

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



## **МАТЕРІАЛИ**

**104-ї підсумкової науково-практичної конференції  
з міжнародною участю  
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**Conclusions.** The cortisol cycle believed to be regulated by light/dark cycle and information sent to hypothalamic area via the retina. Important to receive adequate sleep so as not to be over exposed to higher cortisol levels. So don't feel defeated by the pressures of daily life. Get in control of your stress before it takes control of you. There are many ways to reverse what cortisol does to your stressed brain: exercise, meditation, aware and focused on your surroundings, keeping physiological night/day cycle.

**Yosypenko V.R.**

**THE INFLUENCE OF MELATONIN ON THE ULTRAMICROSCOPIC STATE OF NEURONS OF THE LATERAL PREOPTIC NUCLEUS OF THE HYPOTHALAMUS DURING LIGHT STIMULATION**

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**Introduction.** Currently, the number of elderly people in the world is increasing. Among the problems that are characteristic of this age group is a violation of the quality and/or duration of sleep, which can affect the development of pathological sleep disorders and the general state of health. Sleep is an extremely complex genetically determined cyclic process that is regulated by homeostatic and circadian components with the participation of various neural structures, among which the lateral preoptic nucleus (LPO) of the hypothalamus plays a key role.

**The aim of the study.** To investigate the effect of melatonin injection on the ultrastructural characteristics of LPO neurons in the hypothalamus of old rats under light stimulation

**Materials and methods.** The experiments were performed on 36 old white male rats. The first group of rats was kept under the conditions of a standard herd regime (from 8 am to 8 pm). The second group - is under conditions of round-the-clock lighting. The third group was given melatonin (0.5 mg/kg, Sigma, USA) against the background of round-the-clock lighting. The test material was fixed in a 2.5% solution of glutaraldehyde prepared on the basis of phosphate buffer with a pH of 7.2–7.4. Next, post-fixation was performed in a 1% solution of osmium tetroxide and dehydrated in propylene oxide, after which it was poured into a mixture of epoxy resins. Ultrathin sections made on an ultramicrotome LKB-3 were contrasted with uranium acetate and lead citrate according to the Reynolds method and studied under an electron microscope PEM - 125K.

**Results.** The neurons of the LPO of the hypothalamus under the conditions of the standard mode of illumination at 2 am contain nuclei with uneven contours, sometimes with rather deep indentations. The neuroplasm contains well-developed tubules of granular EPR with ribosomes fixed on their membranes. GC cisterns are small and localized paranuclear, but many vesicles and microbubbles are found. Mitochondria rounded, small, with moderately pronounced cristae.

A study of the ultrastructure of LPO of the hypothalamus under light stimulation at 2 am showed that the neurons contain a rounded nucleus with electron-dense karyoplasm and uneven contours of the nuclear membrane, which forms deep intussusception. The hyaloplasm is also compacted, the EPR tubules are determined, which are locally expanded with the formation of vacuole-like structures. Mitochondria are small, vacuolated, with an enlightened matrix and reduced cristae.

At the same time, we investigated that at 2 am LPO neurons of the hypothalamus under light stimulation and injection of the melatonin contain nuclei of rounded irregular shape, with indistinct nuclear membrane contours, and few nuclear pores are visualized. Tubules of the granular endoplasmic reticulum are well-developed and locally expanded. Mitochondria are rounded and elongated, some of them are hypertrophied, with reduced cristae and a lightened matrix.

**Conclusions.** Neurons of the LPO of the hypothalamus of old rats show increased functional activity in the dark. Light stimulation leads to hypertrophic and initial destructive changes in the nuclei and organelles of the neurons of the LPO of the hypothalamus. Injection of melatonin against the background of round-the-clock lighting leads to a normalization of the submicroscopic state of the LPO of the hypothalamus.