

# Human Anatomy

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## ***LECTURE 1***

**ORGANIZATION OF THE BODY,  
DEFINITIONS & ANATOMICAL  
TERMINOLOGY**

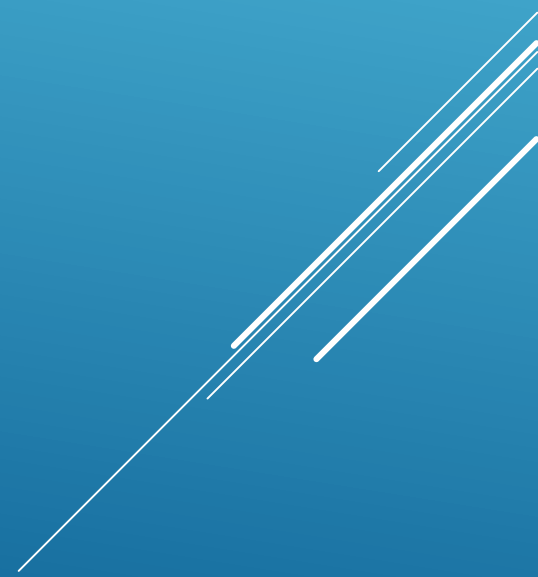
***Sawsan Hamed***

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- ▶ Know the body's levels of structural organization.
- ▶ List the 11 systems of the human body, representative organs present in each.
- ▶ Define the important life processes of the human body.
- ▶ List the six most important life processes (characteristics) in the human body.
  
- ▶ Relate the anatomical names and the corresponding common names for various regions of the human body.
- ▶ Define the anatomical planes, anatomical sections, and directional terms used to describe the human body.
- ▶ Outline the major body cavities, the organs they contain, and their associated linings.

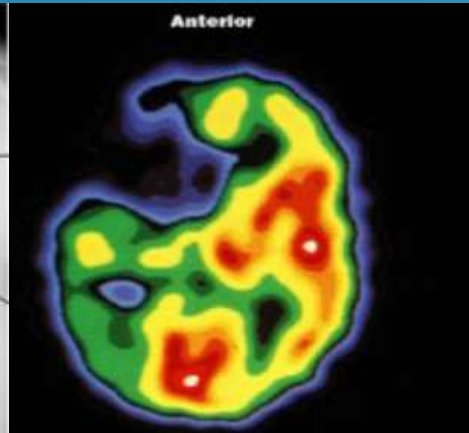
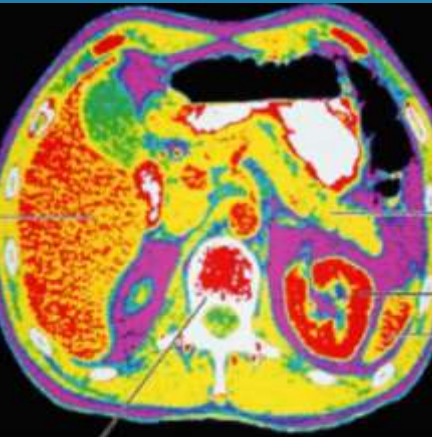
# OBJECTIVES

# OUTLINES OF THE LECTURE

- ▶ 1.1 Introduction to Human body Anatomy & definition
  - ▶ 1.2 Levels of Structural Organization and Body Systems
  - ▶ 1.3 Characteristics of the Living Human Organism
  - ▶ 1.4 Basic Anatomical Terminology
- 

# 1.1 The Human Body Anatomy

- Anatomy – study of body structures and the relationships among them
- Anatomy (ana= up; tomy = process of cutting)
- It was first studied by **dissection** (act of part cutting), the careful cutting apart of body structures to study their relationships.
- Today, a variety of imaging techniques contribute to the advancement of anatomical knowledge



# Medical Imaging Techniques

- X-rays
- CT Scan
- PET Positron emission tomography
- Ultrasound imaging
- MRI



# Branches of anatomy

## BRANCH OF ANATOMY

## STUDY OF

### Embryology

(em'-brē-OL-ō-jē; *embryo-* = embryo; *-logy* = study of)

The first eight weeks of development after fertilization of a human egg.



### Developmental biology

The complete development of an individual from fertilization to death.

### Cell biology (Microscopic Anatomy)

Cellular structure and functions.

### Histology

(his-TOL-ō-jē; *hist-* = tissue)

Microscopic structure of tissues.



### Gross anatomy

Structures that can be examined without a microscope.

### Systemic anatomy

Structure of specific systems of the body such as the nervous or respiratory systems.

### Regional anatomy

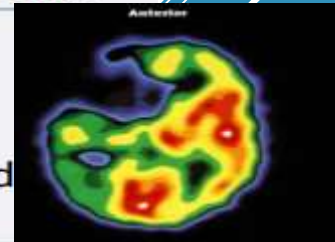
Specific regions of the body such as the head or chest.

### Surface anatomy

Surface markings of the body to understand internal anatomy through visualization and palpation (gentle touch).

### Imaging anatomy

Internal body structures that can be visualized with techniques such as x-rays, MRI, CT scans, and other technologies for clinical analysis and medical intervention.



### Pathological anatomy

(path'-ō-LOJ-i-kal; *path-* = disease)

Structural changes (gross to microscopic) associated with disease.



# 1.2 Levels of Structural Organization & Body system

From the smallest to the largest, six levels of organization are there:

Chemical level → atoms (C, H, O, N, Ph, Ca, S) form molecule

Cellular level → molecules combined to form a cell (smallest unit of organization, (ex; muscle, nerve, bone and epithelial cells

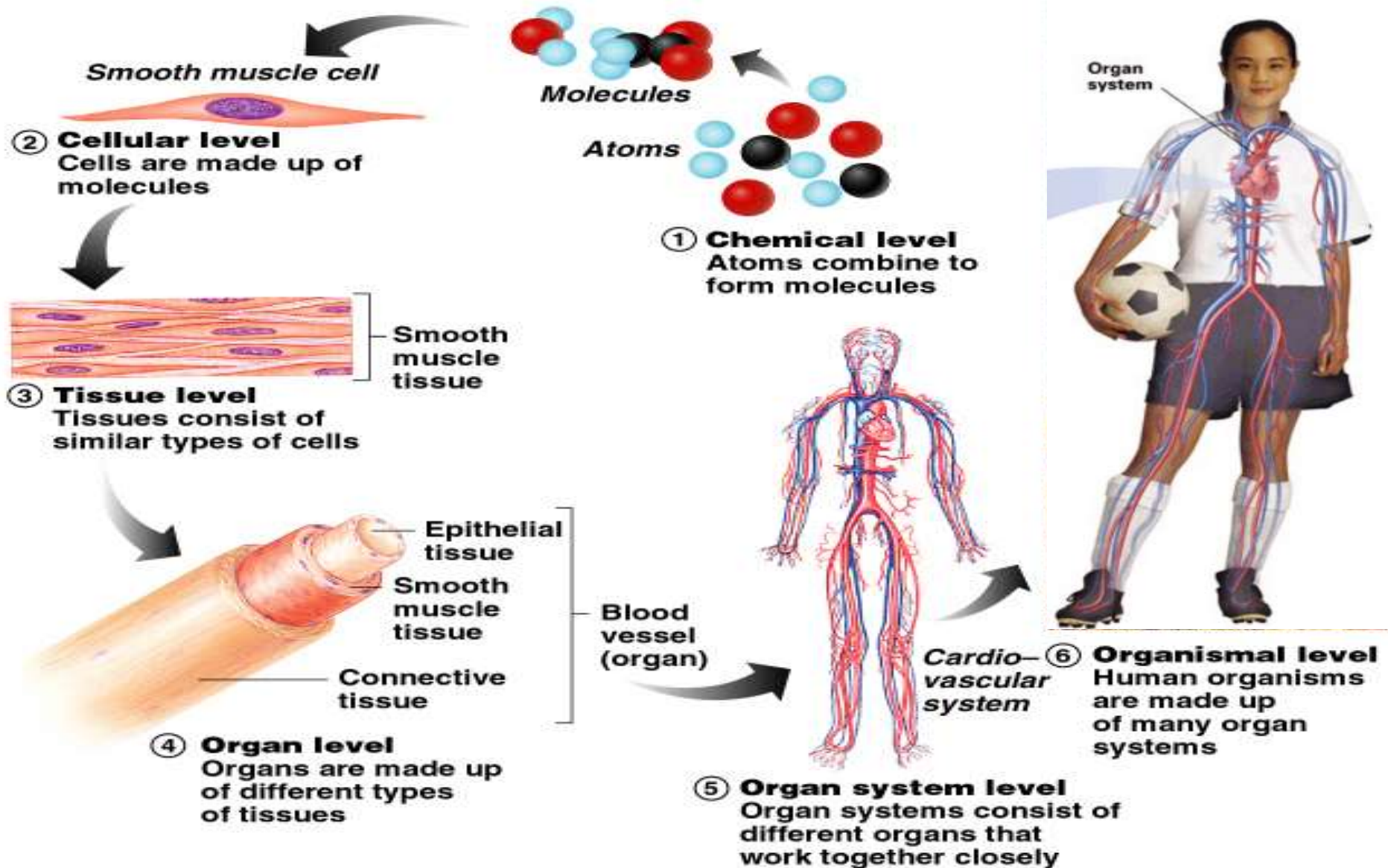
Tissue level → group of similar cells that perform the same function (human body contains four basic types of tissue: muscle, nervous, connective and epithelial tissue)

