клубочків. І хоча відносний обсяг просвіту капсул був трохи більшим, ніж в попередній групі тварин (47,79%), він не досягав значення, характерного для контрольної групи (54,85%).

Відомо, що деяке збільшення відносного обсягу просвіту капсули може побічно вказувати на збільшення клубочкової фільтрації і навпаки. Зниження клубочкової фільтрації розцінюється як гомеостатична реакція, спрямована на зменшення втрати натрію.

Таким чином, вплив екзогенного мелатоніну на діяльність нирок у старих щурів залежить від наявності епіфіза. Мелатонін не усуває змін, що виникали в крові і сечі після епіфізектомії, але нормалізує активність СДГ в шарах нирок, вміст натрію і калію в сосочку. Очевидно, шишкоподібної залози на функціональну діяльність нирок залежить не тільки від мелатоніну, але й від усього комплексу вироблених в ньому біологічно активних речовин.

Bulyk R.Y., Vlasova K.V.

EXOGENOUS MELATONIN INFLUENCE ON CYTOMETRIC INDICES OF THE SUPRAOPTICAL NUCLEI IN THE STRESSED RATS' HYPOTHALAMUS UNDER CONDITION OF 24 HOUR ILLUMINATION

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The hypothalamus is the highest coordinating center of the neuroendocrine system, whose nerve cells are combined in multiple nuclei with various links between themselves and the structures of the CNS, and also possessing secretory activity (these are mainly front and medial areas), carrying out regulatory functions necessary to maintain homeostasis. However, the issues, concerning the correction of the influence of stressors on supraoptical nuclei (SON) in the hypothalamus in case of a changed photoperiod have not been sufficiently studied.

Our study objective was to find out exogenous melatonin influence on changes in cytometric indices of hypothalamus SON under 24 hour illumination.

Experimental animals (mature nonlinear male white rats) were divided into four groups and in each of them biomaterial sampling was performed at 2 PM and 2 AM on the eighth day of the experiment. Fixed with neutrally buffered 10% formalin solution and later coloured with hematoxylin and eosin, microscopic sections 5mcm thick were studied in the programming environment of GIMP 2.8. The terms of the experiment were conditioned by different functional activity of the pineal gland and by the production of a leading chronobiotic – melatonin (MT) in the indicated time periods. The animal groups which underwent 24 hour illumination were injected with exogenous MT for correction. The intact animals underwent a standard photoperiod (12.00L:12.00D).

In the group of animals which were administered exogenous MT and exposed to light stress (+24.00L: 00D) a reduction in such indices as the volume of the neurocyte nucleus (at 02.00 AM - 198 ± 1,3; 02.00 PM - 197 ± 1 2), neurocyte volume (at 02.00 AM- 1114 ± 10,8; 02.00 PM - 1099 ± 10,4), a standard deviation of the neurocyte nucleus coloring (at 02.00 AM - 9,1 ± 0,18; 02.00 PM - 8,8 ± 0,14), increasing in the nuclear-cytoplasmic ratio (at 02.00 AM - 0,178 ± 0,0024; 02.00 PM - 0,179 ± 0,0023) and of the optical density of staining nuclei neurocyte nucleus staining (at 02.00 h - 0,289 ± 0.0028, 14.00 h - 0,296 = 0,0027) compared to intact group.

These cytometric parameters are much higher than those in the groups, which were not injected with MT, but they still do not reach the indices of intact animals.

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DEPENDENCE OF MELATONIN RECEPTORS DENSITY IN THE NEUROCYTES OF HYPOTHALAMUS SUPRAOPTICAL NUCLEI ON STRESS FACTORS IN DIFFERENT PERIODS OF THE DAY

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Disturbances in circadian rhythmicity due to the living conditions (working at night, jet lags) or involuntary circumstances (illness, aging) cause numerous mental and physical disorders. Keeping to physiologicaly characteristic lifestyle is especially important for human safety and productivity. Night secretion of the pineal gland hormone melatonin is a signal to any structures that have melatonin receptors in the brain and peripheral organs, and it affects the time organization of a large number of functions.

The aim of the study was to determine the influence of stress on the optical density of melatonin receptor 1A (M1A) in neurocytes supraoptic nuclei (SON) of the hypothalamus.

Sexually mature males of nonlinear albino rats were divided into three series,and biomaterial sampling was carried out at 2 PM and 2 AM in each of them on the eighth day of the experiment. The material was fixed with neutral buffered 10% formalin solution for 22 hours, and after rapid dehydration it was embedded in paraffin at 58°C. To determine the optical density of melatonin receptors 1A, specific polyclonal antibodies produced by Abcam (UK) and streptavidinbiotin visualization system LSAB2 (USA).

