

BIOCHEMISTRY OF THE ENDOCRINE SYSTEM

¹Isoqova Shahzodabonu, ²Tolipova Marjona

^{1,2} 2nd year students of the 223rd group of Medical faculty, Tashkent Pediatric Medical Institute

Scientific supervisor: Mamazulunov Nurmukhammad

Assistant of the department of Medical and biological chemistry, medical biology, general genetics

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Abstract. *The endocrine system is the system that regulates the entire body as a whole. Hormones are biologically active substances of the body that are synthesized in small quantities in specialized cells of the endocrine system and are delivered through circulating fluids (for example, blood) to target cells, where they exert their regulating effect. The relationship between cells in the body is an important point in their existence and is realized with the participation of the nervous and endocrine systems. The endocrine glands produce hormones for this.*

Keywords: *hormones, signal transmission, hormone regulation.*

Hormones are organic substances of various chemical nature secreted by glandular cells into the blood or lymph, regulating metabolism and physiological functions by transmitting signals from the central nervous system to cells of tissues and organs. Biochemistry studies the chemical structure of hormones, their biosynthesis and catabolism, the effect on metabolism and the mechanism of action, including at the molecular level. According to the classical model of the endocrine system, hormones produced by the endocrine glands enter the blood, are delivered by it to the target organs and bind to specific receptors.

General properties of hormones:

- are released from the cells that produce them into the extracellular
- space;
- are not structural components of cells and are not
- used as an energy source;
- able to interact specifically with cells,
- having receptors for this hormone;
- have very high biological activity
- effectively act on cells in very low

The upper niche is occupied by the hypothalamic hormone system controlled by the Central nervous system. The cells of the hypothalamus respond with the help of specific signaling molecules – releasing factors (stimulating - liberins or inhibitory – statins). These neurohormones with blood flow reach the adenohypophysis, where they stimulate or inhibit the biosynthesis and secretion of tropic hormones. Tropic hormones affect the peripheral glands, stimulating the release of the corresponding peripheral hormones (thyroid hormones, glucocorticoid hormones, sex hormones).

The regulation of the system is carried out on the principle of negative feedback. There are endocrine glands for which there is no regulation by tropic hormones – the parathyroid gland, the adrenal medulla, the renin-aldosterone system and the pancreas. They are controlled by nervous influences or the concentration of certain substances in the blood. Peptides have the shortest effect

– seconds, proteins have a longer effect – minutes, steroid hormones – hours, and thyroid hormones – a day.

Hormones are synthesized at different rates, which depends on:

- the presence of a substrate;
- actions of neurotransmitters;
- other hormones;
- time of day, year;
- age;
- in women from a physiological condition.

Excessive production or hormone deficiency can be the cause of endocrine diseases. The main cause of hormone hypersecretion is hormone–active tumors. The causes of hyposecretion are genetic disorders of enzymes involved in hormone synthesis; damage to hormone-producing cells; infections; tumors and autoimmune reactions.

Protein hormones are hydrophilic and can be carried by the blood in both a free and partially bound state with blood proteins. Steroid hormones are lipophilic (hydrophobic), differ in low solubility, their main amount circulates in the blood in a protein-bound state.

Adrenocorticotrophic hormone (corticotropin; ACTH) Growth hormone (somatotropin; STH). Lactogenic hormone (prolactin; LTG) Melanocytostimulating hormone (MSG) Antidiuretic hormone (vasopressin; ADH) Oxytocin, Parathyroid hormone (parathyroid hormone; PTH) Calcitonin, Insulin, Glucagon.

Steroid hormones are polycyclic chemical compounds of a lipid nature, the structure of which is based on the sterane nucleus. Their biosynthetic precursor is cholesterol.

Receptors are protein compounds that selectively bind signaling molecules (hormones) on membranes or inside cells. According to the localization of the receptor, there are two mechanisms of action of hormones:

- membrane – the receptor is located on the membrane;
- cytosolic – the receptor is located in the cytosol.

Depending on the method of transmitting the hormonal signal to the cell , three classes of membrane - bound receptors are distinguished:

- receptors with catalytic activity;
- channel - forming receptors;
- Receptors associated with G-proteins.

The hormone-receptor complex is activated and gains affinity for DNA. By binding to a hormone-sensitive element in DNA, the hormone affects their transcription of certain genes and changes the concentration of certain proteins in the cell.

REFERENCES

1. Balabolkin M. I. Endocrinology. 1998.
2. Small encyclopedia of an endocrinologist / Edited by A. S. Efimov. — To: Medkniga, 2007
3. Endocrinology. Edited by N. Lavin. Translated from English— M., Praktika, 1999.
4. Okhlobystin A.V. Diagnosis and treatment of Zollinger-Ellison syndrome. Russian Medical Journal. — 1998.