B.Pharm Semester 1

Human Anatomy, Physiology and Pathophysiology I

Unit 01

Introduction to Human Body, Cell Injury and Adaptation

PPT Notes

Small Changes Make a Big Difference

SCIENCE FOR A HEALTHIER TOMORROW





ANATOMY EXPLORES STRUCTURE

PHYSIOLOGY EXPLAINS FUNCTION

PATHOPHYSIOLOGY CONNECTS TO DISEASE

Cells Adapt Survive Thrive



Learn the Structure Behind Life



From Cells to Systems to a Healthier Tomorrow

CELLS BUILD LIFE

SYSTEMS KEEP US GOING

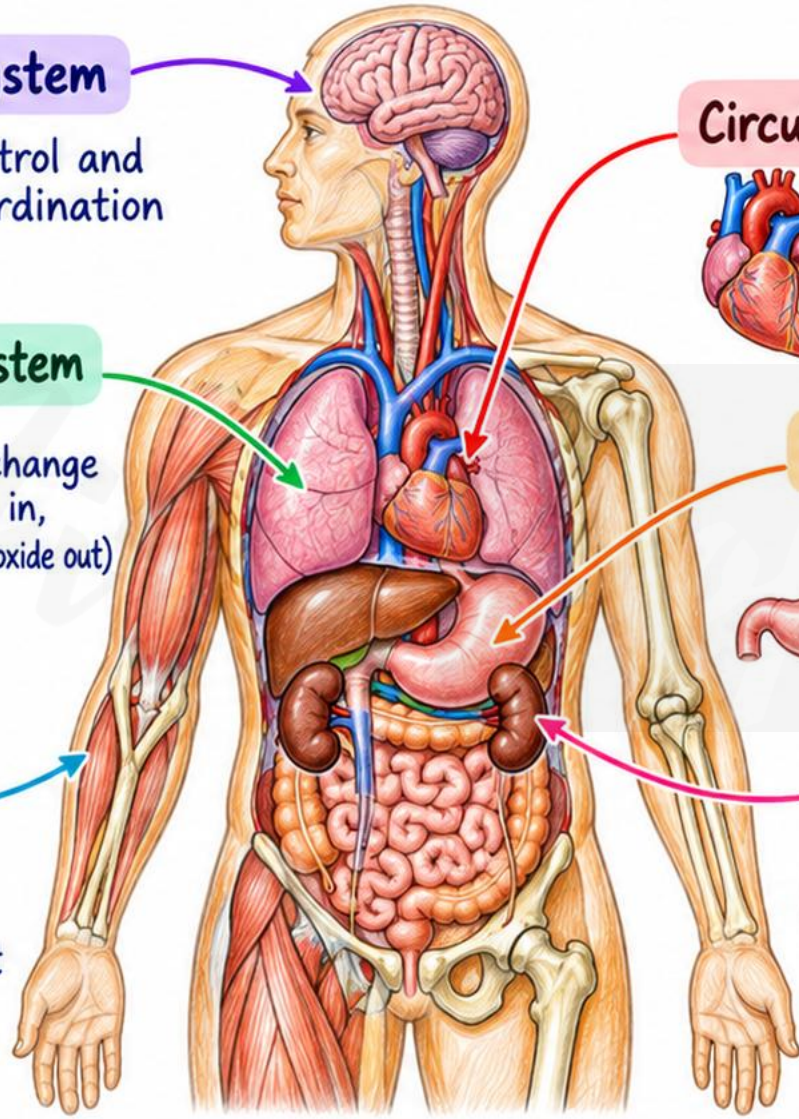
HEALTH INSPIRES TOMORROW

STUDY | UNDERSTAND | APPLY | GROW

ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY

Anatomy

- Study of the structure and organization of the human body.
- Describes the physical make up of organs, tissues and body systems.



