

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



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**THE NATURE OF THE RELATIONSHIPS BETWEEN THE MORPHO-FUNCTIONAL STATE OF THE LIVER AND THE SPLEEN UNDER THE CONDITIONS OF ISCHEMIA-REPERFUSION INJURY OF THE BRAIN**

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**Introduction.** According to literature sources, even short-term disturbances of blood supply to the brain lead to significant pathohistological changes in the liver and the spleen, which, in turn, cause a violation not only of their functioning, but also of the immune state of the body, as well as aggravate the course of the underlying disease. In the recent years, a sufficient number of scientific facts have been accumulated regarding the nature of the relationship between the morpho-functional state of the liver, the spleen and other internal organs and the brain under the conditions of ischemic-reperfusion injury.

**The aim of the study.** The purpose of the work is to analyze the literature data on the relationship between ischemic-reperfusion damage of the brain and the morpho-functional state of the liver and the spleen.

**Material and methods.** The analysis of scientific literary sources (48 articles) describing the relationship between the liver and the spleen in ischemia-reperfusion injury of the brain.

**Results.** Ischemia-reperfusion of the brain leads to the liver damage and dysfunction due to excessive accumulation of reactive oxygen species, energy deficit, and activation of apoptosis and inflammatory response. One of the ways of the liver's response to the brain ischemia-reperfusion is considered to be increased synthesis by the liver of enzymes involved in the metabolism of toxic glutamate, which, as is known, is formed in excessive amounts in the ischemic zone as a result of the activation of the glutamate cascade. However, not only ischemia-reperfusion injuries of the brain can affect the indicators of the morphofunctional state of the liver, but also ischemia-reperfusion of the liver can affect the activity of certain neuronal phenotypes in the brain of rats. The spleen belongs to the lymphoid organs with the largest pool of immunological cells, so it is clear that after ischemia-reperfusion of the brain, the last are directed to areas of inflammation in the damaged brain tissues. Activation of the spleen under these conditions occurs with the participation of the sympathetic nervous system. Other studies strongly demonstrate that the spleen initiates immune responses that exacerbate ischemic brain injury.

**Conclusions.** The analysis of the scientific facts available in the literature proves the presence of two-way relationships between ischemic-reperfusion injury of the brain and the morpho-functional state of the liver and the spleen.

**Semenenko S.B.**

**STUDY OF THE INFLUENCE OF CHRONORHYTHMS ON THE PHYSIOLOGICAL FUNCTIONS OF THE HUMAN BODY**

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**Introduction.** In the recent years, many scientific works have been written about the role of sleep, the endogenous system of the circadian rhythms and its main regulator - melatonin in the development and progression of obesity. Currently, the number of people with obesity is increasing everywhere, which is dangerous not only in itself, but also as a risk factor for the development of metabolic syndrome.

**The aim of this study** is the important aspects of the problem of the circadian rhythms disorders and their relationship with obesity.

**Material and methods.** Literary sources of the foreign and domestic authors were used in the work, and their systematic analysis was carried out.

**Results.** Melatonin is the main hormone of the pineal gland, which is prone to diurnal periodicity with maximum synthesis in the dark time of day. The main function of this hormone is a modulating effect on the circadian organization of physiological processes and ensuring the

synchronization of the body's biological rhythms with the rhythms of the environment. The link between melatonin and body weight control appeared to be mediated by beige fat. Beige fat is a recently discovered type of adipose tissue. It has a thermogenic effect: chronic intake of melatonin sensitizes the thermogenic effect in cold, increases the thermogenic effect of physical exercises and is a component of obesity therapy. Small amounts of melatonin are found in fruits and vegetables: mustard, Tibetan goji berries, almonds, sunflower seeds, cardamom, fennel, coriander, and cherries, which may be a beneficial dietary factor in the treatment of obesity. In particular, there is evidence that melatonin has an antioxidant effect, which consists in binding free radicals, increasing the activity of antioxidant enzymes and potentiating the action of other endogenous antioxidants. Existing drugs used in the treatment of obesity are not effective enough and have many serious side effects. In connection with this, the search for means of prevention and treatment of obesity is an extremely urgent task, which dictates the need to create and use adequate experimental models on animals. In metabolic syndrome, a statistically significant decrease in the level and disruption of the rhythm of melatonin production was found, and a decrease in the night peak was observed. An inverse relationship between the content of melatonin sulfate in urine and components of the metabolic syndrome was revealed: the main marker was abdominal obesity. The lower the concentration of melatonin sulfate in the urine, the greater the frequency and severity of components of the metabolic syndrome. The accumulated knowledge about the metabolic processes of various nutrients in obesity speaks of the polyetiological and polypathogenetic nature of their disorders. An important role is given to the processes of free radical oxidation.

**Conclusions.** In connection with this, further in-depth studies focused on understanding the complex associations between obesity, the circadian rhythms system, and the development of metabolic complications are promising and extremely necessary for the development of science-based principles for early prevention and timely correction of such disorders.

**Yasinska O.V.**

**THE SIGNIFICANCE OF EPIGENETIC MECHANISMS OF PHYSIOLOGICAL ADAPTATION TO HYPOXIA IN THE SEARCH FOR KEY POINTS OF INFLUENCE ON HYPOXIA-DEPENDENT PATHOLOGICAL PROCESSES**

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**Introduction.** Epigenetics is a term in biology referring to heritable traits that do not involve changes in the underlying DNA sequence of the organism. Cancer and stem cell research have gradually focused attention on these genome modifications. The molecular basis of epigenetics involves modifications of DNA and the chromatin proteins associated with it. Recent data suggests that epigenetics plays a crucial role in the development of many processes, including physiological reactions. Increasingly, researchers are detecting links between epigenetics and a number of diseases. Epigenomic modifications are reversible chromatin rearrangements that modulate gene expression without changing DNA sequences and provide variability in the transcriptional activity of individual genes, the course of the cell cycle, DNA replication and repair, and imprinting phenomena. Despite significant progress in the identification of adaptive genomic signals that are closely related to the physiological characteristics of “hypoxia tolerance” in high-altitude populations, many questions regarding the fundamental biological processes underlying such adaptation remain unanswered. The study of the mechanisms of adaptation to hypoxia in the ontogeny process acquires special importance in the view of the potential therapeutic and preventive effect of natural environmental factors. The well-known preconditioning effect of interval hypoxic training on many hypoxia-dependent or hypoxia-induced pathological processes was confirmed by numerous studies at the level of systemic and tissue reactions. Our studies proved the effect of intermittent hypobaric hypoxia on the course of lipid and protein peroxidation, tissue fibrinolysis and proteolysis, including the modifying effect of the changed duration of the photoperiod on these reactions. However, possible epigenomic changes in the body of animals or