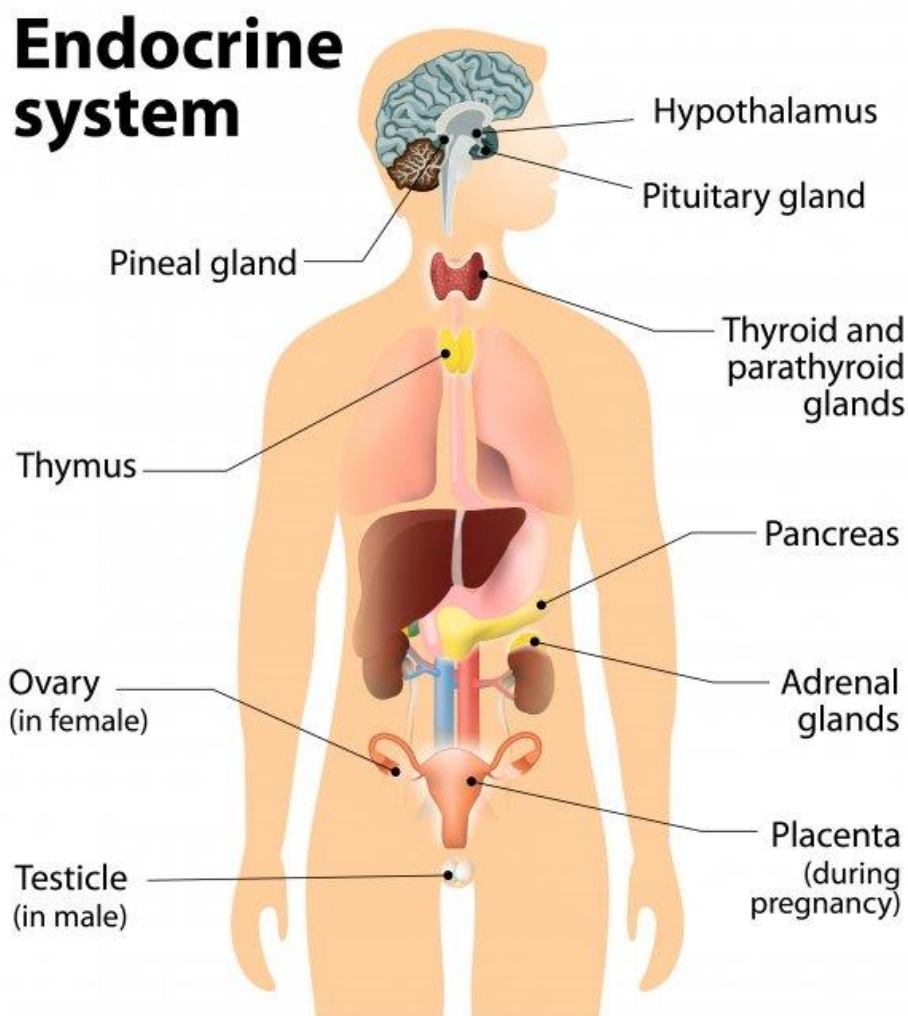


General Principles of Endocrinology

The endocrine system consists of the ductless endocrine glands scattered throughout the body. They all accomplish their functions by secreting hormones into the blood. Once secreted, a hormone travels in the blood to its distant target cells, where it regulates a particular function .

Endocrinology is the study of the endocrine system and its disorders. It involves diagnosing and treating hormone imbalances that affect metabolism, growth, reproduction, and response to stress.

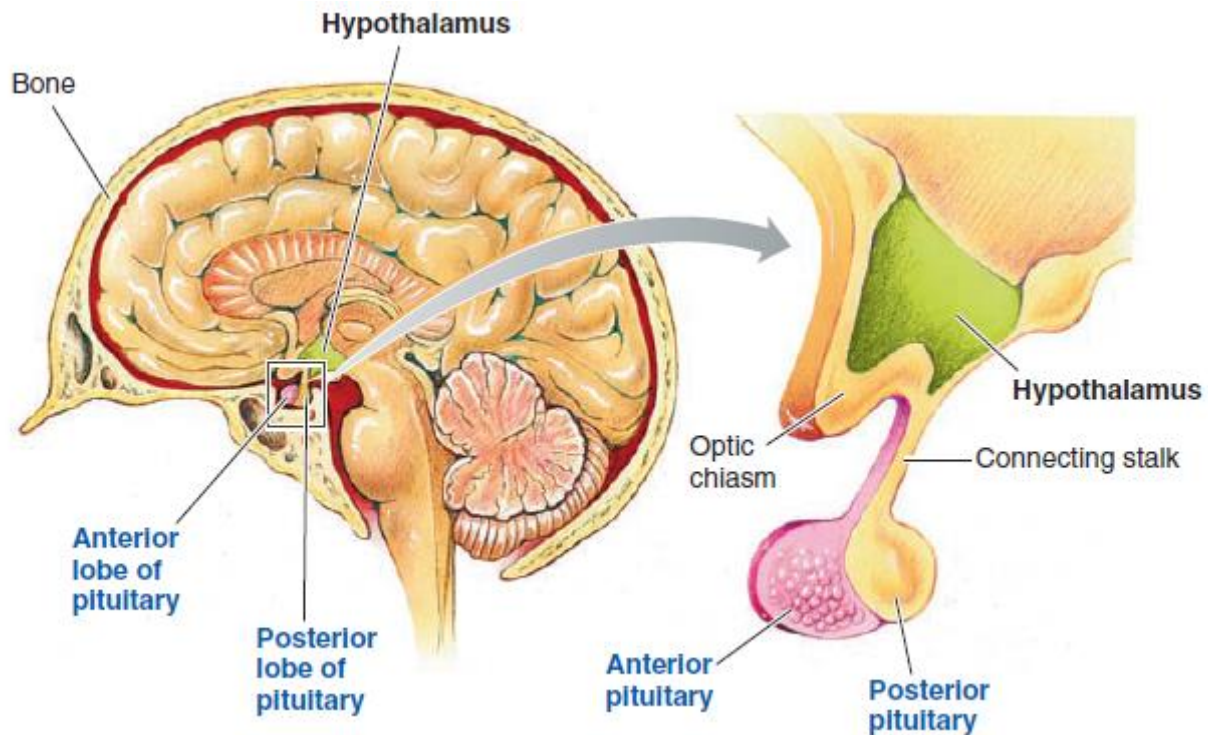
The blood distributes hormones to the body, only specific target cells can respond to each hormone because only the target cells have receptors for binding with the particular hormone. Binding of a hormone with its specific target-cell receptors initiates a chain of events within the target cells to bring about the hormone's final effect.