Nervous System



Control and coordination

Respiratory System



Gas exchange (oxygen in, carbon dioxide out)

Musculoskeletal System



Movement and structural support

Circulatory System

Transport of nutrients, oxygen and wastes

Digestive System



Breakdown and absorption of food

Urinary System



Elimination of waste products

Physiology

- Study of how the body and its parts work.
- Explains the normal functions of organs and body systems to maintain life.

Pathophysiology

- Study of changes in normal function due to disease or injury.
- Links disease processes to the resulting functional changes in the body.

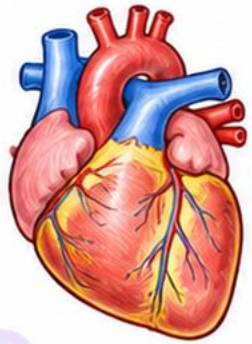
Structure (Anatomy) → Function (Physiology) → Disease-related change (Pathophysiology)

BRANCHES OF ANATOMY

1. GROSS ANATOMY

Studies structures visible to the naked eye.

Example: Heart



2. MICROSCOPIC ANATOMY

Examines structures seen only under a microscope.

Example: Cell (histology)



3. DEVELOPMENTAL ANATOMY

Studies structural changes from conception to adulthood.

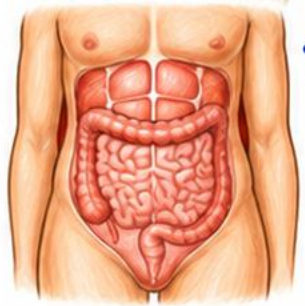
Example: Embryo

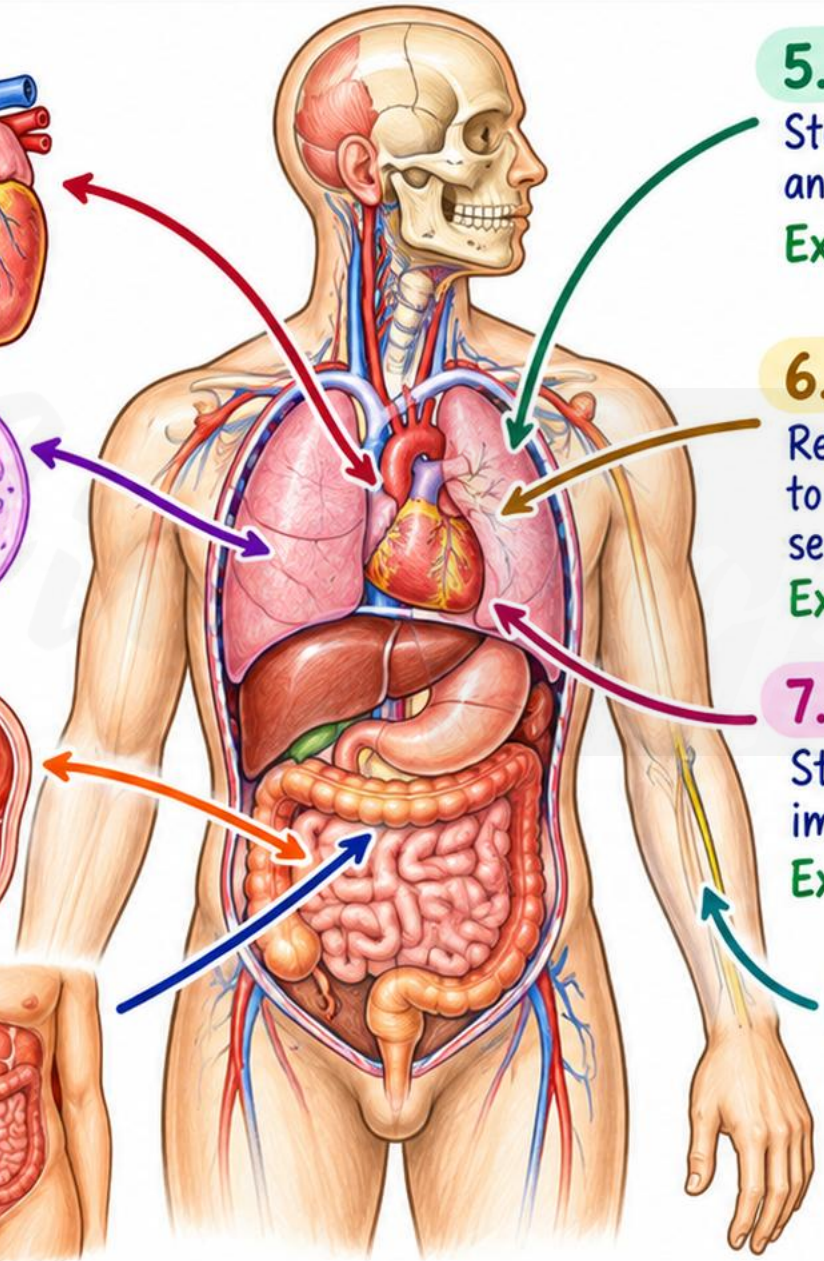


4. REGIONAL ANATOMY

Studies structures in a specific body region.

Example: Abdominal region

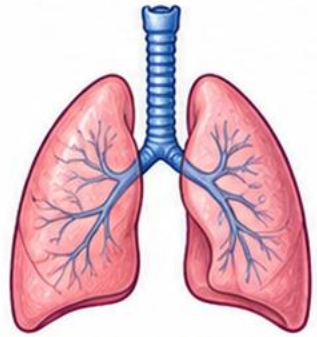




5. SYSTEMIC ANATOMY

Studies entire organ systems and their structures.

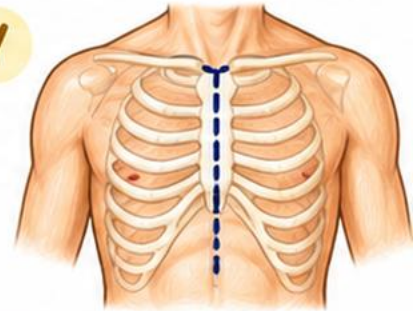
Example: Respiratory system



6. SURFACE ANATOMY

Relates internal structures to external body landmarks seen on the surface.

Example: Sternum



7. RADIOLOGICAL ANATOMY

Studies anatomy using imaging techniques.

Example: X-ray of chest



8. CLINICAL ANATOMY

Applies anatomical knowledge to medical practice.

Example: Nerve injured in fracture



BRANCHES OF PHYSIOLOGY

NORMAL PHYSIOLOGY

Study of normal functions of the body and its systems.

Neurophysiology

Functions of the nervous system (brain, spinal cord and nerves).

Endocrine Physiology

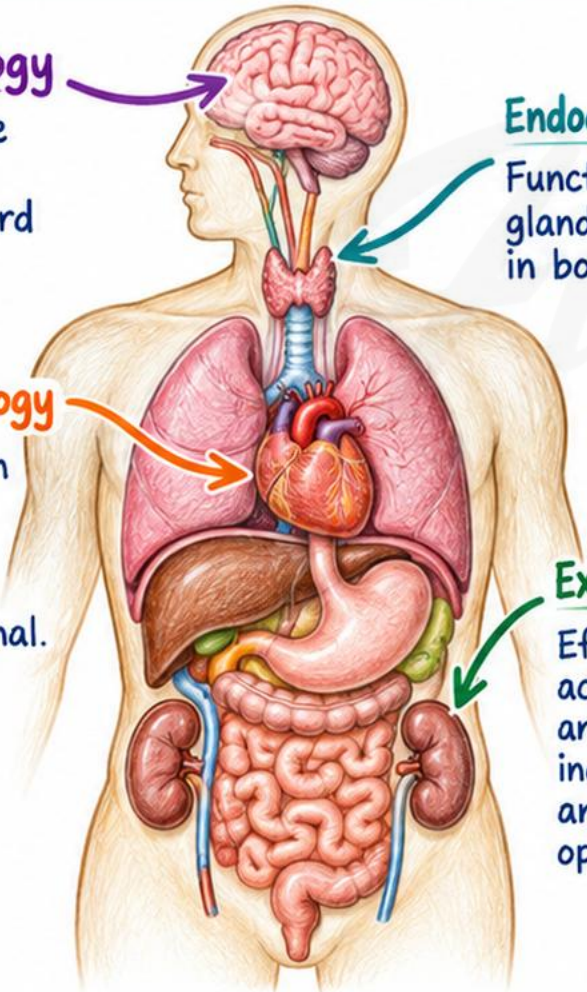
Functions of endocrine glands and hormones in body regulation.

