

Chapter 5: Human Anatomy and Physiology Review

Objectives

1. Define the key terms and abbreviations listed at the beginning of this chapter.
2. Identify and describe body positions, planes, cavities, and directional terms.
3. Define homeostasis and the primary processes of metabolism.
4. Identify and describe the structural components of cells and the four basic types of body tissue.

Objectives (cont'd)

5. Describe the function and identify the components or major structures of each body system.
6. List disorders and diagnostic tests commonly associated with each body system.

Overview

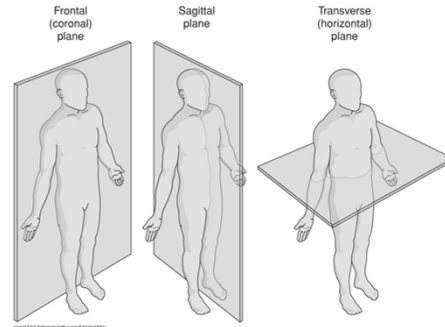
- Human body consists of:
 - >30 trillion cells
 - 206 bones
 - 700 muscles
 - About 5 liters of blood
 - About 25 miles of blood vessels
- **Anatomy:** structural composition
- **Physiology:** function

Body Positions

- Anatomic Position
 - Standing erect
 - Arms at sides
 - Eyes & palms facing forward
- Supine
 - Lying horizontal on the back, face up
- Prone
 - Lying face down
 - In reference to the hand, palm facing down

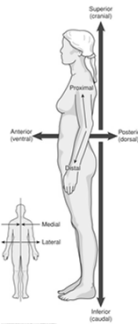
Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Planes



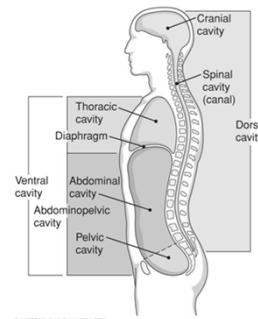
Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Directional Terms



Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Cavities



Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Functions

- Homeostasis
 - A state of equilibrium or balance in the body's internal environment
 - Maintained by compensating for changes (feedback & regulation)
- Metabolism
 - The sum of all physical & chemical reactions needed to sustain life
 - **Catabolism:** complex substances are broken down, usually with release of energy (conversion of carbohydrates into glucose)
 - **Anabolism:** simple substances are converted to more complex (synthesis of a hormone from substances in bloodstream)

Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Organization

- Cells
 - Basic structural unit of all life
 - Trillions in body, responsible for all activities
 - Basic structural components: see Figure 5-4 on next slide. Not shown in Figure:
 - **Chromosomes:** long strands of DNA organized into units called genes, occurring in humans in 23 identical pairs (46 individual)
 - **Organelles:** specialized structures within the cytoplasm
 - **Surface organelles:** structures that project from certain cells
 - **Flagellum:** whiplike extension found on sperm

Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Organization (cont'd)

- Tissues
 - Groups of similar cells that work together to perform a special function
 - Four basic types:
 1. **Connective:** supports & connects all parts of body; includes adipose (fat), cartilage, bone, & blood
 2. **Epithelial:** covers & protects body & lines organs, vessels, & cavities
 3. **Muscle:** contracts to produce movement
 4. **Nerve:** transmits electrical impulses

Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Systems: Skeletal

- Functions
 - Is framework that gives body shape & support
 - Protects internal organs
 - Provides movement & leverage (with muscular system)
 - Stores calcium
 - Produces blood cells in bone marrow (hemopoiesis)

Copyright © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins

Body Systems: Skeletal (cont'd)

- Structures
 - Bones
 - Type of dense connective tissue
 - Consist of bone cells surrounded by hard deposits of calcium salts
 - Living tissue with their own network of blood & lymph vessels & nerves
 - Four shapes: **flat** (ribs), **irregular** (vertebrae), **long** (femur), **short** (carpals)

Body Systems: Skeletal (cont'd)

- Structures
 - Joints
 - Junction or union between 2 or more bones
 - Freely moveable joints have synovial cavity
 - **Bursa: sac filled with synovial fluid to ease movement**
 - Supporting connective tissue
 - Fibrous
 - Ligaments
 - Cartilage

Body Systems: Muscular

- Functions
 - Moves body (via contraction of muscle cells)
 - Maintains posture (via muscle tone)
 - Produces heat (from muscle cell metabolism)
 - Aids in organ function & blood circulation
- Structures
 - **Cardiac muscle:** wall of heart; pumps blood out of heart
 - **Skeletal muscle:** attached to bones; produces movement at joints
 - **Smooth muscle:** wall of hollow organs; produces peristalsis

Body Systems: Integumentary

- Functions
- Largest organ of the body
 - Protects body from bacterial invasion, dehydration, sun's rays
 - Regulates body temperature
 - Eliminates some waste through sweat
 - Receives environmental stimuli (heat, cold, touch, pain)
 - Manufactures vitamin D from sunlight

Body Systems: Integumentary (cont'd)