The indices of optical density of specific M1A neurocytes of SON staining obtained in the intact group (at 02.00 AM- 0,488 ± 0,0024, at 02.00 P.M. - 0,464 ± 0,0023, p = 0.002) and in animals subjected to immobilization (at 02.00 AM-0,295 ± 0, 0019, at 02.00 P.M.- 0,286 ± 0,0018, p = 0,012) had a probable value and were characterized by a clear diurnal periodicity. In the group of animals with pineal gland hypofunction modulation (at 02.00 A.M.- 0,216 ±

0,0017, at 02.00 P.M. - 0,214 = 0,0021, p> 0,05) the results of optical density of specific M1A neurocytes of SON staining are not probable, indicating the existing primary signs of cellular disfunctions

Saving or restoring the inherent biorhythm is extremely important as changing the functioning of the hypothalamus SON neurocytes is likely to have significant consequences associated with an imbalance of water-salt metabolism.

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MORPHLOGY OF PINEAL GLAND IN OL RATS UNDER LIGHT DEPRIVATION AND ITS CORRECTION

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It is known, that the pineal gland is a part of photoperiodic system that is able to perceive changes in lighting of the environment. Changes of lighting, temperature, and humidity of the geomagnetic field will influence the own rhythms of chronoperiodic system.

In the literature there is not enough information about the impact of the correction of prolonged darkness on micro- and ultramicroscopic condition of the pineal gland, thereby the objective of our study was to analyze the synthetic chronobiotic epithalon to restore post-stressed rearrangements in the studied gland.

Experiments were carried out on 30 old (20-24months) mongrel male albino rats weighting 280 to 360 g. Animals were kept under standard vivarium conditions, at the controlled temperature and air humidity; free access to water and food was provided. The pineal gland of old rats with normal lighting regimen was conical- or drop-shaped. We found that parenchyma doesn't maintain it shape, with minor signs of age involution in a small number of apoptotic cells, formed as a result of age load against a background of lower melatonin biosynthesis and reduced concentration in the blood.

Exploring changes in pinealocytes under 7-days constant darkness it has been found, that the ratio of light and dark cells are not significantly different from the averages in animals of the control group and compose of 72± 1,3%:28 ± 1,2% (p>0,05). It is even possible to observe the predominance of light-active cells, thereby confirming the inclusion of a protective mechanism in case of complete darkness, stimulating endogenous melatonin as a natural antistressor. Examination of submicroscopic changes of the pineal gland cells revealed euchromatin in karyoplasm, small granules of heterochromatin. Nuclear membrane is rough, forms a single deep invagination under conditions of 24 hours darkness. The cytoplasm is enriched by narrow tubules of granular endoplasmic reticulum, but somewhere the flake-shaped, electronically low dense fragments are observed, considered to be melatonin granules.

After correction of the changes mentioned above in pinealocytes with epithalon it has been found, that ratio of light and dark pinealocytes had changed toward to control group as (60 ± 1,6)%: (40 ± 1,5)% (p = 0,035). A correction with melatonin showed more intensive recovery of light to dark pinealocytes ratio: (67±1,6)%: (32±1,5)% (p=0,036). According to ultramicroscopic picture, the obtained received data corresponded to parameters of the control group.

Above mentioned findings of the micro-and ultramicroscopic changes in old rats` pinealocytes are indicative of the fact, that light deprivation stimulates the pineal gland function, provides geroprotective effect, actively engaging precursors to melatonin biosynthesis, thereby activating the production of endogenous melatonin in pinealocytes of aging organism.

СЕКЦІЯ 5
АКТУАЛЬНІ ПИТАННЯ ЕКСПЕРИМЕНТАЛЬНОЇ БІОХІМІЇ

Бевзо В.В.

СУПЕРОКСИДДИСМУТАЗНА, КАТАЛАЗНА Й ЗАГАЛЬНА АНТИОКСИДАНТНА АКТИВНОСТІ КРОВІ ЩУРІВ ПРИ ТРИВАЛОМУ ВВЕДЕННІ ГЛУТАМАТУ НАТРІЮ

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Глутамат натрію – це натрієва сіль глютамінової кислоти яка сама по собі є необхідною й корисною для нашого організму. Однак, після того як навчилася синтезувати штучний глутамат натрію, його стали використовувати при виробництві величезної кількості продуктів харчування. На сьогодні спостерігається надмірне споживання глутамату в досить великих кількостях, тому дослідження його впливу на активність окремих ланок антиоксидантного захисту за тривалого введення є досить актуальним. Це дозволить розширити спектр негативних аспектів впливу цієї харчової добавки на деструктивні процеси в організмі та інші біохімічні показники.

Тому метою роботи було вивчення тривалого впливу глутамату натрію на каталазну, супероксиддисмутазну та загальну антиоксидантну активності крові щурів.

Дослідження токсодинаміки глутамату натрію за умов тривалого внутрішньошлункового введення 1 мл 3% водного розчину щурам у дозі 30 мг/кг маси тіла показало, що глутамат натрію викликав вірогідне підвищення загальної антиоксидантної активності крові і в печінці протягом всього періоду експерименту