

## Stress-Induced Cytometric Vibrations of Neurocyte Parameters in the Hypothalamic Supraoptic Nucleus in Rats During Different Periods of the Day and Night

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**INTRODUCTION:** The study of a place and a role of neuroendocrine structures in the central mechanisms of circadian rhythms is one of the actual issues of modern chronophysiology. Supraoptic nuclei (SON) of the hypothalamus are of a great importance among the structures, involved in a neuroendocrine response during stress reactions. However, the morphometric characteristics of hypothalamic neurocyte SON under stress at different periods of the day are unknown. **AIM:** The aim of this study was to find out how the immobilization stress affects the cytometric neurocyte parameters of hypothalamic SON at different periods of the day. **MATERIALS AND METHODS:** Experimental animals (mature nonlinear male white rats) were divided into two groups and in each of them biomaterial sampling was performed at 2 PM and 2 AM respectively. The time, chosen for the experiment, is due to a different functional activity of the pineal gland and the production of the leading chronobiotic- melatonin at the indicated time. The immobilization stress was simulated by keeping the experimental animals in laboratory cages-cases for 3 hours. The cytometry was performed on digital copies of the image in the environment of a computer program GIMP, version 2.8. An average volume of a neurocyte of hypothalamic SON and its nucleus, the nuclear-cytoplasmic ratio, the optical density of staining cytoplasm as well as the standard deviation of the staining neurocyte nucleus have been determined. **RESULTS:** The tendency to increasing nuclear volumes in polygonal neurocytes at 2 AM compared to those at 2 PM was observed by means of cytometric study of SON neurocytes of the hypothalamus under conditions of stress. It was established, by measuring the volumes of SON neurocytes of the hypothalamus, that the average rate at 02.00 AM was significantly higher compared with that at 2.00 PM ( $948 \pm 10,4$  and  $906 \pm 10,0$ , respectively,  $p = 0.016$ ). A significant increase of the standard deviation of the staining neurocyte nucleus of hypothalamic SON was noted at 2 AM compared to that at 2 PM ( $8,4 \pm 0,13$  and  $8,0 \pm 0,11$  respectively,  $p = 0.041$ ). However, during the night time period a significant decline of the nuclear-cytoplasmic ratio compared with 2 PM ( $0,260 \pm 0,0021$  and  $0,272 \pm 0,0023$ , respectively,  $p = 0.008$ ) was revealed. A decrease in the optical density of staining in the cytoplasm neurocytes of SON at 02.00 AM compared to 2 PM (from  $0,304 \pm 0,0026$  to  $0,323 \pm 0,0027$   $p = 0.003$ ) was also found. **CONCLUSION:** Under the influence of immobilization stress an increase in the volume of neurocytes in hypothalamic SON and the standard deviation of the intensity of their nucleus staining at 02.00 AM compared with that at 2 PM was found. However, a decline of the nuclear and cytoplasmic index as well as of optical density in the cytoplasm staining of investigated neurocytes was observed.

**KEYWORDS:** hypothalamus, supraoptic nuclei, stress, photoperiod