


Anatomy

Overview of Anatomy


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Overview of Anatomy

- **Anatomy** is the study of the structure of the human body.
- **Physiology** is the study of body function.


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Gross Anatomy

- **Regional Anatomy** = The study of structures in a specific region of the body. For example the abdomen or the head.
- **Systemic Anatomy** = The study of organs with related functions. For example the muscular system or cardiovascular system. This is the approach for this class.


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Microscopic Anatomy

- **Histology (Tissue Study)** = The study of structures so small they can only be seen under a microscope.
 - Individual cell parts, cells, groups of cells (called tissues) and microscopic details of the organs of the body.

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Structural Organization

The human body has many levels of structural complexity.

1. Chemical level
2. Cellular level
3. Tissue level
4. Organ level
5. Organ System level
6. Organism level

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Chemical Level

- Made up of atoms that combine to form molecules such as carbon dioxide (CO₂) and water (H₂O), and macromolecules.
 - There are four classes of macromolecules found in the body.

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Chemical Level

- Four macromolecule classes :
 1. Carbohydrates (Sugars)
 2. Lipids (Fats)
 3. Proteins
 4. Nucleic Acids (DNA, RNA)
- These are the building blocks of the structures at the cellular level.

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Cellular Level

- Made up of cells and their functional subunits called organelles.
- Cells are the smallest living things in the body and you have trillions of them.

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Tissue Level

- A group of cells that work together to perform a common function.
- There are 4 tissue types that make up all organs in the body: **Epithelial**, **Connective**, **Muscle** and **Nervous** tissue.

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Organ Level

- An organ is a discrete structure made up of more than one tissue.
- Most organs contain all 4 tissues.
- Examples: Liver, brain, femur and heart.

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Organ System Level

- Organs that work closely together to accomplish a common purpose make up an organ system.

Organs of the cardiovascular system

Organs: Heart and blood vessels

Function: Transports blood to the tissues throughout the body.

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Organ System Level

The organ systems of the human body:

1. Integumentary System – Skin, hair, nails
2. Skeletal System – Bones and joints
3. Muscular System – Skeletal muscle
4. Lymphatic / Immune System – Spleen, red bone marrow, lymphatic vessels
5. Respiratory System – Trachea, lungs

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Organ System Level

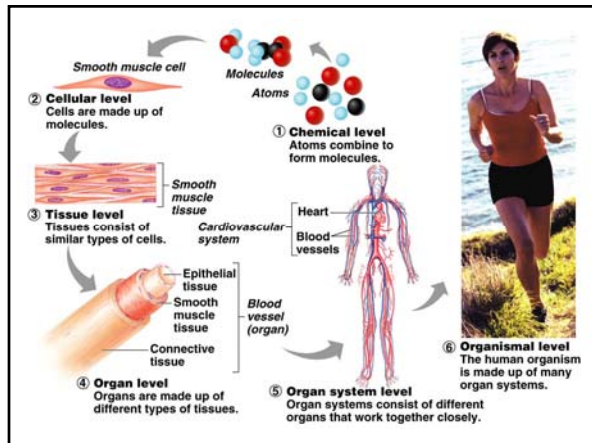
6. Digestive System – Stomach, intestines
7. Nervous System – Brain, spinal cord
8. Endocrine System – Thyroid, Adrenals
9. Cardiovascular System – Heart
10. Urinary System – Kidney, bladder
11. Reproductive System – Male and Female
– Testis, prostate, ovary, uterus

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Organism Level

- All the organ systems working together make up the organism.
 - Example: The human organism (You & Me)

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Anatomical Position

- In order to describe the various body parts and their locations, you need a common visual reference point.
- This reference point is called the **anatomical position**.

Anatomical Position



In this position a person stands erect with feet together and eyes forward. The palms face anteriorly with the thumbs pointed away from the body.

