PITUITARY GLAND

The pituitary gland is a small gland about the size of a pea, located behind the eyes at the base of the brain, in a depression of the sphenoid bone called the sella turcica. The optic nerves pass above the pituitary gland. The pituitary gland consists of two structurally and functionally distinct parts: the anterior lobe and the posterior lobe.

HORMONES OF THE ANTERIOR PITUITARY

Growth Hormone (GH) is important for a child's growth. Growth hormone also affects muscle mass, fat distribution, and bone density.

Adrenocorticotropic Hormone (ACTH) regulates the secretion of adrenal hormones. The most important of these is cortisol, which is an essential hormone for humans. Cortisol affects all cells and is needed at all times, but especially in stressful situations. Cortisol influences blood pressure and blood sugar regulation.

Prolactin stimulates milk production during breastfeeding. During pregnancy, prolactin levels rise and remain elevated during lactation. Excess prolactin secretion affects sex hormones.

Gonadotropins (LH and FSH) are similar in men and women. In men, these hormones regulate testosterone production in the testes and sperm development. In women, these hormones regulate egg maturation in the ovaries and the production of estrogen and progesterone. Their interaction is essential for normal hormonal function of the testes and ovaries.

Thyroid-Stimulating Hormone (TSH) regulates the function of the thyroid gland and controls the secretion of thyroxine from the thyroid. Thyroxine accelerates metabolism and participates in regulating the body's energy balance, growth, development, and activity.

HORMONES OF THE POSTERIOR PITUITARY

Oxytocin is a hormone that influences the initiation of labor and breastfeeding in women. **Antidiuretic Hormone (ADH)**, also called vasopressin, regulates water excretion in the kidneys. ADH secretion increases if blood salt concentration rises. In addition, many medications, pain, nausea, and a sudden drop in blood pressure or blood sugar increase ADH secretion.

PITUITARY DISORDERS

Pituitary disorders are rare diseases within the field of endocrinology. They may appear as tumors, tumor-like inflammatory conditions, or as insufficient pituitary hormone function and the symptoms it causes.

The disorder may be congenital (for example, pituitary insufficiency) or it may develop later in life (for example, in the form of a pituitary tumor). Adenomas are the most common type of pituitary tumor. The most common cause of pituitary insufficiency (hypopituitarism) is a pituitary tumor or its treatment.

Symptoms caused by pituitary disorders depend on the related pituitary hormones, local pressure effects, and various hormone deficiencies. Symptoms may include headache and visual field defects.

The most common cause of pituitary insufficiency (panhypopituitarism) is a pituitary tumor. As it enlarges, the tumor destroys normal pituitary tissue or damage may occur during tumor removal. Rare causes include inflammatory diseases in the brain area or head trauma. Symptoms vary depending on the underlying cause and the hormones affected. One or more pituitary hormones may be partially or completely deficient.

- **ACTH deficiency** reduces cortisol production and may cause weakness, fatigue, loss of appetite, weight loss, nausea and vomiting.
- **Growth hormone deficiency** may lead to unfavorable changes in body fat distribution, bone density and physical performance. Patients are often somewhat overweight with increased fat mass relative to muscle. Psychological symptoms such as fatigue and lack of initiative may also occur.
- **Prolactin deficiency** causes no known symptoms in men. In women, milk production does not begin after childbirth.
- **Deficiency of sex hormone–regulating hormones** causes menstrual disturbances and infertility in women. In men it may cause infertility, decreased libido, erectile dysfunction and impotence.

- **TSH deficiency** causes thyroid gland underfunction, which manifests as fatigue, sensitivity to cold, facial swelling, weight gain and slowing of the heart rate.

- **ADH deficiency** increases water excretion, urine volumes increase and the sensation of thirst becomes stronger.

ACROMEGALY is caused by excessive production of growth hormone. In adults, excess growth hormone is visible as enlargement of the hands, feet, jaw, forehead and nose. Other symptoms of acromegaly include headache, joint pain, increased sweating, snoring and elevated blood pressure.

CUSHING'S SYNDROME is caused by excessive production of ACTH hormone by the pituitary gland, which in turn causes the adrenal cortex to produce too much cortisol. Cushing's syndrome may also develop as a result of long-term use of corticosteroid medications. Symptoms caused by excess cortisol may include central obesity, rounding of the face (moon face), muscle weakness, impaired glucose tolerance (diabetes), thin skin and easy bruising, high blood pressure, depression and osteoporosis.

MEN1 SYNDROME OR MULTIPLE ENDOCRINE NEOPLASIA is hereditary and is caused by a gene mutation located on chromosome 11, which is inherited in a dominant manner from parents to children, of whom 50% have a probability of inheriting the disease. MEN1 is a syndrome involving tumors of several endocrine glands. Tumors may occur in the pituitary gland, parathyroid glands, pancreas and small intestine. Neuroendocrine tumors of the thymus and bronchial tubes are rare and serious tumors in MEN1 syndrome.

In a patient with MEN1 syndrome, benign skin tumors, including lipomas, may be detected. In addition, enlargement of the adrenal glands and tumors in them may also often be found. A pituitary tumor may lead to excessive production of different hormones and other hormonal disturbances. Tumors of the parathyroid glands increase blood calcium levels. Prolonged hypercalcemia may cause excessive excretion of calcium in the urine, which may result in kidney stones and kidney damage. Tumors of the pancreas and gastrointestinal tract are often the most difficult treatment problem in MEN1 patients. These tumors are malignant in approximately 50% of patients.

PROLACTINOMA is caused by excessive prolactin, that is, milk hormone secretion. Symptoms of prolactinoma may include menstrual disturbances, infertility, milk discharge, impotence and osteoporosis.