- Structures
 - Skin (largest organ in body)
 - Exocrine glands (oil & sweat)
 - Hair
 - Nails
 - Blood vessels, nerves, & sensory organs within skin

Body Systems: Integumentary (cont'd)

- Skin Layers
 - **Epidermis**
 - **Outermost & thinnest layer**
 - Made up of stratified, squamous epithelial cells
 - Avascular (no blood or lymph vessels)
 - Only living cells are in deepest layer
 - Produces skin pigment melanin
 - Nourished by diffusion of nutrients from dermis

Body Systems: Integumentary (cont'd)

- Skin Layers
 - **Dermis**
 - **Inner layer of skin**
 - Much thicker than epidermis
 - Composed of elastic & fibrous connective tissue
 - Contains blood & lymph vessels, sebaceous (oil) & sudoriferous (sweat) glands, & hair follicles
 - **Subcutaneous**
 - Connective & adipose tissue; connects skin to surface muscles

Body Systems: Nervous

- Functions
 - Controls & coordinates activities of various body systems by electrical impulses & chemical substances sent & received
 - Two functional divisions:
 - **Somatic:** voluntary movement of skeletal muscle
 - **Autonomic:** involuntary movement of cardiac & smooth muscles & glands

Body Systems: Nervous (cont'd)

- Structures
 - Neuron
 - Fundamental unit of nervous system
 - Conducts impulses that allow body to interact with internal & external environment
 - Consists of cell body with nucleus & organelles, dendrites, & axons

Body Systems: Nervous (cont'd)

- Structures
 - Central nervous system (CNS)
 - Brain & spinal cord
 - Surrounded & cushioned by a cavity filled with **cerebrospinal fluid**
 - Protected by 3 layers of connective tissue (meninges)
 - Peripheral nervous system
 - **Motor or efferent nerves:** carry impulses from CNS to organs, glands, & muscles
 - **Sensory or afferent nerves:** carry impulses to CNS from sensory receptors in various parts of the body

Body Systems: Endocrine

- Functions
 - Secretes hormones directly into the bloodstream
 - Affects metabolism, growth & development, reproduction, personality, response to stress, & resistance to disease

Body Systems: Endocrine (cont'd)

- Structures: Endocrine Glands
 - Hypothalamus & pituitary (brain)
 - Pineal (brain)
 - Thyroid (throat, near larynx)
 - Parathyroids (on thyroid)
 - Thymus (chest, behind sternum)
 - Adrenals (on top of each kidney)
 - Islets of Langerhans (pancreas)
 - Testes (scrotum)
 - Ovaries (pelvic cavity)

Body Systems: Digestive

- Functions
 - Takes in food
 - Breaks food down into usable components for absorption
 - Eliminates waste products
- Structures
 - Gastrointestinal tract (mouth, pharynx, esophagus, stomach, small & large intestines)
 - Accessory organs (lips, teeth, tongue, salivary glands, liver, pancreas, gallbladder)

Body Systems: Reproductive

- Functions
 - Produces gametes needed to form a new human being
 - Spermatozoa (males)
 - Ova (females)
- Structures
 - **Female:** ovaries (female gonads), fallopian tubes, uterus, cervix, vagina, vulva
 - **Male:** testes (male gonads), seminal vesicles, prostate, epididymis, vas deferens, seminal ducts, urethra, penis, spermatic cords, scrotum

Body Systems: Urinary

- Functions
 - Filters waste products from the blood
 - Creates urine
 - Eliminates wastes from body in urine
 - Helps regulate body fluids
 - Hematuria: Microscopic blood in the urine
- Structures: Must know
 - **Kidneys:** contain nephrons, working unit of kidney. They also produce **erythropoietin**, a hormone that stimulates red blood cell production
 - **Ureters:** transport urine from kidney to bladder
 - **Urinary bladder:** stores urine
 - **Urethra:** transports urine from bladder to outside the body

Body Systems: Respiratory

- Functions
 - Respiration
 - **External:** oxygen (O₂) from air enters bloodstream in lungs & carbon dioxide (CO₂) leaves bloodstream & enters air from lungs
 - **Internal:** oxygen leaves bloodstream & enters cells in tissues & carbon dioxide from cells enters bloodstream
 - Gas exchange & transport
 - Acid-base balance

Body Systems: Respiratory (cont'd)

- Structures
 - Respiratory tract
 - Nose
 - Pharynx
 - Larynx
 - Trachea
 - Bronchi
 - Lungs (pleura, pleural space, alveoli)

Chapter 5 test info: Human anatomy

- Know body planes (pg. 123)
- Know all body systems and their functions
- Hematuria: microscopic blood in the urine
- Creatinine Clearance is a urinary test
- ABGs: To test respiratory function
- Know steady state: means "staying the same" (PG 125)
- What is "distal"
- Layers of skin and what they contain

Cont. Test info

- Tissue: What are they, the 4 basic types and their function
- Know catabolism, anabolism (pg 125 & 126)
- Know study questions