

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ  
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»**



## **МАТЕРІАЛИ**

**105-ї підсумкової науково-практичної конференції  
з міжнародною участю  
професорсько-викладацького персоналу  
БУКОВИНСЬКОГО ДЕРЖАВНОГО МЕДИЧНОГО УНІВЕРСИТЕТУ  
присвяченої 80-річчю БДМУ  
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**THE STATE OF THE HEXOSOMONOPHOSPHATE SHUNT IN THE LIVER OF RATS WITH LATENT ALLOXAN DIABETES UNDER CONDITIONS OF MELATONIN ADMINISTRATION AND ALTERED PHOTOPERIOD**

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**Introduction.** The pentose phosphate pathway (or hexosomonophosphate shunt) is necessary for transformed cells to synthesize ribonucleotides and is the main source of NADPH<sub>2</sub>.

**The aim of the study.** To find out the influence of melatonin on the activities of glucose-6-phosphate dehydrogenase (G-6-PDH), 6-phosphogluconate dehydrogenase (6-PGDH) and transketolase (TK) in the liver of rats with latent diabetes under conditions of normal, hyper- and hypofunction of the pineal gland.

**Material and methods.** Experiments were conducted on male outbred white rats weighing 180±10 mg. Photoperiodic changes were simulated for 12 days: 1) natural equinox from March 19 to 25 (L12:D12); 2) constant light during the day (500 lux); 3) constant darkness during the day. Alloxan diabetes was induced by intraperitoneal administration of a 5% solution of alloxan monohydrate at a dose of 170 mg/kg once, after a 24-hour fast. Basal glycemia (BG) was determined using the One Touch Ultra device (Johnson & Johnson, USA). On the third day, the death of 50% of diabetic rats was observed. Experimental animals were divided into the following groups: 1) intact rats (control); 2) rats with latent diabetes (BG≤6.9 mmol/l); 3) rats with latent diabetes mellitus, which were intraperitoneally injected with melatonin (Sigma, USA) at a dose of 10 mg/kg of body weight from the 5th day after the administration of alloxan for a week at 8:00 a.m. daily. Animals were euthanized on the 12th day from the beginning of the experiment in accordance with the ethical principles of experiments on animals. In the supernatant obtained after centrifugation of 5% liver homogenate at 900 g, enzyme activities were determined according to standard methods. Statistical processing was performed according to the Student.

**Results.** The activities of G-6-PDH, 6-PGDH in animals with latent diabetes were 77 and 64% higher, respectively, than in control. In the liver of control animals that were under conditions of constant darkness, the activities of G-6-PDG, 6-PGDH, and TK increased by 38, 29, and 12%, respectively, under conditions of constant light, the activities of G-6-PDG, 6-PGDG, and TK decreased by 18, 10 and 15%, respectively, in comparison with the indicators of intact animals under equinox conditions. With constant darkness against the background of latent diabetes, the activities of G-6-PDG, 6-PGDH and TK increased by 115, 95 and 30%, respectively; under conditions of constant light, the activities of G-6-PDG, 6-PGDH, and TK were 24, 16, and 22% lower, respectively, than in the group of intact animals under equinox conditions. But if oxidative stress develops in the cell, then the pentose phosphate pathway will "reciprocate" with glycolysis through fructose-6-phosphate, which is formed in the process of the non-oxidative phase. If the cell is in a state of oxidative stress, then it immediately stops glycolysis and transfers all glucose to the pentose phosphate pathway the path for the synthesis of NADPH. Administration of melatonin to animals with latent diabetes under all lighting conditions led to the normalization of all investigated parameters (except for the activity of G-6-PDH under conditions of constant light in latent diabetes, which increased by 20% compared to intact animals at the equinox).

**Conclusions.** Melatonin allows to restore the violation of carbohydrate metabolism in the context of the restoration of biosynthetic processes and antioxidant protection due to the regulation of the enzyme activity of the hexosomonophosphate shunt of glucose-6-phosphate oxidation.