Organ level → different kinds of tissues joined together.

System level → different types of organs doing the same function

Organismal levels → organ systems functioning together constitute the total human body

# 1.2 Levels of Structural Organization & Body system

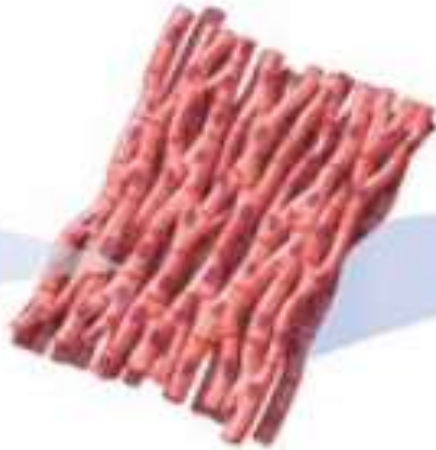




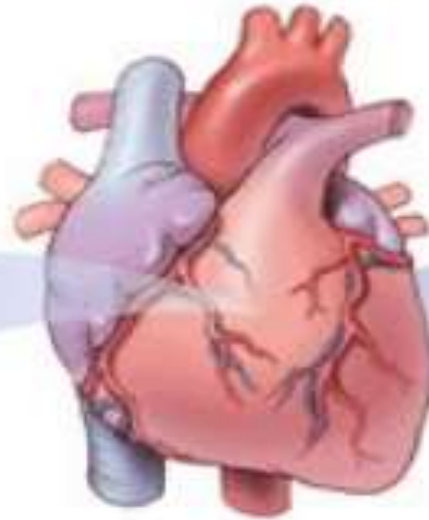
# 1.2 Levels of Structural Organization & Body system



**Cell**



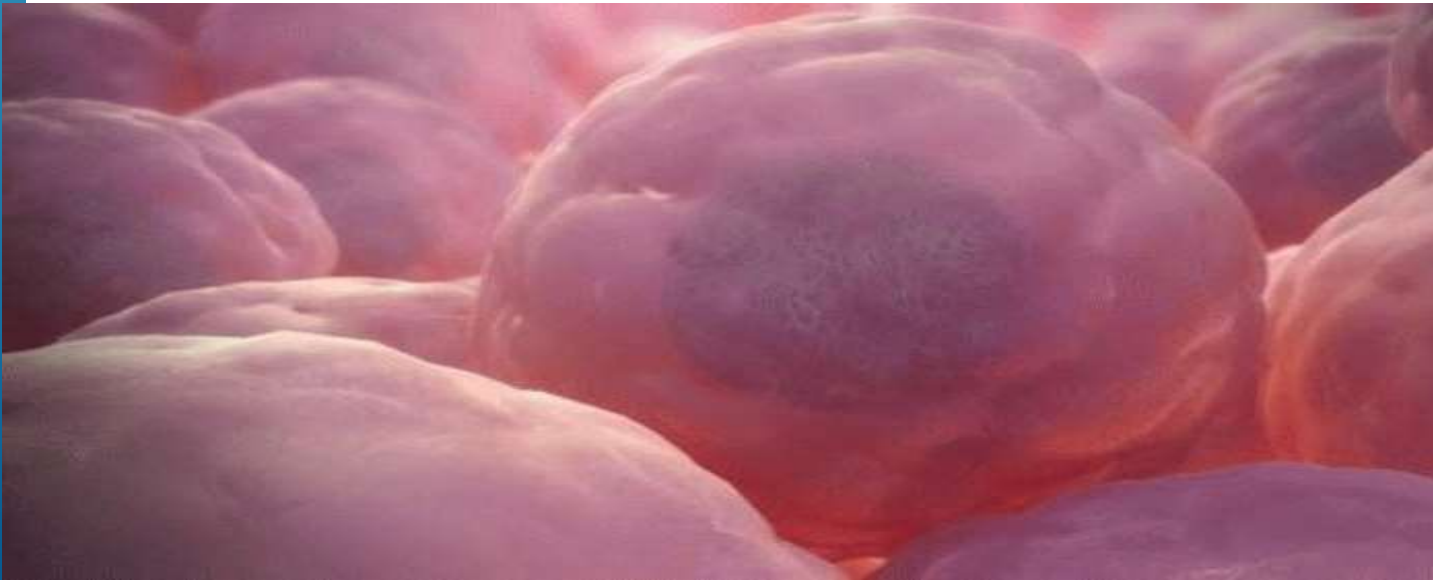
**Tissue**



**Organ**



**Organ system**

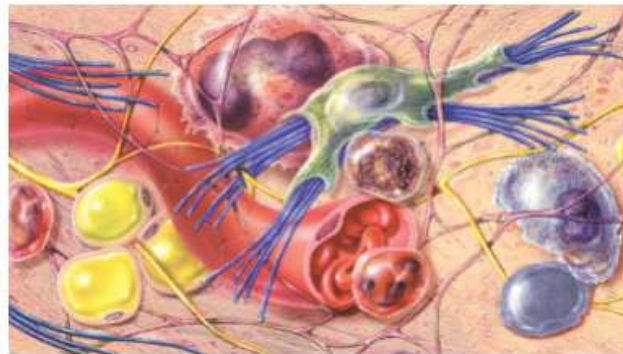
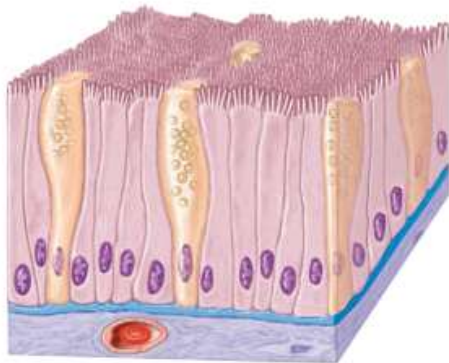


# 1. What is a tissue?

- a group of cells that usually have a common origin in an embryo and function together to carry out specialized activities.

# 2. What are the four basic types of human tissues?

Each of the four types of tissues has different cells that vary in shape, structure, function, and distribution.



