



MARTINI | NATH

FUNDAMENTALS OF

# ANATOMY & PHYSIOLOGY

*Eighth Edition*

## Chapter 1

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# An Introduction to Anatomy and Physiology

**PowerPoint® Lecture Slides  
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# Structure and Function

- Anatomy
  - Describes the **structures** of the body
    - What they are made of
    - Where they are located
    - Associated structures
- Physiology
  - Is the study of
    - Functions of anatomical structures
    - Individual and cooperative functions

# Anatomy and Physiology Integrated

- **Anatomy**
  - **Gross anatomy**, or macroscopic anatomy, examines large, visible structures
    - *Surface anatomy*: exterior features
    - *Regional anatomy*: body areas
    - *Systemic anatomy*: groups of organs working together
    - *Developmental anatomy*: from conception to death
    - *Clinical anatomy*: medical specialties

# Anatomy and Physiology Integrated

- Anatomy
  - **Microscopic anatomy** examines cells and molecules
    - *Cytology*: study of cells and their structures
      - cyt- = cell
    - *Histology*: study of tissues and their structures

# Anatomy and Physiology Integrated

- Physiology
  - **Cell physiology:** processes within and between cells
  - **Special physiology:** functions of specific organs
  - **Systemic physiology:** functions of an organ system
  - **Pathological physiology:** effects of diseases

# Levels of Organization

- **The Chemical (or Molecular) Level**
  - Atoms are the smallest chemical units
  - Molecules are a group of atoms working together
- **The Cellular Level**
  - Cells are a group of atoms, molecules, and organelles working together
- **The Tissue Level**
  - Tissues are a group of similar cells working together
- **The Organ Level**
  - An organ is a group of different tissues working together

# Levels of Organization

- **The Organ System Level**

- Organ systems are a group of organs working together
- Humans have 11 organ systems

- **The Organism Level**

- A human is an organism



Levels of Organization



Organ Systems

# Anatomical Terminology

- Superficial Anatomy
  - **Anatomical position:** hands at sides, palms forward
  - **Supine:** lying down, face up
  - **Prone:** lying down, face down



# Anatomical Terminology

- Superficial Anatomy
  - **Anatomical Landmarks**
    - References to palpable structures
  - **Anatomical Regions**
    - Body regions
    - Abdominopelvic quadrants
    - Abdominopelvic regions
  - **Anatomical Directions**
    - Reference terms based on subject

# Anatomical Terminology

- Sectional Anatomy
  - Planes and sections
    - **Plane:** a three-dimensional axis
    - **Section:** a slice parallel to a plane
    - Used to visualize internal organization and structure
    - Important in radiological techniques
      - MRI
      - PET
      - CT

# Body Cavities

- Body cavities have two essential functions
  - Protect organs from accidental shocks
  - Permit changes in size and shape of internal organs
- Ventral body cavity (*coelom*)
  - Divided by the **diaphragm**:
    - **Thoracic cavity**
    - **Abdominopelvic cavity**

# Body Cavities

- **The Thoracic Cavity**

- Separated into regions

- Right and left **pleural** cavities

- contain right and left lungs

- **Mediastinum**

- upper portion filled with blood vessels, trachea, esophagus, and thymus

- lower portion contains **pericardial cavity**

- » the **heart** is located within the pericardial cavity

# Body Cavities

- **The Abdominopelvic Cavity**
  - **Peritoneal cavity** — chamber within abdominopelvic cavity
    - *Parietal peritoneum* lines the internal body wall
    - *Visceral peritoneum* covers the organs

# Body Cavities

- **The Abdominopelvic Cavity**

- Abdominal cavity — superior portion

- Diaphragm to top of pelvic bones

- Contains digestive organs

- **Retroperitoneal space**

- Area posterior to peritoneum and anterior to muscular body wall

- Contains pancreas, kidneys, ureters, and parts of the digestive tract

# Body Cavities

- **The Abdominopelvic Cavity**
  - **Pelvic cavity** — inferior portion
    - Within pelvic bones
    - Contains reproductive organs, rectum, and bladder