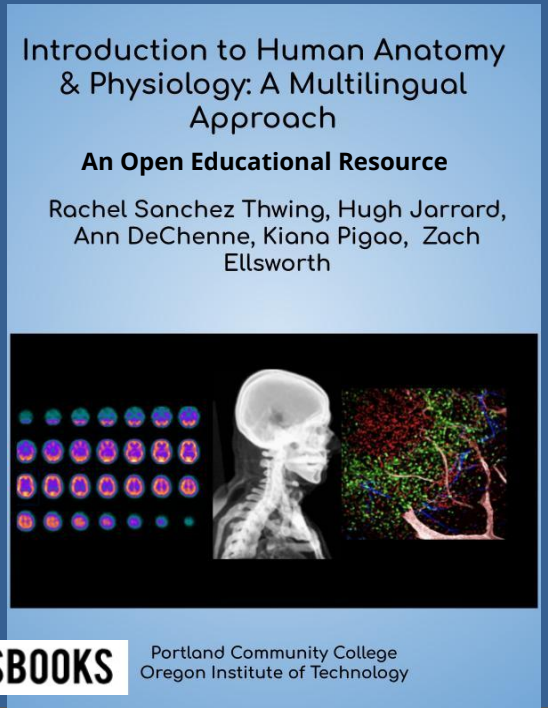
Organization and Homeostasis of the Human Body: Levels of Organization & Organ Systems



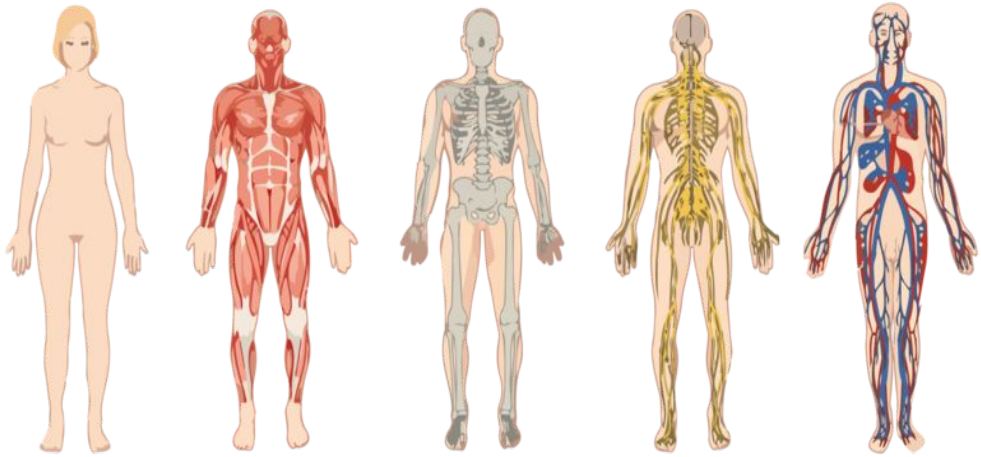


Figure 1.4 by OpenStax A&P

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Lesson 1: Levels of Organization and Organ System Overview

Learning Objectives:

Define, in order from simplest (chemical) to most complex (organismal), the major levels of structural organization in the human organism.

Utilize systemic and regional approaches to relate gross anatomical structures to their functions.

Explain how the cells and forms of the tissues contribute to their function in the body.

Identify the different tissue types (nervous, muscle, connective, epithelial, and membrane) by microscopic methods.

See the Body Organization & Homeostasis Wordlist!

- Can be found in accompanying materials to this lecture
- Materials are available in English, Spanish, Russian, Vietnamese, Filipino, East African French, Kiswahili (Swahili) and Chinese.

Module 1 Body Organization and Homeostasis Word List

Body Planes/Sections
Coronal
Oblique
Sagittal
Transverse

Directional Terms
Anterior vs Posterior
Deep vs Superficial
Distal vs Proximal
Dorsal vs Ventral
Inferior vs Superior
Lateral vs Medial

Body Regions
Abdominal
Acromial
Antecubital
Axillary
Brachial
Buccal
Carpal
Cephalic
Cervical
Coxal
Crural
Cranial
Digital
Facial
Femoral
Fibular
Frontal
Genital
Gluteal
Hallux
Inguinal
Lumbar
Mammary
Mental
Nasal
Occipital
Oral
Orbital/Ocular
Otic
Palmar
Patellar
Pectoral
Pedal
Pelvic
Perineal
Plantar
Popliteal
Pollex
Pubic
Sacral
Sternal
Tarsal
Thoracic
Umbilical
Vertebral