(a) Epithelial tissue

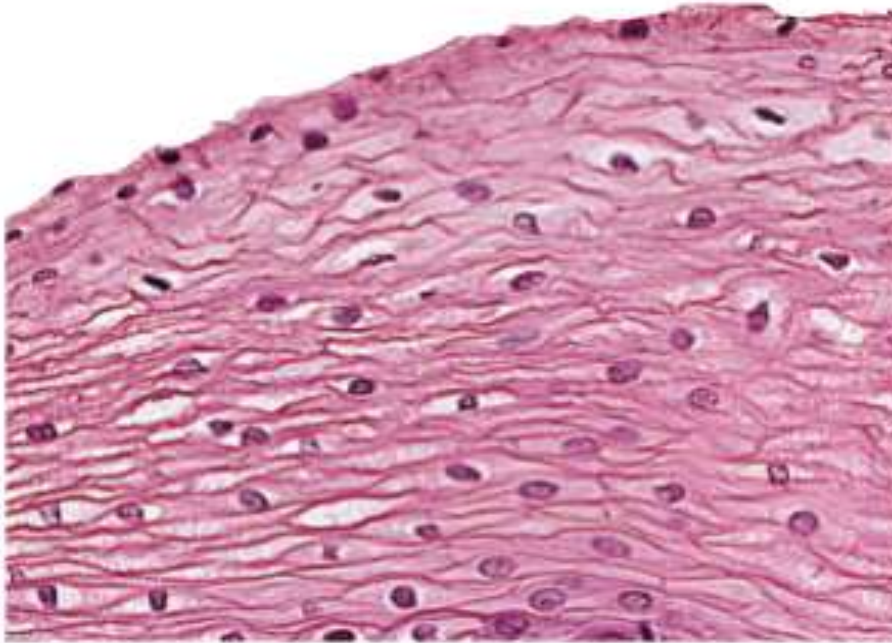
(b) Connective tissue

(c) Muscular tissue

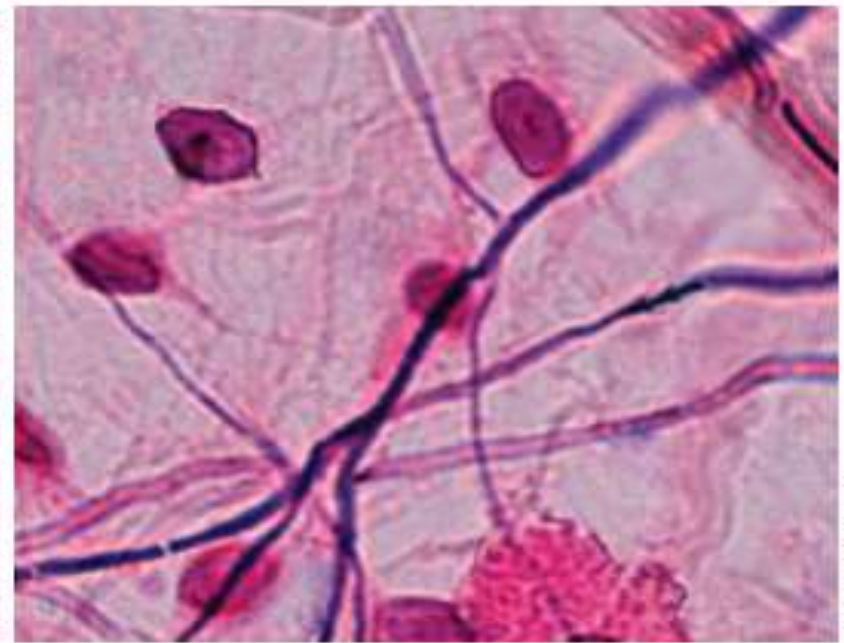
(d) Nervous tissue

All cells and tissues in the body derive from three **germ layers** in the embryo: **the ectoderm, mesoderm, and endoderm**. Different types of tissues form membranes that enclose organs, provide a friction-free interaction between organs, and keep organs together.

The ratio of cells to extracellular matrix is a major difference between epithelial tissue and connective tissue.

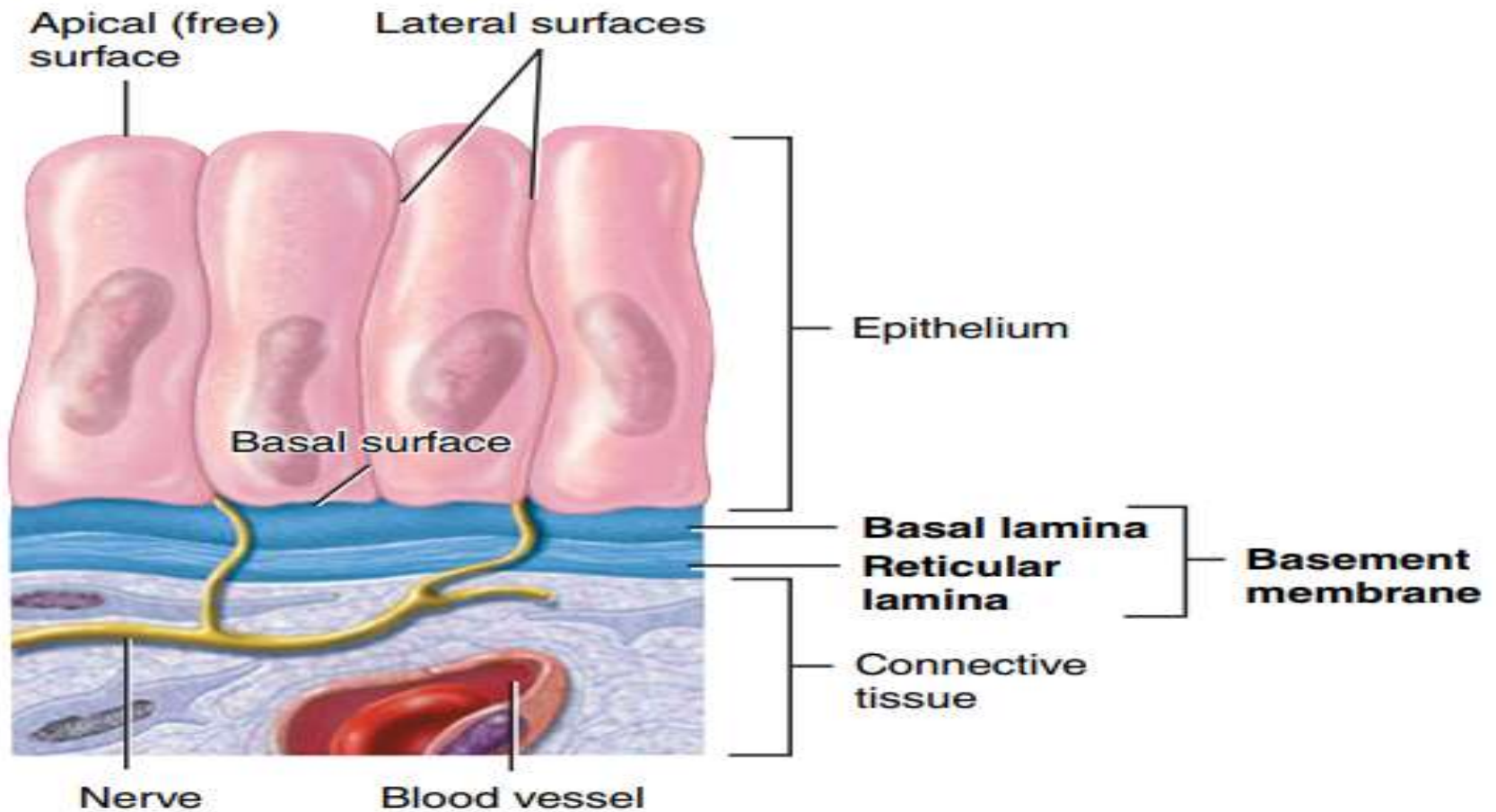


(a) Epithelial tissue with many cells tightly packed together and little to no extracellular matrix



(b) Connective tissue with a few scattered cells surrounded by large amounts of extracellular matrix

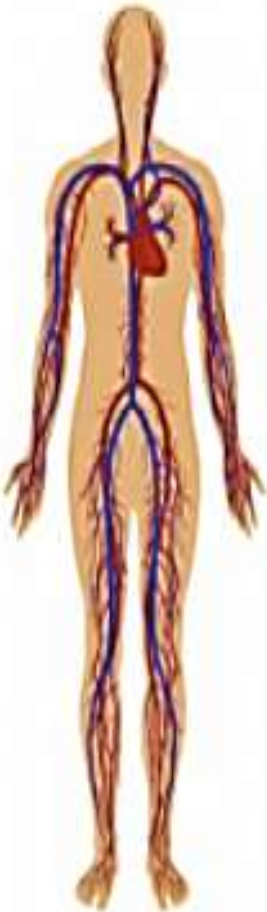
What relationship between epithelial tissue and connective tissue is important for the survival and function of epithelial tissues?



