Pancreas

Islets of Langerhans:

os-cells P-cells A-cells

Glucagon

Insulin

Somatostatin

8.

Gonads (testes, ovaries)

Levdig cells Sertoli cells Granulosa cells

Testosterone Estrogens, inhibin Estrodo, ettene, progesterone Progesterone Thepiosynthesis of hormones specialized The piosynthesis of hormones is programmed in the genetic apparatus of specialized endocrine cells. Consequently, it depends on the structure and expression of the genes encoding the synthesis of these hormones, as well as on the enzymes that regulate hormone synthesis and post-translational processes. The absence or defect of the corresponding genes leads to endocrinopathy. An example is dwarfism due to a genetic defect in growth hormone.

2. Secretion of hormones. As indicated, the most important feature of any hormone is its secretion. The hormone packaged in vesicles or granules is transported towards the cytoplasmic membrane. The release of protein-peptide hormones and catecholamines from the cell is preceded by the interaction of the cytoplasmic membrane and the membrane of the secretory granule. After this, their lysis occurs and the hormone leaves the cell. This process is activated by many factors, mediators, high potassium concentrations, electrical stimuli, etc. Hormone secretion is an act accompanied by energy expenditure, so it is always associated with shifts in the ATP-cAMP system. Secretion requires the participation of calcium ions, which activate proteins of the microtubularmicrofilamentous system, facilitating the interaction of hormone granules with them, and affect the formation of cAMP. Therefore, a decrease in the content of calcium ions in the extracellular environment and its entry into the endocrine cell inevitably leads to a decrease in the secretory activity of this cell.

3. Transport of hormones. The secreted hormone enters the internal environment of the body, mainly into the blood, and is transported further. Most hormones form complex compounds in the blood with plasma proteins. Some of these proteins are specific transport proteins (for example, transcortin, which binds hormones of the adrenal cortex), some are nonspecific (for example, γ -globulins). Complexation with proteins is a reversible process. In addition, some hormones are associated in the blood with formed elements, in particular red blood cells.

The formation of a bound form of hormones is of great physiological importance. Firstly, it protects the body from excessive accumulation of free hormones in the blood (and, therefore, effects on tissues). Secondly, the bound form of the hormone is its physiological reserve. Thirdly, binding to proteins helps protect the hormone from destruction by enzymes, i.e. prolongs his life. Finally, complexation with proteins prevents the filtration of small-molecule hormones through the glomeruli and thereby inhibits these important regulatory modesces.

4. Recognition of a hormonal signal. Attracting the peripheral organs, hormones, as a rule, are freed from the protein component and, fixing on certain receptors of cells that parceive this hormone (target cells), carry out their specific action. Daries the peripheral attractor normones, various transformations occur. In this case, the formation of new hormonal products is possible, often more active or producing a different biological effect than the original hormone. Thus, the thyroid hormone thyroxine can be converted in tissues into triiodothyronine, a more active hormone of the same gland. Androgens (male sex hormones) are converted in the hypothalamus into estrogens - female sex hormones. Transduction of a hormonal signal into a biological response is organically related to the mechanism of action of this hormone.

The effect of any hormone on target cells always begins with its interaction with certain components of the cell. This phenomenon is called hormone reception, and the cellular components that interact with the hormone are called receptors. Hormone receptors are acidic large molecular oligopeptides.

The structure of the receptor molecule is characterized by asymmetry. There are three sections:

binding hormone;

the basal ganglia, as well as a decrease in the number of receptors, binding cholecystokinin in these structures and in the cerebral cortex). Whether these changes are primary or appear as a consequence of the development of diseases remains to be determined.

The discovery of opioid peptides and the distribution of their receptors in various brain structures, in particular in the limbic system, has attracted attention to assessing their significance in the pathogenesis of mental disorders. A hypothesis has been proposed for the existence of opioid deficiency in patients with schizophrenia, in particular the impossibility of the formation of γ -endorphin, which has a neuroleptic effect. An increase in the concentration of atriopeptide has been established during congestion in the circulatory system, which may be a mechanism for compensating for disturbances in sodium metabolism (its delay).

The study of oligopeptide hormones as a regulatory system led to the identification of a special group of diseases caused by its pathology - apudopathies.

Apudopathies are diseases associated with disruption of the structure and function of apudocytes and expressed in certain clinical syndromes. There are primary apudopathies, caused by the pathology of the apudocytes themselves, and secondary ones, which arise as a proclum of apudocytes to a disturbance in the body's homeostasis caused by a disease, the pathogenesis of which is not primarily associated with the pathology of the APUD system (in infectious diseases avoid growth, disease of the nervous system, etc.).

Primary apudopathies can manifest themselves in hyperfunction, hypofunction, dysfunction, and in the formation of apudos - tumors from cells of the APUD system. Examples are the following apudoms.

Gastrinoma is an apudoma of cells that produce gastrin, which is known to stimulate the secretion of large amounts of gastric juice with high acidity and digestive power. Therefore, gastrinoma is clinically manifested by the development of ulcerogenic Zollinger Ellison syndrome.

Corticotropinoma is an apudoma that develops from apudoblasts of the gastrointestinal tract and is manifested by ectopic hyperproduction of ACTH and the development of Itzen syndrome co-Cushing's.

Vipoma is a tumor of cells that secrete vasoactive intestinal peptide. Localized in the duodenum or pancreas. It is manifested by the development of water diarrhea and dehydration, as well as a disorder of electrolyte metabolism.