Cavities
Dorsal Cavity
  Cranial Cavity
  Spinal Cavity
Ventral Cavity
  Thoracic Cavity
    Mediastinum
    Pericardial Cavity
    Pleural Cavity
  Abdominopelvic Cavity
    Abdominal Cavity
    Pelvic Cavity

Membranes
Visceral vs Parietal
Peritoneum

Body Systems (general function)
Cardiovascular System
Digestive System
Endocrine System
Integumentary System
Lymphatic/Immune System
Muscular System
Nervous System
Reproductive System
Respiratory System
Skeletal System
Urinary System

Homeostasis
Control Center
Homeostasis
Effector
Negative Feedback
Positive Feedback
Receptor
Set Point

General Terminology
Anatomy
Gross Anatomy
Microscopic Anatomy
Regional Anatomy
Systemic Anatomy
Physiology

Techniques
Palpation
Auscultation
Percussion

Levels of Structural Organization:

1. Atoms
2. Cells
3. Tissues
4. Organs
5. Organ systems
6. Organisms

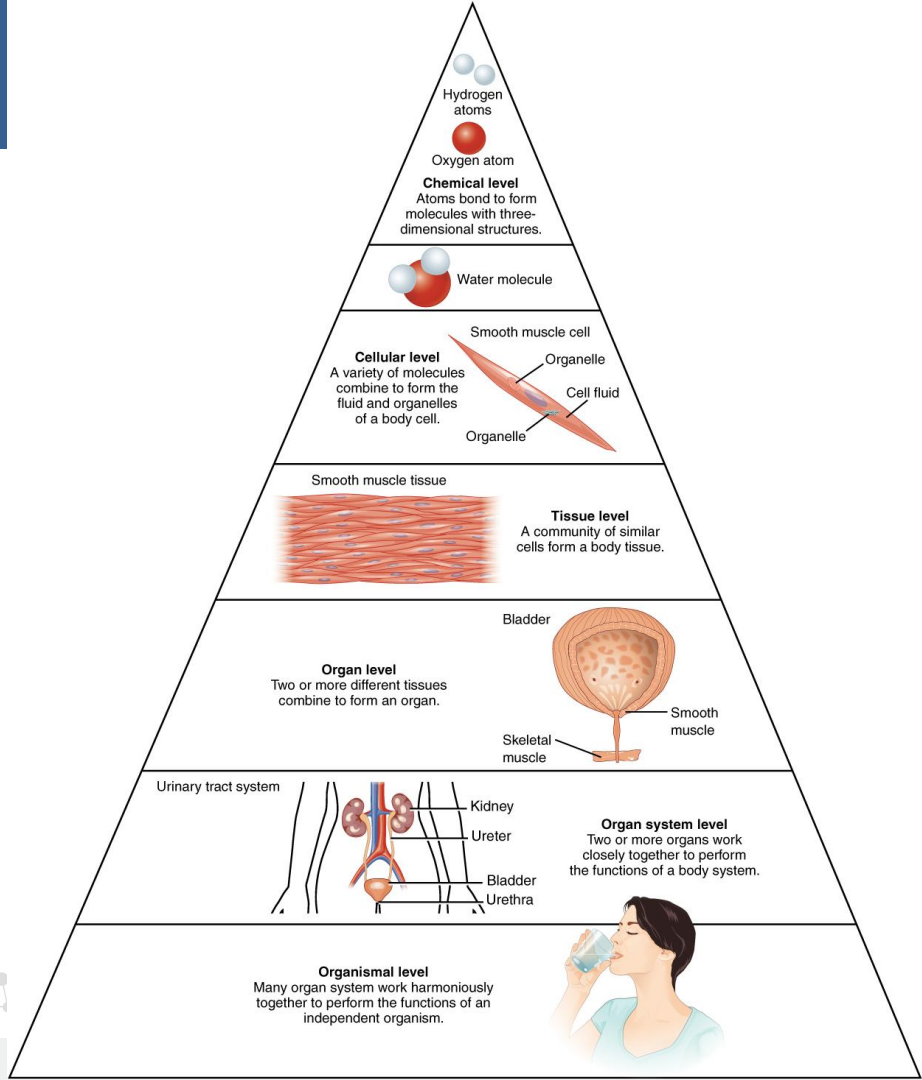


Figure 1.3 by OpenStax A&P

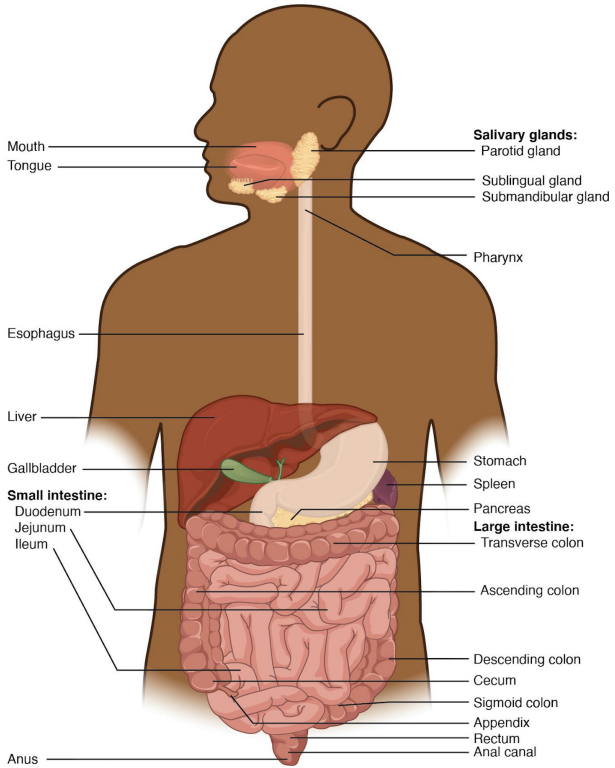
Anatomy = Structure

Gross anatomy = easily observable structures

Surface anatomy

Systemic anatomy

Regional anatomy



Digestive
Breaks food down into absorbable nutrients that enter the blood for distribution to body cells; indigestible foodstuffs are eliminated as feces.

Figure 23.2 by OpenStax A&P

Compare Gross Anatomy with...