- ▶ Epithelial tissue lacks blood vessels and forms surfaces, it is always found immediately adjacent to blood vessel-rich connective tissue, which enables it to make the exchanges with blood necessary for the delivery of oxygen and nutrients and the removal of wastes that are critical processes for its survival and function.

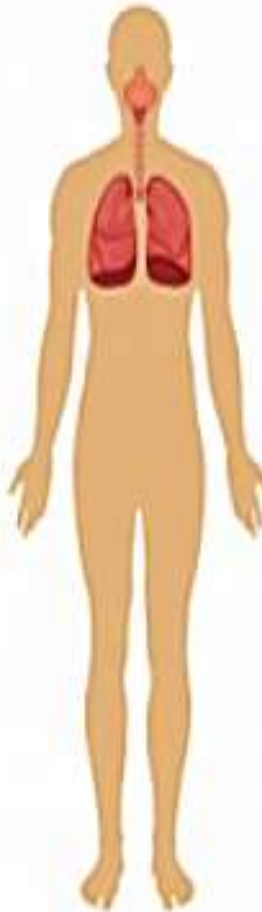
# Human Body Systems

Nervous System

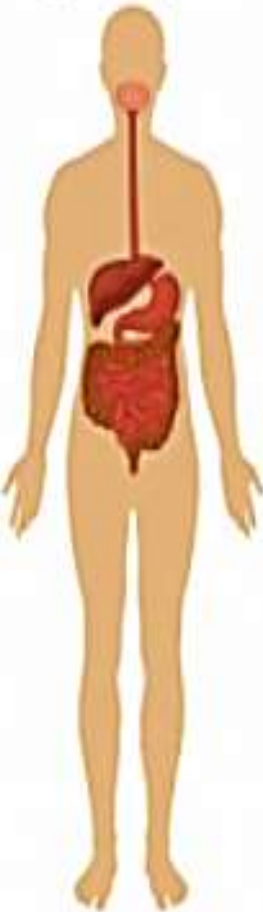


Circulatory System

Digestive System



Respiratory System

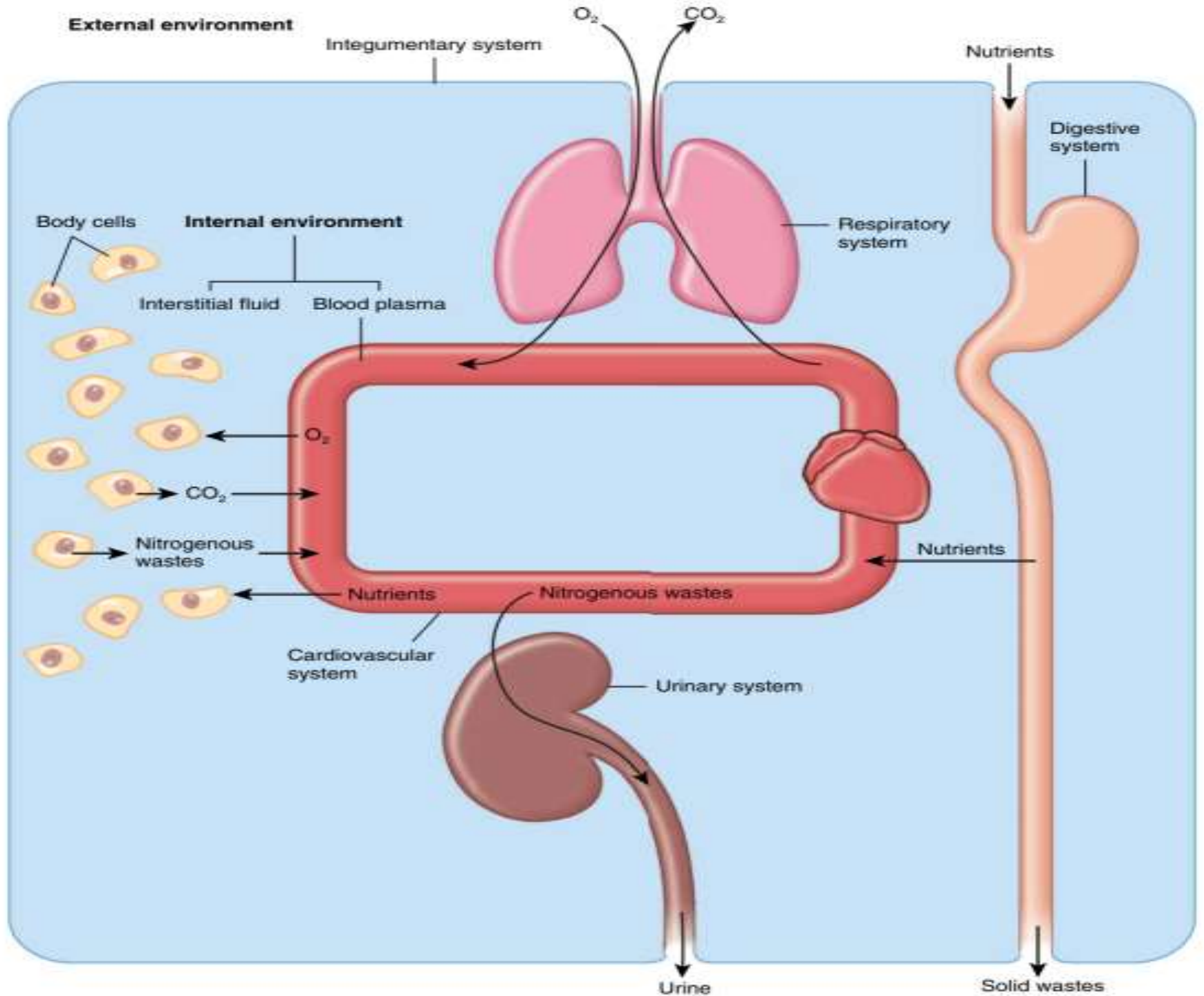


Skeletal System

Muscular System




There are Eleven Systems of the Human Body.




# 1.3 Characteristics of the Living Human Organism (life process)

Processes distinguish living things organisms from non living things

- Movement
    - Locomotion
    - Movement of substances
  - Responsiveness
    - Ability to sense changes and react
  - Digestion (Nutrient)
    - Break-down and delivery of nutrients
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# 1.3 Characteristics of the Living Human Organism

- Metabolism – all chemical reactions within the body
    - Production of energy
    - Making body structures
  - Excretion
    - Elimination of waste from metabolic reactions
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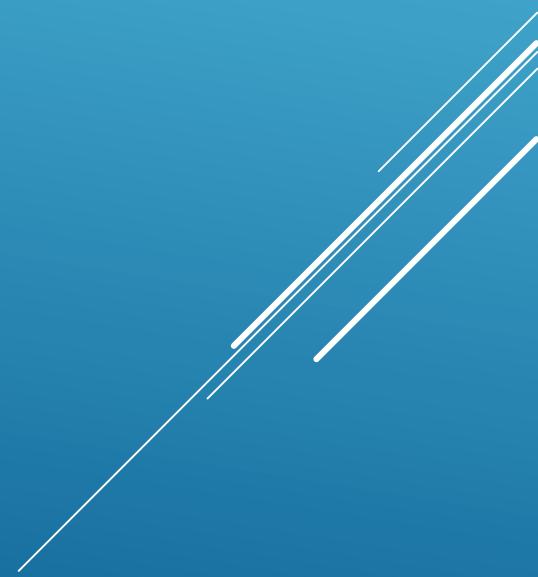


# 1.3 Characteristics of the Living Human Organism


- Reproduction
  - Production of future generation
  - Provides new cells for growth and repair
- Growth
  - Increasing of cell size and number

**MRS. GREN**

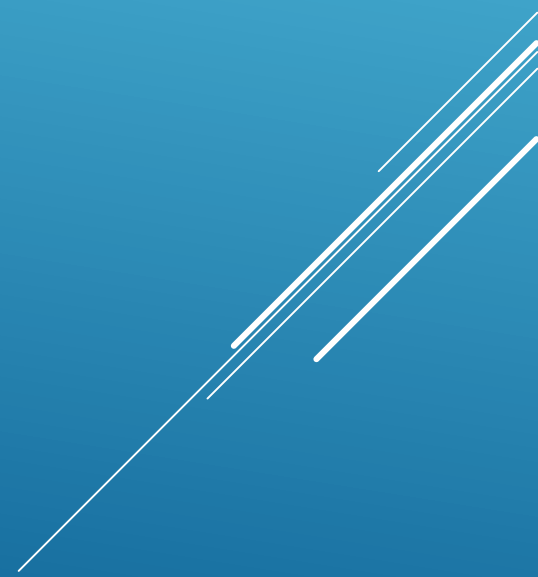
# Survival Needs

- Nutrients
    - Chemicals for energy and cell building
    - Includes carbohydrates, proteins, lipids, vitamins, and minerals
  - Oxygen
    - Required for chemical reactions
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# Survival Needs

