Introduction

Definitions and Anatomical Terms

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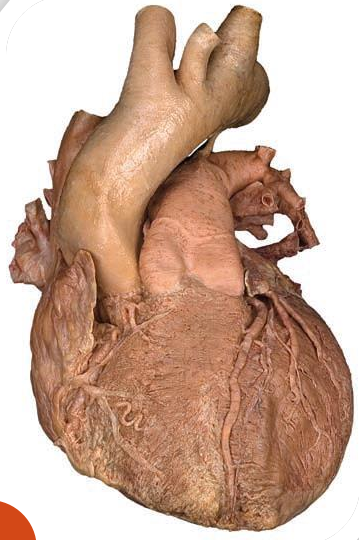
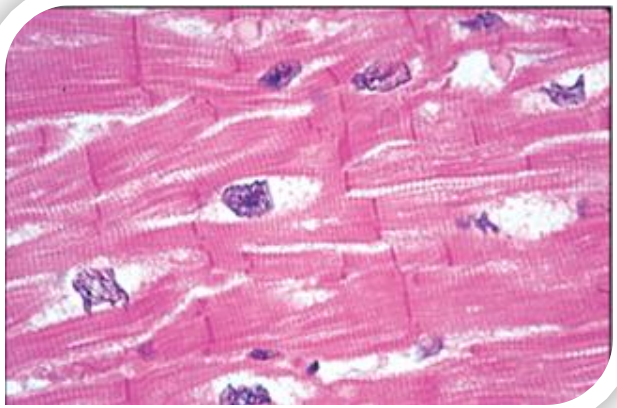
- ***What is Anatomy?***

- **Anatomy:**
  Is the study of the various structures of the human body and the relationship of these structures to each other.

- Various methods are used to study body structures leading to the appearance of various disciplines of anatomy.

Discipline	Definition	Method Used
Gross Anatomy	Study of body structures without using magnifying instruments (with the eyes).	Dissection (cutting) of cadavers.
Histology	Study of cells and tissues with the aid of a magnifying instrument – the microscope.	Microscopy
Radiographic Anatomy	Study body structures by using imaging techniques.	X-Ray. CT-Scan. Ultrasound. MRI…..





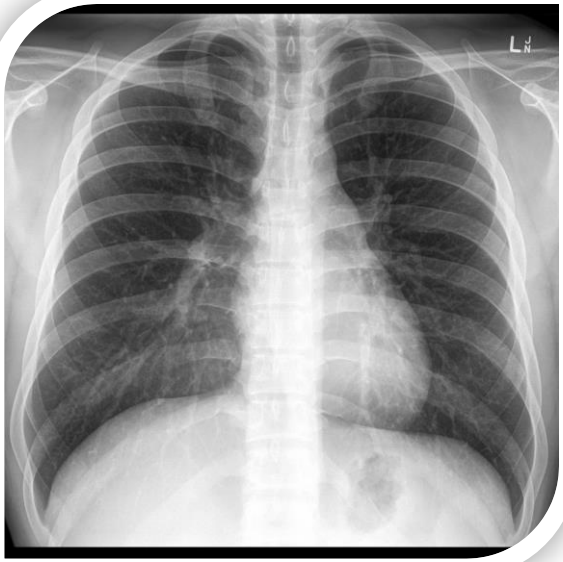
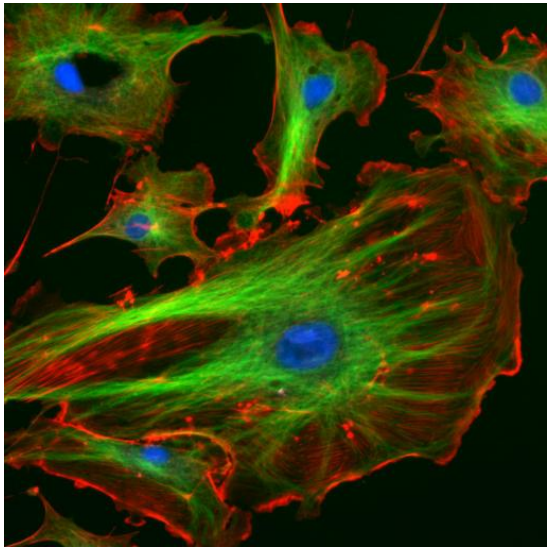