Hypothalamus and Pituitary

The **pituitary gland**, or **hypophysis**, is a small endocrine gland located in a bony cavity at the base of the brain just below the hypothalamus .

The pituitary is connected to the hypothalamus by a thin connecting stalk. If you point one finger between your eyes and another finger toward one of your ears, the imaginary point where these lines would intersect is about where your pituitary is located.



The pituitary gland consists of anterior and posterior lobes.

The pituitary has two anatomically and functionally distinct lobes, the **posterior pituitary** and the **anterior pituitary** . The posterior pituitary is composed of nervous tissue and thus is also termed the **neurohypophysis**. The anterior pituitary consists of glandular epithelial tissue and accordingly is also called the **adenohypophysis** .

The release of hormones from both the posterior and the anterior pituitary is directly controlled by the hypothalamus, but the natures of these relationships are entirely different. The posterior pituitary connects to the hypothalamus by a neural pathway, whereas the anterior pituitary connects to the hypothalamus by a unique vascular link.

The hypothalamus and posterior pituitary act as a unit to secrete vasopressin and oxytocin.

The hypothalamus and posterior pituitary form a neuroendocrine system that consists of a population of neurosecretory neurons whose cell bodies lie in two well-defined clusters in the hypothalamus. The axons of these neurons pass down through the connecting stalk to terminate on capillaries in the posterior pituitary .

Posterior pituitary hormones

Vasopressin

Vasopressin (antidiuretic hormone, ADH) has two major effects that correspond to its two names:

- (1) it conserves H₂O during urine formation by the kidney nephrons (an antidiuretic effect)
- (2) it causes contraction of arteriolar smooth muscle (a vessel pressor effect).

Oxytocin

Oxytocin stimulates contraction of uterine smooth muscle to help expel the infant during childbirth, and it promotes ejection of milk from the mammary glands (breasts) during breast-feeding.

In addition to these two major physiologic effects, oxytocin influences a variety of behaviors, especially maternal behaviors.

For example, this hormone fittingly facilitates bonding, or attachment, between a mother and her infant. For this reason, oxytocin is sometimes nicknamed the “**love hormone**” .

Anterior pituitary hormones

Unlike the posterior pituitary, which releases hormones synthesized by the hypothalamus, the anterior pituitary synthesizes the hormones it releases into the blood :-

1. **Growth hormone (GH, somatotropin)**, the primary hormone responsible for regulating overall body growth.
2. **Thyroid-stimulating hormone (TSH, thyrotropin)**, which stimulates secretion of thyroid hormone and growth of the thyroid gland.
3. **Adrenocorticotrophic hormone (ACTH, adrenocorticotropin)**, the hormone that stimulates cortisol secretion by and promotes growth of the adrenal cortex.
4. **Follicle-stimulating hormone (FSH)** helps regulate gamete (reproductive cells, namely, ova and sperm) production in both sexes.
5. **Luteinizing hormone (LH)**, helps control sex hormone secretion in both sexes.
6. **Prolactin (PRL)**, which enhances breast development and lactation (milk production) in females.

Hypothalamic releasing and inhibiting hormones help regulate anterior pituitary hormone secretion.

TABLE 18-3 Major Hypophysiotropic Hormones

Hormone	Effect on the Anterior Pituitary
Thyrotropin-releasing hormone (TRH)	Stimulates release of TSH (thyrotropin) and prolactin
Corticotropin-releasing hormone (CRH)	Stimulates release of ACTH (corticotropin)
Gonadotropin-releasing hormone (GnRH)	Stimulates release of FSH and LH (gonadotropins)
Growth hormone–releasing hormone (GHRH)	Stimulates release of GH
Somatostatin (growth hormone–inhibiting hormone; GHIH)	Inhibits release of GH and TSH
Prolactin-releasing peptide (PrRP)	Stimulates release of PRL
Dopamine (prolactin-inhibiting hormone; PIH)	Inhibits release of PRL