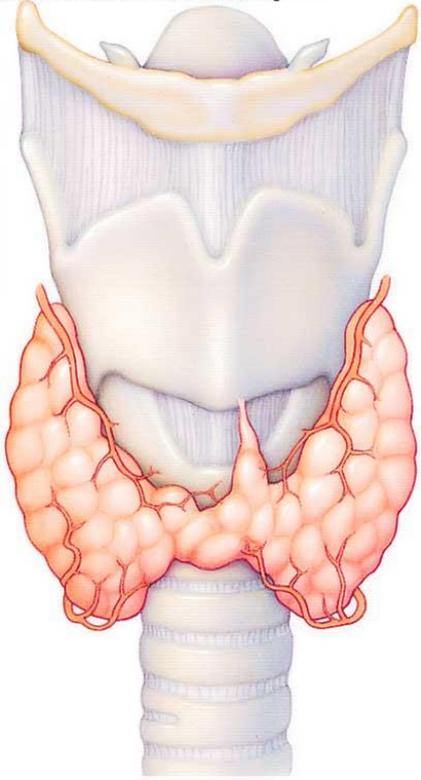


Endocrine Control

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The Endocrine System

Key Concepts:



- ⌘ **Hormones integrate activities of individual cells in ways that benefit the whole body**
- ⌘ **Only the cells with receptors for specific hormones are the targets**
- ⌘ **Hormones affect the target cells in various different ways**

Key Concepts:



- ⌘ **The hypothalamus and pituitary gland interact to coordinate the activities of endocrine glands**
- ⌘ **Other factors besides hormones trigger hormone secretions**

Hormones & Other Signaling Molecules



- ⌘ In the human body, the responses of millions to billions of cells must be integrated to keep the whole body alive and functioning.
- ⌘ This integration is brought about by **signaling molecules**.
- ⌘ These are hormones, neurotransmitters, local signaling molecules, and pheromones.

Hormones and Other Signaling Molecules

⌘ Hormones

- ☑ Are secreted by endocrine glands
- ☑ Sent via the blood
- ☑ Target sites throughout the body

⌘ Neurotransmitters

- ☑ Released from axons

⌘ Local signaling molecules

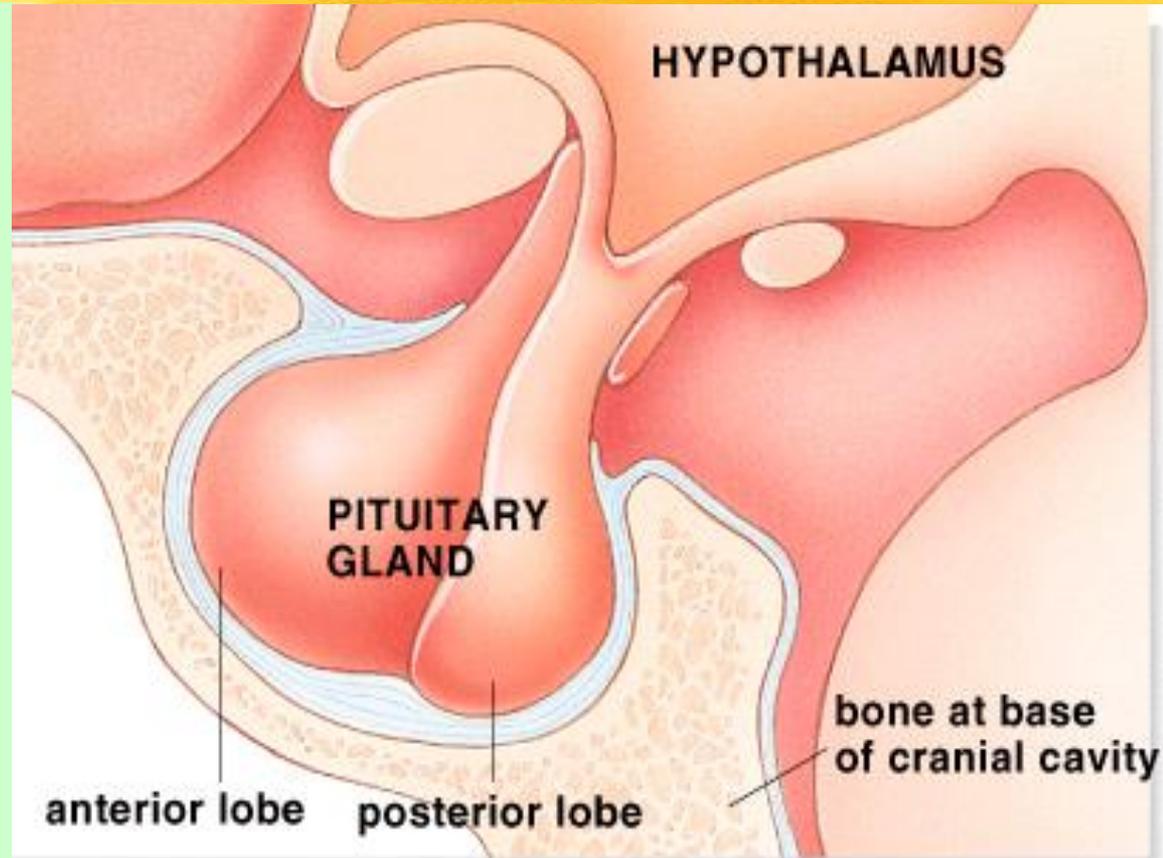
- ☑ Released by body cells for a local response