Planes of the Body

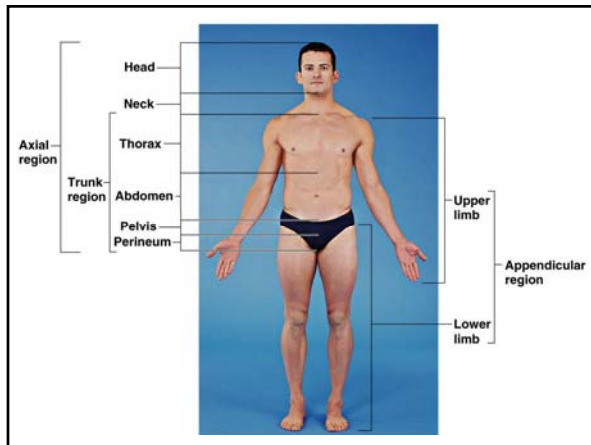
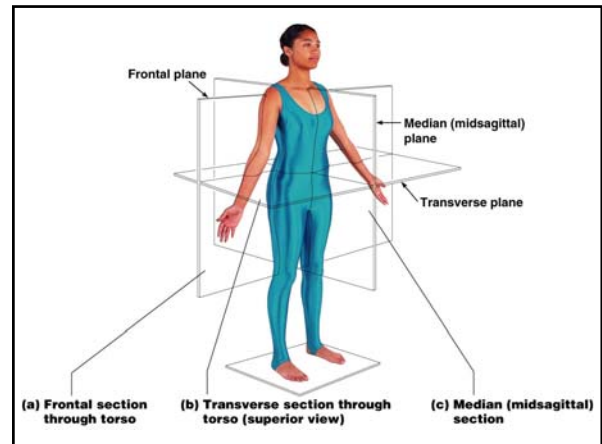
- **Frontal (Coronal) Plane** – Divides the body into anterior (front) and posterior (back) portions.
- **Transverse (Horizontal) Plane** – Divides the body into superior (top) and inferior (bottom) portions.

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Planes of the Body

- **Sagittal Plane** – Divides the body into right and left parts. There are two types:
 - ✓ **Midsagittal Plane** – A specific sagittal plane that lies exactly in the midline. Divides the body equally into left and right HALVES.
 - ✓ **Parasagittal Plane** – All other sagittal planes offset from midline.
- **Oblique Sections** – A cut along any plane that lies diagonally between the horizontal and vertical

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Regional Terms

- Axial Region – Head, neck and trunk.
 - Cephalic Region - Head
 - Cervical Region – Neck
 - Thorax or Thoracic Region – Upper trunk
 - Abdominal Region – Middle trunk
 - Pelvic Region – Lower trunk
- Appendicular Region - Extremities

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Cephalic Region

- Orbital – Eye
- Otic - Ear
- Nasal – Nose
- Oral – Mouth
- Buccal - Cheek
- Mental – Chin
- Frontal – Forehead
- Occipital – Back of head

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Thorax or Thoracic Region

- Pectoral Region – Chest
- Mammary Region – Breast
- Sternal Region – Center of chest
- Axillary Region - Armpit

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Abdominal Region & Pelvic Region

- Abdominal region
 - Located below the diaphragm and above the top of the hips.
 - Umbilical region – around the umbilicus
- Pelvic region
 - Inferior to the abdominal region; located between the hip bones.

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Upper Extremity

- Deltoid region – Shoulder (lateral)
- Acromial – Shoulder (superior)
- Brachial region – Arm (shoulder to elbow)
- Cubital region – Elbow region
- Antecubital region – Elbow region (anterior)
- Olecranal – Elbow region (posterior)

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Upper Extremity

- Antebrachium region – forearm (elbow to hand)
- Carpal region - Wrist
- Hand
 - Palmar – Palm (front side) of hand
 - Dorsum – Back of hand
 - Digital – Fingers (phalanges)
 - Pollex - Thumb

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Lower Extremity

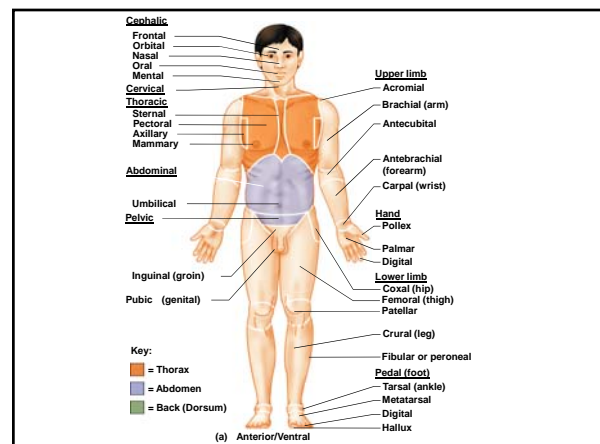
- Gluteal region – Buttocks
- Coxal region - Hip
- Femoral region – Thigh (hip to knee)
- Patellar region – Front surface of the knee
- Popliteal region – Back of the knee
- Crural region – Leg (knee to ankle)
- Sural region – Calf (posterior leg)
- Peroneal or Fibular – Lateral leg

