Melatonin and its metabolites have potent antioxidant/anti-inflammatory properties, and they have proven to be highly effective in a variety of disorders linked to inflammation and oxidative stress.

Hyperglycemia-mediated oxidative stress plays a crucial role in diabetic complications. The consequence of the emergence of this shift can be the appearance of age features in the body's resistance to harmful factors of diabetic mellitus.

Changes in the ontogenesis of sensitivity of the carbohydrate metabolism in the blood on the background of diabetic mellitus and melatonin injections are less studied.

The object of this experimental research was to ascertain the influence of melatonin on the background of aging on the level of glycemia and activity of pyruvate kinase in blood of alloxan diabetic rats.

We used male Wistar rats, two age groups: the 2-month rats (late puberty), and the 4-month rats (adult). Alloxan diabetes was evoked via injecting the rats with a 5% solution of alloxan monohydrate intraperitoneally in a dose of 170 mg/kg. In each age group there were control rats and diabetic animals. Melatonin ("Sigma", USA) preparation was introduced to diabetic animals intraperitoneally in a dose of 10 mg/kg of body weight at 8 a.m. daily during 42 days starting with the fifth day 24 hour period after the injection of alloxan. Blood was taken from the tail vein to evaluate the glycemia level on the fifth and the 47-th day after the injection of alloxan. Rats were sacrificed on the 47-th day of the experiment in accordance with the ethical treatment of animals.

The level of glucose on the fifth day of the experiment in animals of both groups increased on average by 115% from baseline values. However, on 47-th day this index was higher in group of late puberty rats 20% more than in the group of adult rats. Pyruvate kinase activity in erythrocytes of adult and late puberty animals with overt diabetes decrease by 25% and 50% respectively compared with the control rats. The changes may be the result of age-related disorders of energy metabolism due to disturbances in free radical mechanisms. Moreover, hyperglycemia leads to increased free radical mechanism in old rats. We have reached the recovery of the pyruvate kinase activity in the blood of diabetic rats of both age groups by melatonin injections.

Thus, we have determined that there is a change in the course of ontogenesis of the sensitivity of the pyruvate kinase activity in the blood to the effect of diabetic mellitus factors. According to the results of the study, melatonin shows its protective action against hyperglycemia inducing age-related changes of pyruvate kinase activity in the blood of alloxan diabetic rats.

**Lenha E.L.**

## EFFECTS OF ECHINACEA PURPUREA TINCTURE ON TOTAL ANTIOXIDANT ACTIVITY OF RAT SERUM AT DIFFERENT PHOTOPERIOD

*Department of Bioorganic and Biological Chemistry and Clinical Biochemistry*
*Bukovinian State Medical University*

The state of antioxidant defense of the body is determined by many endogenous and exogenous factors. One of them is the duration of the photoperiod, which controls the level of functional activity of the pineal gland, and hence the level of a powerful antioxidant - melatonin. Under conditions of oxidative stress, depletion of endogenous antioxidant systems is widely used antioxidants based on plant materials.

The goal of the study was to study the changes in the total antioxidant activity of the serum (TAAS) of rat blood under conditions of toxic hepatitis and the introduction of Echinacea purpurea tincture (EPT).

Experimental studies were carried out on white adult male rats weighing 180±20 g in the spring. Depending on the lighting conditions, the animals were divided into three groups: I - artificial lighting conditions with periods of 12 hours of light: 12 hours of darkness (12L: 12D); II - 24 hours of light: 0 hours of darkness (24L: 0D) and III - 0 hours of light: 24 hours of darkness (0L: 24D). After a five-day stay under appropriate lighting conditions, each group was divided into subgroups: A - control; B - animals were intragastrically injected by Echinacea purpurea tincture (0.25 ml / kg body weight); C - animals with toxic hepatitis (intragastrically twice (every other day)

the animals were administered a 50% oil solution of tetrachlormethan at a dose of 0.25 ml / 100 g weight); D - for the next seven days after intoxication, the animals were intragastrically injected by Echinacea purpurea tincture (0.25 ml / kg body weight). Euthanasia, by decapitation under light ether anesthesia, was performed at 8 o'clock in the morning. In the serum of rats TAAS was determined, which was expressed as a percentage of inhibition of spontaneous peroxidation of endogenous lipids of the brain (according to the content of malonic dialdehyde).

Under conditions of different duration of the photoperiod, changes in TAAS were observed: in the second group of animals, it decreased by 9.21%, and in the third group it increased by 18% compared to the animals of the first group. The introduction of EPT increased the antioxidant activity of rat serum by 10.32% (under conditions 12L: 12D), by 18.74% (under conditions 24L: 0D) and by 6.5% (under conditions 0L: 24D) compared with animals of the corresponding control groups.

After intoxication with tetrachlormethan in all groups of animals, there was a decrease in the level of TAAS: in the IC group - by 28.04%; in the IIC group - by 34.7% and in the IIIC group by 27% compared with animals of the corresponding control groups. At seven-day administration of EPT to intoxicated rats the increase of TAAS by 24% (under conditions 12L: 12D), by 40% (under conditions 24L: 0D) and by 14% (under conditions 0L: 24D) was revealed.

Therefore, according to the results of research there was a decrease in TAAS of rats under conditions of stay in constant daylight and an increase of it in round-the-clock darkness, which may indicate the suppression of antioxidant protection in conditions of reduced functional activity of the pineal gland. At the same time, the presence of animals in the conditions of round-the-clock darkness promotes the activation of TAAS in them. The introduction of EPT has a positive effect on increasing the antioxidant resistance of serum in both healthy animals and those intoxicated with tetrachlormethan. This effect was manifested, in particular, at low functional activity of the pineal gland and may indicate the feasibility of EPT as a drug with antioxidant properties under conditions of enhanced oxidation processes.

**Luhinich N.M.**

## EFFECTS OF THE 14-DAY-INTRODUCTION OF MELATONIN ON CONTENT OF TBA-ACTIVE PRODUCTS IN THE LIVER OF ALLOXAN DIABETIC RATS

*Department of Bioorganic and Biological Chemistry and Clinical Biochemistry*
*Bukovinian State Medical University*

Complications of diabetes include cardiovascular disease, chronic renal insufficiency and diabetes retinopathy. These complications associated with hyperglycemia cause oxidative stress in the body.

The experimental model of alloxane diabetes is quite common, which is often used to study the different aspects of pathogenesis and pathomorphology of diabetes. It is known that during the diabetes activation of free radical oxidation of biomolecules occurs as well as depletion of the antioxidant system. Free radicals destroy lipids and proteins on the membranes and cause modifications and oxidation of lipids and proteins thereby damaging cells.

Melatonin is one of the strongest antioxidants that is secreted by the daily rhythm of the pineal gland. Recently, scientists and physicians actively studied the physiological effects of melatonin on different organs and systems, as this hormone has somnogenic effect and it is a regulator of circadian systems of the organism as well as the immune system stimulator and shows protective properties from premature senescence, cancer, stress and is an antioxidant. It can suppress reactive oxygen species (ROS). This study was aimed to investigate the effect of melatonin on content of TBA-active products in the liver of alloxan diabetic rats.

The experiments were carried out on sexually mature male albino rats with the body weight – 150-180 g. Alloxan diabetes was evoked via single injecting the rats with 5% alloxan monohydrate solution (Sigma Chemicals Company: 150 mg/kg body weight) dissolved in normal saline to the male rats, after an overnight fast (access to only water) of 12 hours to make them more