⌘ Pheromones

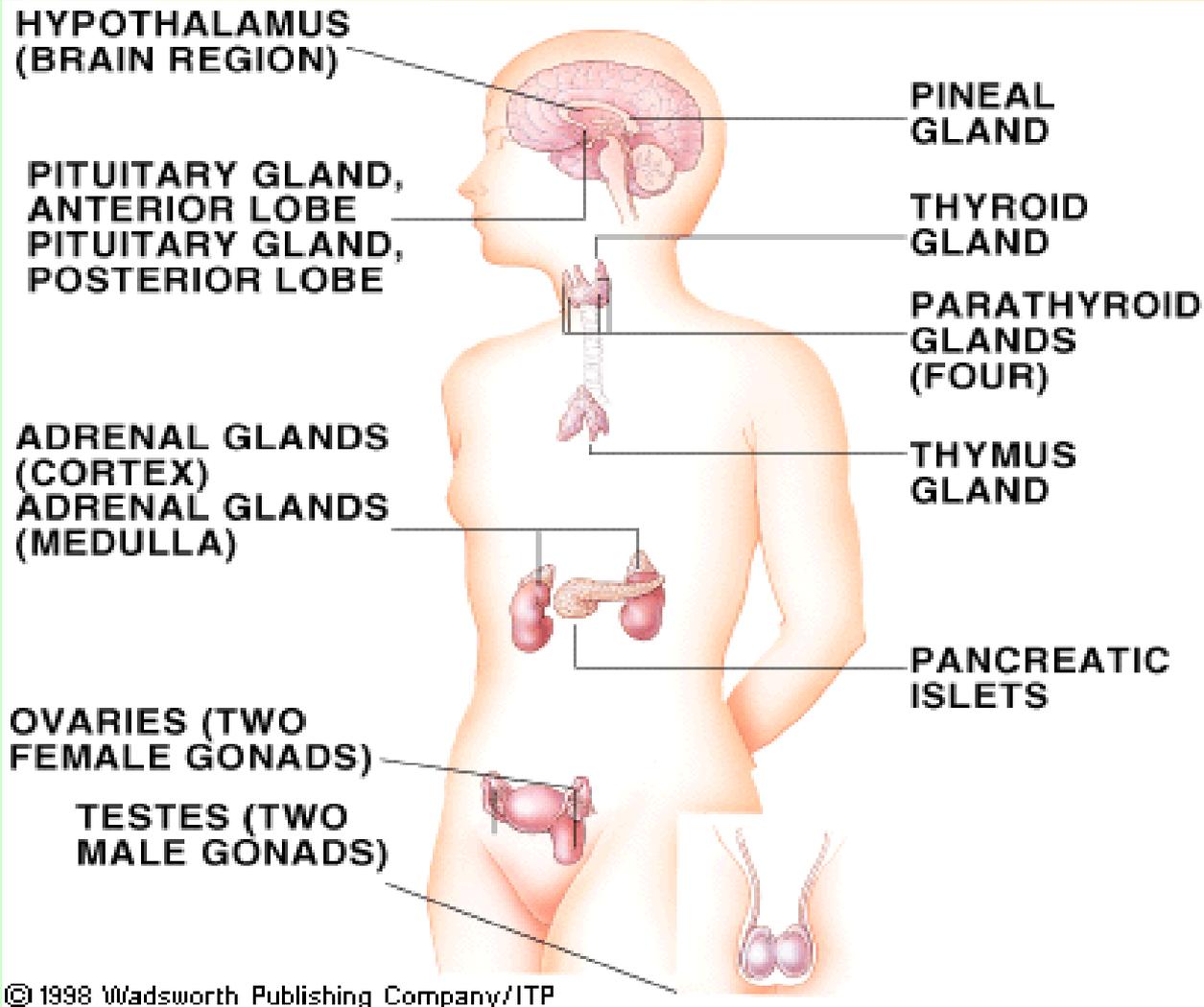
- ☑ Odorless secretions diffuse through air

