

9

PART B

The Endocrine System

PowerPoint® Lecture Slide Presentation by Jerry L. Cook, Sam Houston University



ESSENTIALS OF HUMAN ANATOMY & PHYSIOLOGY

EIGHTH EDITION

ELAINE N. MARIEB

Thyroid Gland

- Found at the base of the throat
- Consists of two lobes and a connecting isthmus
- Produces two hormones
 - Thyroid hormone
 - Calcitonin

Thyroid Gland

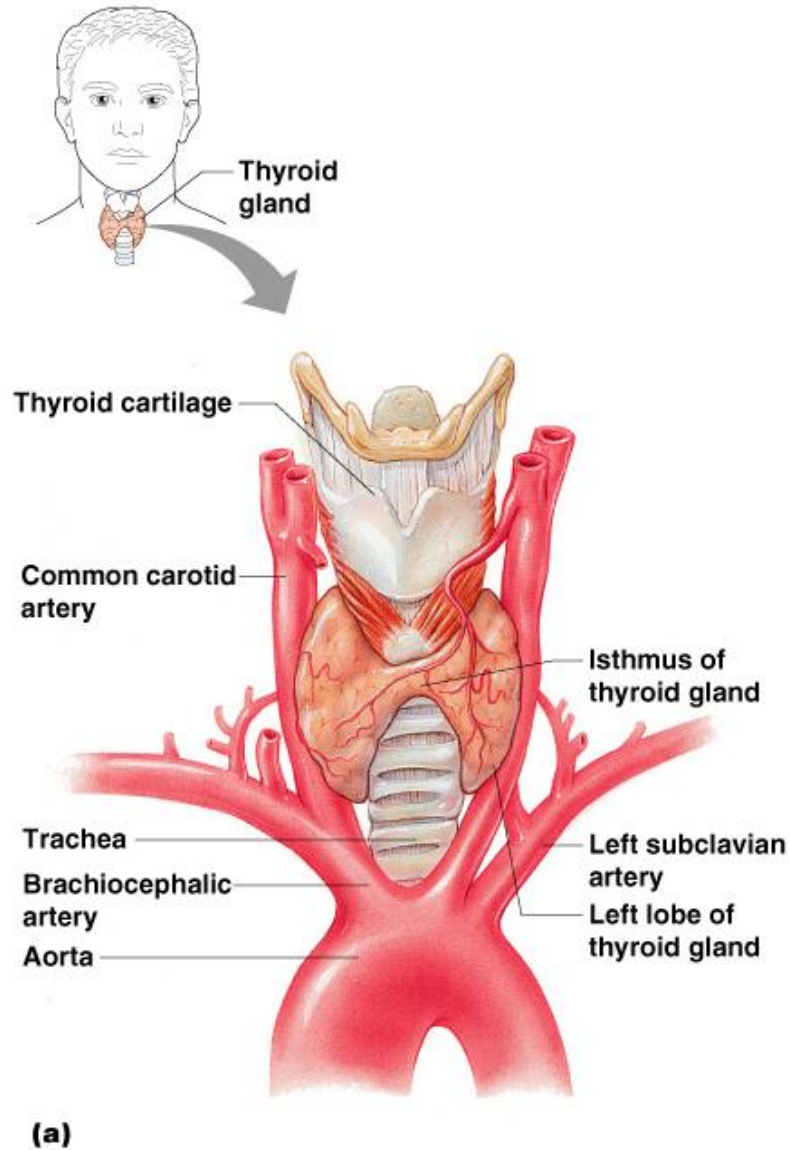
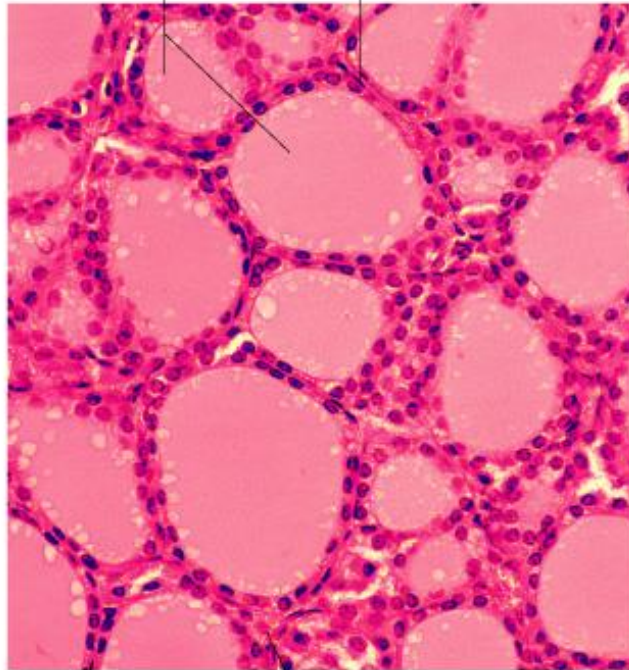