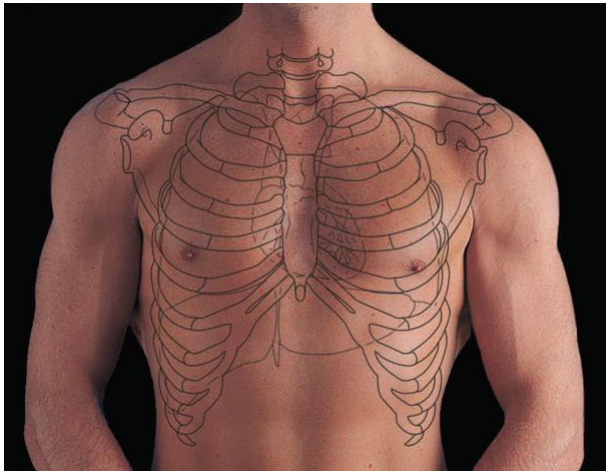
Fig.1: Some disciplines of anatomy.

Discipline	Definition	Method Used
Embryology	Study of human development	Imaging and dissection
Cytology (branch of histology)	Study of cells	Microscopy
Surface Anatomy	Study of surface markings of the internal organs	Inspection and palpation
Sectional Anatomy	Study of structures through body sections	Dissection and imaging

Human embryo,
4 weeks old

A cell, seen under
the microscope using
special stains





Surface anatomy
of the chest

Cross section of
the arm

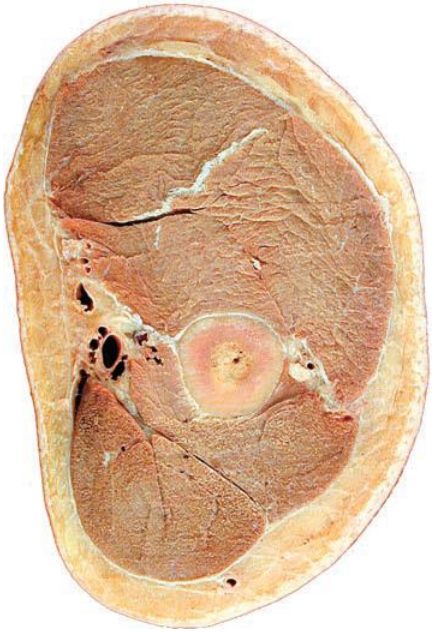


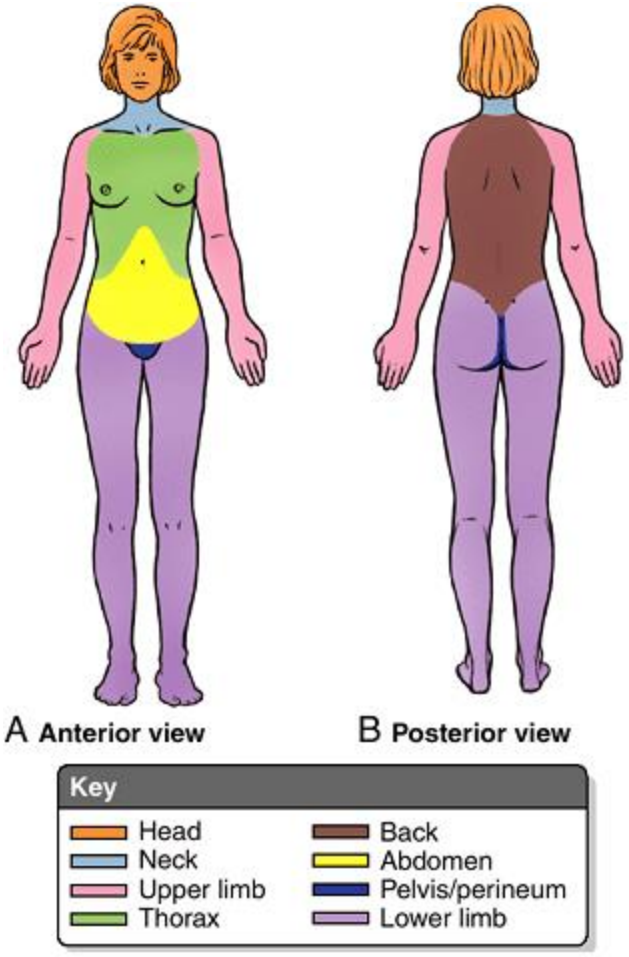
Fig.2: Other disciplines of anatomy.

