

UDC: 577.1

INFLUENCE OF MELATONIN ON CATALASE-PEROXIDASE ACTIVITY IN THE MUSCLES TISSUE OF ALLOXAN DIABETIC RATS

Kushnir O.Yu.¹, Yaremii I.M.²

¹*Candidate of Medical Sciences, Assistant, Department: Bioorganic and Biological Chemistry and Clinical Biochemistry, Higher State Educational Establishment of Ukraine "Bukovinian State Medical University", Chernivtsi, Ukraine;*

²*Candidate of Biological Sciences, Assistant professor Department of Bioorganic and Biological Chemistry and Clinical Biochemistry, Higher State Educational Establishment of Ukraine "Bukovinian State Medical University", Chernivtsi*

Key words: melatonin, diabetic rats, alloxan.

Introduction. Melatonin (N-acetyl-5-methoxytryptamine) is the major product of the pineal gland, which functions as a regulator of sleep, circadian rhythm, and immune function.

Melatonin is an indoleamine with potent multifunctional biological and pharmacological effects, both receptor dependent and receptor-independent effects, including antioxidant, anticancer, antitumor, anti-inflammatory, anti-aging, anti-diabetic, antiviral, neuroprotective activities. Melatonin mitigates tissue injury via modification of abnormalities in redox status and other biochemical markers.

The aim was to determine the influence of melatonin on basal levels of glucose in the blood (BG), activity of Catalase (EC 1.11.1.6) and Glutathione peroxidase (GPx) (EC 1.11.1.9) in muscles of alloxan diabetic rats.

Material and methods. The experiments were carried out on 24 sexually mature male albino rats with the body mass - (0.18 - 0.20) kg. Alloxan diabetes originated via injecting the rats with a 5% solution of alloxan monohydrate intraperitoneally in a dose of 170 mg/kg of body weight (b.w.). The animals were divided into three subgroups: 1) control group; 2) diabetic rats; 3) diabetic animals which were introduced the melatonin (Merk, Germany) preparation intraperitoneally in a dose of 10 mg/kg of b.w. at 8 a. m. daily during 14 days starting with a 5-th 24 hour period after the injection of alloxan. Rats were sacrificed at the nineteenth day from the beginning of the experiment accordance with the ethical treatment of animals. Determinations of the enzymes activities were carried out by standard methods. Statistical analysis of the results was conducted by Student's test. Sufficient level considered probability differences $p \leq 0.5$.

Results. Glutathione system - one of the main antioxidant system in all tissues of the body. Glutathione system consists of G-SH and glutathione-related enzymes (glutathione peroxidase and glutathione-S-transferase). As we know glutathione exists in 2 forms: G-SH and G-S-S-G. G-SH has free SH-group, and that is why it may be used in decreasing the content of the active form of oxygen (H_2O_2) by Se-dependent glutathione peroxidase and in formation of the conjugates with different xenobiotics in tissue of the body. In the tissues of the muscles of aloxandiabetic rats, catalase activity was on average 50% lower than that of the control group of animals. At the same time, the activity of glutathione peroxidase in the muscles averaged 32% lower than the activity of a given enzyme of intact rats. Exogenous melatonin (10 mg / kg, per os, daily for 14 days) helps to reduce blood glucose level and basal indices of glutathione standardization system in the muscles of rats with overt diabetes. The normalization of the studied parameters in the muscles of the alloxandiabetic rats receiving melatonin daily for two weeks is due to both the possible positive effect of melatonin on the expression of the catalase and peroxidase genes and the activation of regeneration of glutathione, required for functioning of glutathione peroxidase from its oxidized form. In addition, exogenous melatonin due to direct antioxidant action, contributed to a decrease in the level of active forms of oxygen in tissues, which ultimately contributed to a decrease in the oxidative modification of proteins, in particular catalase.

Conclusion. Our results suggest an increased regenerative or recovery process in the muscular tissue and an increased antioxidant defenses in the group of alloxan diabetic rats.