Figure 9.6

Colloid-filled
follicles

Follicle cell



C (parafollicular) cell

(b)

Thyroid Hormone

- Major metabolic hormone
- Targets every cell in the body!
- Composed of two active iodine-containing hormones
 - Thyroxine (T_4) – secreted by thyroid follicles
 - Triiodothyronine (T_3) – conversion of T_4 at target tissues

Goiter



Graves' Disease



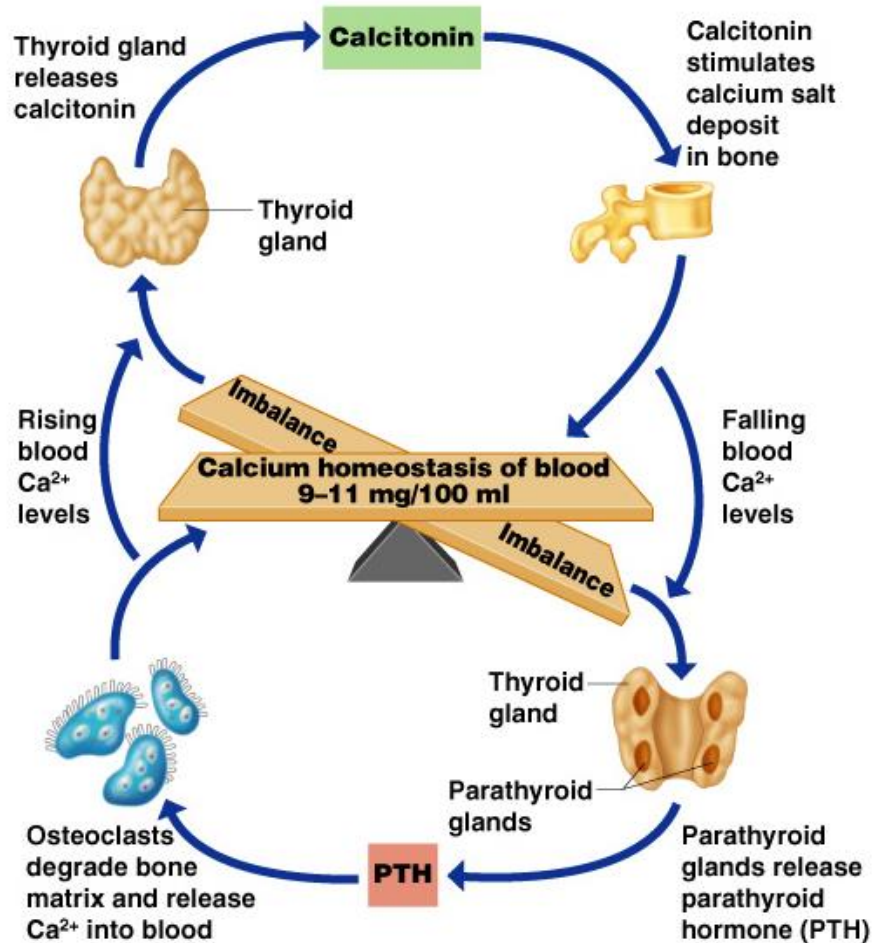
Parathyroid Glands

- Tiny masses on the posterior of the thyroid
- Secrete parathyroid hormone
 - Stimulate osteoclasts to remove calcium from bone
 - Stimulate the kidneys and intestine to absorb more calcium
 - Raise calcium levels in the blood

