МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ

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106-ї підсумкової науково-практичної конференції
з міжнародною участю
професорсько-викладацького колективу
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Матеріали підсумкової 106-ї науково-практичної конференції з міжнародною участю професорсько-викладацького колективу Буковинського державного медичного університету (м. Чернівці, 03, 05, 10 лютого 2025 р.) – Чернівці: Медуніверситет, 2025. – 450 с. іл.

У збірнику представлені матеріали 106-ї науково-практичної конференції з міжнародною участю професорсько-викладацького колективу Буковинського державного медичного університету (м. Чернівці, 03, 05, 10 лютого 2025 р.) зі стилістикою та орфографією у авторській редакції. Публікації присвячені актуальним проблемам фундаментальної, теоретичної та клінічної медицини.

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hypothalamic lateral preoptic nucleus (LPON) plays a central role in circadian rhythm regulation. These LPON neurons are sensitive to both the internal circadian clock and external lighting conditions, adjusting their activity accordingly to support sleep-wake transitions. Proteins within neurons, including those in the LPON, play vital roles in cellular activity, neuroplasticity, and adaptation to environmental changes. Protein concentrations in neurons can reflect cellular metabolic activity and are thus useful biomarkers for assessing neuronal function.

The aim of the study. To investigate the effect of changes in the light regime on the accumulation of proteins in the LPON in mature and old rats.

Materials and methods. White non-linear rats (mature and old) (n=36) were grouped based on age and lighting conditions: standard light (12 hours light/12 hours dark), light deprivation (continuous darkness), and light stimulation (continuous light exposure). Each group included two subgroups of six animals. Tissue samples from LPON neurons were collected at two time points (2 pm and 2 am) after 7 days of exposure, fixed, and stained with bromophenol blue using the Mikel Calvo method. The optical density of protein staining was measured using computer microdensitometry to quantify protein concentration, with statistical analysis conducted via Student's t-test and Mann-Whitney test to assess age and lighting effects.

Results. Under standard lighting, mature rats exhibited significantly higher protein levels, which was especially noticeable at 2 a.m. (0.271±0.0016 optical density units) in LPON neurons than old rats (0.221±0.0013 optical density units, $p<0.001$), indicating age-related declines in neuronal protein concentration. Light deprivation had little effect on mature rats but caused a notable decrease in protein levels in old rats, particularly at 2 pm (0.208±0.0016 optical density units, $p<0.001$). Continuous light exposure increased protein concentration in mature rats (0.326±0.0014 optical density units, $p<0.001$), while it decreased in old rats (0.196±0.0017 optical density units, $p<0.001$). This suggests an age-dependent response, with older rats showing reduced adaptability to environmental light changes, likely due to lower melatonin levels and structural changes in LPON neurons.

Conclusions. The study reveals significant ontogenetic variations in LPON protein concentration under different lighting conditions. Mature rats maintain stable protein levels under light changes, while old rats exhibit decreased protein levels, indicating reduced neuronal adaptability. These findings emphasize the importance of light as a regulator of circadian rhythms and suggest age-related vulnerabilities in maintaining stable circadian functions under environmental stressors, potentially linked to reduced melatonin production and LPON structural alterations in older rats.

Fedoriak I.V.

STRESS-INDUCED CHANGES IN THE STATE OF THE PARAVENTRICULAR NUCLEUS OF THE RAT HYPOTHALAMUS

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Introduction. At present, the study of the place and role of neuroendocrine structures in the central mechanisms of circadian rhythms is one of the pressing issues of modem chronophysiology. Changes in the duration of the main time setter - the photoperiod, as a stress factor, desynchronize the rhythms of somatic and visceral functions, as well as the coordination and modulation of the mechanisms of adaptation of the organism to the influence of various factors. One of the structures that are primarily involved in the neuroendocrine response to stress reactions is the subnucleus of the paraventricular nucleus (PVN) of the hypothalamus. There is no information in the literature on the morpho-functional characteristics of PVN for different photoperiod durations.

The aim of the study. The study aims to determine the effect of photoperiod modifications on the morphofunctional state of the PVN subnuclei at different times of the day.

