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PHA 304

PHARMACOLOGICAL OF TH PITUITARY GLAND

The pituitary gland is often called the master gland because it controls several other hormone glands in your body, including the thyroid and adrenals, the ovaries and testicles. It secretes hormones from both the front part (anterior) and the back part (posterior) of the gland. Hormones are chemicals that carry messages from one cell to another through your bloodstream.

If your pituitary gland is not producing sufficient amounts of one or more hormones this is called hypopituitarism.

If on the other hand you are over producing certain hormones, then you would have features due to the over production of the specific hormone concerned.

Anatomy of the Pituitary Gland

The pituitary gland is only about 1/3 of an inch in diameter (that's about as large as a pea) and located at the base of the brain.

Since their functions are so intertwined, it's no surprise that the hypothalamus and pituitary are located near each other. They're actually connected by the pituitary stalk, or more technically, the infundibulum.

The pituitary glands are made of the anterior lobe and posterior lobe. The anterior lobe produces and releases hormones. The posterior lobe does not produce hormones per se—this is done by nerve cells in the hypothalamus—but it does release them into the circulation.

Hormones of the Pituitary Gland

The hormones of the pituitary gland send signals to other endocrine glands to stimulate or inhibit their own hormone production. For example, the anterior pituitary lobe will release adrenocorticotrophic hormone (ACTH) to stimulate cortisol production in the adrenal glands when you're stressed.

The anterior lobe releases hormones upon receiving releasing or inhibiting hormones from the hypothalamus. These hypothalamic hormones tell the anterior lobe whether to release more of a specific hormone or stop production of the hormone.

Anterior Lobe Hormones:

Adrenocorticotrophic hormone (ACTH): ACTH stimulates the adrenal glands to produce hormones.

Follicle-stimulating hormone (FSH): FSH works with LH to ensure normal functioning of the ovaries and testes.

Growth hormone (GH): GH is essential in early years to maintaining a healthy body composition and for growth in children. In adults, it aids healthy bone and muscle mass and affects fat distribution.

Luteinizing hormone (LH): LH works with FSH to ensure normal functioning of the ovaries and testes.

Prolactin: Prolactin stimulates breast milk production.

Thyroid-stimulating hormone (TSH): TSH stimulates the thyroid gland to produce hormones. The posterior lobe contains the ends of nerve cells coming from the hypothalamus. The hypothalamus sends hormones directly to the posterior lobe via these nerves, and then the pituitary gland releases them.

Posterior Lobe Hormones:

Anti-diuretic hormone (ADH): This hormone prompts the kidneys to increase water absorption in the blood.

Oxytocin: Oxytocin is involved in a variety of processes, such as contracting the uterus during childbirth and stimulating breast milk production.

Using Adrenocorticotrophic hormone (corticotropin)

Corticotropin-releasing hormone (CRH) is responsible for the synthesis and release of the peptide pro-opiomelanocortin by the pituitary Adrenocorticotrophic hormone (corticotropin)

CRH is used diagnostically to differentiate between Cushing syndrome and ectopic ACTH-producing cells

ACTH is released from the pituitary in pulses with an overriding diurnal rhythm, with the highest Concentration occurring at approximately 6 AM and the lowest in the late evening Stress stimulates ACTH secretion, whereas cortisol acting via negative feedback suppresses its release. Adrenocorticotrophic hormone (corticotropin)

Mechanism of action:

The target organ of ACTH is the adrenal cortex, where it binds to specific receptors on the cell surfaces

The occupied receptors activate G protein-coupled processes to increase cAMP, which in turn stimulates the rate-limiting step in the adrenocorticosteroid synthetic pathway (cholesterol to pregnenolone)

This pathway ends with the synthesis and release of the adrenocorticosteroids and the adrenal androgens

Therapeutic uses:

Diagnostic use for differentiating between primary adrenal insufficiency (Addison disease, associated

with adrenal atrophy) and secondary adrenal insufficiency (caused by the inadequate secretion of ACTH by the pituitary)

ACTH is used in the treatment of multiple sclerosis and infantile spasm (West syndrome)

Adverse effects

Similar to those of glucocorticoids

- Osteoporosis
- Hypertension
- Peripheral edema
- Hypokalemia
- Emotional disturbances
- Increased risk of infection