Systems Physiology

Functions of organ systems such as cardiovascular, respiratory, renal and gastrointestinal.

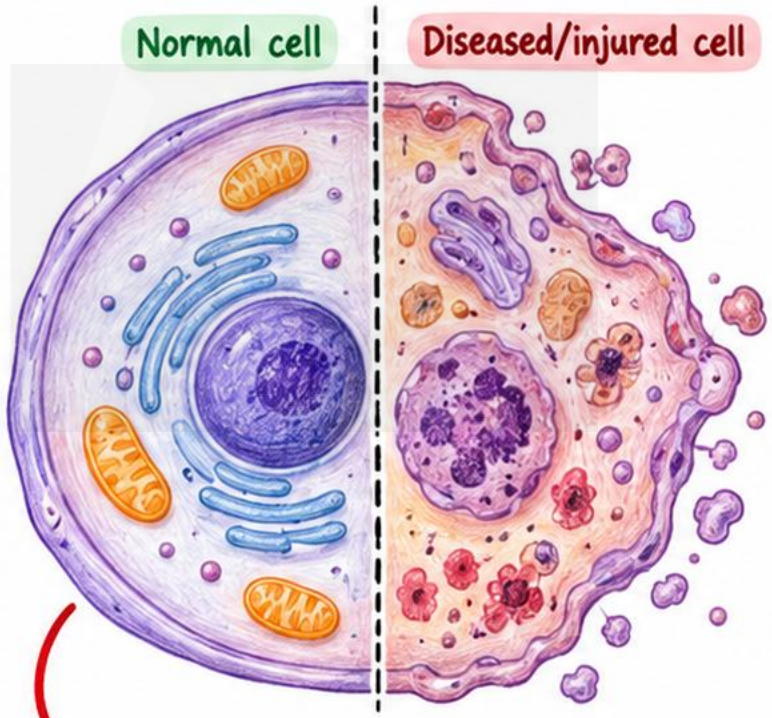
Exercise Physiology

Effects of physical activity on the body and its systems, including adaptations and performance optimization.



PATHOPHYSIOLOGY

Study of functional changes in the body that occur as a result of disease, injury or abnormal conditions.



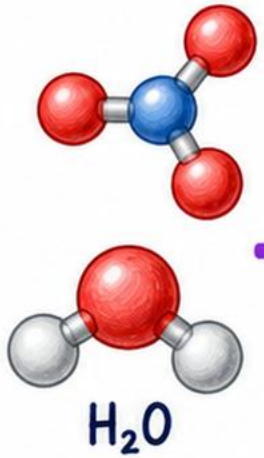
Disease, injury or genetic disorders can alter normal cell structure and function.

Key areas

1. **Cellular**
   Structural and functional changes in cells; how damaged cells contribute to disease.
2. **Systemic**
   How diseases affect organ systems and their responses.
3. **Molecular**
   Molecular and biochemical mechanisms (e.g. genetic mutations, protein dysfunction, signaling changes).
4. **Clinical**
   Relationship between disease mechanisms, clinical signs and symptoms; helps in diagnosis and treatment.
5. **Experimental**
   Study of disease mechanisms through laboratory research and experimental models.

