± 0,008
ЎП	10	0,460±0,008	0,551± 0,021	0,258± 0,009
ЎП + α-токоферол	10	0,252±0,015	0,291± 0,004	0,183± 0,003



Note: \* R \* 0.001, Statistically significant compared to healthy animals

Pre-saturation of the body of animals of group 4 (O'P + E) with tocopherol prevents the increase of LPO processes, which is expressed by a significant decrease in the amount of MDA in the blood plasma from 1.8 to 1.4 in the dynamics of the study (Table 2).

Thus, in animals with OP, there is an increase in LPO processes, which is one of the central mechanisms for the development of structural and functional disorders in cell biomembranes.

The study of AOH showed that a unilateral change in the activity of catalase and SOD was detected in the blood of animals (Table 3).

In animals of group 2 (control) and group 3 (O'P), a decrease in catalase activity was noted on the 7th and 10th days of the study. In group 3 (O'P) animals, catalase activity decreased by 3 times on the 7th day. An increase in catalase activity up to  $0.504 * 0.002$  was noted during 1 month, not reaching the level of healthy and control animals (Table 3).

Saturation of the animal organism with tocopherol leads to a significant increase in catalase activity in group 4 (O'P + E) compared to group 3 (O'P) that did not receive tocopherol in the research dynamics. However, it should be noted that in the considered group, catalase activity decreased by 1.8-2.4 times compared to group 1. Analysis of the dynamics of changes in SOD activity in the blood of group 2 (control) showed an increase of the parameter by 37% and 152% both on the 7th day and after 1 month, respectively (Table 3).

OP is characterized by an increase in SOD activity on the 10th day and 1 month after the start of the experiment. Pre-administration of tocopherol to group 4 (OP + E) animals leads to a statistically significant increase in SOD activity in the study dynamics, and it reaches a maximum value of  $2.735 * 0.012$  in the long term. It is 1.2 and 1.9 times higher than group 3 (O'P) and group 1 (healthy), respectively (Table 3). A similar trend of changes in AOH parameters was found in experimental animals with O'P when studying the microsomal cytosolic part of the liver.

Thus, in OP, inhibition of SOD and catalase activity in the microsomal-cytosolic fraction of blood and liver is noted, which leads to an increase in the formation of free radicals and the beginning of lipid peroxidation in biomembranes.

The activation we observed was not associated with the remaining high values of AGP and MDA.



By introducing tocopherol (vitamin E), the strengthening of the antioxidant status of the body of experimental animals leads to an increase in the activity of the body's own enzymes that protect against oxidants

Table 3

The dynamics of changes in the activity of AOS enzymes and the amount of MDA in liver and blood in OP (M±m)

Animals group	Experiment length (сутка)								
	7			10			30		
	MDA nmol/mg protein	Catalase $\mu\text{mol H}_2\text{O}_2 / \text{min}\cdot\text{mg protein}$	SOD is necessary. one./ min·mg of protein	MDA nmol/mg protein	Catalase $\mu\text{mol H}_2\text{O}_2 / \text{min}\cdot\text{mg protein}$	SOD is necessary. one./ min·mg of protein	MDA nmol/mg protein	Catalase $\mu\text{mol H}_2\text{O}_2 / \text{min}\cdot\text{mg protein}$	SOD is necessary. one./ min·mg of protein
Healthy (n=10)	$0,081\pm 0,0007$ $0,161\pm 0,004$	$0,239\pm 0,004$ $0,618\pm 0,007$	$3,398\pm 0,007$ $1,418\pm 0,039$	$0,081\pm 0,0007$ $0,161\pm 0,004$	$0,239\pm 0,004$ $0,618\pm 0,007$	$3,398\pm 0,007$ $1,423\pm 0,039$	$0,081\pm 0,0007$ $0,161\pm 0,004$	$0,239\pm 0,004$ $0,620\pm 0,005$	$3,398\pm 0,007$ $1,441\pm 0,011$
Control (n=10)	$0,110\pm 0,0001^a$ $0,393\pm 0,005^a$	$0,297\pm 0,005$ $0,378\pm 0,006$	$3,526\pm 0,027$ $1,942\pm 0,011$	$0,101\pm 0,012^a$ $0,364\pm 0,008$	$0,280\pm 0,004$ $0,533\pm 0,006$	$3,886\pm 0,036$ $0,895\pm 0,012$	$0,097\pm 0,0034$ $0,201\pm 0,008^a$	$0,261\pm 0,004$ $0,631\pm 0,002$	$3,644\pm 0,031$ $2,190\pm 0,017$
OP(n=10)	$0,156\pm 0,001^{ab}$ $0,450\pm 0,08^a$	$0,103\pm 0,003^{ab}$ $0,198\pm 0,001$	$2,326\pm 0,037$ $1,499\pm 0,018$	$0,147\pm 0,003^{ab}$ $0,551\pm 0,021^{ab}$	$0,090\pm 0,004^{ab}$ $0,214\pm 0,003$	$2,188\pm 0,004$ $1,857\pm 0,012$	$0,119\pm 0,006^a$ $0,258\pm 0,009^a$	$0,117\pm 0,003^{ab}$ $0,504\pm 0,002$	$2,477\pm 0,035$ $2,355\pm 0,011$
OP + $\alpha$ -tocopherol (n=10)	$0,096\pm 0,001^b$ $0,252\pm 0,015^{ab}$	$0,167\pm 0,004^{ab}$ $0,256\pm 0,008$	$5,180\pm 0,047$ $1,916\pm 0,018$	$0,092\pm 0,002$ $0,291\pm 0,004$	$0,131\pm 0,004^{ab}$ $0,341\pm 0,007$	$4,960\pm 0,032$ $2,162\pm 0,018$	$0,086\pm 0,0027^b$ $0,183\pm 0,003^b$	$0,209\pm 0,004^b$ $0,590\pm 0,010$	$3,430\pm 0,019$ $2,735\pm 0,012$

Note: in the numerator - data on the liver, in the denominator - blood; Reliability  $P < 0.05$ : a – in relation to intact; b - in relation to the control group; c - in relation to the OP; in other cases –  $P > 0.05$

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