Neural - Endocrine Control Center

⌘ **Pituitary gland
(endocrine)
interacts with the
hypothalamus
(nervous – part
of the brain)**



The Human Endocrine System



Hormonal Action



- ⌘ Hormones & other signaling molecules interact with protein receptors of target cells.
- ⌘ When a hormone reaches a target cell that cell will either be stimulated or inhibited.

Composition of Signaling Mechanisms

⌘ Steroids

⊞ Testosterone, Estrogens, Progestins, Cortisol, Thyroid, Vitamin D, Aldosterone

⌘ Peptides

⊞ Glucagon, ADH, Oxytocin, TRH

⌘ Proteins

⊞ Insulin, Somatotropin, Prolactin

⌘ Glycoproteins

⊞ FSH, LH, TSH

The Hypothalamus and Pituitary Gland

⌘ Hypothalamus (found deep in the forebrain)

⊞ Monitors internal activities and organs

⌘ Pituitary Gland (suspended from the hypothalamus and about the size of a pea)

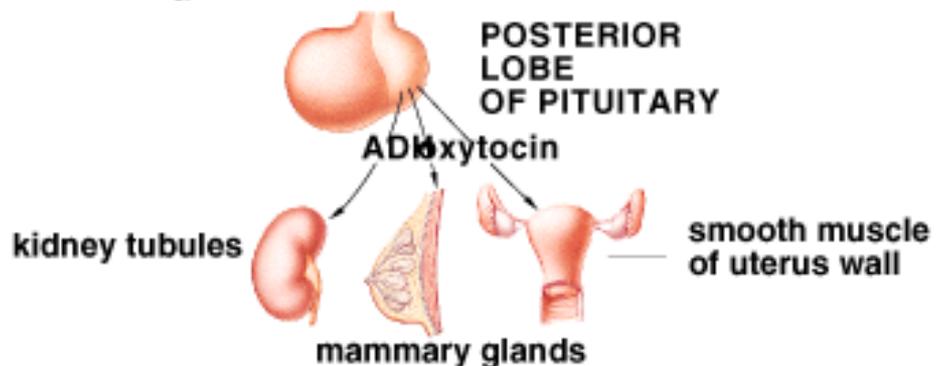
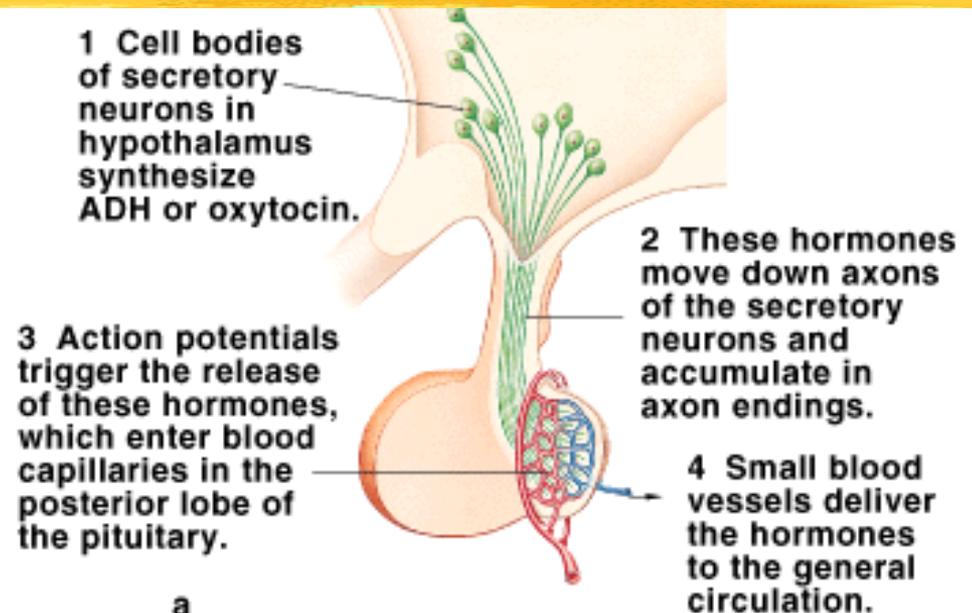
⌘ Has Two Lobes

