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PATHOLOGICAL PHYSIOLOGY AND GENERAL PATHOLOGY

Effect of Chorionic Gonadotropin on Normalization of Lipid Peroxidation

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A study is performed of the effect of chorionic gonadotropin on lipid peroxidation in the liver and myocardium of white rats injected subcutaneously with tetrachloromethane for a long time. Chorionic gonadotropin is shown to reduce the content of diene conjugates and Schiff bases, which suggests an antioxidant effect of the hormone.

Key Words: *chorionic gonadotropin; lipid peroxidation; liver; heart*

Activation of lipid peroxidation (LPO) arising in diverse injuries in different cells of the organism aggravates various diseases and complicates their treatment [1,4]. Therefore, inhibition of LPO represents an important component in the pathogenetic treatment of many diseases. Established antioxidants usually exert an insufficient effect on LPO [8].

Chorionic gonadotropin (CG) is known as the main specific hormone of pregnancy [2] and as a medicinal preparation used in endocrine disorders [8].

Later investigations revealed the ability of CG to stimulate regeneration of pathologically altered liver and to normalize its structure and function together with the correction of homeostasis [11]. On the basis of this CG was proposed as an agent in regenerative therapy of chronic diffuse liver diseases [11], whose beneficial effect has been demonstrated in both treatment [3,7,10] and surgical [6,9,13] clinics.

MATERIALS AND METHODS

The present study explores the effect of CG on the state of LPO in liver tissue and myocardium of 50 unbred white rats which had for a long time been receiving subcutaneous injections of tetrachloromethane (CCl_4, 0.3 ml 65% solution in vegetable oil, four times per week). The state of LPO in the liver and heart was assessed by the content of diene conjugates (DC) and Schiff bases (SB),

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TABLE 1. Content of DC (nmol/mg) in the Liver and Heart of CCl_4 – Treated Animals ($M \pm m$)

Group	20 injections of CCl_4		50 injections of CCl_4	
	liver		liver	heart
	2 days	10 days	45 days	45 days
1. Untreated	451.8±72.0	–	845.9±89.3	636.5±11.6
2. Treated with CG	227.0±7.8	282.1±13.7	508.9±46.8	355.9±28.3
3. Intact	231.5±37.0	–	453.0±32.5	278.6±29.0
p	$p_{1-2}<0.01$ $p_{1-3}<0.02$ $p_{2-3}>0.9$	$p_{2-3}>0.2$	$p_{1-2}<0.02$ $p_{2-3}>0.5$ $p_{1-3}<0.01$	$p_{1-2}<0.05$ $p_{2-3}>0.05$ $p_{1-3}<0.02$

and the DC to SB ratio. The level of DC [12] and SB [14] was determined as described earlier. Some animals received a domestic preparation of CG in a dose of 150 U. Samples for the studies were taken on geomagnetically calm days, since LPO has been shown to be considerably activated during magnetic storms [5].

The results were processed statistically using methods of variational statistics after Student.

RESULTS

The effect of CG on LPO was studied on rats which had received either 20 or 50 injections of CCl_4. The content of DC in the liver of rats which had received 20 injections was 1.5-fold higher than in intact animals (Table 1). Three days after discontinuation of CCl_4 some animals of this group received CG on days 1, 2, and 3. After two daily injections the content of DC dropped to a normal value and after 10 days remained at this level. The concentration of SB in these animals remained unaffected and no differences between groups were noted (Table 2).

After 50 injections of CCl_4 during 5 months the content of DC was increased 2-fold in comparison with untreated animals sacrificed simultaneously, but this difference became unreliable in comparison with intact animals of the same age.

The content of DC in the myocardium increased 2.5-fold after 50 injections of CCl_4 in comparison with intact animals of the same age, and it returned to the normal value after 45 days in animals which had received CG (Table 1).

The accumulation of DC after administration of CCl_4 was noted to be more pronounced in the myocardium (2.6-fold) than in the liver (1.8-fold) in comparison with the control.

The content of SB in the myocardium after 50 injections of CCl_4 remained unchanged. Administration of CG reduced the content of SB in the myocardium even in comparison with intact animals.

The increased content of DC in rat liver after 20 injections of CCl_4 together with the unchanged content of SB and increased DC/SB ratio suggest intensification of LPO in the initial stages. In animals treated with CG the parameters of LPO in this group did not differ from those in intact controls, which suggests an antioxidant effect of CG.

In the group which received 50 injections of CCl_4, 45 days after discontinuation of the treatment the content of DC and SB was found to be increased 2-fold, the DC/SB ratio being unchanged in comparison with intact animals. This suggests active LPO at all stages in this type of liver pathology.

Administration of CG reduced the content of DC and SB in both the liver and myocardium, which implies an antioxidant effect of the hormone.

TABLE 2. Content of SB (rel. units) in the Liver and Heart of CCl_4 – Treated Animals ($M \pm m$)

Group	20 injections of CCl_4		50 injections of CCl_4	
	liver		liver	heart
	2 days	10 days	45 days	45 days
1. Untreated	48.6±11.2	–	30.7±4.3	39.0±8.5
2. Treated with CG	50.6±10.6	44.7±11.1	17.5±1.7	15.4±0.4
3. Intact	66.0±15.1	–	17.4±0.6	51.5±8.1
p	all differences unreliable		$p_{1-2}<0.02$	$p_{1-2}<0.02$ $p_{1-3}>0.3$ $p_{2-3}<0.01$

Thus, administration of CG normalizes LPO activated by CCl_4 both in the liver and in the myocardium.

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Study of Cardioprotective Effect of α-Tocopherol and Panthenol Using an Experimental Model of Ischemized-Reperfused Isolated Heart

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Using an experimental ischemia-reperfusion model it is found that combined treatment with α-tocopherol and panthenol markedly increases the content of endogenous antioxidant tocopherol during total ischemia and reperfusion, i.e., it improves the antioxidant state of the postischemized myocardium, thus preventing possible damage caused by stepped-up production of active oxygen forms during reoxygenation.

Key Words: *antioxidants; tocopherol; panthenol; ischemia; heart; perfusion*

The ischemized myocardium is characterized by a reduced content of antioxidants and high-energy compounds and a lowered activity of antioxidant enzymes together with an increased content of prooxidant metabolites [2]. The fate of the ischemized myocardium during reperfusion is determined not only by the magnitude and reversibility of the changes induced by ischemia itself, but also by the reperfusion period. During this period intensification of lipid peroxidation (LPO) in the vascular endothelium and in cardiomyocyte membranes, which may be caused by the elevated content of active

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