Histology

cell and tissue level structure

Histopathology

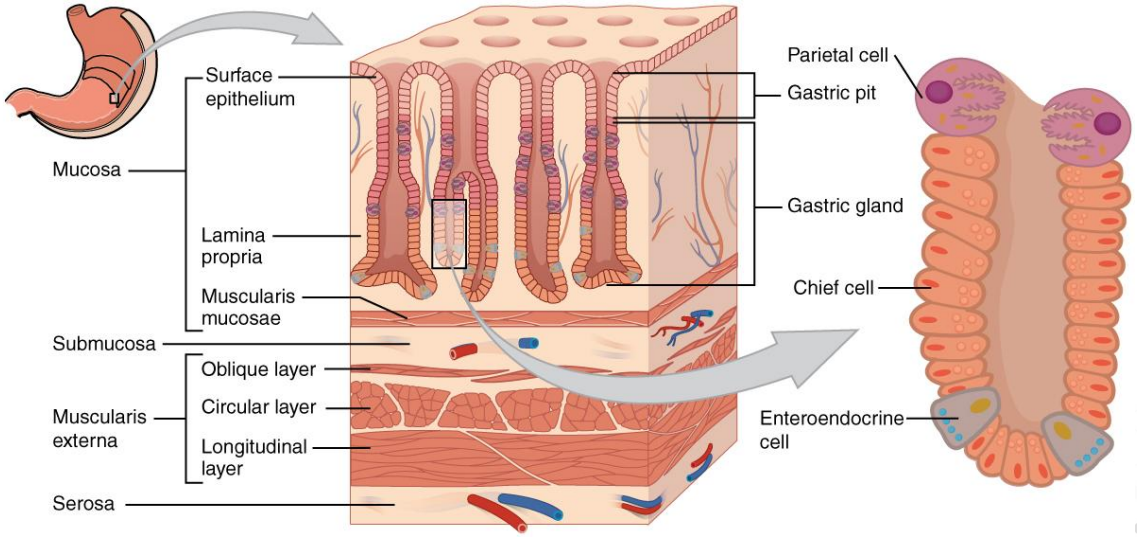


Figure 23.16 by OpenStax A&P

Tissue Types

1. Epithelial
2. Connective
3. Muscular
4. Nervous

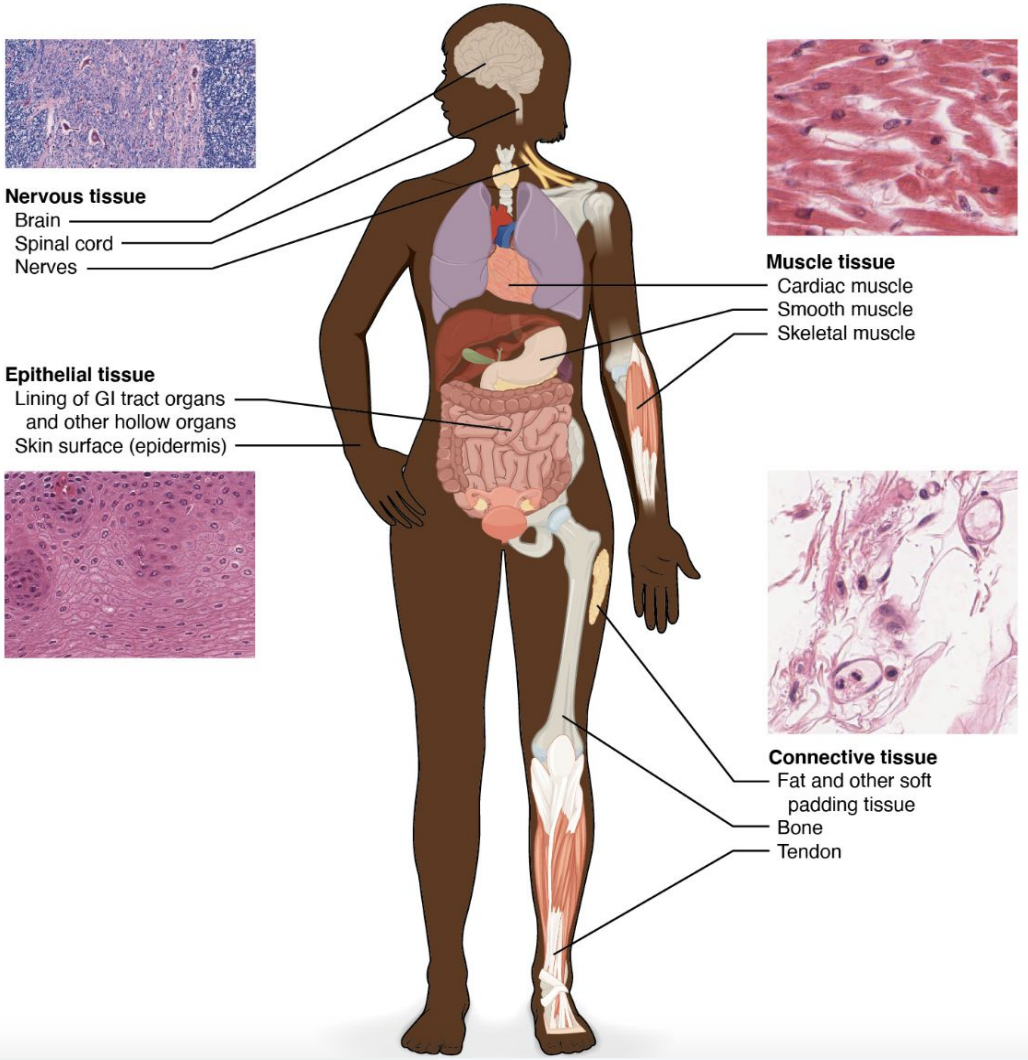


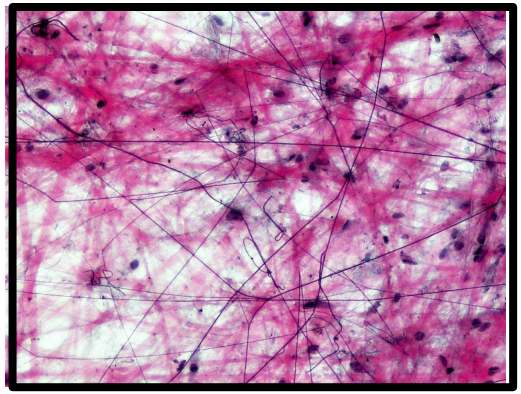
Figure 4.2 by OpenStax A&P

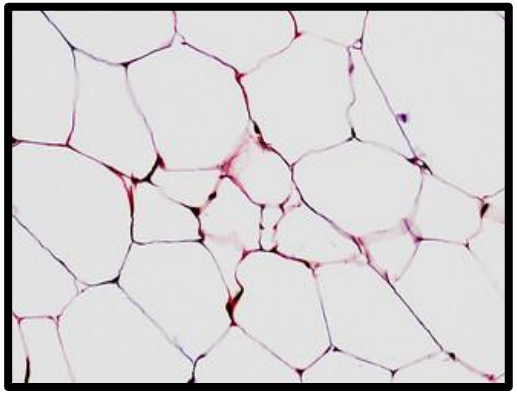
Epithelia

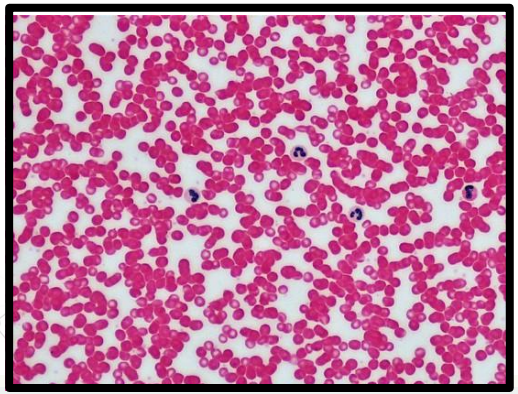
- Locations
  - Cover surfaces
  - Line cavities
- Functions
  - Protect, absorb, secrete, excrete, filter
- Characteristics
  - Free surface
  - Tightly packed cells
  - Rapid regeneration

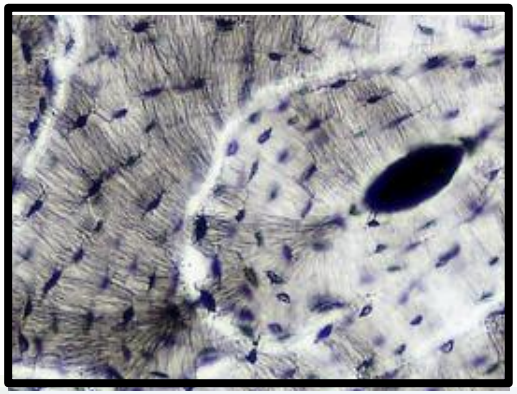
Connective Tissue

- Locations
  - Throughout Body
- Functions
  - Bind, support, store energy, transport substances
- Characteristics
  - Most replicate slowly
  - Few/Scanty cells with extracellular matrix (EM)
  - Subtypes based on EM



