

Pituitary Physiology

CoreNotes by Core Concepts Anesthesia Review, LLC

What You Must Know

1. The pituitary is an endocrine gland located at the base of the brain in a bony enclosure known as the sella turcica.
2. Anatomically, the pituitary is divided into anterior (adenohypophysis) and posterior (neurohypophysis) lobes.
3. The anterior pituitary secretes:
 - a. Growth hormone (GH)
 - b. Thyroid stimulating hormone (TSH)
 - c. Adrenocorticotrophic hormone (ACTH)
 - d. Prolactin
 - e. Luteinizing hormone (LH)
 - f. Follicle-stimulating hormone (FSH)
4. The posterior pituitary secretes :
 - a. Oxytocin
 - b. Antidiuretic hormone (ADH), also known as vasopressin
5. Hormones released by the anterior pituitary are controlled by the hypothalamus through the use of hypothalamic releasing factors.
6. The posterior pituitary is an extension of the hypothalamus with axons that project directly into the posterior lobe and release short-acting hormones.

The pituitary gland, sometimes referred to as the 'master gland,' is responsible for the regulation of many for the endocrine functions of the body. Important functions controlled by the pituitary include growth, blood pressure, reproduction, lactation, metabolism, regulation of blood chemistry, and the physiologic response to stress.

Growth hormone has anabolic effects promoting increases in protein synthesis, bone growth and muscle mass.

TSH stimulates the thyroid gland to produce and release T4, which is converted peripherally to T3 that regulates the metabolic rate of virtually all tissues. Elevated thyroid hormone levels serve as a negative feedback loop, inhibiting the release of TSH.

ACTH stimulates the release of glucocorticoids, and to a lesser extent mineralocorticoids, from the adrenal cortex. As with TSH, glucocorticoid hormone levels serve as a negative feedback loop, inhibiting the release of ACTH.

ADH, also known as arginine vasopressin (ARV), is a polypeptide hormone that has important renal effects, causing the retention of free water. Physiologically, it is released in response to hyperosmolality of the plasma, usually secondary to dehydration. ADH also causes vasoconstriction and is used during CPR.

Oxytocin causes uterine contraction and is unique in that its effects cause a positive feedback loop – uterine contraction causes the further release of oxytocin.

Additional Reading:

Longnecker, DE, Brown, DL, Newman MF and Zapol, WM. *Anesthesiology*. New York: McGraw Hill, 2012: 159-160