Calcitonin

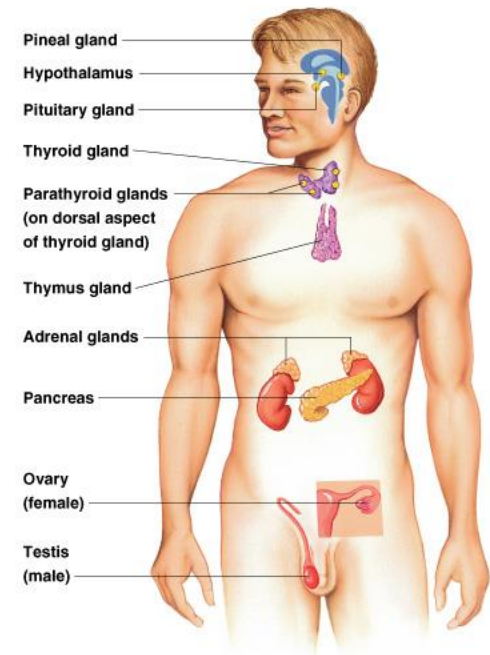
- Decreases blood calcium levels by causing its deposition on bone
- Antagonistic to parathyroid hormone
- Produced by C (parafollicular) cells

Figure 9.9



Adrenal Glands

- Two glands
 - Cortex – outer glandular region in three layers
 - Medulla – inner neural tissue region
- Sits on top of the kidneys



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Hormones of the Adrenal Cortex

- Mineralocorticoids (mainly aldosterone)
 - Produced in outer adrenal cortex
 - Regulate mineral content in blood, water, and electrolyte balance
 - Target organ is the kidney

