

# ENDOCRINOLOGY

## Section I - Introduction to Endocrinology

### I. Basic Principles

- A. The endocrine system consists of glands that work together to maintain homeostasis.
  - 1. A hormone is a molecule that is released from a gland into the bloodstream and modulates an aspect of physiology, typically at a distant location.
  - 2. Figure 6.1 provides an overview of the basic anatomy.
  - 3. Table 6.1 lists the major structures and functions of the endocrine system.

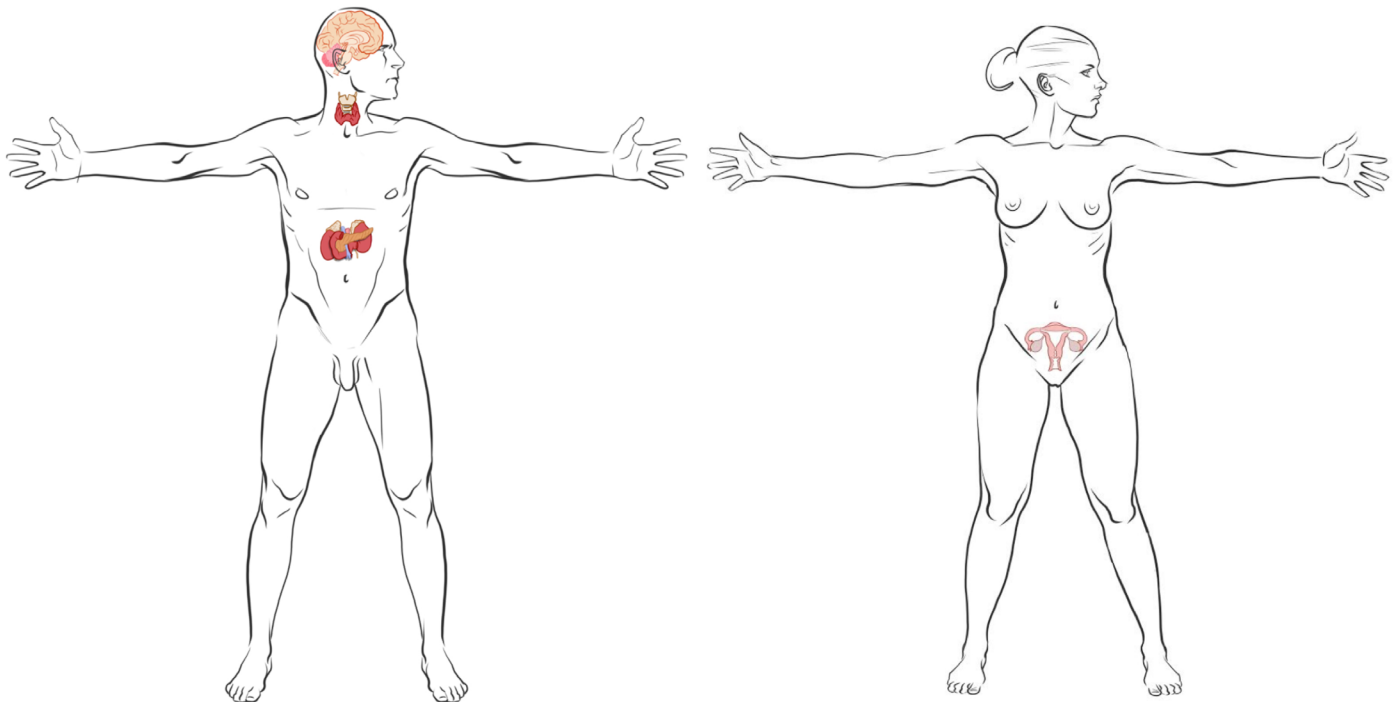


Figure 6.1 - Anatomy of the Endocrine System

Table 6.1 - Endocrine Structures and Functions

GLAND	FUNCTION
Hypothalamus	Control Center
Pituitary Gland	Control Center
Parathyroid Gland	Calcium and Bone
Skin	Calcium and Vitamin D
Thyroid Gland	Metabolism
Heart	Sodium
Adrenal Gland	Blood Pressure and Blood Volume Sexual Function (zona fasciculata) Sympathetic response (zona reticularis)
Kidneys	Blood Volume (RAAS)
Pancreas	Blood Glucose
Gonads	Sexual Function
Adipose Tissue	Appetite