DIABETES INSIPIDUS occurs as a postoperative condition after pituitary tumor surgery in at least 15% of cases. Most often the condition resolves within a few days, but it may also remain permanent. Diabetes insipidus may also occur, for example, as a consequence of a pituitary tumor. In hormone deficiency, water excretion increases and urine volumes may be several liters per day. Symptoms often occur at night, which may lead to interrupted sleep and fatigue. A strong sensation of thirst is also one of the symptoms of the disease. The disease differs from diabetes mellitus, among other things, in that sugar is not excreted in the urine; instead, the urine is abnormally dilute.

ADRENAL GLAND

The adrenal glands are paired small glands located above the kidneys. They normally weigh 4–5 grams. The adrenal glands produce several hormones that regulate bodily functions and metabolism. The adrenal glands are divided into the cortex and the medulla, which are functionally completely different. The cortex produces cortisol and mineralocorticoid hormone, that is, aldosterone. The medulla produces adrenaline and noradrenaline.

HORMONES OF THE ADRENAL CORTEX

Hormones of the cortex are structurally so-called steroids and because they are produced in the cortex, they are also called corticosteroids.

Aldosterone aims to regulate the body's sodium stores and to increase potassium excretion. It is important in regulating the body's salt balance and blood pressure.

Androgens, that is, sex hormones secreted by the adrenal glands, are biologically relatively weak hormones. Their effects resemble male sex hormones such as testosterone.

Cortisol is a hormone that has effects in almost all organs and tissues. Its most important effects concern energy metabolism. Cortisol secures the body's energy supply in all situations, such as fasting, physical exertion and stressful situations. In addition, cortisol has effects on the body's defense mechanisms, calcium and bone metabolism, and longitudinal growth.

ABOUT ADRENAL DISEAS

Adrenal diseases are rare and their cause may be suppression of hormone secretion, a tumor or excessive growth of the cortex. Symptoms of adrenal diseases may appear very slowly over months to years or, on the other hand, very rapidly. Not all patients have similar symptoms; they vary. Symptoms may be difficult to recognize because they are vague or very common, such as changes in weight and blood pressure and fatigue.

Sometimes, in imaging examinations of the abdominal area, an adrenal tumor (incidentaloma) may be found incidentally. Tumors may produce too many hormones or be non-functioning. Further examinations determine whether the adrenal tumor produces too much of some hormone and whether the tumor is benign or malignant. Most tumors are benign glandular tumors, so-called adenomas

The second most common cause of **CUSHING'S SYNDROME** is an adrenal tumor. The tumor is usually benign, but it may also be malignant. The tumor is located in one adrenal gland, but very rarely it may involve excessive growth of both adrenal cortices. A common feature of Cushing’s syndrome is excessive production of cortisol from the adrenal cortex and the symptoms it causes. Excess cortisol is associated with weight gain, accumulation of fat in the trunk and thinning and weakening of the muscles. The patient’s face may become round and reddish. Bruises may appear on the skin. Blood sugar may rise and bone density may decrease. The patient may also experience depression.

PHEOCHROMOCYTOMA is a tumor of the adrenal medulla, but it may sometimes also be located outside the adrenal gland. In the tumor, so-called stress hormones are produced, adrenaline and its related hormone noradrenaline. These are called catecholamines. Excess secretion of adrenaline and noradrenaline causes an increase in blood pressure and often episodic symptoms, which may include headache, palpitations and sweating.

ADRENAL INSUFFICIENCY is caused by the cessation of hormone secretion from the adrenal cortex. Adrenal insufficiency may originate from the adrenal gland itself, the pituitary gland or the hypothalamus. When the disorder is in the adrenal gland, it is referred to as primary adrenal cortical insufficiency, that is, Addison's disease. If the insufficiency is due to the pituitary gland or hypothalamus, it is referred to as pituitary-origin adrenal cortical insufficiency. Most commonly, the underlying cause is an autoimmune reaction initiated by the body for an unknown reason. The cause of the disease may also be cortisone medication, which may lead to suppression of the body's own cortisol secretion if the dose is high and the treatment duration is long. The production of mineralocorticoid hormone, that is, aldosterone, does not depend on ACTH, so in pituitary-origin insufficiency there is no deficiency of aldosterone. The main symptoms of the disease are due to hormone deficiencies, which are of two types: cortisol (glucocorticoid) deficiency and mineralocorticoid deficiency, which regulates salt balance and blood pressure. The disease may begin very abruptly with symptoms of shock, in which case it is referred to as an Addisonian crisis. Its characteristic features include sudden drop in blood pressure, vomiting, abdominal pain and disturbances of consciousness. A crisis may also occur due to neglect of medication in a patient who has already been diagnosed earlier.

Addison’s disease usually begins gradually and the symptoms are often vague. Common symptoms include fatigue, weakness, weight loss, loss of appetite, nausea, vomiting, muscle weakness and salt craving. Women may experience menstrual disturbances and men may have impotence. Mood changes such as depression are common if untreated. Blood pressure may also be low. Darkening of the skin may occur, although not in all patients.

PRIMARY HYPERALDOSTERONISM is caused by excessive production of aldosterone from the adrenal cortex. Most commonly the cause is an unknown overgrowth of the adrenal cortex or a benign tumor (adenoma). The key feature is elevated blood pressure, which may not cause symptoms itself but significantly increases cardiovascular risk. If blood potassium is low, heart rhythm disturbances, muscle weakness and cramps may occur.

Source and more information:
The Finnish Endocrine Society
https://www.endo.fi/in-english/

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