МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
ВИЩИЙ ДЕРЖАВНИЙ НАВЧАЛЬНИЙ ЗАКЛАД УКРАЇНИ
«БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»

М А Т Е Р І А Л И

101 – ї
підсумкової наукової конференції
професорсько-викладацького персоналу
Вищого державного навчального закладу України
«БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»
10, 12, 17 лютого 2020 року

Чернівці – 2020

УДК 001:378.12(477.85)
ББК 72:74.58
М 34

Матеріали 101 – ї підсумкової наукової конференції професорсько-викладацького персоналу вищого державного навчального закладу України «Буковинський державний медичний університет» (м. Чернівці, 10, 12, 17 лютого 2020 р.) – Чернівці: Медуніверситет, 2020. – 488 с. іл.

ББК 72:74.58

У збірнику представлені матеріали 101 – ї підсумкової наукової конференції професорсько-викладацького персоналу вищого державного навчального закладу України «Буковинський державний медичний університет» (м.Чернівці, 10, 12, 17 лютого 2020 р.) із стилістикою та орфографією у авторській редакції. Публікації присвячені актуальним проблемам фундаментальної, теоретичної та клінічної медицини.

ISBN 978-966-697-843-4

(intragastrically twice (every other day) animals were given a 50% oil solution of tetrachloromethane in the dose of 0.25 ml / 100 g mass); III - against the ground of toxic hepatitis, animals were injected intragastrically with melatonin in the dose of 3 mg / kg. Euthanasia by decapitation under mild ether anesthesia was performed on the 5th and 7th day from the beginning of melatonin administration. The content of reduced glutathione was determined in the blood of rats.

In animals with toxic hepatitis on the 5th and 7th day of the experiment, the content of reduced glutathione in the blood of the animals decreased by 38.4% and 61.2%, respectively, compared with animals of the control group. In animals with seven-day toxic hepatitis, the content of reduced glutathione was 33% lower than in animals with 5-day intoxication. With daily administration of melatonin, the content of reduced glutathione in the blood of rats increased by 55.7% (on day 5) and 2.5-fold (on day 7) compared with animals with toxic hepatitis and recovered to the level of animals in the control group.

Therefore, in tetrachloromethane toxic hepatitis, the content of reduced glutathione in the blood of rats decreases due to its use by the enzymes of the glutathione system. Decrease in the content of reduced glutathione depends on the duration of intoxication of the animals, which is due to the depletion of its reserves in the body.

The introduction of melatonin helps to increase the content of reduced glutathione in the blood of animals by activating its regeneration from the oxidized form (activation of gene expression of glutathione reductase), as well as by the direct scavenger action of melatonin on reactive oxygen species. A more positive effect on the recovery of the pool of reduced glutathione is observed with prolonged use of melatonin.

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EFFECTS OF MELATONIN ON CERULOPLASMIN CONCENTRATION IN THE BLOOD OF ALLOXAN DIABETIC RATS

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The most relevant problems of modern medicine are the search for means to improve the therapy of diabetes, which has become widespread in recent years due to the progress of many amplifications of this disease.

Free radicals formed at oxidative stress are highly toxic to cellular components especially lipids and proteins that are a part of cell membranes. Free radicals destroy lipids and proteins on the membranes and cause modifications and oxidation of lipids and proteins thereby damaging cells. Lipid and protein oxidation products are metabolized by non-enzymatic and enzymatic mechanisms to eliminate oxidative stress.

Melatonin (5-methoxy-N-acetyltriptamine) is one of the strongest antioxidants secreted by the daily rhythm of the pineal gland. Melatonin is believed to be useful for therapy of many diseases, such as depression, insomnia, obesity, cancer, immune and cardiac disorders. This study was aimed to investigate the effect of melatonin on ceruloplasmin concentration in the blood 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 simulated 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 susceptible to developing diabetes. After diabetes induction, melatonin (10 mg/kg daily) was administered intragastrically to the animals in the melatonin-treated group, for 7 or 14 days.

The animals were divided into the following groups: control rats – group I; diabetes (7 days) – group II; diabetes + melatonin (7 days) – group III; diabetes (14 days) – group IV; diabetes + melatonin (14 days) – group V. All the data are expressed as means ± S.E. and represent at least

four independent experiments. Significant differences between groups were evaluated by using Wilcoxon test with $p< 0.05$.

Ceruloplasmin concentration in blood plasma of rats with alloxane diabetes was found to be lower than in the control group of animals for 7 and 14 days by 38 % and 29% respectively. Therefore, the level detected in the experiment may be due to the depletion of the antioxidant protective system. As a result, evoked oxidative stress breaks the pro- and antioxidant balance.

The introduction of melatonin during 7 days contributed to the increase of ceruloplasmin concentration on 20 % compared with alloxan diabetic rats. In addition, the administration of melatonin during 14 days contributed to the normalization ceruloplasmin concentration (higher on 20% compared with untreated animals).

The obtained results evidence the effectiveness of the use of melatonin for the correction of the antioxidant defense system in experimental diabetes mellitus. The antidiabetic melatonin function is implemented at the cellular and systemic levels. An important aspect of the cellular effect of melatonin is its effect on the process of lipid peroxidation and the level of free radicals that increase in diabetes mellitus. Antioxidant effect of melatonin is likely related to the ability to intercept free radicals due to the presence of indole ring in its composition. There are certain data available that melatonin may directly effect on genes expression responsible for the synthesis of antioxidant enzymes.

Alloxane diabetes was found to reduce concentration of ceruloplasmin in the blood. In conditions of alloxane diabetes and the introduction of exogenous melatonin in rats with alloxane diabetes in the dose of 10 mg / kg daily for 7 and especially 14 days, it caused a pronounced antioxidant effect, normalizing ceruloplasmin concentration, an enzyme of antioxidant protection in the blood of alloxane diabetic rats.

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IMPROVEMENT OF THE RDE STATIONARY VOLTAMMETRY METHOD

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The processes occurring within the diffusion part of electrical double layer (EDL) can make a significant influence on the electrode reactions in the low ionic strength systems. The classical model of the concentration polarization processes simulation is based on the Levich's equation of convective diffusion, which considers only the convection and diffusion parts of the electroactive components transfer within the diffusion layer while the migration flux remains neglected. This approach can derive a systematic error in the surface-inactive electrolyte systems with low ionic strength because the background electrolyte concentration is insufficient to ensure smallness of the electroactive components migration flux. Let's study this question.

The experimental results have been used to find the kinetic parameters of persulfate ion reduction on the tin RDE under the stationary voltammetry. The linear regression equations were found by the Gui-Chapman-Stern-Grem (GCSG) EDL theory, Frumkin's slow discharge/ionization theory while the mass-transfer equations with respect to the boundary conditions and electroneutrality condition were used to calculate the electroactive ions concentrations in the near-electrode layer. A solution for the mass transfer equation without consideration of the migration flux can be found analytically. Concentration profile for the electroactive ions with consideration of the migration flux was calculated by numerical methods.

From Fig. it is seen that the differences in the obtained results increase with decreasing ionic strength of the solution.

A comparison between dispersions of the two approaches by Fisher's method proves that a difference between them is statistically insignificant. Therefore, both approaches show same reproducibility. However, a difference derived from the modified Student's test of the kinetic parameters found by both approaches is statistically significant. This means that the systematic error