Hormones of the Adrenal Cortex

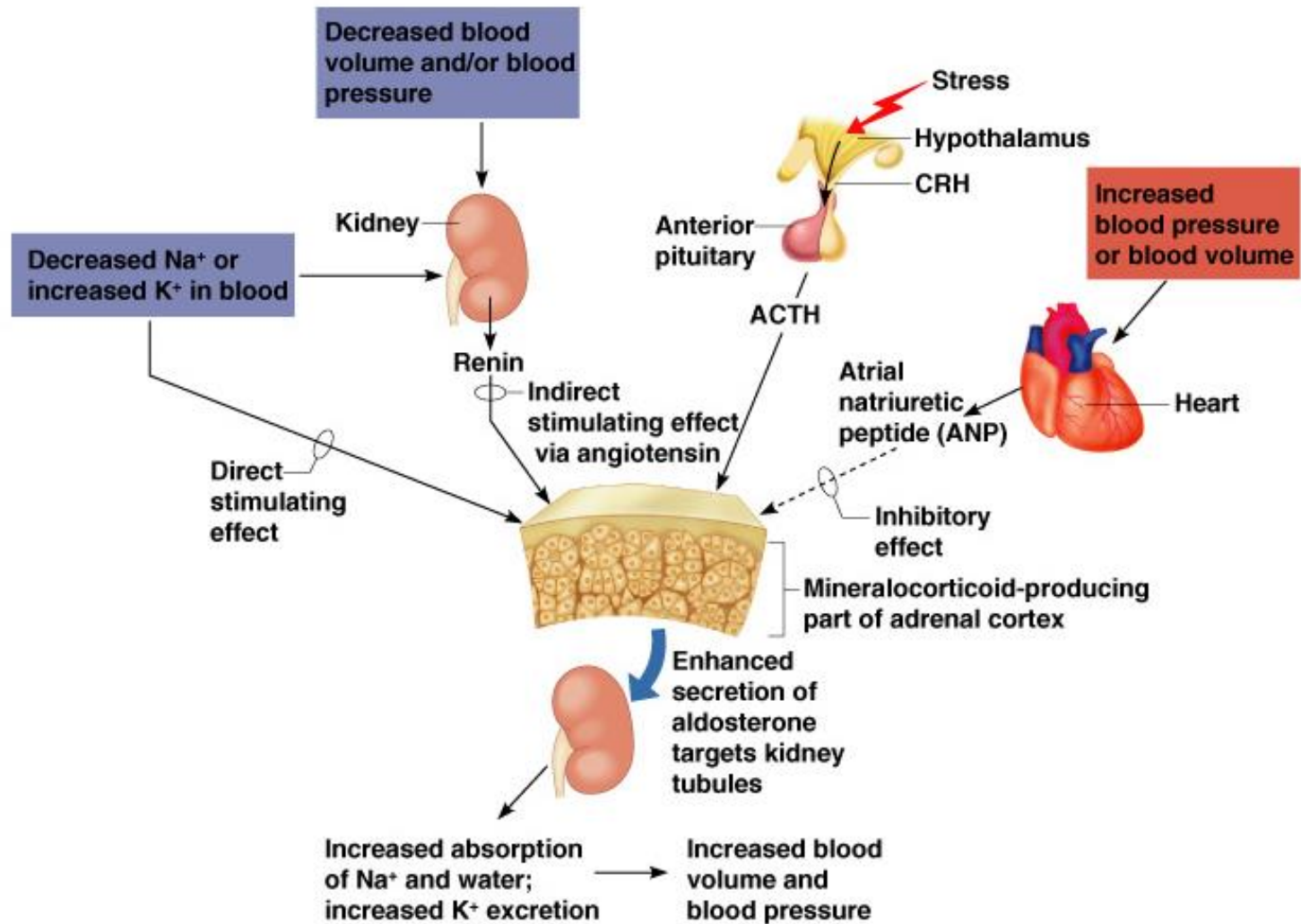


Figure 9.10

Hormones of the Adrenal Cortex

- Glucocorticoids (including cortisone and cortisol)
 - Produced in the middle layer of the adrenal cortex
 - Promote normal cell metabolism
 - Help resist long-term stressors
 - Released in response to increased blood levels of ACTH

Hormones of the Adrenal Cortex

- Sex hormones
 - Produced in the inner layer of the adrenal cortex
 - Androgens (male) and some estrogen (female)

Hormones of the Adrenal Medulla

- Produces two similar hormones (catecholamines)
 - Epinephrine
 - Norepinephrine
- These hormones prepare the body to deal with short-term stress