- Water
    - 60–80% of body weight
    - Provides for metabolic reaction
  - Stable body temperature
  - Atmospheric pressure must be appropriate
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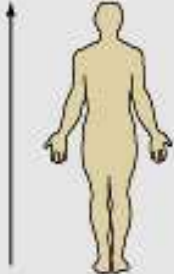
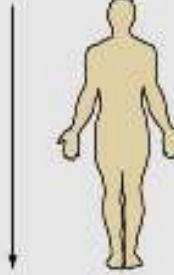
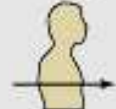
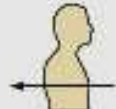
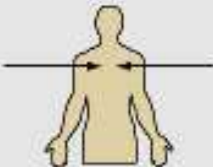
# Basic Anatomical Terminology

- Special terminology is used in anatomy for:
    - Position
    - Direction
    - Regions
    - Structures
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# Some Anatomical Directions

- Superior and Inferior
- Anterior and Posterior
- Dorsal and Ventral
- Proximal and Distal
- Medial and Lateral

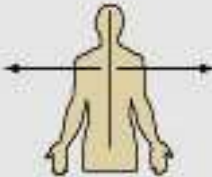


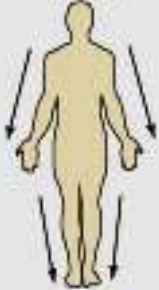

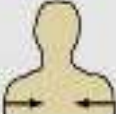
# Position and Directional Terms

Term	Definition	Illustration	Example
Superior (cranial or cephalad)	Toward the head end or upper part of a structure or the body; above		The forehead is superior to the nose.
Inferior (caudal)	Away from the head end or toward the lower part of a structure or the body; below		The navel is inferior to the breastbone.
Anterior (ventral)*	Toward or at the front of the body; in front of		The breastbone is anterior to the spine.
Posterior (dorsal)*	Toward or at the backside of the body; behind		The heart is posterior to the breastbone.
Medial	Toward or at the midline of the body; on the inner side of		The heart is medial to the arm.

\**Ventral* and *anterior* are synonymous in humans; this is not the case in four-legged animals. *Ventral* refers to the "belly" of an animal and thus is the inferior surface of four-legged animals. Likewise, although the dorsal and posterior surfaces are the same in humans, the term *dorsal* refers to an animal's back. Thus, the dorsal surface of four-legged animals is their superior surface.

Table 1.1

# Position and Directional Terms

Term	Definition	Illustration	Example
Lateral	Away from the midline of the body; on the outer side of		The arms are lateral to the chest.
Intermediate	Between a more medial and a more lateral structure		The armpit is intermediate between the breastbone and shoulder.
Proximal	Close to the origin of the body part or the point of attachment of a limb to the body trunk		The elbow is proximal to the wrist (meaning that the elbow is closer to the shoulder or attachment point of the arm than the wrist is).
Distal	Farther from the origin of a body part or the point of attachment of a limb to the body trunk		The knee is distal to the thigh.
Superficial	Toward or at the body surface		The skin is superficial to the skeleton.
Deep	Away from the body surface; more internal		The lungs are deep to the rib cage.

# Directional Terms

## Distal

(Reference to the extremities only)

- Refers to a structure being further away from the root of the limb than another structure in the limb

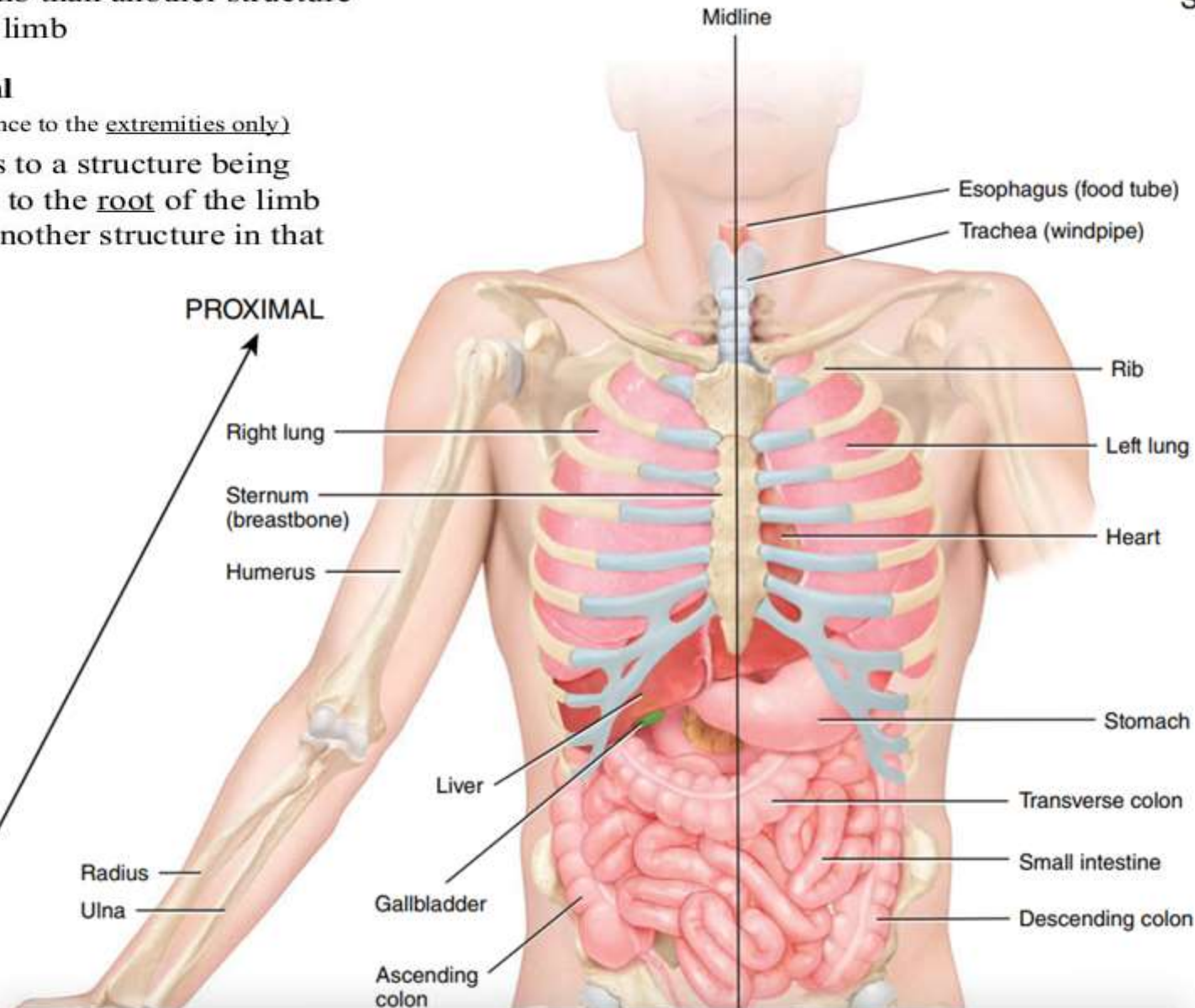
## Proximal

(Reference to the extremities only)

- Refers to a structure being closer to the root of the limb than another structure in that limb

LATERAL ↔ MEDIAL ↔ LATERAL

SUPERIOR ↑





# Body Planes

- Describe three-dimensional structures.

