

I. The Endocrine System

• A. Hormones and Other Signaling Molecules

- 1. _____ are hormones and secretions that can bind to target cells and elicit in them a response.
- 2. There are _____ main types of signaling molecules
- _____ are secreted from endocrine sources and some neurons, and are then transported by the blood to remote targets.
- _____ are secreted from neurons and act on immediately adjacent target cells for a short time.
- _____ are secreted from cells of many different tissues; they act locally and are swiftly degraded
- _____, which are secreted by exocrine glands, have targets outside the body; they integrate social activities between animals.

II. Signaling Mechanisms

• A. The Nature of Hormonal Actions

- 1. The sources of _____ may be collectively called the _____, which shows intimate connections with the nervous system.
- 2. Different _____ different cellular response mechanisms.
- 3. Not all cells have _____ for all hormones; the cells that respond are selected by the means of the type of receptor they possess.

- B. Characteristics of Steroid Hormones
 - 1. _____, assembled from _____, cross membranes readily.
 - 2. Steroids _____ or _____ protein synthesis by switching certain genes on or off.
 - They bind to _____ in the nucleus, and then activate transcription.

Figure 36.3
Page 630

- _____ is the male hormone with receptors throughout the body; however, in testicular feminization syndrome, none of the target cells respond correctly, so the XY individual develops female characteristics.

III. The Hypothalamus and Pituitary Gland

- A. The _____ and _____ work jointly as the neural-endocrine control center.
 - 1. The _____ is a portion of the brain the monitors internal conditions and emotional states.
 - 2. The _____ is a pea-sized gland connected to the hypothalamus by a stalk.

Figure 36.2a
Page 628

- The _____ of the pituitary consists of nervous tissue and releases two neurohormones made in the hypothalamus

- The _____ consists of glandular tissue and secretes six hormones and controls the release of others.
- B. Posterior Lobe Secretions
 - 1. The _____ of neuron cell bodies in the hypothalamus _____ into the posterior lobe of the pituitary.
 - 2. Two hormones are released into the capillary bed.
 - a. _____ acts on the walls of kidney tubules to control the body's water and solute levels.
 - b. _____ triggers uterine muscle contractions to expel the fetus and acts on mammary glands to release milk.

Figure 36.5a
Page 633
Figure 36.5b
Page 633

- C. Anterior Lobe Secretions
 - 1. The anterior lobe releases six hormones that stimulate ("tropic") other endocrine glands:
 - _____ stimulates the adrenal cortex
 - _____ stimulates the thyroid gland
 - _____ stimulates egg formation in females and sperm formation in males
 - _____ also acts on the ovary to release the egg and on the testes to release the sperm.

- _____ acts on the mammary glands to sustain milk production
- _____, or _____, acts on body cells in general to promote growth.
- 2. The _____ produces releasing and inhibiting hormones that target the anterior pituitary.

Figure 36.6a
Page 633

IV. Abnormal Pituitary Outputs

- A. The body does not produce _____ quantities of each hormone.
- B. But experience has shown that _____, no matter how tiny, are critical to normal body functioning.
 - 1. In childhood, too little _____ can cause pituitary dwarfism, while too much causes gigantism.
 - 2. _____ of _____ in adulthood causes thickening of skin and bones called _____.

V. Feedback Control of Hormonal Secretions

- A. A shift in the amount of hormone in the blood causes a feedback mechanism to operate.
 - 1. With _____, an increase or decrease in the concentration of a hormone triggers events that *inhibit* further secretion.
 - 2. With _____, an increase in the concentration of hormone triggers events that *stimulate* further secretion.

- B. Negative Feedback from the Adrenal Cortex

- 1. One _____ is located on top of each kidney
- 2. Among the secretions of the outer portion are the _____ such as _____, which control blood glucose levels.
 - _____ secretions is an example of a negative feedback loop.
 - When blood levels of glucose _____ (as in hypoglycemia), the hypothalamus releases

CRH anterior pituitary ACTH adrenal
cortex cortisol

this prevents muscle cells from withdrawing glucose from the blood.

- When the body is _____, as in painful injury, the nervous system provides an override mechanism in which the levels of cortisol remain high to promote healing.

Figure 36.8
Page 636

C. Local Feedback in the Adrenal Medulla

- 1. The inner medulla portion secretes _____ and *norepinephrine* under direction from sympathetic nerves from the hypothalamus.
- 2. Its secretions mobilize the body during times of excitement or stress (“fight-or flight”) response.

D. Cases of Skewed Feedback from the Thyroid

- 1. The human _____ lies at the base of the neck in front of the trachea.
- 2. Its hormones, _____ and *triiodothyronine*, influence metabolic rates, growth, and development.
 - a. These two hormones _____ critical amounts of iodine.
 - b. If the blood levels of iodine are _____, the pituitary responds with too much TSH causing the thyroid gland to enlarge abnormally in what we call a goiter.

Figure 36.9a
Page 637

- 3. _____ in adults results in lethargy and weight gain.
- 4. _____ increases heart rate and blood pressure and causes weight loss.

V. Direct Responses to Chemical Changes

- A. Secretions from Pancreatic Islets
 - 1. The _____ is dual function gland; its exocrine function is to secrete digestive enzymes.
 - 2. Certain cells within the pancreas have an endocrine function:
 - a. _____ cells secrete *glucagon*, which causes glycogen stored in the liver to be converted to glucose, raising its levels in the blood.
 - b. _____ cells secrete *insulin*, which stimulates the uptake of glucose by liver, muscle, and adipose to reduce glucose levels in the blood, especially after a meal.

- c. _____ cells secrete *somatostatin*, which can inhibit the secretion of glucagon and insulin.

Figure 36.12

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- 3. _____ is a disease resulting from imbalances of insulin: its effects include weight loss, water-solute problems, ketone production, and possible death.
 - a. In _____, insulin is no longer produced because the beta cells have been destroyed by an autoimmune response; treatment is by insulin injection.
 - b. In _____, the insulin levels are near normal but the target cells cannot respond to the hormone; controlling diet is an effective treatment.