Materials and methods. Adult male rats were divided into three groups: the first was under standard lighting conditions (light from 8 am to 8 pm), the second - at 7-day lighting (light intensity 500 Lk), and the third - at 7-day darkness. Morphometric and densitometric analysis of PVN

subnuclei and quantitative analysis of RNA content were performed on a computer system for digital image analysis of VIDAS-386 (Germany) in the visible spectrum.

Results. The function of neurons of medial small cell and lateral large cell subnuclei of the PVN of rat hypothalamus is marked by circadian rhythms. The decrease in densitometric parameters is more pronounced in the lateral large cell nuclei, in particular in the samples taken for study at 2 am there was a probable decrease in the area of the neuron by 11.2% ($p < 0.01$) due to a decrease in the area of its nucleus by 13.8 % ($p < 0.01$), nucleoli - by 10.6% ($p < 0.05$) and cytoplasm by 7.8% ($p < 0.05$). Also, a decrease in RNA concentration is observed in the nucleus - by 7.1% ($p < 0.05$) relative to similar values obtained during the day. Under the conditions of light deprivation, desynchrony of the activity of studied neurosecretory cells of the hypothalamus and a shift of the largest values of the area of the neuron structures from 2 pm to 2 am are manifested.

Conclusions. Absence of the expressed strengthening of functional activity of medial small-cell subnuclei and probable differences of the area of neuron bodies, their nuclei, nucleoli, cytoplasm, and concentration in them of RNA. Nuclear-cytoplasmic ratio, specific nuclei, and cytoplasm in animals exposed to light modes I2.00L: 12.00D and 24.00L: 00D allows us to assume wide limits of the plasticity of the studied neurosecretory cells when keeping animals under constant lighting conditions during the week.

Smetaniuk O.V.

PRENATAL TRANSFORMATIONS OF THE TEMPORAL BONE

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Introduction. Congenital malformations of the temporal bone (including anomalies of the external, middle, and internal ear) can cause severe diseases in children, for example, hearing loss and balance problems (Yiin R.S.Z. et al., 2011). L. Sennaroglu et al. (2002) proposed classifications of internal ear abnormalities that include complete labyrinthine aplasia, cochlear aplasia, common cavity, incomplete division of types I and II, auricle hypoplasia, semicircular canal anomalies, and enlarged vestibular labyrinth. These defects usually develop in the embryonic and early pre-fetal periods, therefore, clarification of the features of the embryogenesis of the temporal bone is an actual direction of morphological research.

The aim of the study of the study is to clarify the peculiarities and chronological sequence of the sources of the rudiments and the dynamics of morphological transformations of the temporal bone in the prenatal period of human ontogenesis.

Material and methods. Research was performed on 12 specimens of embryos and pre-fetuses, and 14 specimens of human fetuses using microscopy, morphometry, x-ray techniques, 3D reconstruction, and statistical analysis. The investigations were performed keeping to the major regulations of the European Union Convention on Human Rights and Biomedicine (04.04.1997), the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects (1964-2008), EU Directives №609 (24.11.1986), the Orders of the Ministry of Health of Ukraine № 690 dated 23.09.2009, №944 dated 14.12.2009, № 616 dated 03.08.2012.

Results. It was found that at the beginning of the 4th week of intrauterine development, the sources of the facial, frontal, sphenoid, and squamous part of the temporal bones are determined, which originate from the neural crest, and the paraxial mesoderm is the source of the parietal, petrous part of the temporal and occipital bones. Embryologically, the temporal bone is divided into two main anatomical parts. The cranial nerves and the otic capsule (helix and vestibular apparatus) originate from the neuroectoderm. Everything else, including the auditory ossicles, arises from the neural crest. Some of the components of the neural crest form parts of the viscerocranium in the 7th week of intrauterine development, in particular the mandible and maxilla, incus and malleus (first branchial arch), as well as the stapes and styloid process of the temporal bone (second branchial arch). The rudiment of the temporal bone has four separate components, which ossify both through the membranous and cartilaginous pathways. During the 7-8th week of intrauterine development, the squamous part of each temporal bone is ossified by membranous ossification, which spreads