- **Sectional Planes:**

**Transverse Planes-** divide the body into superior/inferior sections.

**Frontal Planes -** divide the body into anterior and posterior sections.

**Sagittal Planes-**divide the body into left and right sections. Exactly equal halves- **Midsagittal Section**

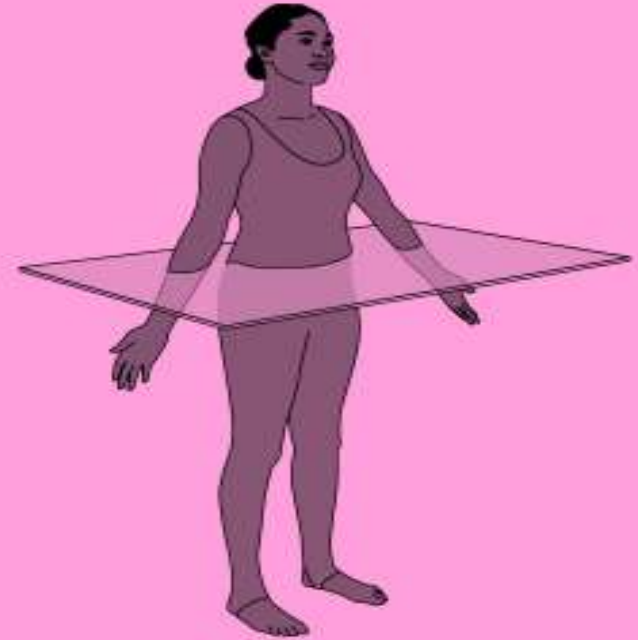
# Body Planes



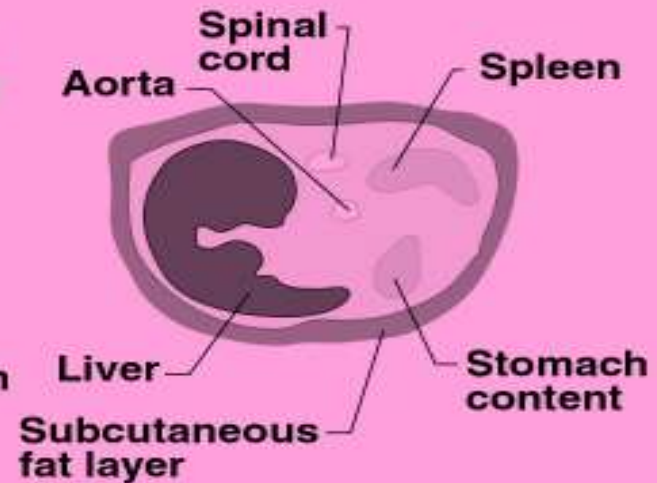
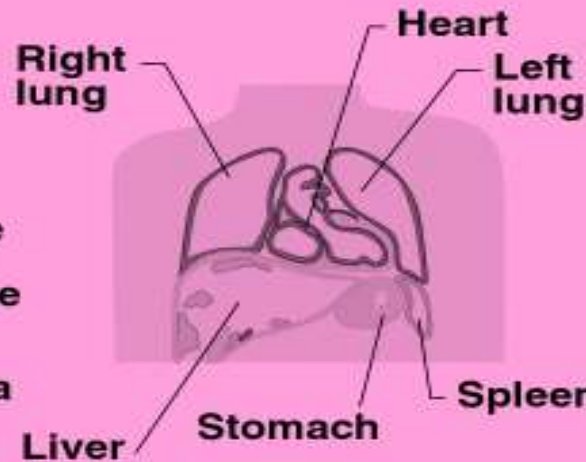
**(a) Median (midsagittal)**