• How is anatomy studied:

➢Regional Anatomy:

Study of all the structures present in a specific region of the body.

Fig.3: Major regions of the body.



Major regions of the body:

1) Head
2) Neck
3) Thorax = Chest
4) Abdomen
5) Pelvis and perineum
6) Back

Trunk

7) Upper limb = Shoulder girdle + Arm + Forearm + Hand
8) Lower limb = Pelvic girdle + Gluteal region+ Thigh + Leg + Foot

➢Systemic Anatomy:

Study of all the structures that form a specific system in the body.

- In systemic anatomy, any method used will involve the study of several regions of the body.

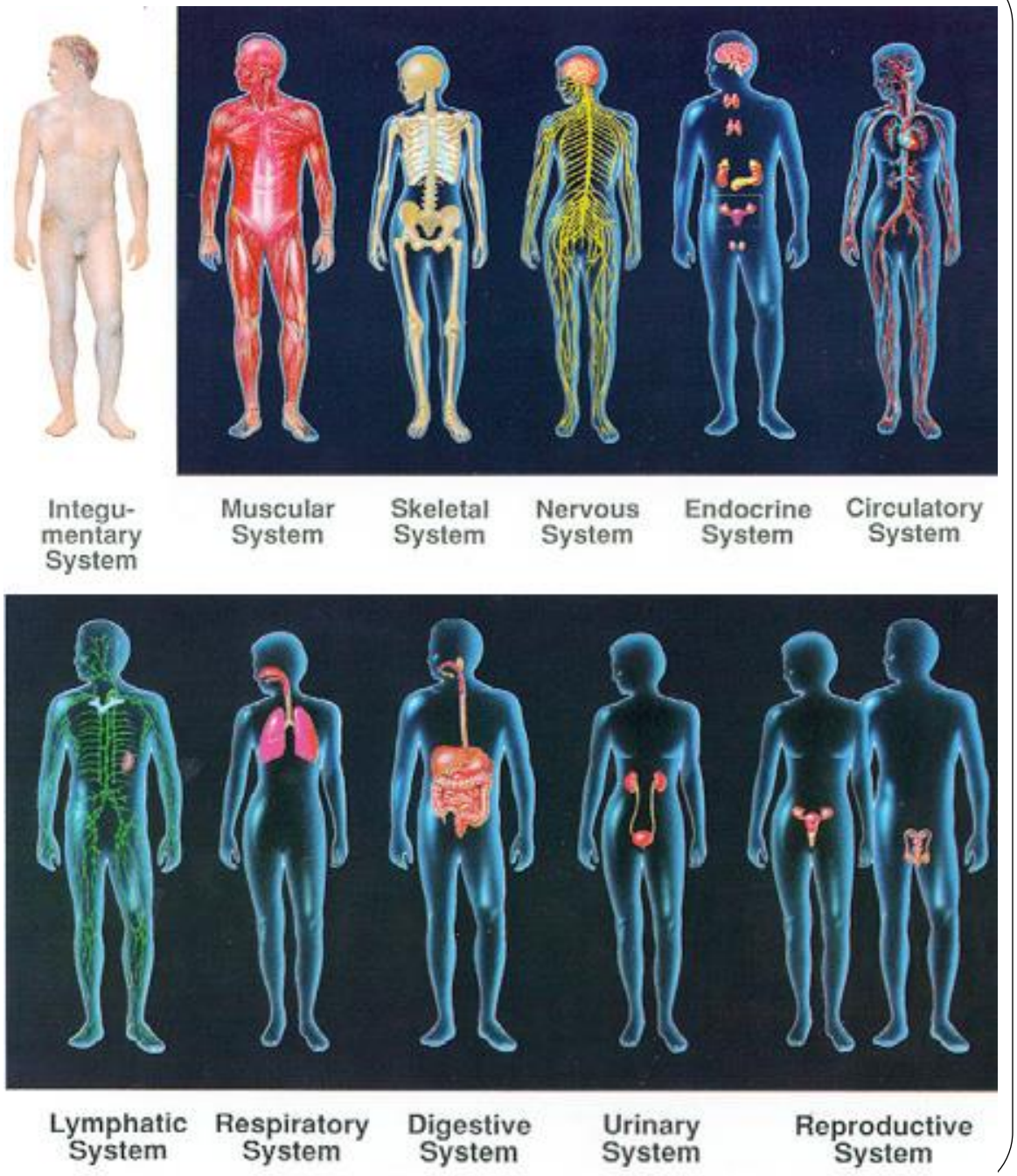


Fig.4: Body systems.

Structural levels of organization:

- The human body can be seen to be organized at 6 levels. These levels range from the simplest and smallest to the most complex and largest.

• These levels are: (Fig.4)

1) **Chemical:** This is the simplest level. It includes the **atoms** which are the building blocks of all matter. The most important atoms in the human body are oxygen, carbon, hydrogen, and nitrogen. Two or more atoms unite to form **molecules** that could be small like water or large like DNA.

2) **Cellular:** Cells are the *simplest structural and functional units of the body*. Cells are formed of various molecules.

3) **Tissue level**: Several cells come together with some other materials surrounding them to form the various tissues of the body. A certain type of tissue performs a certain function. There are four basic body tissues: *epithelial*, *connective*, *muscular* and *nervous*.

4) **Organ level**: An organ is formed of several types of tissues. It has a specific shape and performs a specified function.

5) **System level**: A system consists of several organs that act together to perform certain functions. Example: the digestive system is formed of all the organs that help in the digestion and absorption of food.

6) **Organism level**: Each organism is formed of several systems that work together to ensure the survival of the organism.

