

THE POSSIBILITIES OF COLD INJURY TREATMENT WITH OLIGOPEPTIDES-HOMOLOGUES OF THE FRAGMENT OF ACTH₁₅₋₁₈

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Nowadays the problem of hypothermia takes more attention from specialists in modern medicine. The population of most countries and climatic zones is adversely affected by low temperatures. Climatic conditions, wars, conflicts, catastrophes, low socio-economic level are the main factors that lead to the adverse effect of hypothermia and people's death. This problem is most widespread for Ukraine, Siberia, the Far North, the central part of Europe, Canada, and USA. So, in Ukraine up to 12,000 people affected by cold, in Russia up to 20,000 people are registered each year. The disability of the people affected by low temperature is from 1 to 10%, and mortality is 40-50%.

Considering that disorders of the cardiovascular, endocrine, central nervous system, gastrointestinal tract, skin, muscles, carbohydrate metabolism take place in the pathogenic mechanism of cold trauma, the approach to treating this condition is complex. Multisystem pathogenic mechanism causes the baffling complexity of treatment.

The range of frigoprotectors – drugs that increase body cold resistance is narrow, which causes the search and study of new effective drugs for the prevention and treatment of hypothermic conditions. Active search for frigoprotectors is carried out in three main areas of pharmacological correction of conditions associated with hypothermia: increased heat production (sydnocarb with glutaminic acid), regulation of energy supply systems (amber acid salts), energy savings (diazepam with sodium oxybutirate). However, the presence of side effects and multisystem pathogenic mechanism of cold trauma make it relevant to search for safe frigoprotectors affecting all parts of hypothermia pathogenic mechanism.

In resolving this issue, attention is attracted by neuropeptides, as promising substances that can reduce the effect of acute and chronic stress. Today, there is a wide search for stress-protectors in this class of substances: analogues of vasopressin, angiotensin II, CRH receptor antagonist, analogues of ACTH₆₋₉, analogues of ACTH₄₋₁₀, antagonists of orexin receptors, antagonists and agonists of grelinetc.

Special attention among neuropeptides should be paid to neuropeptides-homologues of the fragment of ACTH₁₅₋₁₈, which show a pronounced stress-protective effect. Since hypothermia is one of the kinds of stress, it would be obvious to assume the presence of frigoprotective properties in oligopeptides – homologues of the fragment of ACTH₁₅₋₁₈.

The peptide homologues of the fragment of ACTH₁₅₋₁₈ (Lys-Lys-Arg-Arg) under the code KK-1 and KK-5 were synthesized at the Federal State Unitary Enterprise «State Research Institute of High Pure Biopreparations» of the Federal Medical and Biological Agency of Russia (St. Petersburg, the Russian Federation) supervised by Doctor of Biological Sciences O.O. Kolobov.

The study of frigoprotective properties has been carried out on the model of acute cold stress in rats. It has been found that peptides-homologues of the AKTG₁₅₋₁₈ fragment prevent the decrease in the rectal temperature of animals; normalize the level of glucose, lactate and pyruvate in the blood serum; prevent depletion of glycogen stores in the liver of animals [1; 2].

Further study of the mechanisms of the frigoprotective action of peptide-homologues of the ACTH₁₅₋₁₈ fragment is advisable.

References

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