⊞ Posterior Lobe

⊞ ADH

⊞ Oxytocin

⊞ Anterior Lobe

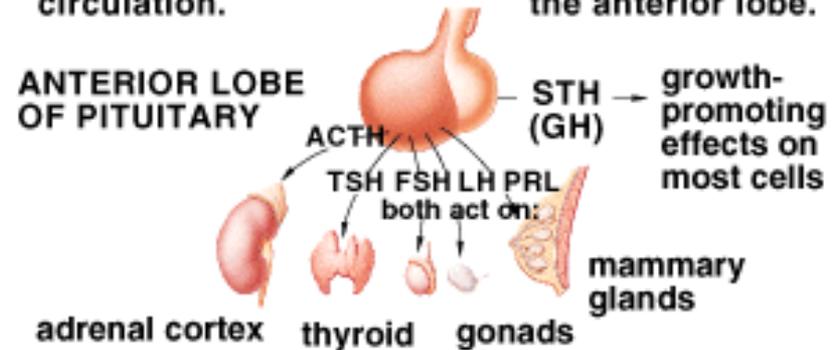
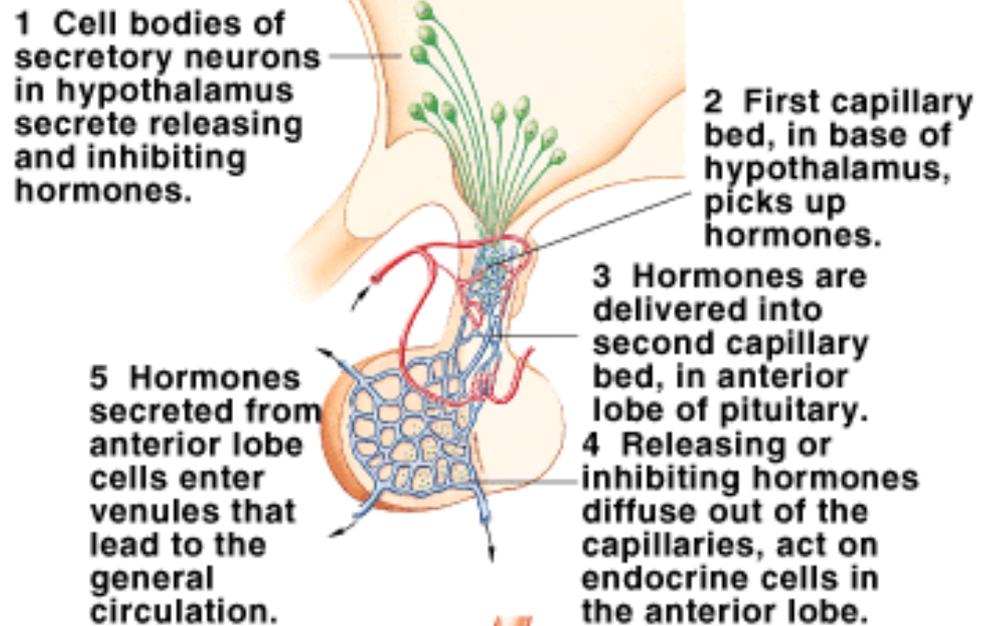