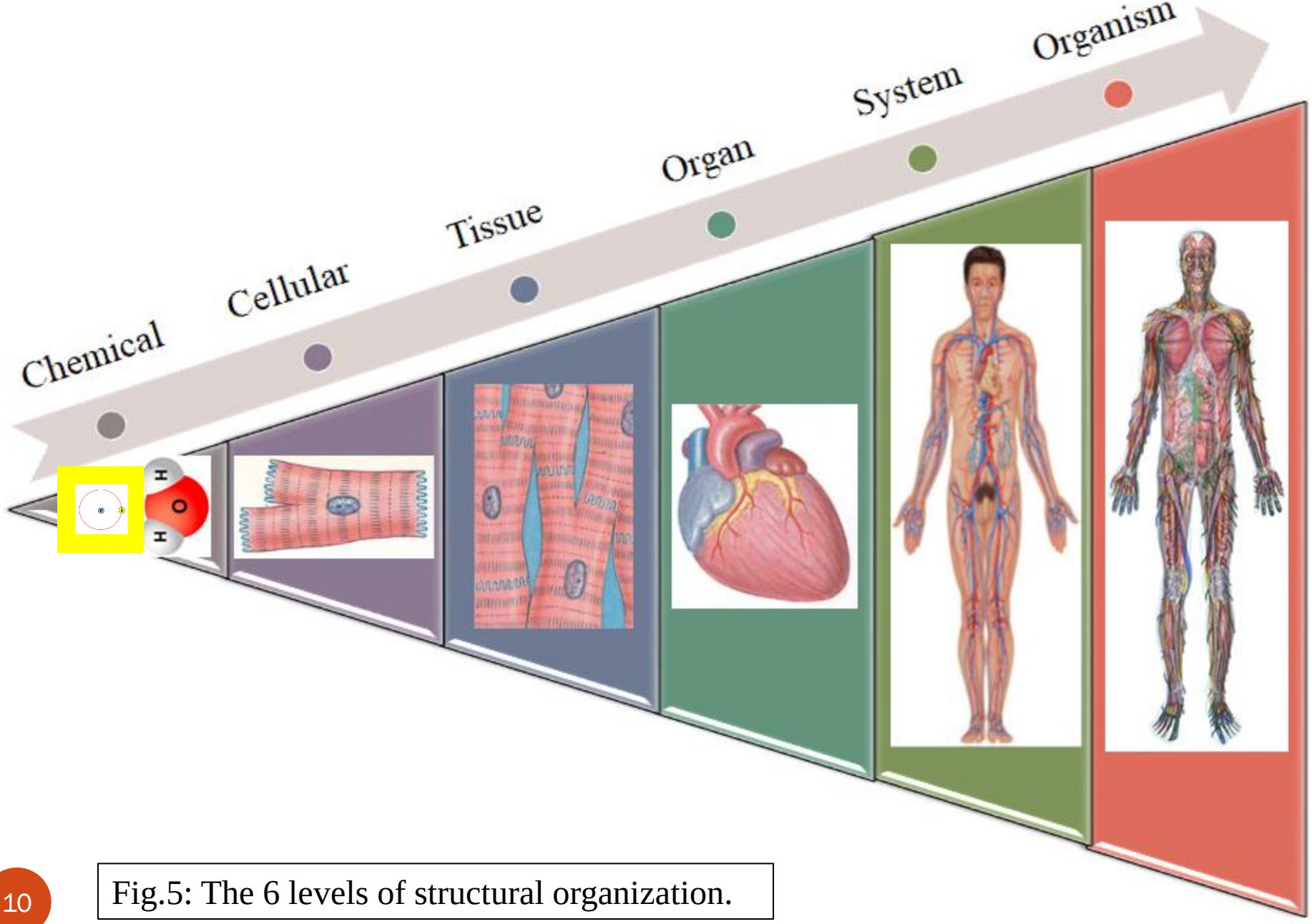


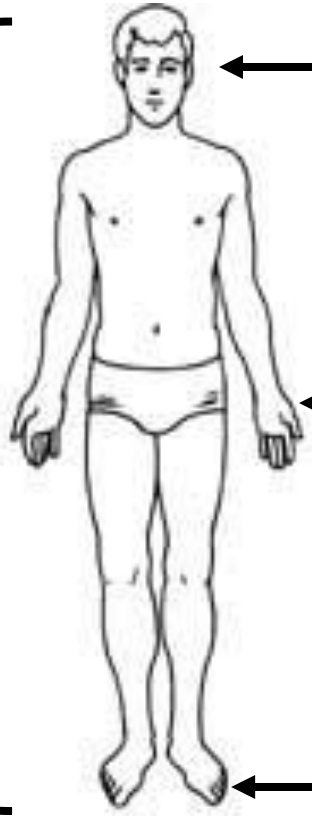
Fig.5: The 6 levels of structural organization.

