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REGULARITIES OF CHANGES OF NEURON MORPHOFUNCTIONAL CONDITION OF THE HYPOTHALAMIC SUPRAOPTIC NUCLEI IN CASE OF VARIOUS DURATION OF PHOTOPERIOD

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Different systems of the body follow circadian rhythms that are synchronized with a master clock in the brain. This master clock is directly influenced by environmental cues, especially light, which is why circadian rhythms are tied to the cycle of day and night. Lifestyle is a major determinant of circadian health and relates to people's psychosomatic factors such as feeding-fasting, activity-rest, sleep-wake routines. Technology growth provided a platform to lifestyle modifications leading to conditions like mental depression, cancers, cardiovascular disease, diabetes, and many other diseases.

Objective – to find regularities of changes of neuron morphofunctional condition of the hypothalamic supraoptic nuclei in case of various duration of photoperiod, as well as to detect the role of melatonin in the mechanisms of correction of the detected deviations; methods – morphometric, densitometric, histological, immunohistochemical, electron microscopic, physiological, correlation and regressive analysis, mathematic statistics.

More pronounced circadian regularities of the morphofunctional parameter rebuilding of the examined hypothalamic neuroendocrine cells under continuous lighting than in case of light deprivation are found; for the first time on the basis of the conducted ultrastructural examinations of rats under conditions of light stimulation more pronounced destructive disorders in the hypothalamic neurons are found, as well as reduction of their functional activity in the examined periods of the day than in case of light deprivation; on the basis of a comprehensive examination of the character of melatonin receptors density in hypothalamic supraoptic neurons during 24 hours convincing evidence of photo-induced circadian rhythm disorders of melatonin receptors functioning in the examined neuroendocrine cells is received; as a result of the conducted study, for the first time circadian variations of optic density and standard deviation of nuclear staining, nuclear-cytoplasmatic coefficient of pineal gland cells of rats kept under conditions of changed photoperiod are demonstrated; the regularity is proved, according to which introduction of exogenous melatonin (0,5 mg/kg) promotes the increase of ultra-structures resistance to light stimulation, the tendency to normalize cytometric parameters of hypothalamic supraoptic neuron components of rats.

Thus, more pronounced circadian regularities of the morphofunctional parameter rebuilding of the examined hypothalamic neuroendocrine cells under continuous lighting than in case of light deprivation are found; for the first time on the basis of the conducted ultrastructural examinations of rats under conditions of light stimulation more pronounced destructive changes in the hypothalamic neurons are found, as well as reduction of their functional activity in the examined periods of the day than in case of light deprivation.

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CORRECTION OF IMMUNOHISTOCHEMICAL DISORDERS OF THE LATERAL PREOPTIC NUCLEUS OF THE HYPOTHALAMUS OF MATURE RATES CAUSED BY CONSTANT LIGHTING

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Physiological processes in living systems are subordinate regular cyclic oscillations - biological rhythms. Humans have a 24-hour circadian sleep-wake cycle, but sleep is more than just part of the circadian system. About a third of a person's life is spent asleep, and its quality determines overall health. An important component in the regulation of the sleep-wake cycle is the lateral preoptic nucleus of the hypothalamus. Another important structure involved in the regulation of the sleep-wake cycle is the pineal gland, which synthesizes the hormone melatonin. The secretion

of melatonin is circadian in nature: in the dark period, the concentration of melatonin in the blood is 5-10 times higher than during the day. The presence of melatonin receptors in the lateral preoptic nucleus of the hypothalamus is a convincing criterion for the participation of this nucleus in the temporal organization.

The aim of the study was to study the corrective effect of melatonin on immunohistochemical features of melatonin receptor density type 1A in neurons of the lateral preoptic nucleus of the hypothalamus of mature rats, which were under constant light.

The study was performed on 36 white nonlinear male rats. The first group of laboratory animals consisted of mature rats, which were kept under standard lighting conditions (light from 8 am to 8 pm). The second group - mature rats, which were seven days in constant light (light stimulation). The third group - mature rats, which were kept under light stimulation and injected melatonin (Sigma, USA) at a dose of 0.5 mg/kg of rat body weight. To detect circadian differences in the studied structures, the material was taken at 2 pm and 2 am. Quantitative differences in melatonin type 1A receptor density were detected according to the intensity of the specific (immunohistochemical) staining, which was determined by computer microdensitometry in relative units of optical density.

The results of the study state that the optical density of staining for melatonin receptors 1A in the neurons of the lateral preoptic nucleus of the hypothalamus of mature rats for a period of 2 am is on average higher than at 2 pm. In particular, at 2 am the indicator was 0.264 ± 0.0016 units of optical density, and at 2 pm - 0,248 ± 0,0018 units of optical density.

Under light stimulation, a decrease in the optical density of melatonin 1A receptors was observed in the neurons of the lateral preoptic nucleus of the hypothalamus. Data on the optical density of melatonin 1A receptors in mature rats, which were kept in round-the-clock lighting, were in the range: at 2 am - 0,182 ± 0,0017 0018 units of optical density, at 2 pm - 0,180 ± 0,0018 0018 units of optical density.

Injection of melatonin to rats exposed to light stimulation resulted in an increase in the average optical density of melatonin 1A receptors in the neurons of the lateral preoptic nucleus of the hypothalamus. In particular, at 2 pm it was 0.249 ± 0.0017 0018 units of optical density, and at 2 am - 0,275 ± 0,0015 0018 units of optical density.

Therefore, it can be concluded that light stimulation leads to a pronounced violation of the quantitative characteristics of the optical density of melatonin 1A receptors in the neurons of the lateral preoptic nucleus of the rat hypothalamus. Injection of melatonin leads to an increase in the optical density for melatonin receptors 1A in the neurons of the lateral preoptic nucleus of the mature rat hypothalamus was observed: at 2 pm - to the level of rats kept under the standard light regime, and at 2 am - even higher than rats kept under the standard light conditions.

Волошин В.Л.

ЗАБРУДНЕННЯ ЗЕМЕЛЬ СІЛЬСЬКОГОСПОДАРСЬКОГО ПРИЗНАЧЕННЯ В УКРАЇНІ

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В Україні, на сьогоднішній день все частіше можна почути по радіо, побачити репортажі по телебаченні та прочитати у пресі про багато екологічних проблем. Все більшої актуальності набуває проблема забруднення ґрунтів. Серед світових лідерів за площею чорноземів наша держава посідала четверте місце після Російської федерації, Сполучених штатів Америки та Китаю. Беручи до уваги те, що в нашій державі активно використовується понад 90% територій не можна недооцінювати впливу діяльності людини на земельні ресурси. За останні майже сто років на території нашої держави відбувалося багато подій пов'язаних в той чи інший спосіб із використанням земельних ресурсів. Проводилися меліоративні заходи пов'язані із осушуванням боліт, зміною русел річок, побудовою зрошувальних каналів, створенням штучних водосховищ. Здійснювалося затоплення значних територій безпосередньо пов'язаних із побудовою гідроелектростанцій, атомних