**(b) Frontal (coronal) plane**

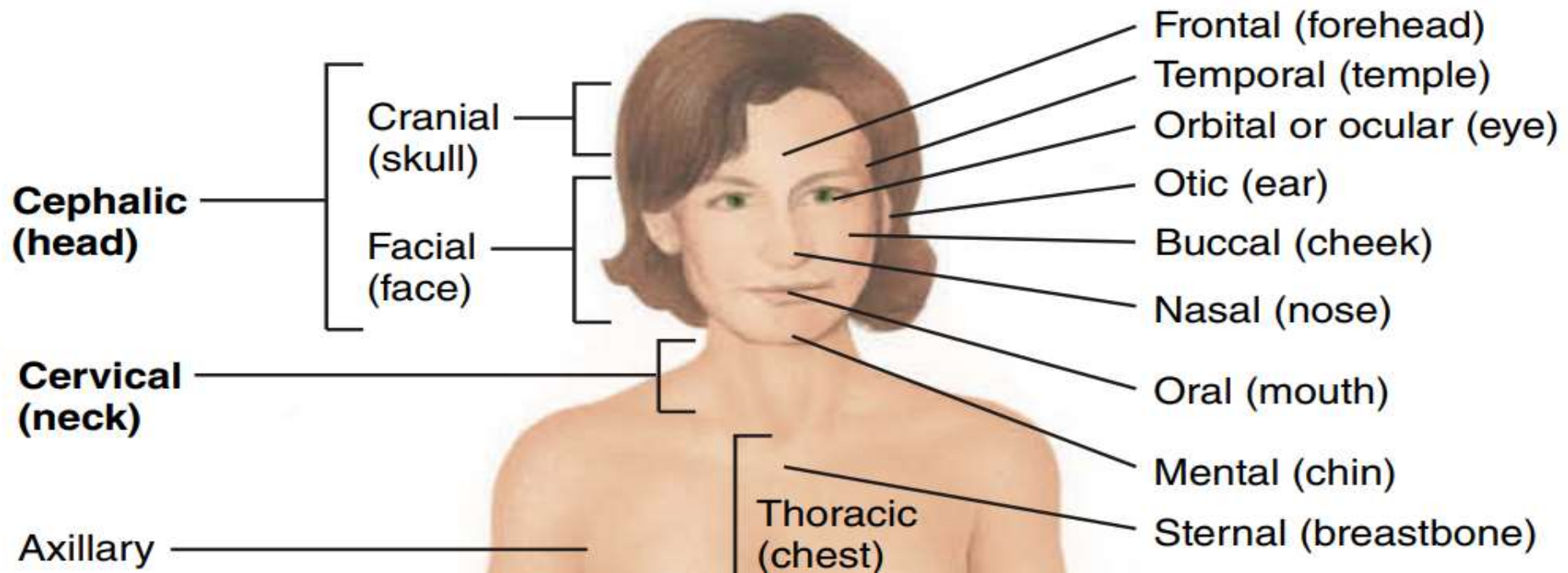


**(c) Transverse plane**

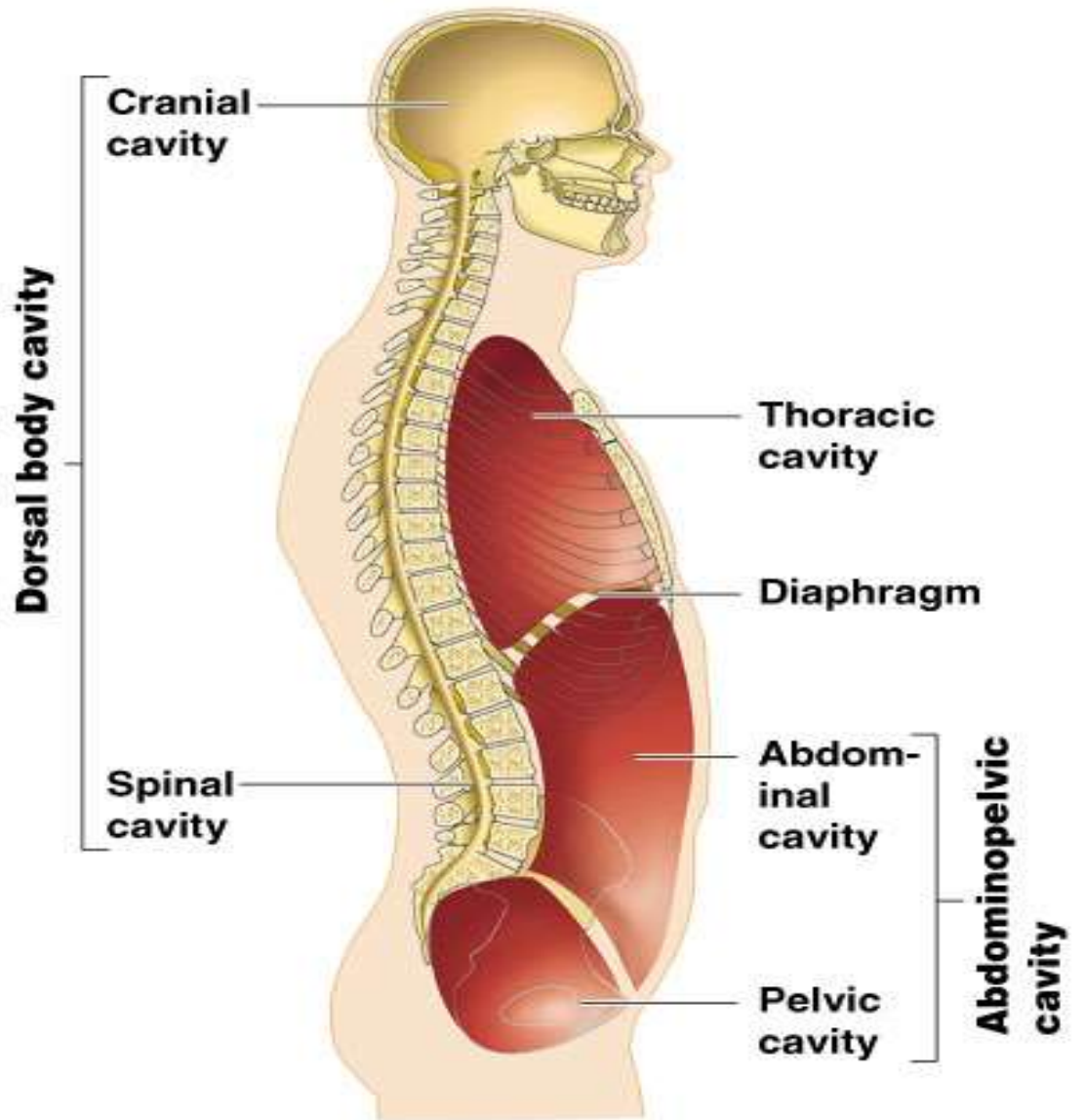


# Regional Names

- The human body is divided into several major regions that can be identified externally.
- The principal regions are the head, neck, trunk, upper limbs, and lower limbs