Anatomical Position:

- In order to understand the position of a structure and the positional relationship between structures, a position of reference must be used. This reference position is called the **Standard Anatomical Position.**

- In this position:

(1) The subject stands erect



(2) The head is level with eyes facing forward

(3) Upper limbs at the sides and the palms facing forward

(4) Feet level on the ground and directed forward

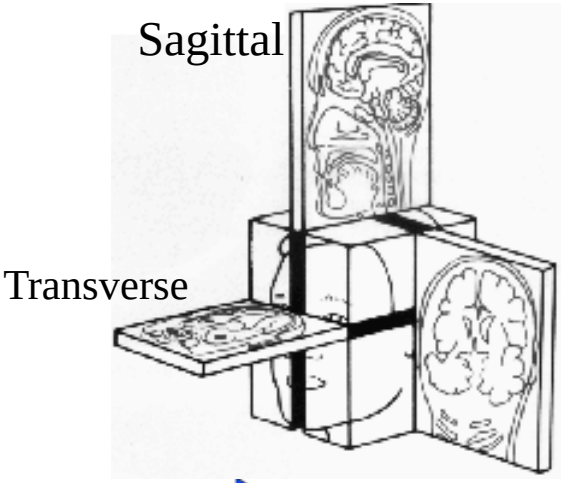
Fig.6: The standard anatomical position.

- When the person is lying down, he’s either in a prone position (on his belly) or in a supine position (on his back).

Anatomical Planes:

- These are imaginary flat surfaces that pass through the body, region, or organ.

1) **<u>Sagittal plane</u>**: is a vertical plane that divides the body, region, or organ into right and left parts. If the plane passes through the midline of the body dividing it into equal halves, then it's called a ***midsagittal*** or ***median*** plane. If the sagittal plane divides the body into unequal parts, then it's called a ***parasagittal*** plane.