The Hypothalamus and Pituitary Gland

⌘ Pituitary Gland

⊞ Anterior lobe

⊞ ACTH, TSH, FSH, LH, Prolactin, GH (growth hormone)



Examples of Abnormal Pituitary Output



⌘ Gigantism

☑ Excess GH in childhood

⌘ Dwarfism

☑ Underproduction of GH

⌘ Diabetes insipidus

☑ Diminished ADH secretion

⌘ Acromegaly

☑ Excess GH in adulthood

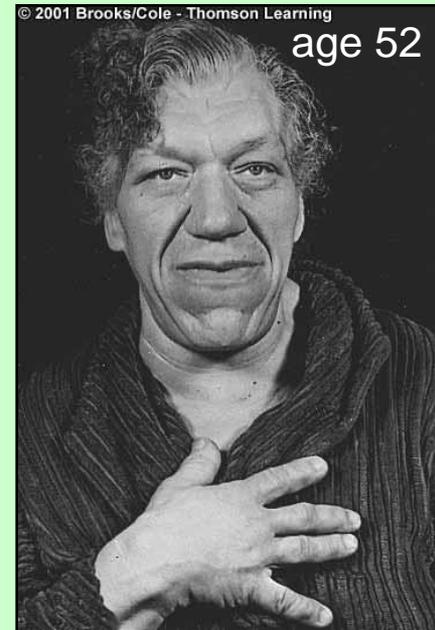
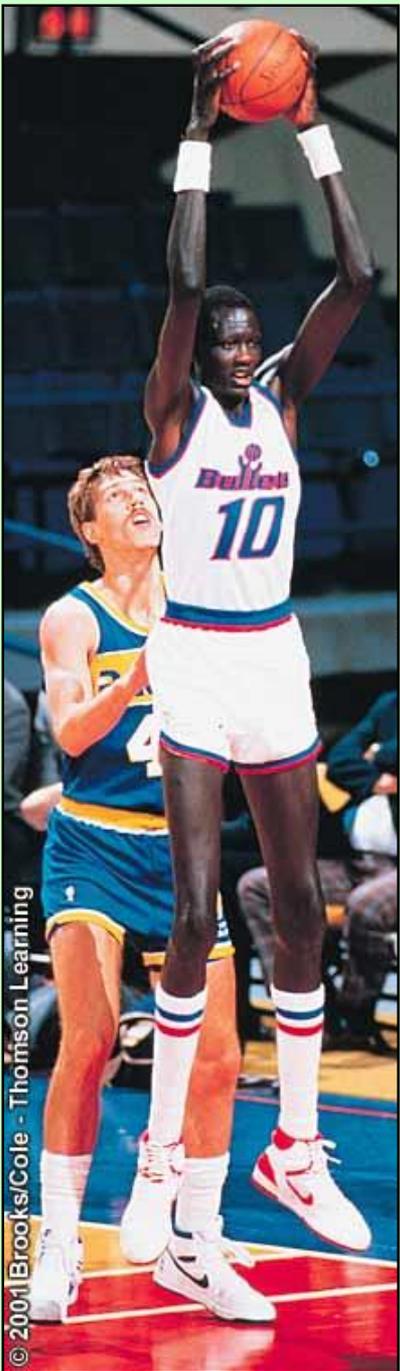


Fig. 37.7, p. 634

Sources and Hormones

⌘ Adrenal Cortex	Glucocorticoids
⌘ Adrenal medulla	Epinephrine Norepinephrine
⌘ Thyroid	Thyroxine Calcitonin
⌘ Parathyroid	PTH
⌘ Gonads	
⊠ Testes	Androgens
⊠ Ovaries	Estrogen Progesterone

