

TECHNOLOGY TRANSFER: INNOVATIVE SOLUTIONS IN MEDICINE, 2018

1. Introduction

Nowadays, one of the most important problems is stressful reaction of human and animal systems [1, 2]. In the current pace of life, constant stress causes an increase in the body the levels of hormones, primarily adrenaline, the high level of which can lead to the activation of products of lipid peroxidation (oxidation of lipids) and decrease of antioxidant defense, as a result of changes in rheological properties of blood towards the thickening of blood, adrenaline myocardial damage and the development of coronary heart disease [3, 4]. Normally, the amount of free radicals is controlled by antioxidants, with stress, antioxidants inadequate struggling with stress, which is described by G. Selye [5, 6]. Immobilization stress in rat tissues causes changes alterations in adaptive reactions, protein oxidation, lipid peroxidation and antioxidant defense system [7, 8].

The aim of our study was to find out the peculiarities of the dynamics of changes in the indices of diene conjugates and malonic dialdehyde in blood in rats under the conditions of development of immobilization stress.

2. Material and methods of research

The experiments were carried out on white male rats of the Vistar line weighing 180–200 g which were divided into 3 groups for 10 animals (one control and three tested). The control group of rats was injected with 1 mg physiological saline per kg body weight intraperitoneally. Animals of the first experimental group were subjected to immobilization stress (IS) for 3 hours, withdrawn from the experiment on the 1st day, animals of the second experimental group (EG) were in the experiment for 3 days, animals of the third experimental group (EG) on the 5th day were withdrawn from the experiment.

Immobilization stress (IS) was reproduced by method of P. D. Horizontov, O. I. Belousova, M. I. Fetodov (1983) [9].

All experimental animals were kept under the standard vivarium in Lviv National Medical University named after Danylo Halytsky. The research has been carried out with the observance

CONTENT OF DIENE KOH'UGATIVES AND MALONIC DIALDEHYDE IN BLOOD FOR RATS IN DYNAMICS OF FORMATION OF IMMOBILIZATIONAL STRESS

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Abstract: Nowadays, one of the most important problems are stressful reaction of human and animal systems.

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Results. The state of the processes (POFs) was assessed by the content of blood vessels detected in different periods (1 st, 3 rd, and 5 th day) after conducting of IS in rats. Under the conditions of the development of the IS, an increase in the content of DK was observed at 116.96 % ($p < 0.05$) in the experimental group1 accordingly on the 1st day after the IS compared with the control. For the 3rd day of the study, the level of DK increased by 44.24 % ($p < 0.05$) in experimental group 2, against the intact group of animals. Experimental group 3, in which animals were withdrawn from the IS for the 5th day, was characterized by an increase in the content of DK by 41.84 % ($p < 0.05$) compared with the control group. Another indicator of MDA in the blood for 1 day of the experiment in experimental group 1 increased by 104.15 % ($p < 0.05$) in the case of IS in relation to the intact group. On the 3rd day of the experiment under the conditions of development of IP, the level of MDA increased by 83.9 % ($p < 0.05$), against control. At the 5th day of the experiment, MDA level was 30.1 % ($p < 0.05$) for IS, when compared with control

Conclusion. Consequently, the experiment made it possible to establish the significant activation of the LP processes, which we determined with increasing levels of DC and MDA in animals under IS conditions, the most of it was on the 1th day of the experiment.

Keywords: rats, blood, lipid peroxidation, antioxidant defense, immobilization stress, diene conjugates, malonic dialdehyde.

of scientific and practical recommendations on the maintenance and handling of laboratory animals, and the provisions of the “European Convention” for the protection of vertebrate animals used for experimental and scientific purposes. The animals were decapitated under anesthesia caused by sodium thiopental (intraperitoneal injection of 1 % solution of 50 mg/kg) and withdrawn from the experiment after 1, 3, and 5 days. In blood plasma was determined the content of diene conjugates (DC) and malonic dialdehyde (MDA) in stress-induced rats, the groups were compared with the control group rats [10].

Statistical processing of the material was carried out using a package of applications (MS Excel, SPSS), which determined the analysis of regression and Pearson coefficient correlation [11].

3. Results

The state of the processes (POFs) was assessed by the content of blood vessels detected in different periods (1 st, 3 rd, and 5 th day) after conducting of IS in rats. Under the conditions of the development of the IS, an increase in the content of DK was observed at 116.96 % ($p < 0.05$) in the experimental group 1 accordingly on the 1 st day after the IS compared with the control. For the 3rd day of the study, the level of DK increased by 44.24 % ($p < 0.05$) in experimental group 2, against the intact group of animals. Experimental group 3, in which animals were withdrawn from the IS for the 5th day, was characterized by an increase in the content of DK by 41.84 % ($p < 0.05$) compared with the control group (Fig. 1).

Another indicator activation of the LP processes of MDA in the blood for 1 day of the experiment in experimental group 1 increased by 104.15 % ($p < 0.05$) in the case of IS in relation to the intact group.

On the 3rd day of the experiment in experimental group 2 under the conditions of development of IS, the level of MDA increased by 83.9 % ($p < 0.05$), against control. At the 5th day of the experiment group 3, MDA level was 30.1 % ($p < 0.05$) for IS, when compared with control (Fig. 2).