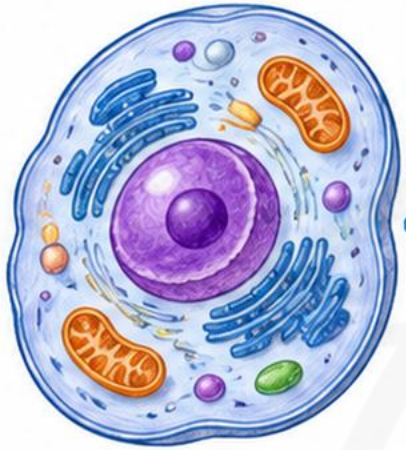
LEVELS OF STRUCTURAL ORGANIZATION

1. Chemical Level



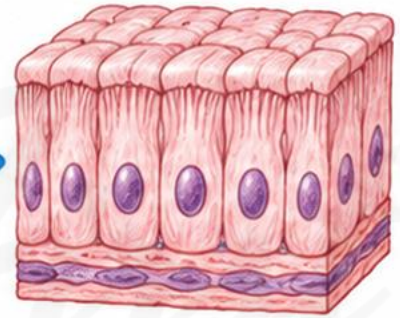
- Atoms and molecules.
- Examples: water, proteins, lipids, carbohydrates.

2. Cellular Level



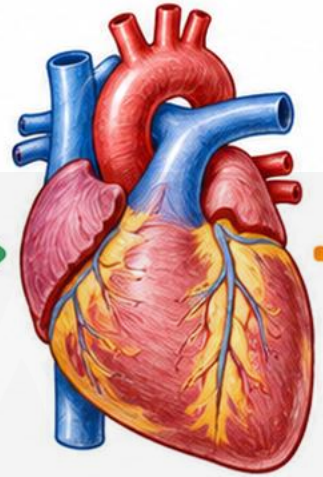
- Cell is the smallest functional unit of life.
- Contains organelles (e.g., nucleus, mitochondria, endoplasmic reticulum).

3. Tissue Level



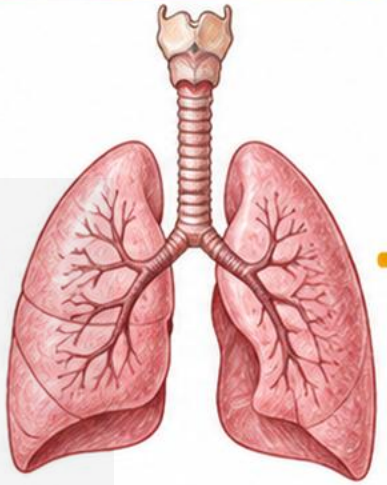
- Group of similar cells working together.
- Four types: epithelial, connective, muscle and nervous tissue.

4. Organ Level



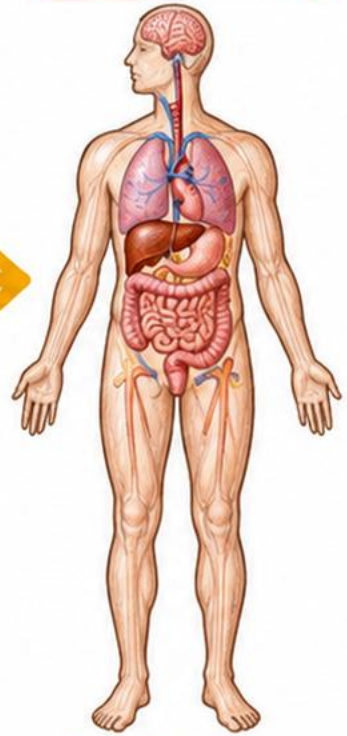
- Structure composed of two or more tissue types.
- Examples: heart, lungs, liver, kidneys.

5. Organ System (Body System) Level



- Group of organs working together to perform specific functions.
- Example: respiratory system (lungs, airways).

6. Organism Level



- Complete human organism with all body systems working together.

Atoms → Molecules → Cells → Tissues → Organs → Organ Systems → Organism

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