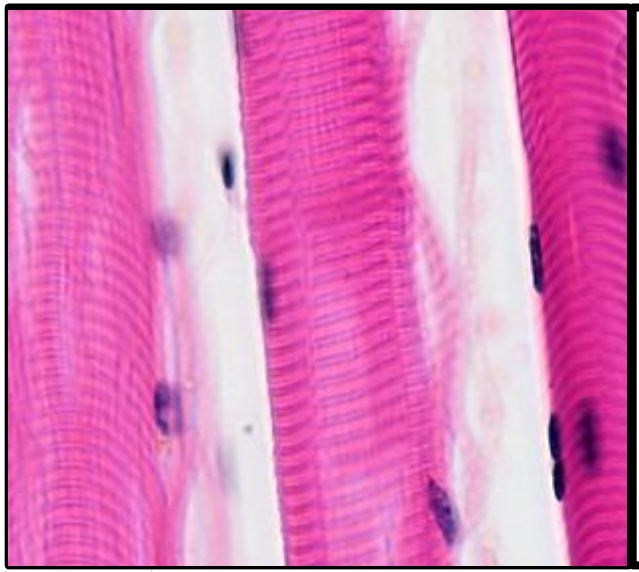


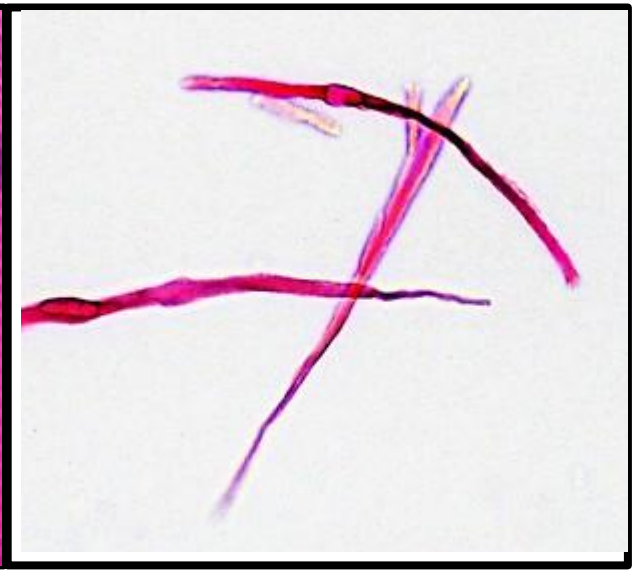




Muscular Tissue

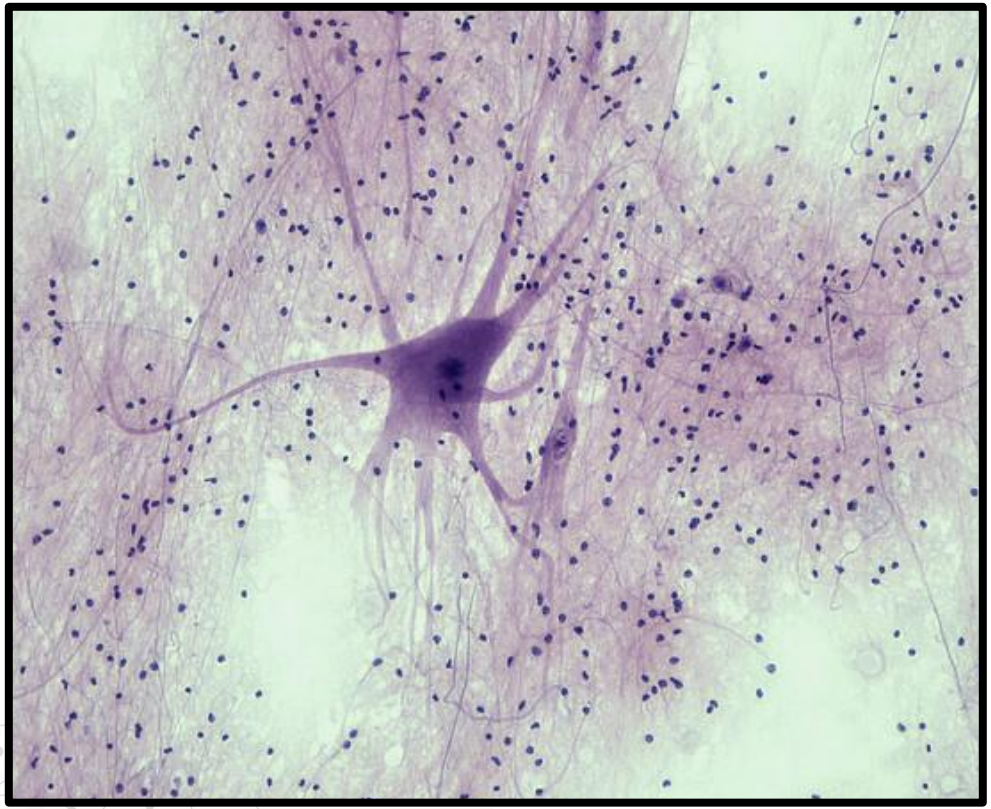
- Locations
  - Attached to bone
  - In heart
  - Walls of hollow organs
- Functions
  - Movement & Stability
- Characteristics
  - Can Contract
  - Highly cellular
  - Vascular





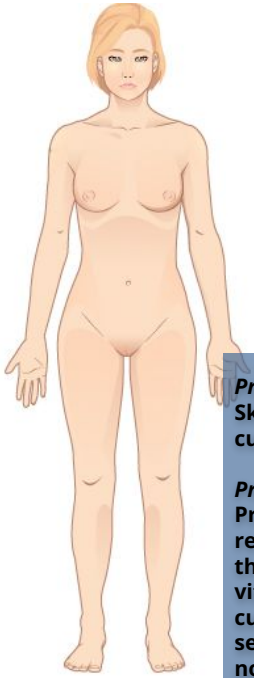
Nervous Tissue

- Locations
  - Brain
  - Spinal Cord
  - Nerves
- Functions
  - Coordinate body functions
- Characteristics
  - Neurons with axons and dendrites
  - Neuroglia
  - avascular



Organ System Overview: Integument, Skeletal, Muscular, Nervous

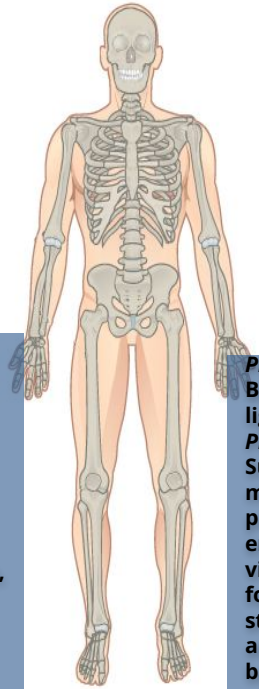
Integumentary system



Principal organs: **Skin, hair, nails, cutaneous glands**

***Principal functions*:** **Protection, water retention, thermoregulation, vitamin D synthesis, cutaneous sensation, nonverbal communication**