Sources and Hormones



⌘ **Pancreas**

Insulin

Glucagon

Somatostatin

⌘ **Thymus**

Thymosins

⌘ **Pineal**

Melatonin

⌘ **Stomach**

Gastrin

⌘ **Small intestine**

Gastrin

Secretin

Sources and Hormones



⌘ **Liver**

Somatomedins

⌘ **Kidneys**

Erythropoietin

Angiotensin

Calcitriol

⌘ **Heart**

**Atrial natriuretic
hormone**

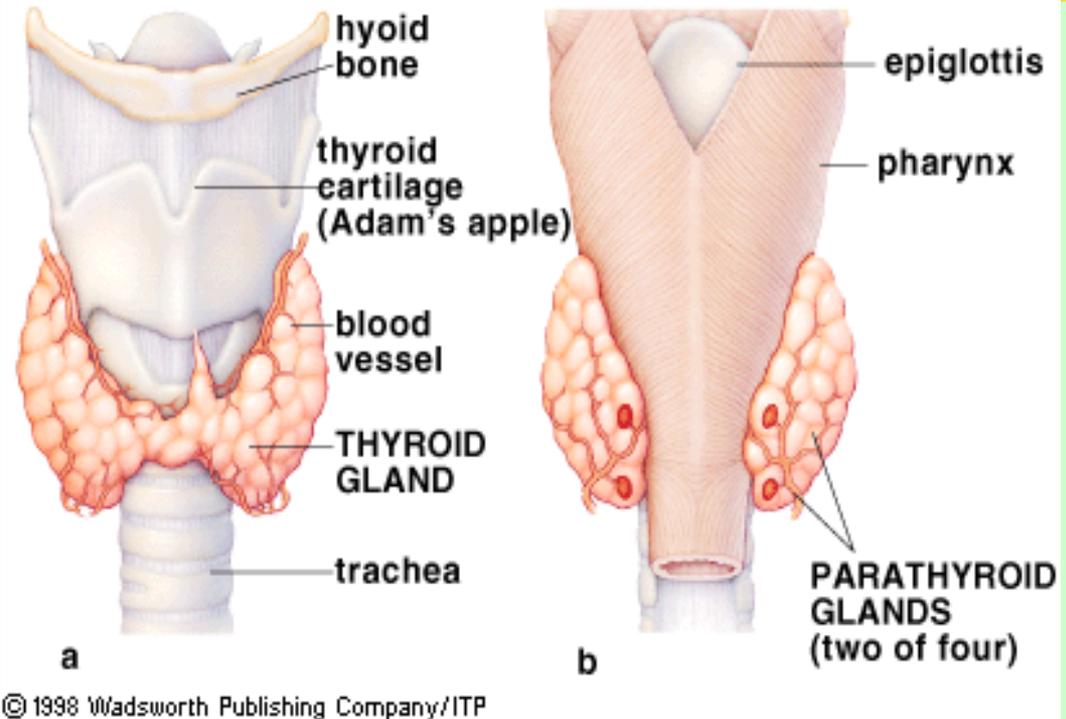
Feedback Control of Hormonal Secretions



- ⌘ **Two types of feedback**
- ⌘ **Negative Feedback**
- ⌘ **Some positive feedback**
 - ⊞ **Labor and delivery**