Roles of the Hypothalamus and Adrenal Glands in the Stress Response

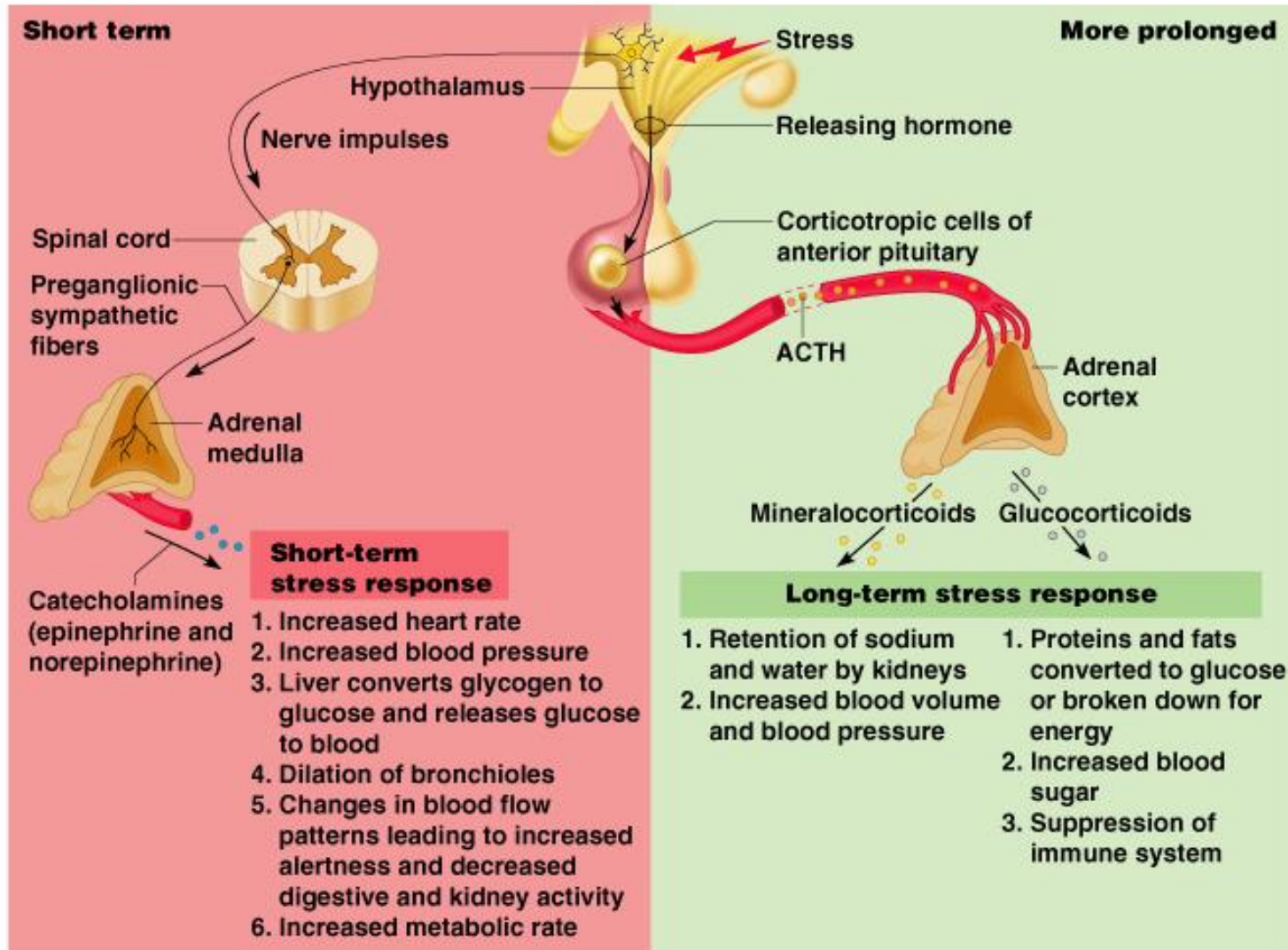


Figure 9.12



Pancreatic Islets

- The pancreas is a mixed gland
- The islets of the pancreas produce hormones
 - Insulin – allows glucose to cross plasma membranes into cells (produced in beta cells)
 - Glucagon – allows glucose to enter the blood (produced in alpha cells)
 - These hormones are antagonists that maintain blood sugar homeostasis