Skeletal system



Principal organs: **Bones, cartilages, ligaments**

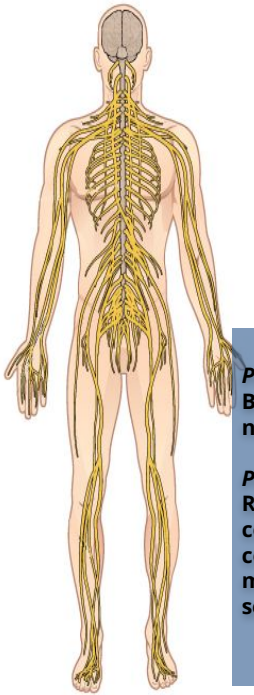
***Principal functions*:** **Support, movement, protective enclosure if viscera, blood formation, mineral storage, electrolyte and acid-base balance**

Muscular system

Principal organs: **Skeletal muscles**

***Principal functions*:** **Movement, stability, communication, control of body openings, heat production**

Nervous system



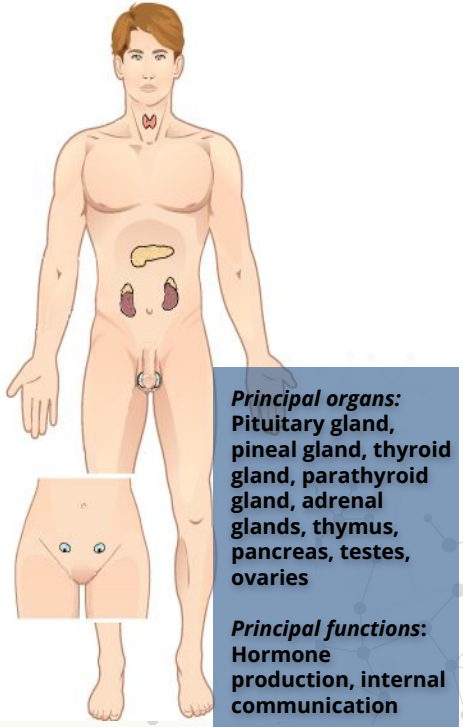
Principal organs: **Brain, spinal cord, nerves, ganglia**

***Principal functions*:** **Rapid internal communication, coordination, motor control, and sensation**

Figure 1.4 by OpenStax A&P

Organ System Overview: Endocrine, Cardiovascular, Lymphatic, Respiratory

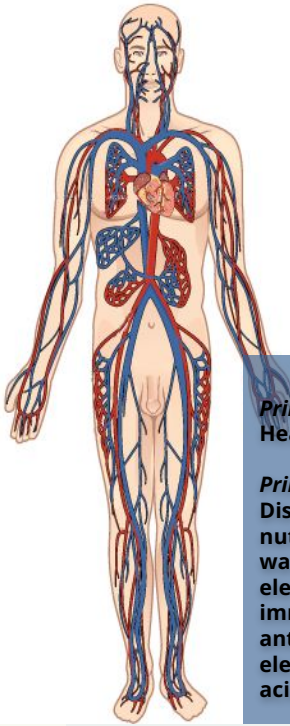
Endocrine system



Principal organs: **Pituitary gland, pineal gland, thyroid gland, parathyroid gland, adrenal glands, thymus, pancreas, testes, ovaries**

***Principal functions*:** **Hormone production, internal communication**

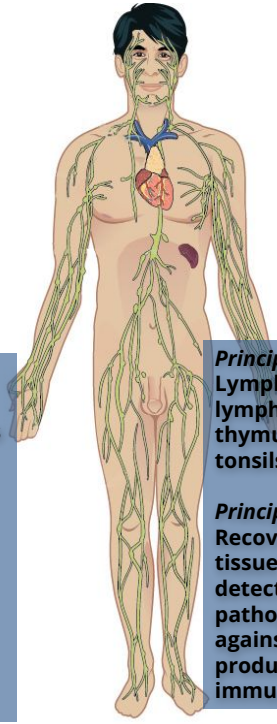
Cardiovascular system



Principal organs: **Heart, blood vessels**

***Principal functions*:** **Distribution of nutrients, oxygen, wastes, hormones, electrolytes, heat, immune cells, and antibodies; fluid, electrolyte, and acid-base balance**