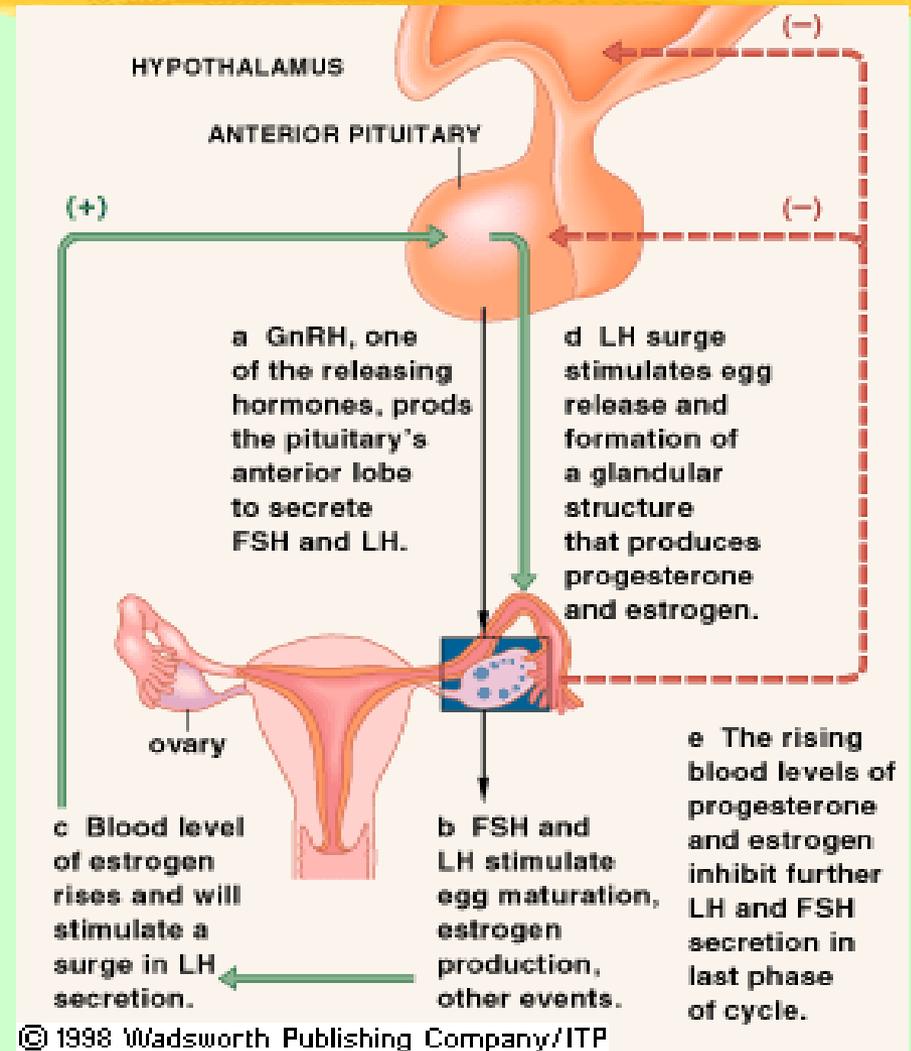
The Thyroid

- ⌘ Produces Thyroxine
 - ⊞ Made from iodine
- ⌘ TSH from the anterior pituitary gland stimulates thyroid
- ⌘ Hypothyroidism
 - ⊞ Goiter
- ⌘ Hyperthyroidism



