МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»

М А Т Е Р І А Л И

105-ї підсумкової науково-практичної конференції
з міжнародною участю
професорсько-викладацького персоналу
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Матеріали підсумкової 105-ї науково-практичної конференції з міжнародною участю професорсько-викладацького персоналу Буковинського державного медичного університету, присвяченої 80-річчю БДМУ (м. Чернівці, 05, 07, 12 лютого 2024 р.) – Чернівці: Медуніверситет, 2024. – 477 с. іл.

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У збірнику представлені матеріали 105-ї підсумкової науково-практичної конференції з міжнародною участю професорсько-викладацького персоналу Буковинського державного медичного університету, присвяченої 80-річчю БДМУ (м. Чернівці, 05, 07, 12 лютого 2024 р.) із стилістикою та орфографією у авторській редакції. Публікації присвячені актуальним проблемам фундаментальної, теоретичної та клінічної медицини.

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12-hour intervals (2 p.m. and 2 a.m.). Histological sections were stained by the histochemical method according to Nisle's neutral red (modification) for the tigroid substance of neurons. On digital copies of images with histochemical staining, the intensity of staining was assessed by computer microdensitometry.

Results. We found that on average the amount of tigroid substance in mature rats was higher than in old rats. In particular, the optical density of immunohistochemical staining for tigroid substance in mature rats under standard light conditions was in the range of 0.258±0.0019 units of optical density at 2 p.m. and 0.263±0.0017 units of optical density at 2 a.m. Whereas in old rats, this indicator was 0.214±0.0017 units of optical density at 2 p.m. and 0.216±0.0018 units of optical density at 2 a.m. ($p<0.001$).

A significant decrease in the amount of tigroid substance in the neurons of the hypothalamic LPN was observed under round-the-clock illumination, which was especially noticeable in old rats. Thus, the optical density of immunohistochemical staining for the tigroid substance of mature rats at 2 p.m. was in the range of 0.252±0.0020 units of optical density, and at 2 a.m. - 0.259±0.0024 units of optical density. At the same time, in old rats, this indicator was 0.183±0.0018 units of optical density at 2 p.m., and 0.192±0.0019 units of optical density at 2 a.m. ($p<0.001$).

Conclusions. The amount of tigroid substance in mature rats is on average higher than in old animals. Light stress leads to a decrease in the amount of tigroid substance in the neurons of the lateral preoptic nucleus of the hypothalamus in both mature and old rats, indicating deep dystrophic changes in the neurons.

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MORPHOMETRIC CHARACTERISTICS OF THE STATE OF NEURONS OF THE MEDIAL SMALL-CELL SUBNUCLEI OF THE HYPOTHALAMIC PARAVENTRICULAR NUCLEI OF OLD RATS AT DIFFERENT PHOTOPERIOD DURATION

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Introduction. Many physiological and behavioral processes exhibit circadian (circadian) rhythms generated by internal chronometric systems, biological clocks. Light disturbance (prolonged lighting, constant darkness) is a major stressor that leads to the development of desynchronosis. One of the important links in the brain's neuroendocrine adaptation to stress is the hypothalamic paraventricular nuclei (PVN), which ensure the development of adaptive responses and the formation of the body's resistance to stress.

The aim of the study. To investigate the effect of changes in the lighting regime on morphological and densitometric changes in the neurons of the medial small cell subunits (mPVN) and posterior large cell subunits (pPVN) of the rat hypothalamus.

Material and methods. The experiments were performed on 36 old white male rats. The material was sampled at 12-hour intervals (2 p.m. and 2 a.m.) due to the cyclicity of melatonin synthesis. Histological sections were stained with hematoxylin and eosin. For computer morphometry, digital copies of the images of the studied structures were obtained using a LUMAMP8 microscope and an Olympus C740UZ digital camera.