# Body Cavities

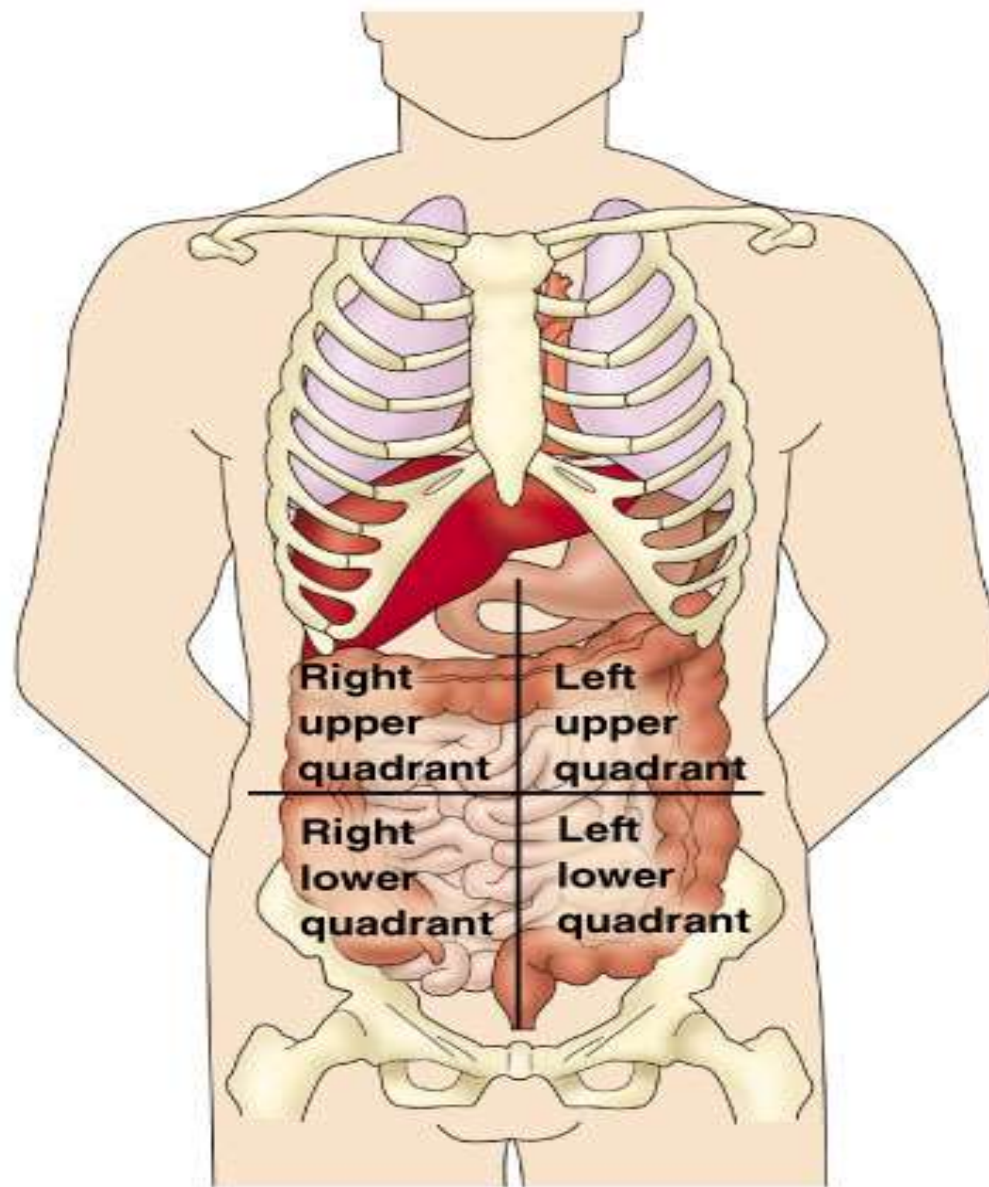


**KEY:**

 Dorsal body cavity

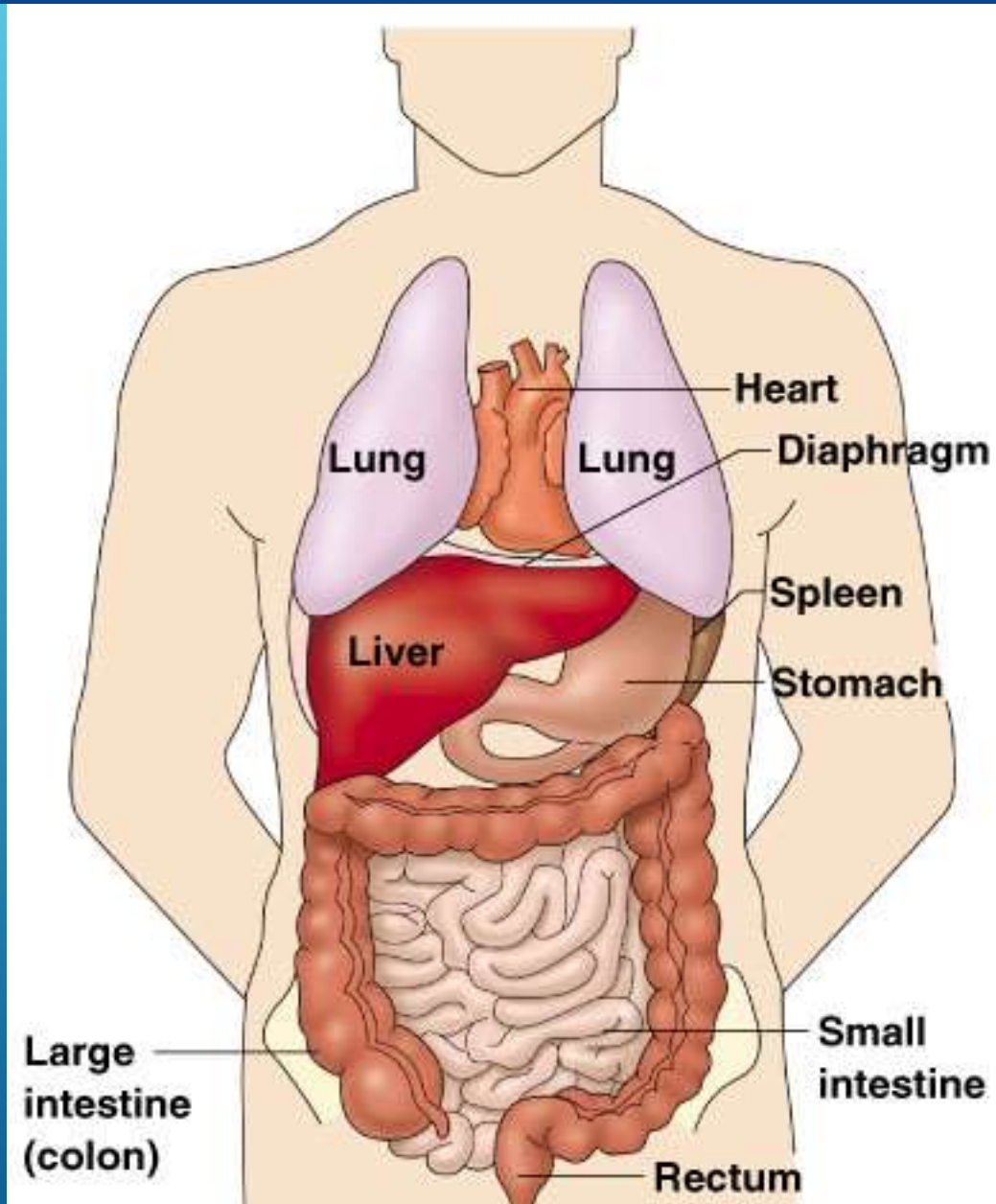
 Ventral body cavity

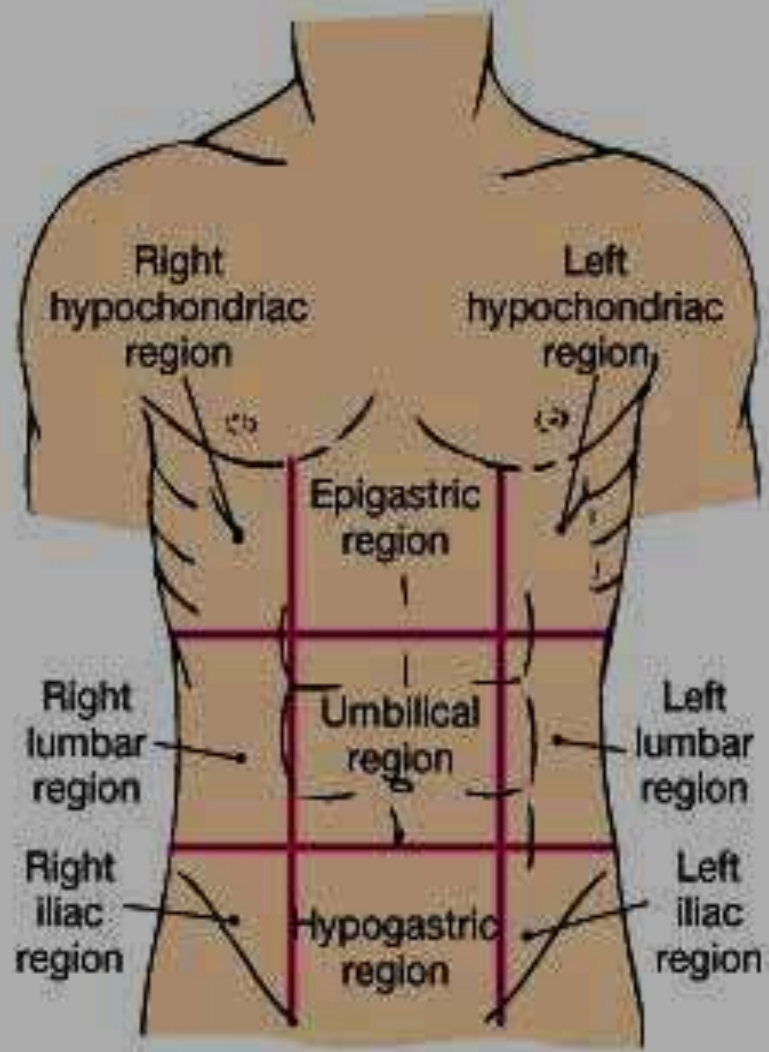
# Abdominopelvic Quadrants



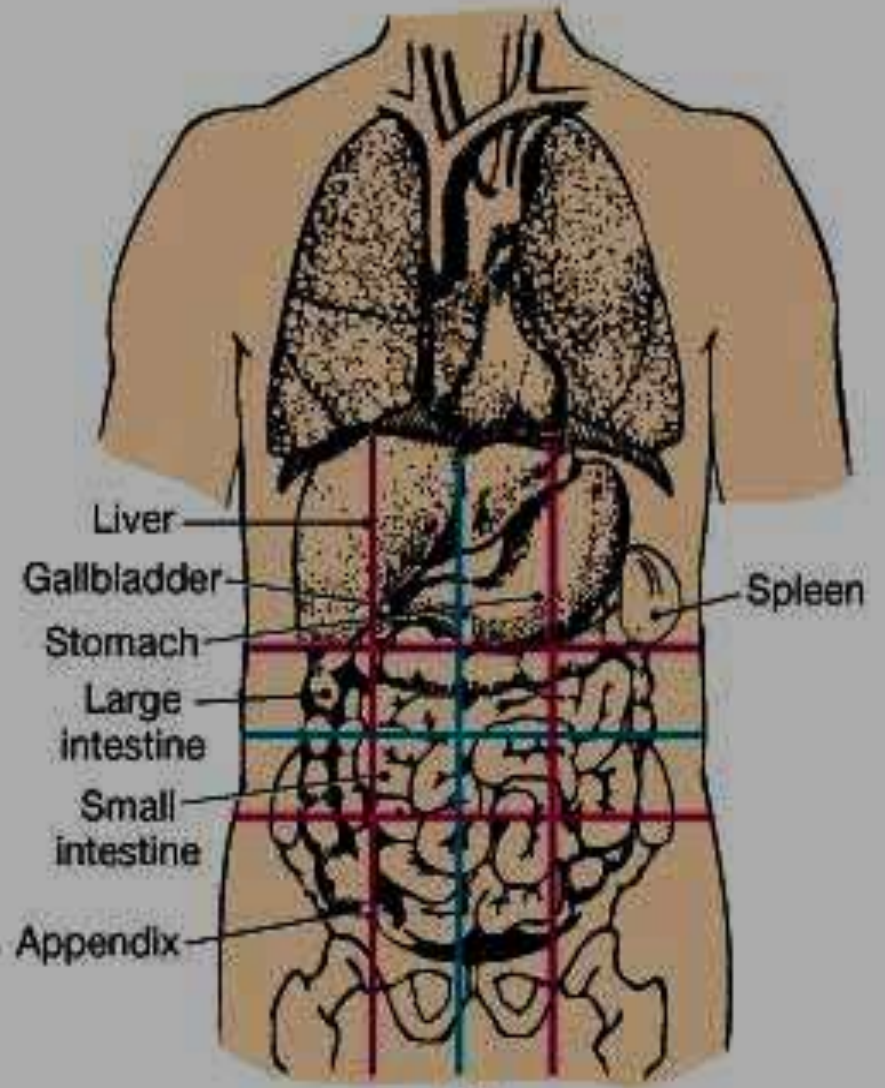
(a)

# Abdominopelvic Major Organs





(b)



(c)

**FIGURE 1-8 Abdominopelvic Quadrants and Regions.** (b) More-precise regional descriptions are provided by reference to the appropriate abdominopelvic region. (c) Quadrants or regions are useful because there is a known relationship between superficial anatomical landmarks and underlying organs.

- ▶ Describe the body's six levels of structural organization.
- ▶ List the 11 systems of the human body, representative organs present in each.
- ▶ Define the important life processes of the human body.
- ▶ List the six most important life processes in the human body.
  
- ▶ Relate the anatomical names and the corresponding common names for various regions of the human body.
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# Q&A