Experiments were performedon 50 mature white male rats with body weight 160-180 g. Alloxan diabetes was induced by intraperitoneal injection 5% solution of alloxanmonohydrate at a dose of 150 mg/kg. Animals were divided into groups: 1) control animals; 2) animals with manifest diabetes (basal glycemia 12,8-17,2 mmol /l); 3) animals with manifest diabetes which underwent intragastric administration of melatonin daily at a dose of 10 mg/kg at 8.00 a.m. The animals were decapitated under light ether anesthesia on the 7thand 14th day of the drug administration. In postnuclear supernatants of heart homogenates the activity of glutathione-S-transferase was measured. The results were processed statistically using nonparametric methods of variation statistics using STATISTICA 7.

Experimental model of alloxan diabetes accompanied by an increased activity of glutathione-S-transferase in the rats' hearts by 34% above the control one on the 7th of the experiment. The increase of glutathione-S-transferase activity in the hearts of diabetic rats is probably related to an increased disposal of waste products of lipid peroxidation and other oxidized compounds by conjugation with glutathione. On the 14th day of the experiment there was no significant difference in this parameter between control and diabetic animals.

Administration of melatonin to animal with alloxan diabetes caused a decrease of glutathione-S-transferase activity in the heart compared to untreated animals on the 7th day of experiment which resulted in normalization of its value.

Antioxidant properties of melatonin are likely to be related to both direct disposal of reactive oxygen species and the influence of melatonin on the expression of genes responsible for synthesis of antioxidant enzymes.

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ACTIVITY OF MITOCHONDRIAL SUCCINATE DEHYDROGENASE IN THE KIDNEYS UNDER CONDITIONS OF EXPERIMENTAL DIABETES MELLITUS

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Mitochondria are the keepers of the eukaryote's cell viability by regulating programmed cell death, and they control the production of reactive oxygen species. Some findings suggest that mitochondria play a key role in diabetes complications, because diabetes mellitus is a disease characterized by different molecular and cellular destructions.

The aim of our study was enzymohistochemical observation and biochemical determination of activity of mitochondrial succinate dehydrogenase (SDH) in the kidneys under conditions of experimental diabetes mellitus.

The experiment was carried out on male albino rats with the body weight 0.16 – 0.18 kg. The animals in the experimental group were administered a single intraperitoneal dose of alloxan (150 mg/kg). Mitochondria were isolated by differential centrifugation in the isolation buffer. Statistical analysis was done using Microsoft excel, Office 2007. $P<0,01$ was considered to be statistically significant. All manipulations with animals were carried out according to European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes and the law of Ukraine "On protection of animals from cruelty".

Succinate dehydrogenase is an enzyme complex bound to the inner mitochondrial membrane that converts succinate into fumarate, in a reaction coupled to the reduction of flavin adenine dinucleotide to $FADH_2$. According to the literature, succinate and its mitochondrial metabolites may participate in triggering of insulin release by pancreatic islets. Activity of mitochondrial SDH in diabetic rats was markedly lowered (by 16 %), probably due to impairment in the Krebs cycle activity.

Moreover, the enzymohistochemical observation shows a decrease of the activity of succinate dehydrogenase at the level of the proximal tubules of the nephron. These changes might have a critical role in determining the direction of electron flow. The decrease of activity of mitochondrial SDH perturbs cellular bioenergetics, supporting the metabolic disorders by diabetes mellitus.

In addition, the role of mitochondria in diabetes has not been fully elucidated and the energy metabolism under conditions of diabetes mellitus needs further studying.

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DYE SENSITIZED TiO_2-BASED SOLAR CELLS

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The solar energy generation has significant potential and wide prospects to supply mankind with environmentally safe energy. However, the solar energy generation still covers less than 1 % of the total energy output. These photoelectrochemical redox systems built with the wide-zone oxide semiconducting materials sensitized with different dyes have better competitive potential and can easily be introduced into commercial energy production.

Gratzel cell is known as an especially promising type of the photoelectrochemical solar cells made of inexpensive components and without any sophisticated equipment.

Construction and development of the TiO_2-based solar cells sensitized with different dyes and determination of their efficiency under various working conditions were the main aims of this work.