The Language of Anatomy

- Special terminology is used to prevent misunderstanding
- Exact terms are used for:
  - Position
  - Direction
  - Regions
  - Structures

The Language of Anatomy

- Anatomical position
  - Standard body position used to avoid confusion
  - Terminology refers to this position regardless of actual body position
  - Stand erect, feet parallel, arms hanging at the sides with palms facing forward and thumbs pointing away from the body

Directional Terms

- Directional terms
  - Explain location of one body structure in relation to another

Directional Terms

- Superior (cranial or cephalic): toward the head or upper part of a structure or the body; above
- Inferior (caudal): away from the head or toward the lower part of a structure or the body; below

Directional Terms

- Anterior (ventral): toward or at the front of the body; in front of
- Posterior (dorsal): toward or at the backside of the body; behind

Directional Terms

- Medial: toward or at the midline of the body; on the inner side of
- Lateral: away from the midline of the body; on the outer side of
- Intermediate: between a more medial and a more lateral structure

Directional Terms

- Proximal: close to the origin of the body part or point of attachment to a limb to the body trunk
- Distal: farther from the origin of a body part or the point of attachment of a limb to the body trunk

Necessary Life Functions

- Metabolism—chemical reactions within the body
  - Breaks down complex molecules into smaller ones
  - Builds larger molecules from smaller ones
  - Produces energy (ATP)
  - Regulated by hormones
- Excretion
  - Eliminates excreta (waste) from metabolic reactions
  - Wastes may be removed in urine, feces, or sweat

Necessary Life Functions

- Reproduction
  - Occurs on cellular level or organismal level
    - On cellular level—new cells are used for growth and repair
    - On organismal level—the reproductive system handles the task
- Growth
  - Increases cell size or body size (through increasing the number of cells)
  - Hormones play a major role

Survival Needs

- Nutrients
  - Chemicals used for energy and cell building
  - Include carbohydrates, proteins, lipids, vitamins, and minerals
- Oxygen
  - Required for chemical reactions
  - Made available by the cooperation of the respiratory and cardiovascular systems

Survival Needs

- Water
  - 60 to 80 percent of body weight
  - Most abundant chemical in the human body
  - Provides fluid base for body secretions and excretions
- Normal body temperature
  - 37°C (98.6°F)
  - Below this temperature, chemical reactions slow and stop
  - Above this temperature, chemical reactions proceed too rapidly

Survival Needs

- Atmospheric pressure
  - Must be appropriate for gas exchange

Organ System Overview

- Respiratory system
  - Includes the nasal passages, pharynx, larynx, trachea, bronchi, and lungs
  - Gases are exchanged with the blood through air sacs in the lungs
    - Supplies the body with oxygen
    - Removes carbon dioxide

Organ System Overview

- Digestive system
  - Includes the oral cavity (mouth), esophagus, stomach, small and large intestines, rectum, and accessory organs
  - Breaks down food
  - Allows for nutrient absorption into blood
  - Eliminates indigestible material as feces

Organ System Overview

- Urinary system
  - Includes the kidneys, ureters, urinary bladder, and urethra
  - Eliminates nitrogenous wastes
  - Maintains acid-base balance
  - Regulates water and electrolyte balance
  - Helps regulate normal blood pressure

Organ System Overview

- Reproductive system
  - For males, includes the testes, scrotum, penis, accessory glands, and duct system
    - Testes produce sperm
    - Duct system carries sperm to exterior
  - For females, includes the ovaries, uterine tubes, uterus, and vagina
    - Ovaries produce eggs
    - Uterus provides site of development for fetus

Maintaining Life: Necessary Life Functions

- Maintaining boundaries
  - Boundaries separate the "inside" from the "outside"
- Movement
  - Locomotion
  - Movement of substances
- Responsiveness (irritability)
  - Ability to sense changes and react
- Digestion
  - Breakdown and absorption of nutrients

Organ System Overview

- Endocrine system
  - Secretes chemical molecules, called hormones, into the blood
  - Body functions controlled by hormones include:
    - Growth
    - Reproduction
    - Use of nutrients

Organ System Overview

- Endocrine system (continued)
  - Endocrine glands include:
    - Pituitary gland
    - Thyroid and parathyroids
    - Adrenal glands
    - Thymus
    - Pancreas
    - Pineal gland
    - Ovaries (females) and testes (males)

Organ System Overview

- Cardiovascular system
  - Includes heart and blood vessels
    - Heart pumps blood
    - Vessels transport blood to tissues
  - Blood transports:
    - Oxygen and carbon dioxide
    - Nutrients
    - Hormones
  - Blood also contains white blood cells and chemicals that provide protection from foreign invaders

Organ System Overview

- Lymphatic system
  - Includes lymphatic vessels, lymph nodes, and lymphoid organs
  - Complements the cardiovascular system by returning leaked fluids back to bloodstream
  - Lymph nodes and other lymphoid organs cleanse the blood
  - Houses white blood cells, which are involved in immunity

Levels of Structural Organization

- Six levels of structural organization
    1. Atoms
    2. Cells
    3. Tissues
    4. Organs
    5. Organ systems
    6. Organisms

Organ System Overview

- Integumentary system
    - Forms the external body covering (skin) and includes hair and fingernails
    - Waterproofs the body
    - Cushions and protects deeper tissue from injury
    - Produces vitamin D with the help of sunlight
    - Excretes salts in perspiration
    - Helps regulate body temperature
    - Location of cutaneous nerve receptors

Organ System Overview

- Skeletal system
    - Consists of bones, cartilages, ligaments, and joints
    - Provides muscle attachment for movement
    - Protects vital organs
    - Site of blood cell formation
    - Stores minerals

Organ System Overview

- Muscular system
    - Skeletal muscles contract (or shorten)
    - Produces movement of bones

Organ System Overview

- Nervous system
    - Fast-acting control system
    - Consists of brain, spinal cord, nerves, and sensory receptors
    - Responds to internal and external stimuli
    - Sensory receptors detect changes
    - Messages are sent to the central nervous system
    - Central nervous system assesses information and activates effectors (muscles and glands)

Chapter 1
The Human Body: An Orientation

Anatomy
- Anatomy
  - Study of the structure and shape of the body and its parts
  - Observation is used to see sizes and relationships of parts

Anatomy
- Gross anatomy
  - Large structures
  - Easily observable

Anatomy
- Let's look at an example of gross anatomy using the digestive system organs

Anatomy
- Microscopic anatomy
  - Structures are too small to be seen with the naked eye
  - Cells and tissues can be viewed only with a microscope

Anatomy
- Let's look at an example of microscopic anatomy using a digestive system organ, the stomach

Physiology
- Physiology
  - Study of how the body and its parts work or function

Physiology
- Structure determines what functions can occur
- For example, the air sacs of the lungs have very thin walls, a feature that enables them to exchange gases and provide oxygen to the body