

## BIOLOGICAL EFFECTS OF TRITERPENE GLUCOSIDES OF KOKUMARIA JAPANESE

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**A wide range of physiological activity of triterpene glycosides holothurians opens up great prospects for their practical use as drugs and biologics. Considering the real prospect of using dietary supplements to regulate the functions of the reproductive system and stress-limiting systems, the effect of triterpene glycosides on the adrenal glands during stress and the ovaries of rats was studied in the experiment. The adrenal glands play a key role in the adaptation process; therefore, their morphofunctional state directly affects the successful formation of adaptive mechanisms. Triterpene glycosides have an adaptogenic effect on the stress response, which is accompanied by less pronounced fluctuations in the main quantitative parameters of the functional elements of the adrenal cortex. The study of the ovaries has shown that triterpene glycosides contribute to the reduction of atretic follicles in mature experimental animals and lead to a decrease in the number of atresisable follicles in the deestrus and an increase in growing follicles in the estrus in immature animals.**

Key words: adaptogens, stress, the adrenal glands, ovaries

Against the background of the decline in the effectiveness of traditional therapies for diseases, the development of new food additives with the healing properties of natural origin continues to be relevant. Physiologically active triterpene glycosides of holothurians were discovered in the early 60-s and immediately attracted the attention of specialists with their broad spectrum of action. [1, 3]. Glycoside holothurians interact with biological and model membranes containing natural sterols, with the formation of glycoside-sterol conductive complexes, dramatically increasing membrane permeability. The nature of changes in membrane permeability depends on the dose of glycoside in the solution and the type of sterol in the membrane. Interestingly, the glycosides of holothurians most effectively act on membranes containing cholesterol [4].

Experimental studies of the extract (containing triterpene glycosides of at least 550  $\mu\text{g} / \text{cm}^3$ ) and hydrolyzate (containing triterpene glycosides of at least 100  $\mu\text{g} / \text{cm}^3$ ) from *Cucumaria japonica* on the morphofunctional state of the adrenal glands under acute stress were conducted. The absence of pronounced functional stress during acute stress was confirmed by the absence of hypertrophy of the cells of the adrenal cortex while maintaining their high mitotic activity, preserving the width of the lipid layer of the adrenal cortex. The administration of extract and hydrolyzate from Japanese cucumaria in animals showed a lower degree of delipoidization of the cortical substance than in the stress control animals, only the reticular zone and the lower third of the beam zone had no lipids. Experimental animals in the adrenal glands did not observe severe morphological and, as a result, functional disorders. The latter was confirmed by the level of cortisol in the blood of the stressed

animals. This figure was reduced by half compared to control animals that did not receive food additives. Retaining the reserve capabilities of secretory cells and microcirculatory components, triterpene glycosides from Japanese cucumaria increase the resistance of the adrenal cortex to extreme factors and have an adaptogenic effect [5].

In mature experimental rats with established estrous cycles that received extract and hydrolyzate from Japanese cucumaria, a decrease in atretic follicles in the ovaries was found by 38,8 – 51,4%. Perhaps this phenomenon is associated with blockade of the apoptogenic enzyme, activated by increasing levels of calcium and / or magnesium, due to changes in the permeability of biological membranes for Ca<sup>2+</sup> ions. Consequently, a slower “expense” of the generative elements occurs.

In immature animals, a significant decrease in the number of atresisable follicles in the diestrus and an increase in the growing follicles in the estrus was detected. The fact of a sharp increase in growing vesicular follicles can be explained by the transition of follicles of the previous classes to the subsequent ones, therefore, a natural process characteristic of the estrous cycle occurs. It is possible that a certain part of the antral follicles are follicles “returned” from the state of early atresia. Consequently, a regular process occurs: with a decrease in some steroid-producing structures, the number of others increases. The use of food additives with triterpene glycosides in androgenized rats resulted in excessive steroid-like stimulation of folliculogenesis with the formation of follicular cysts and corpus luteum cysts [2].

The results of numerous studies show that compounds isolated from marine hydrobionts have a wide range of biological effects and are recommended as biologics for complex prophylaxis and auxiliary treatment of a wide range of diseases.

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