Results. Under normal lighting conditions, the average volume of neurons ($p<0.05$) in the hypothalamic mPVN of old rats significantly decreased at 2 a.m. compared to 2 p.m., while the volume of their nuclei did not change on average during these periods of study. Under conditions of light deprivation, the volume of neurocytes of the hypothalamic mPVN of old rats increased compared to animals under normal lighting conditions. In addition, the average number of neurocytes on the standard plane of the histological section slightly increased. At the same time, it should be noted that under conditions of light deprivation in the neurons of the hypothalamic mPVN of old rats, the average volume of neurons significantly decreased ($p<0.05$) at 2 a.m. compared to 2 p.m., while the volume of their nuclei did not change on average during these periods of study.

Under light stress in the hypothalamic pPVN nucleus at night, a significant increase in the neuronal body area by 9.3 % was found compared to that in intact old animals at 2 a.m. This pattern was caused by a significant increase in the nucleus by 16.1 % and the nucleolus by 27.3 %. Constant illumination was also reflected in a significant increase in RNA concentration in the nucleus by 5.5%, in the nucleolus by 9.2%, and in the cytoplasm by 7.9% compared with the group of the previous time interval.

Conclusions. The functioning of the neurons of the medial small-cell and posterior large-cell subnuclei of the rat hypothalamic paraventricular nucleus is characterized by circadian rhythmicity. Under conditions of light deprivation, desynchronization of the activity of the studied structures and a shift in the largest values of the neuronal area from 2 p.m. to 2 a.m. were observed. There is no pronounced increase in the functional activity of the median small cell subnuclei and no significant differences in the area of neuronal bodies, their nuclei, nucleoli, cytoplasm, concentration of RNA, specific volumes of nuclei and cytoplasm in animals exposed to standard light conditions and light stress regimes suggests wide limits of plasticity of the studied neurosecretory cells when animals were kept under constant light conditions for a week.

Vlasova K.V.

THE ROLE OF LEPTIN AND GHRELIN IN THE REGULATION OF FOOD INTAKE AND BODY WEIGHT

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Introduction. Food intake and energy expenditure must be balanced to maintain a healthy body weight. This balance is kept by the central nervous system which controls feeding behavior and energy metabolism.

The aim of the study. To analyze reference data about the influence of stress and diet on obesity.

Material and methods. The databases Pubmed, Scopus, Jama were analized.

Results. Several brain systems are involved including the brainstem which receives neural inputs from the digestive tract, and the hypothalamus which picks up hormonal and nutritional signals from the circulation. These two systems collect information about the body's nutrient status and respond accordingly. They also interact with the reward and motivation pathways which drive food seeking behavior. The arcuate nucleus, ARC, of the hypothalamus emerges as the major control center. There are two groups of neurons with opposing functions in the ARC. The appetite stimulating neurons expressing NPY and AGRP peptides and the appetite suppressing neurons producing POMC peptide. Appetite stimulating neurons are activated by hunger, while appetite suppressing neurons are stimulated by satiety or fullness. Neurons of the ARC project to other nuclei of the hypothalamus of which the paraventricular nucleus PVN is most important. PVN neurons further process the information and project to other circuits outside the hypothalamus, thus coordinating our response that controls energy intake and expenditure. Short-term regulation of feeding is based on how empty or how full the stomach is, and if there are nutrients in the intestine. In the fasting state and empty stomach sends stretch information to the brainstem signaling hunger. It also produces a peptide called ghrelin which acts in the arcuate nucleus to stimulate feeding. Ghrelin also acts directly on the PVN to reduce energy expenditure. Upon food ingestion, distention of the stomach is perceived by the brainstem as satiety. Ghrelin is no longer produced. Instead, several other gut peptides are released from the intestine and act on the hypothalamus and other brain areas to suppress appetite and increase energy expenditure. Long-term regulation on the other hand takes cues from the amount of body fat: low body fat content encourages feeding and energy preservation, while high body fat suppresses appetite and promotes energy expenditure. Two hormones are involved: leptin and insulin. Insulin is a hormone produced by the pancreas and is released into the bloodstream upon food ingestion, when blood glucose starts to rise. Leptin is a hormone secreted by adipose tissues in a process dependent on insulin. The amount of circulating leptin in the plasma is directly proportional to the body fat content. Increased leptin levels in the