

## Pre-clinical study of the effect of oligopeptides-homologues of the ACTH<sub>15-18</sub> fragment on the adrenal glands histostructure in rats on the model of acute hypothermia

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**Introduction:** Disturbances in the peptidergic system functioning under the influence of stress factors is aiming to find substances that can eliminate disintegration in this component of pathogenesis. The study of oligopeptides-homologues of the ACTH<sub>15-18</sub> fragment is a promising direction. Our previous studies established their effect on behavioral responses, anxiety, exercise tolerance and carbohydrate metabolism in rats under acute hypothermia [1, 2]. **The aim** of the current study is to evaluate the oligopeptides influence on the adrenal glands histostructure in rats on the model of acute hypothermia.

**Materials and methods:** The model of acute hypothermia (animals were placed in a freezer at  $-18^{\circ}\text{C}$  for 2 hours) [3] was used to study the effect of oligopeptides-homologues of the ACTH<sub>15-18</sub> fragment (Lys-Lys-Arg-Arg) (laboratory ciphers KK-1 and KK-5) [4] on the adrenal glands in male rats. Oligopeptides and the reference medicine Semax were administered intranasally (solution) at a dose of 20 mg/kg 30 minutes before and after hypothermia. Sections of the adrenal glands tissue were stained with haematoxylin-eosin. Adrenal cortex zones width (zona glomeruloza, zona fasciculata, zona reticularis, cells and nuclei area ( $\mu\text{m}^2$ ), adrenocorticocytes of zona fasciculata) was measured using the Toupcam Granum software.

**Results:** Hypothermia caused adrenal cortex hypertrophy, which was characterized by an increase in the area of adrenocorticocytes in the zona fasciculata and their nuclei which is accompanied with lipid depletion. This indicated a functional tension associated with the stimulation of glucocorticoid hormone production, capillaries expansion and plethora. Oligopeptides KK-1 and KK-2 prevented structural changes in the adrenal cortex, stabilized the activity of glucocortic-producing cells, maintained lipid saturation. For the severity of the stress-protective effect, the KK-5 oligopeptide exceeded the effect of the KK-1 oligopeptide, and both test substances exceeded Semax.

**Conclusions:** Keeping reserve capabilities, oligopeptides KK-1 and KK-5 increase the resistance of the adrenal cortex to acute cold stress.

### References

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