Pancreatic Islets

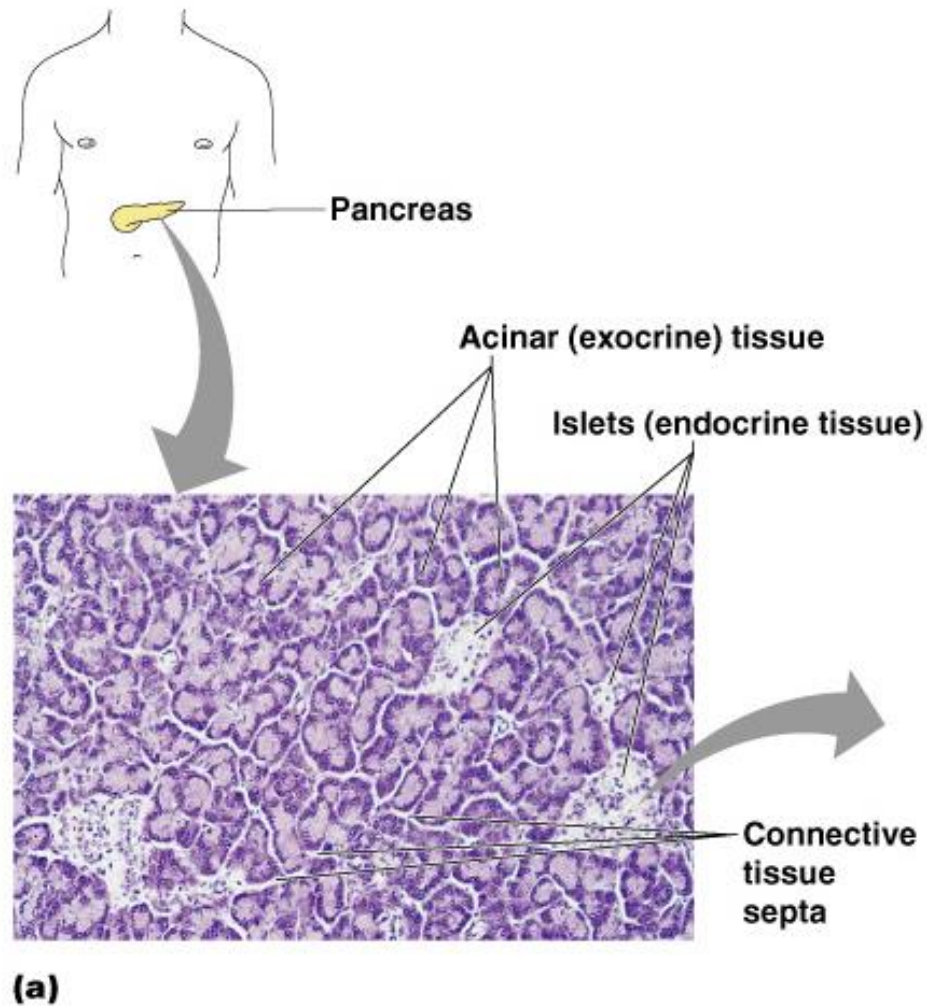


Figure 9.13

Pancreatic Hormones and Blood Sugar

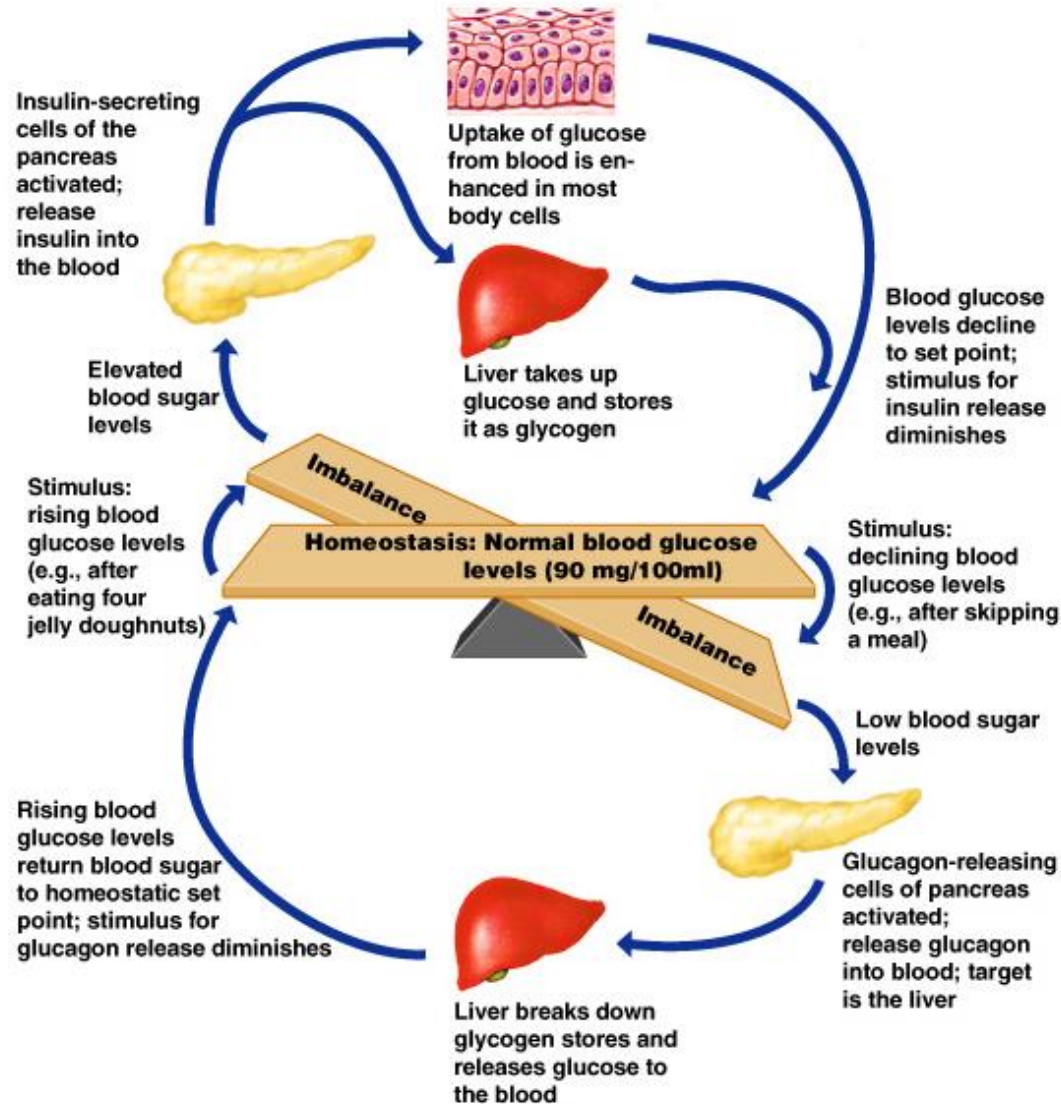


Figure 9.14

Pineal Gland

- Found on the third ventricle of the brain
- Secretes melatonin
 - Helps establish the body's wake and sleep cycles
 - May have other as-yet-unsubstantiated functions

Thymus

- Located posterior to the sternum
- Largest in infants and children
- Produces thymosin
 - Matures some types of white blood cells
 - Important in developing the immune system



Hormones of the Ovaries

- Estrogens
 - Produced by ovarian follicles or the placenta
 - Stimulates the development of secondary female characteristics
 - Matures female reproductive organs
 - Helps prepare the uterus to receive a fertilized egg
 - Helps maintain pregnancy
 - Prepares the breasts to produce milk

Hormones of the Ovaries

- Progesterone
 - Produced by the corpus luteum
 - Acts with estrogen to bring about the menstrual cycle
 - Helps in the implantation of an embryo in the uterus

Hormones of the Testes

- Produce several androgens
- Testosterone is the most important androgen
 - Responsible for adult male secondary sex characteristics
 - Promotes growth and maturation of male reproductive system
 - Required for sperm cell production

Endocrine Function of the Placenta

- Produces hormones that maintain pregnancy
- Some hormones play a part in the delivery of baby
- Produces HCG in addition to estrogen, progesterone, and other hormones

Other Hormone-Producing Tissues and Organs

- Parts of the small intestine
- Parts of the stomach
- Kidneys
- Heart
- Many other areas have scattered endocrine cells