Endocrine System

- Second messenger system of the body
- Uses chemical messages (hormones) that are released into the blood
- Hormones control several major processes
    - Reproduction
    - Growth and development
    - Mobilization of body defenses
    - Maintenance of much of homeostasis
    - Regulation of metabolism
- Hormones are produced by specialized cells
- Cells secrete hormones into extracellular fluids
- Blood transfers hormones to target sites
- These hormones regulate the activity of other cells
- Hormones affect only certain tissues or organs (target cells or organs)
- Target cells must have specific protein receptors
- Hormone binding influences the working of the cells

Endocrine Glands

Pituitary

- Size of a grape
- Hangs by a stalk from the hypothalamus
- Protected by the sphenoid bone
- Has two functional lobes
    - Anterior pituitary – glandular tissue
    - Posterior pituitary – nervous tissue

Thyroid

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

Parathyroid

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

Adrenals

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

Pancreas

- The pancreas is a mixed gland
- The islets of the pancreas produce hormones

        - Insulin – allows glucose to cross plasma membranes into cells from beta cells
        - Glucagon – allows glucose to enter the blood from alpha cells
        - These hormones are antagonists that maintain blood sugar homeostasis

Pineal

- 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

Ovaries

- Estrogens
    - Produced by Graafian 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
- 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

Testes

- Interstitial cells of testes are hormone-producing
- 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