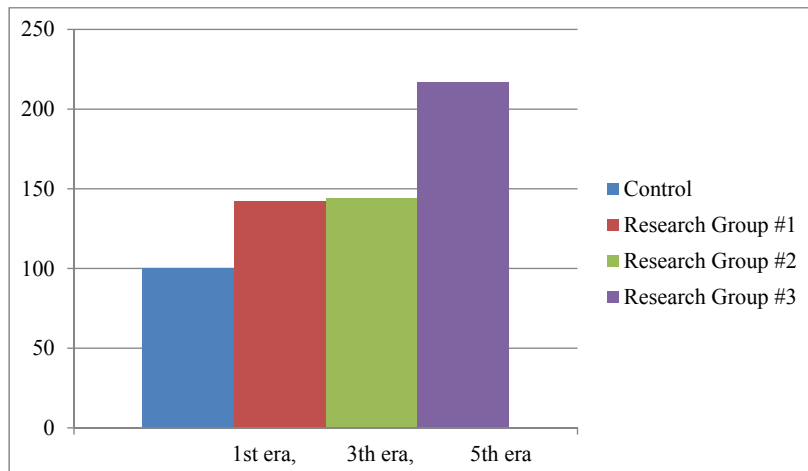


Fig. 1. Concentration of diene conjugates in blood of rats in the dynamics of development of immobilization stress (% of control)

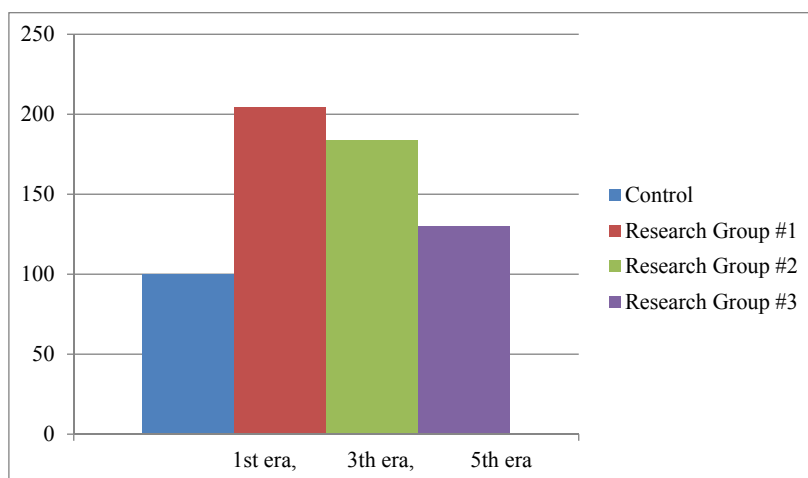


Fig. 2. Concentration of malonic dialdehyde in blood of rats in the dynamics of development of immobilization stress (% of control)

4. Discussion

At the literary review there were no similar results. The tangible results on the issue of the strain were at Magalhães R which investigation reveal the changes that stress triggers in the brain, with structural atrophy affecting key regions such as the prelimbic, cingulate, insular and retrosplenial, somatosensory, motor, auditory and perirhinal/entorhinal cortices, the hippocampus, the dorsomedial striatum, nucleus accumbens, the septum, the bed nucleus of the stria terminalis, the thalamus and several

brain stem nuclei. These structural changes are associated with increasing functional connectivity within a network composed by these regions [12]. Shuai Gong Yi-Long Miao et al in study, effects of estrous cycle stage, circadian rhythm, and acute and chronic (repeated or unpredictable) stressors of various severities on dynamics and correlation of serum cortisol and corticosterone were examined in mice [13]. Banni S et al, investigations it is concluded that a choline-devoid diet, which is hepatocarcinogenic in the rat, does not induce a peroxidation of liver cell membrane lipids, and that not only trans fatty acids, but also fatty acids with conjugated dienes present in a partially hydrogenated fat, are absorbed and assimilated in rat tissue lipids.

The benefits of the work are that it is studying the actual stress problems in an experimental animal model to then model on a person. The disadvantages of work are that you can still explore enzymes of antioxidant protection such as, catalase and superoxide dismutase.

The conducted experiment allowed to establish a significant violation of the prooxidant balance in animals under conditions of immobilization stress. In the future and prospect to study in the experiment and clinic the use of the drug L-arginine for the purpose of correction of metabolic disorders in conditions of experimental immobilization stress.

Prospects for further research. Determination of the processes of lipid peroxidation (DC, MDA) and antioxidant system (CT, SOD) in blood in rats under conditions of immobilization stress can serve as an important criterion for correction of these disorders by antioxidants and promote the normalization of antioxidant defense.

Consequently, the experiment made it possible to establish the significant activation of the LP processes, which we determined with increasing levels of DC and MDA in animals under IS conditions, the most of it was on the 1th day of the experiment. The determination of deviation the processes of lipid peroxidation (DC) in blood in rats under IS conditions can serve a major criterion of correction these deviations by antioxidants and to promote the normalization of antioxidant defense.

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