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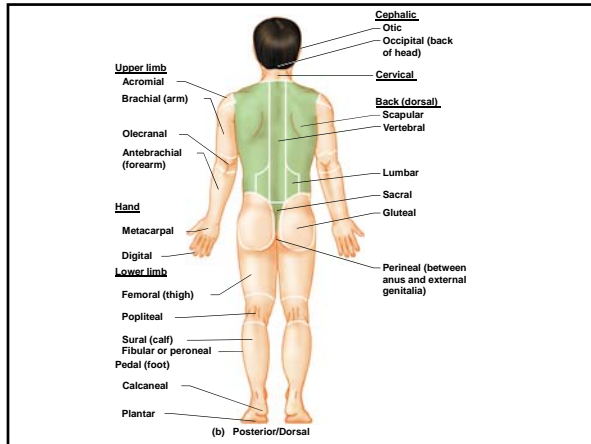
Lower Extremity

- Pedal region - Foot
 - Plantar – Sole (bottom) of the foot
 - Dorsum – Top surface of the foot
 - Digital – Toes (phalanges)
 - Tarsal – Ankle
 - Calcaneal – Heel
 - Hallux – Big toe

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Lecture 1 - Overview of Anatomy



Orientation & Directional Terms

TABLE
1.1 Orientation and Directional Terms

Term	Definition	Example
Superior (cranial)	Toward the head end or upper part of a structure or the body; above	The head is superior to the abdomen.
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 chin.
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 back of the body; behind	The heart is posterior to the breastbone.

*Whereas the terms ventral and anterior are synonymous in humans, this is not the case in four-legged animals. Ventral specifically refers to the "belly" of a vertebrate 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 specifically refers to an animal's back. Thus, the dorsal surface of four-legged animals is their superior surface.

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Orientation & Directional Terms

TABLE
1.1 Orientation and Directional Terms

Term	Definition	Example
Medial	Toward or at the midline of the body; on the inner side of	The heart is medial to the arm.
Lateral	Away from the midline of the body; on the outer side of	The arms are lateral to the chest.
Proximal	Closer 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.
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.

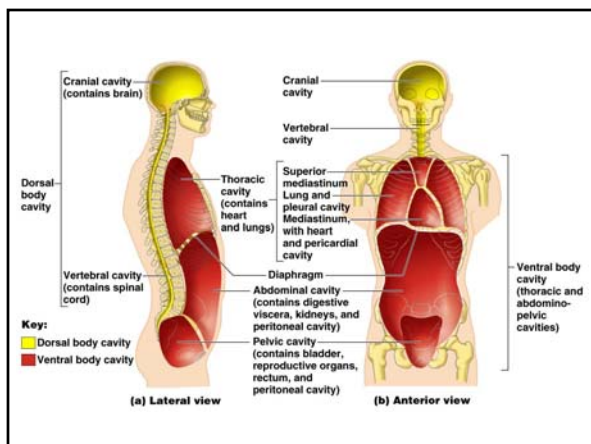
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Orientation & Directional Terms

TABLE
1.1 Orientation and Directional Terms

Term	Definition	Example
Superficial (external)	Toward or at the body surface	The skin is superficial to the skeletal muscles.
Deep (internal)	Away from the body surface; more internal	The lungs are deep to the skin.
Ipsilateral	On the same side	The right hand and right foot are ipsilateral.
Contralateral	On opposite sides	The right hand and left foot are contralateral.

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Body Cavities and Membranes

- **Dorsal Cavity** – Subdivided into two smaller cavities:
 - **Cranial Cavity** – Lies in the skull and encases the brain.
 - **Vertebral Cavity** – Runs through the vertebral column to enclose the spinal cord.

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Body Cavities and Membranes

- **Ventral Cavity** – Two main divisions:
 - **Thoracic Cavity** – It is superior and is surrounded by the ribs and the muscles of the chest wall. (Superior to the diaphragm)
 - **Abdominopelvic Cavity** – It is inferior and is surrounded by the abdominal walls and the pelvic girdle.