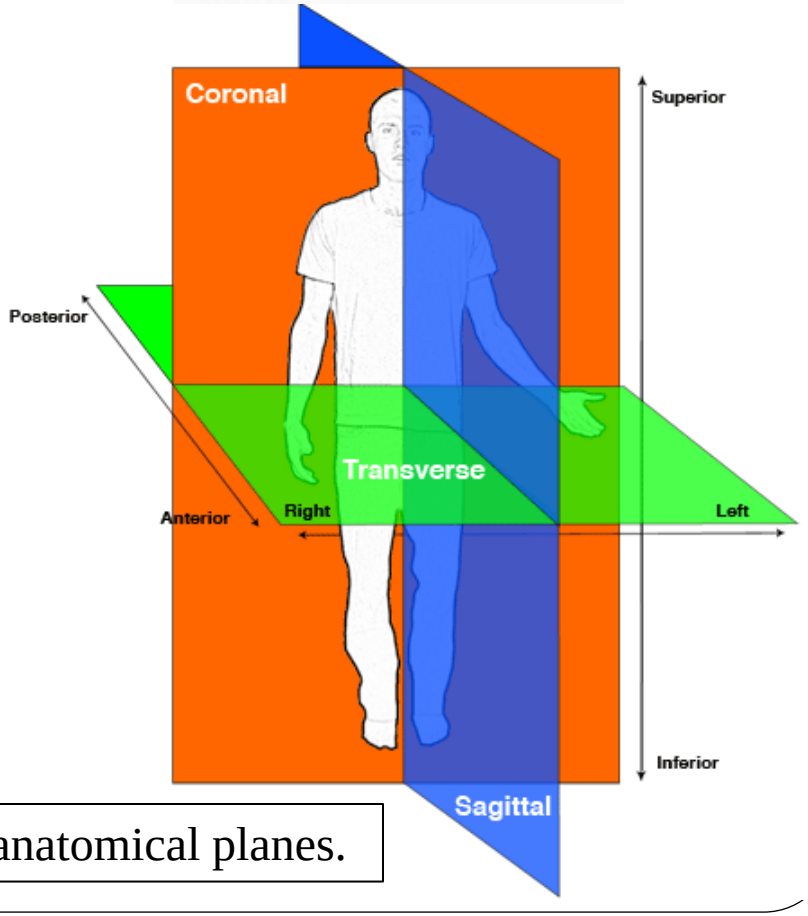
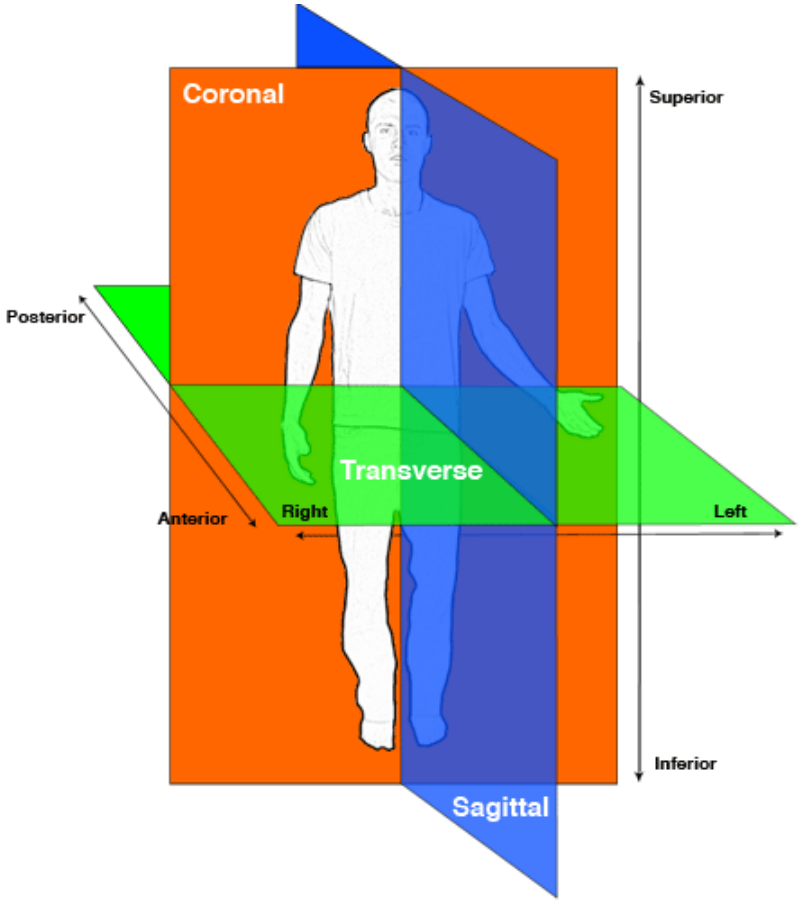


Fig.7: The anatomical planes.

2) **Coronal (Frontal) plane**: is the plane that divides the body, region, or organ into front and back portions.

3) **Transverse (Cross-sectional) plane**: is the plane that divides the body, region, or organ into upper and lower parts.



- These planes are at right angles to each other. A plane that passes through the body or organ at an angle not 90º is called an **oblique** plane.

Directional Terms in Anatomy:

- To appreciate the relative position of a structure, some directional terms are used in anatomy.

  - These terms only make sense when describing the position of a structure relative to another.
  - The subject is in the standard anatomical position.

Term	Meaning
Anterior	Nearer to the front
Posterior	Nearer to the back

Superior	Above or higher in position; towards the head.
Inferior	Below or lower in position; towards the feet.

Term	Meaning
Lateral	Farther from the midline.
Medial	Nearer to the midline.
Median	In the median plane of the body.

Proximal	Nearer to the attachment of a limb to the trunk; nearer to the origination of a structure.
Distal	Farther from the attachment of a limb to the trunk; farther from the origination of a structure.

Ipsilateral	On the same side of the body's midline as another structure.
Contralateral	On the opposite side of the body's midline from another structure.