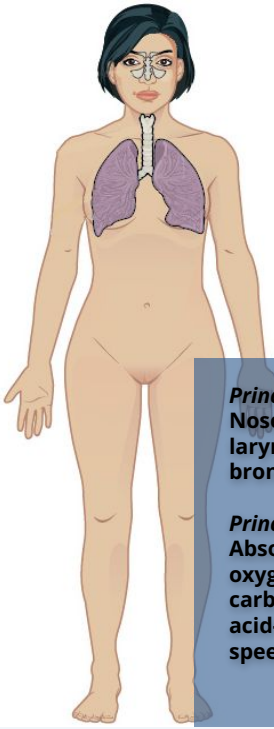
Lymphatic system



Principal organs: **Lymph nodes, lymphatic vessels, thymus, spleen, tonsils**

***Principal functions*:** **Recovery of excess tissue fluid, detection of pathogens, defense against disease, production of immune cells**

Respiratory system



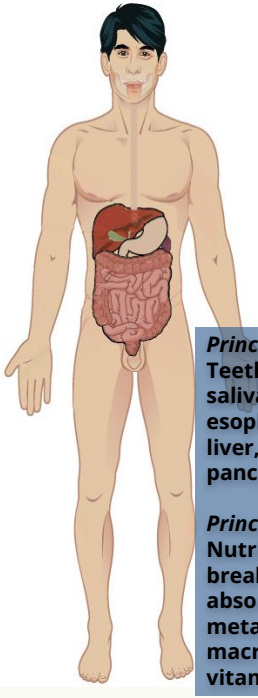
Principal organs: **Nose, pharynx, larynx, trachea, bronchi, lungs**

***Principal functions*:** **Absorption of oxygen, discharge of carbon dioxide, acid-base balance, speech**

Figure 1.5 by OpenStax A&P

Organ System Overview: Digestive, Urinary, Reproductive

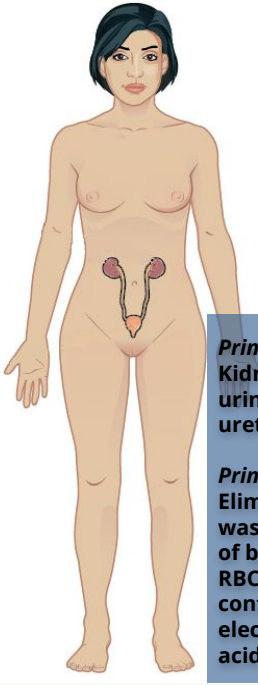
Digestive system



Principal organs: **Teeth, tongue, salivary glands, esophagus, intestines, liver, gallbladder, pancreas**

***Principal functions*:** **Nutritional breakdown and absorption; metabolism of macromolecules, vitamin production**

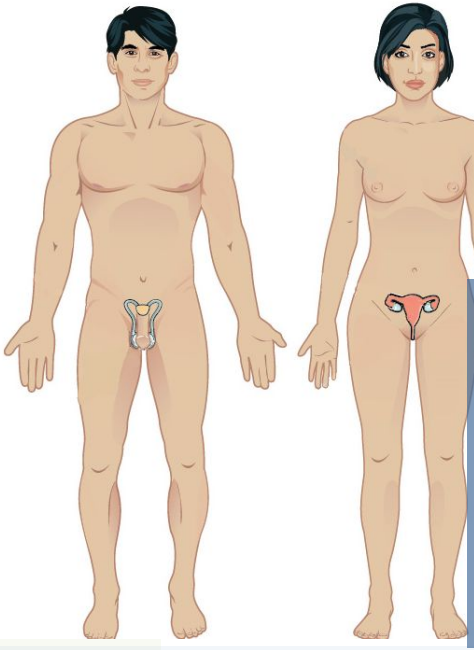
Urinary system



Principal organs: **Kidneys, ureters, urinary bladder, urethra**

***Principal functions*:** **Elimination of wastes; regulation of blood pressure; RBC formation, control of fluid, electrolyte, and acid-base balance**

Reproductive system



Principal organs: **Testes, ovaries, epididymis, uterine tubes, spermatic ducts, uterus, prostate, vagina, peins**

***Principal functions*:** **Production and delivery of gametes, fetal development, secretion of hormones**

Figure 1.5 by OpenStax A&P