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Thoracic Cavity

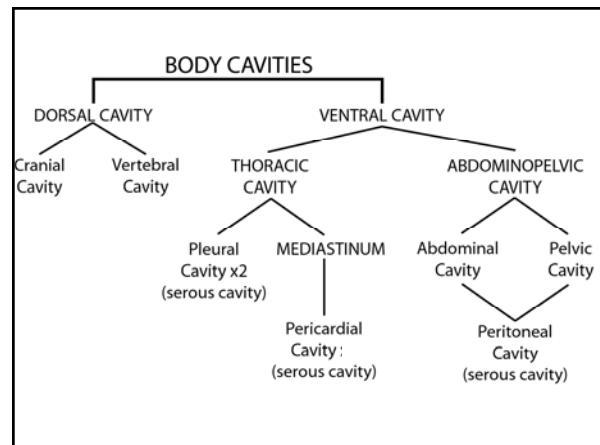
- **Thoracic Cavity** – Made up of four parts:
 - **Pleural Cavity (2)** – There are two of these cavities, each surrounding a lung.
 - **Mediastinum** – Contains the heart, esophagus and trachea. Within the mediastinum is the **pericardial cavity** that surrounds the heart.

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Abdominopelvic Cavity

- **Abdominopelvic Cavity** – Two parts:
 - 1) **Abdominal Cavity** – It is the superior part and it contains the liver, gallbladder, pancreas, spleen, stomach and other organs.
 - 2) **Pelvic Cavity** – It is the inferior part and it contains the bladder, some reproductive organs and the rectum.
 - ❖ **Peritoneal Cavity** – This surrounds many organs in the abdominopelvic cavity.

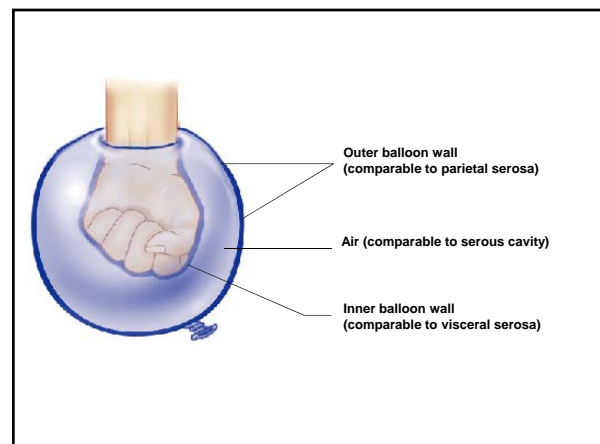
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Serous Cavities

- Serous cavities include:
 - **Pleura** – Surrounding the lungs.
 - **Pericardium** – Surrounding the heart.
 - **Peritoneum** – Surrounding various organs of the abdominopelvic cavity.

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Serous Cavities

- Serous cavities are lined by **serous membranes** or **serosa**. There are 2 parts:
 - **Parietal Serosa**– The outer wall.
 - **Visceral Serosa** – The inner wall that covers the organ.

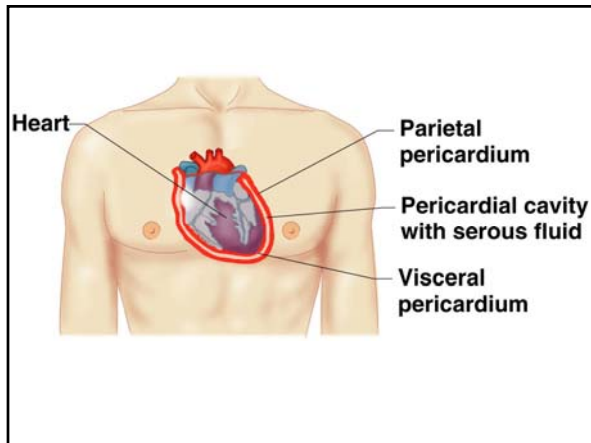
The two are continuous with each other. Think of the balloon example.

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Serous Cavities

- Serous cavities are filled with a thin layer of **serous fluid** (watery).
 - Serous fluid is secreted by both serous membranes.
 - Allows visceral organs to move with little friction across the cavity walls.

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Other Cavities

- Oral Cavity – Mouth
- Nasal Cavity – Posterior to the nose
- Orbital Cavities – House the eyes
- Middle Ear Cavities – Medial to the ear drum
- Synovial Cavities – Fluid filled joint cavity

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Abdominal Quadrants

- The abdomen can be divided into 4 quadrants (general) or 9 quadrants (specific).
- The 4 quadrants:
 - Right upper – Liver, gallbladder, etc.
 - Left upper – Stomach, spleen, pancreas, etc.
 - Right lower – Cecum, appendix, etc.
 - Left lower – Sigmoid colon, rectum, etc.

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