**Lenha E.L.**

**EFFECT OF MELATONIN ON CATALASE ACTIVITY IN THE BLOOD OF RATS**

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**Introduction.** Violation of the body's antioxidant resistance under the influence of physical, chemical or stressful factors requires early diagnosis with subsequent correction to prevent and

eliminate the effects of peroxide damage to biomolecules, which is accompanied by a violation of biochemical and physiological processes and the development of pathology.

**The aim of the study.** To determine the effect of melatonin on catalase activity in the blood of rats with toxic hepatitis under the conditions of different functional activity of the pineal gland.

**Material and methods.** Experimental studies were carried out on white non-linear male rats weighing  $180 \pm 10$  g. For 14 days before the beginning and throughout the experiment, the animals were kept under different lighting conditions (corresponding to the various functional activity of the pineal gland): group A - normal function - (12 hours of light: 12 hours of darkness); group B – hypofunction - (24 hours of light: 0 hours of darkness); group C - hyperfunction - (0 hours of light: 24 hours of darkness). Daylight lamps with an intensity of 1500 lux were used in the experiment.

On the 15th day from the beginning of the experiment, subgroups were formed in each group of animals: I - control - continued to be kept under the appropriate conditions of the light regime; II – animals were injected intragastrically twice (every other day) with a 50% oily solution of tetrachloromethane at a dose of 0.25 ml/100 g of mass; III – against the background of tetrachloromethane intoxication (see subgroup II), during the next 7 days, the animals received melatonin (daily at 8 a.m. a solution (3 mg/100 g of body weight) was administered intragastrically). Animals were euthanized by decapitation under light ether anesthesia at 8 a.m. Blood catalase activity was determined by the amount of hydrogen peroxide used in the reaction and expressed in  $\mu\text{mol/h} \cdot \text{mg}$  of protein. Statistical processing of the obtained results was carried out using the Student's parametric t-test. The difference in results at  $p < 0.05$  was considered statistically significant.

**Results.** After analyzing the obtained results, it was established that the activity of catalase in the blood of rats changes under conditions of different duration of the photoperiod, namely, in comparison with animals of the AI group, the activity was 14.6% lower in the BI group and 6% higher in the CI group. Under the conditions of intoxication of rats with hepatotoxin, a tendency to a decrease in enzyme activity was observed in all groups of animals: by 10% in group AII, by 14.6% in group BII and by 9% in group CII compared to the respective control groups. When exogenous melatonin was administered, the activity of the enzyme increased by 17% in animals of group AIII (which was 6% higher than that of group AI), by 14% in animals of group BIII, and by 13% in animals of group CIII. In general, it should be noted the negative effect of 24-hour, two-week light exposure on blood catalase activity. However, keeping animals in 24-hour darkness contributed to an increase in enzyme activity, especially under the conditions of exogenous melatonin administration.

**Conclusions.** The toxic effect of tetrachloromethane combines a direct effect on the functioning of hepatocytes and the activation of oxidation processes in the body as a whole. This effect increases against the background of insufficient synthesis of melatonin by the pineal gland (round-the-clock experimental exposure to light). Against the background of such changes, exogenously administered melatonin helps to restore the activity of the enzyme in the blood. Probable mechanisms of realization of this effect of the hormone are its action as a direct scavenger of reactive oxygen species, protection of the enzyme from oxidation and reduction of the total oxidant load on the body with activation of the glutathione antioxidant system.

**Panasenko N.V.**

## **SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF PYRAZULUM-CONTAINING SEMICARBAZONES**

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**Introduction .** Semicarbazones are important intermediates for the creation of drugs, as well as effective organocatalysts. In addition, such synthetic drugs as Dantrolen, Etoperidon, Glisoxepid, Nitrofurantoin contain both exo- and endocyclic fragments of the semicarbazide system.