Chapter 4

Organ Systems of the Body
Objectives

• Define and contrast the terms *organ* and *organ system*
• List the 11 major organ systems of the body
• Identify and locate the major organs of each major organ system
• Briefly describe the major functions of each major organ system
• Identify and discuss the major subdivisions of the reproductive system
• Describe the current approaches to organ replacement
Definitions and Concepts

- **Organ**—a structure made up of two or more kinds of tissues that can together perform a more complex function than a single tissue.

- **Organ system**—a group of organs that perform a more complex function than can any organ alone.

- A knowledge of individual organs and how they are organized into groups makes more meaningful the understanding of how a particular organ system functions as a whole.
Integumentary system

- Structure—organs
  - Only one organ, the skin, has many appendages (attached structures)
    - Skin appendages
    - Hair
    - Nails
    - Microscopic sense receptors
    - Sweat glands
    - Oil glands
• Integumentary system
  – Functions
    • Protection—primary function
    • Regulation of body temperature
    • Synthesis of chemicals
    • Sense organ
Organ Systems of the Body

• Skeletal system (Figure 4-2)  
  – Structure  
  • Bones—organs of the skeletal system  
    – 206 named bones in the skeleton  
    – Additional variable bones occur in each individual  
  • Cartilage connects and cushions joined bones  
  • Ligaments—bands of fibrous tissue that hold bones together  
  • Joints—connections between bones that make movement possible
Organ Systems of the Body

• Skeletal system
  – Functions
    • Supporting framework for entire body
    • Protection of brain and internal organs
    • Movement (with joints and muscles)
    • Storage of minerals
    • Formation of blood cells
Organ Systems of the Body

• Muscular system
  – Structure
    • Muscles are the primary organs
      – Voluntary or striated skeletal muscle
      – Involuntary or smooth muscle tissue in walls of some organs
      – Cardiac muscle in wall of the heart
  – Function—movement
  – Skeletomuscular system—combination of the skeletal and muscular systems
Organ Systems of the Body

• Nervous system
  – Structure
    • Central nervous system (CNS)
      – Brain
      – Spinal cord
    • Peripheral nervous system (PNS)
      – Cranial nerves and their branches
      – Spinal nerves and their branches
      – Sense organs
Organ Systems of the Body

• Nervous system
  – Functions
    • Communication between body organs
    • Integration of body functions
    • Control of body functions
    • Recognition of sensory stimuli
• Endocrine system
  – Structure—ductless glands that secrete signaling hormones directly into the blood
• Endocrine system
  – Structure
    • Pituitary gland
    • Pineal gland
    • Hypothalamus
    • Thyroid gland
    • Parathyroid glands
    • Thymus gland
    • Adrenal glands
    • Pancreas
    • Ovaries (female)
    • Testes (male)
Organ Systems of the Body

• Endocrine system
  – Functions
    • Same as nervous system—communication, integration, control
    • Control is slow and of long duration
    • Neuroendocrine system—combination of nervous and endocrine systems
• Endocrine system
  – Functions
    • Examples of hormone regulation
      – Growth
      – Metabolism
      – Reproduction
      – Fluid and electrolyte balance
• Cardiovascular system (also referred to as circulatory system)
  – Structure
    • Heart
    • Blood vessels
Organ Systems of the Body

- Cardiovascular (circulatory) system
  - Functions
    - Transportation of substances throughout the body
    - Regulation of body temperature
    - Immunity (body defense)
• Lymphatic and immune systems
  – Lymphatic system
    • Structure
      – Lymphatic vessels
      – Lymph nodes and tonsils
      – Thymus
      – Spleen
Organ Systems of the Body

• Lymphatic and immune systems
  – Lymphatic system
    • Functions
      – Transportation of lymph
      – Immunity
Organ Systems of the Body

• Lymphatic and immune systems
  – Immune system
    • Structure
      – Unique cells
        » Phagocytes
    • Secretory cells
      – Defensive protein compounds
        » Antibodies
        » Complements
• Lymphatic and immune systems
  – Immune system
    • Functions
      – Phagocytosis of bacteria
      – Chemical reactions that provide protection from harmful agents
• Respiratory system
  – Structure
    • Nose
    • Pharynx
    • Larynx
    • Trachea
    • Bronchi
    • Lungs
Organ Systems of the Body

• Respiratory system
  – Functions
  • Exchange of waste gas (carbon dioxide) for oxygen in the alveoli of the lungs
  • Filtration of irritants from inspired air
  • Regulation of acid-base balance
Organ Systems of the Body

• Digestive system
  – Structure
    • Primary organs—form alimentary canal, or GI tract
      – Mouth
      – Pharynx
      – Esophagus
      – Stomach
      – Small intestine
      – Large intestine
      – Rectum
      – Anal canal
Organ Systems of the Body

• Digestive system
  – Structure
    • Accessory organs—assist the digestive process
      – Teeth
      – Salivary glands
      – Tongue
      – Liver
      – Gallbladder
      – Pancreas
      – Appendix
• Digestive system
  – Functions
  • Mechanical and chemical breakdown (digestion) of food
  • Absorption of nutrients
  • Elimination of undigested waste product—referred to as feces
  • Appendix holds bacteria that assist digestion
Organ Systems of the Body

• Urinary system
  – Structure
    • Kidneys
    • Ureters
    • Urinary bladder
    • Urethra (part of both urinary and reproductive systems in males)
Organ Systems of the Body

• Urinary system
  – Functions
    • “Clearing” or cleaning blood of waste products—excreted from the body as urine
    • Electrolyte balance
    • Water balance
    • Acid-base balance
• Reproductive systems
  – Structure
    • Male
      – Gonads—testes
      – Other structures—vas deferens, urethra, prostate, external genitalia (penis and scrotum)
Organ Systems of the Body

• Reproductive system
  – Structure
    • Female
      – Gonads—ovaries
      – Other structures—uterus, uterine (fallopian) tubes, vagina, external genitalia (vulva), mammary glands (breasts)
• Reproductive system
  – Functions
    • Survival of genes
    • Production of sex cells (male: sperm; female: ova)
    • Transfer and fertilization of sex cells
    • Development and birth of offspring
    • Nourishment of offspring
    • Production of sex hormones
Integration of Body
Organ System Functions

• No one body system functions entirely independently of other systems
• All body systems are structurally and functionally interrelated and interdependent
Organ Replacement

• Loss of function in nonvital organs is not immediately life threatening; loss of function in vital organs is immediately life threatening

• Loss of function in organs can be treated by organ replacement
  – Artificial organs (prostheses)
  – Organ transplantation
  – Free-flap surgery
  – Stem cell treatment