## II. Hypothalamic-Pituitary Axis

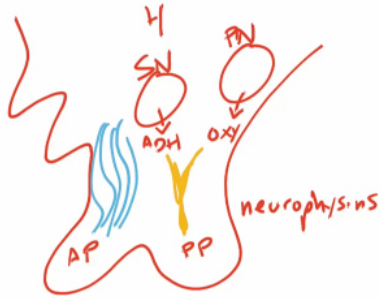
A. The Hypothalamus is a region in the forebrain that is responsible for regulating hormone concentrations.

1. Table 6.2 lists the hormones of the hypothalamic-pituitary axis.

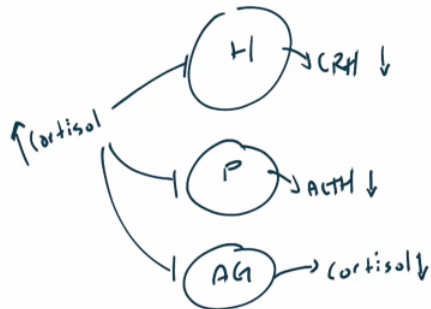
Table 6.2 - Hypothalamic Hormones and Actions

Hypothalamic Hormones	Abbreviation	Major Action
Corticotropin-releasing hormone	CRH	Stimulates ACTH release
Dopamine (prolactin-inhibiting factor)	PIF	Inhibits prolactin release
Growth hormone-releasing hormone	GHRH	Stimulates GH release
Gonadotropin-releasing hormone	GnRH	Stimulates FSH and LH release
Somatostatin (somatotropin release-inhibiting hormone)	SRIF	Inhibits GH release
Thyrotropin-releasing hormone	TRH	Stimulates TSH release Stimulates prolactin (PRL) release
Antidiuretic hormone (vasopressin)	ADH	Stimulates water reabsorption at the kidneys and vasoconstriction of arterioles
Oxytocin		Stimulates milk let-down and uterine contraction

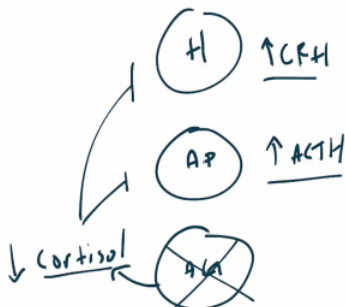
- Most hormones made in the hypothalamus travel down the hypophyseal portal system of veins to exert their action on the anterior pituitary (adenohypophysis).
- Oxytocin and ADH are produced in the hypothalamus and packaged into vesicles that are transported along axons to the posterior pituitary (neurohypophysis). The vesicles contain neurophysin proteins which help stabilize oxytocin and ADH.



- Drugs that act on the hypothalamus can cause an increase in ADH secretion, leading to syndrome of inappropriate antidiuretic hormone (SIADH).
- The final hormone in the pathway of the HP axis inhibits the additional release of hormones from the hypothalamus and pituitary, a term called negative feedback.
  - Iatrogenic use of hormones or drugs can disrupt the HP axis.



- Disease processes can disrupt the HP axis.



## REVIEW QUESTIONS

- What are commonly tested drugs that can cause syndrome of inappropriate antidiuretic hormone (SIADH)?

- SSRIs
- Carbamazepine

- How would the hypothalamic pituitary axis be altered in a patient with rheumatoid arthritis who has a history of chronic steroid use?

- Exogenous cortisol would inhibit the hypothalamic pituitary axis
- Endogenous CRH, ACTH, and cortisol would be decreased

- Why should a surgeon be cautious when operating on a patient taking exogenous cortisol?

- Exogenous cortisol causes atrophy of the adrenal cortex
- The ability of the adrenal cortex to release cortisol during stress is diminished
- Cortisol regulates blood pressure through alpha-1 receptors
- During surgery the patient could become hypotensive

- How would Addison's disease alter the hypothalamic pituitary axis?

- $\downarrow$  cortisol  $\rightarrow \uparrow$  CRH and ACTH