Feedback Control of the Gonads

⌘ Loop to the hypothalamus and pituitary gland from the ovaries



Secretions from Parathyroid Glands

⌘ PTH

☑ Regulates calcium levels in blood

☑ Low calcium blood levels

---->

Parathyroid secretes PTH



Secretions from Pancreatic Islets

⌘ Alpha cells

⌘ Glucagon

- ⊗ Glycogen conversion to glucose

⌘ Beta cells

⌘ Insulin

- ⊗ Glucose uptake by cells

⌘ Delta

⌘ Somatostatin

- ⊗ Control of digestion

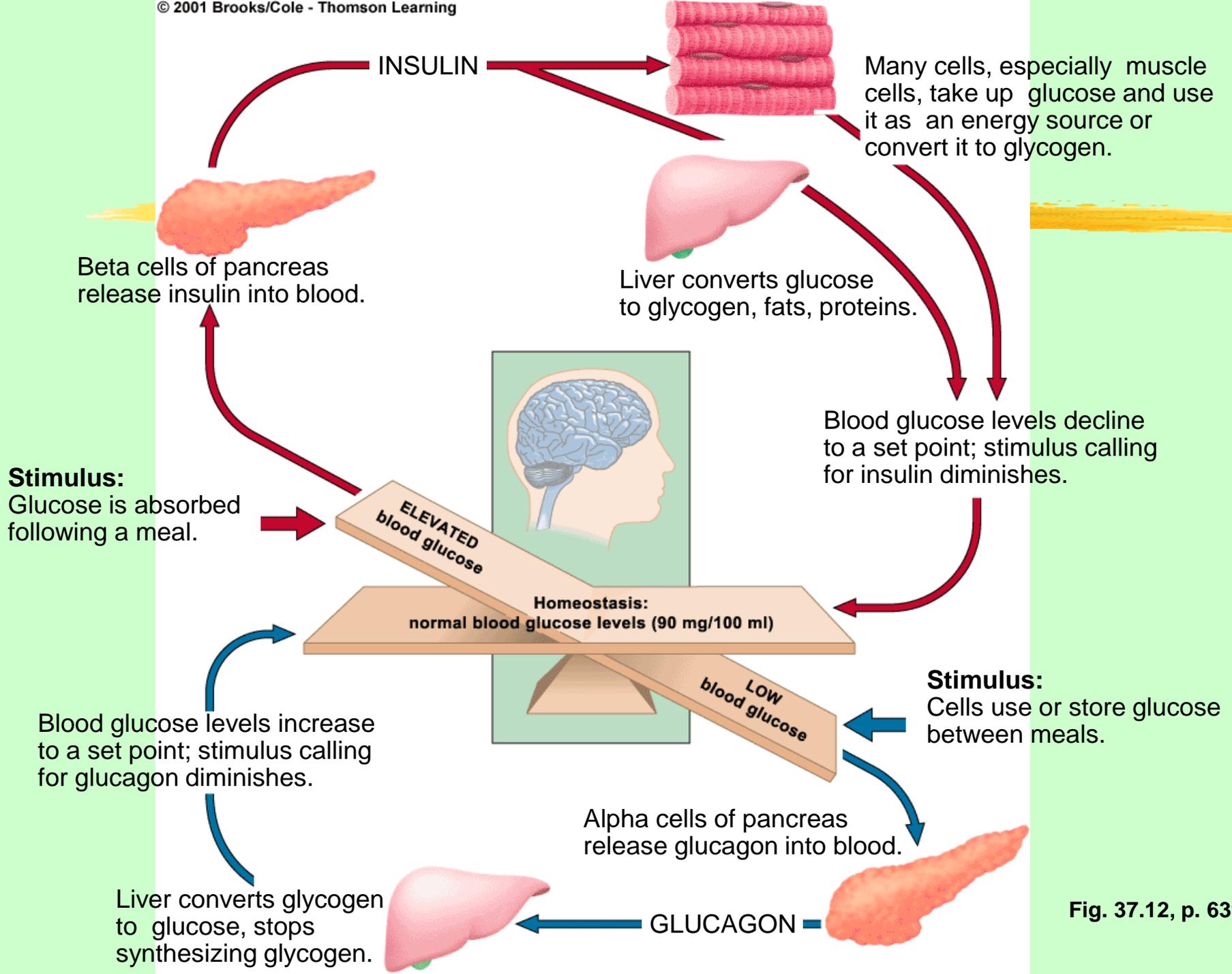


Fig. 37.12, p. 639

Applications Manual (p96)

60 points



⌘ Endocrine disorders can develop due to abnormalities in the endocrine glands, the endocrine or neural regulatory mechanisms, or the target tissues. Listed below are various endocrine disorders. Describe each one:

Disorders (30 points)



⌘ Thyroid Gland Disorders

- Hypothyroidism

- Goiter

- Grave's Disease

⌘ Parathyroid Disorders

- Hyperparathyroidism

⌘ Adrenal Cortex Disorders

- Addison's Disease

- Cushing's Disease

Diabetes (30 points)



⌘ Diabetes is a fairly common problem in the U.S. Diabetes comes in two forms: Insulin-dependent diabetes, or Type I, & non-insulin dependent diabetes, or Type II. Describe each form of the disease. Make sure to include symptoms, testing for the disease, as well as treatment.