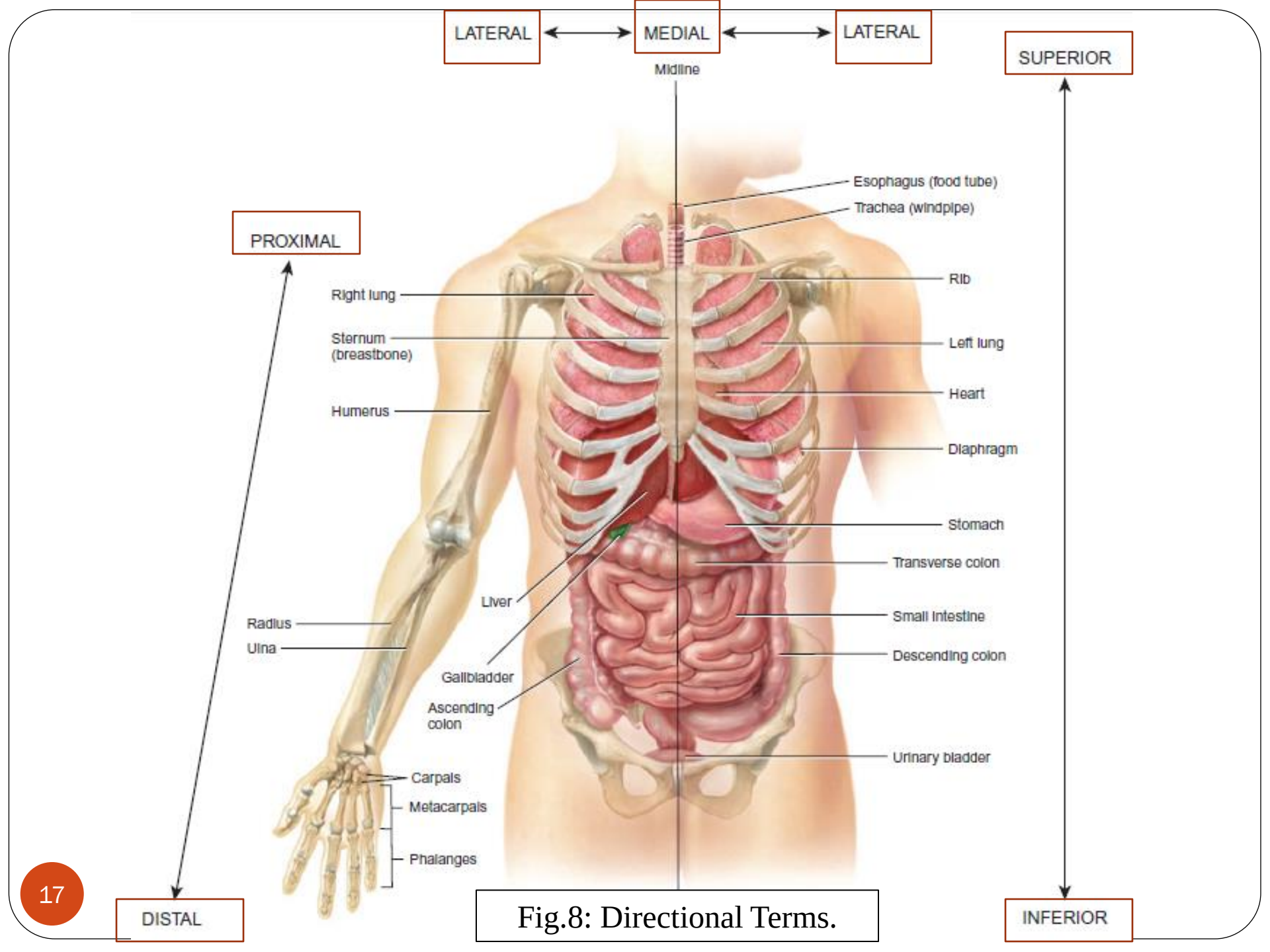


Fig.8: Directional Terms.

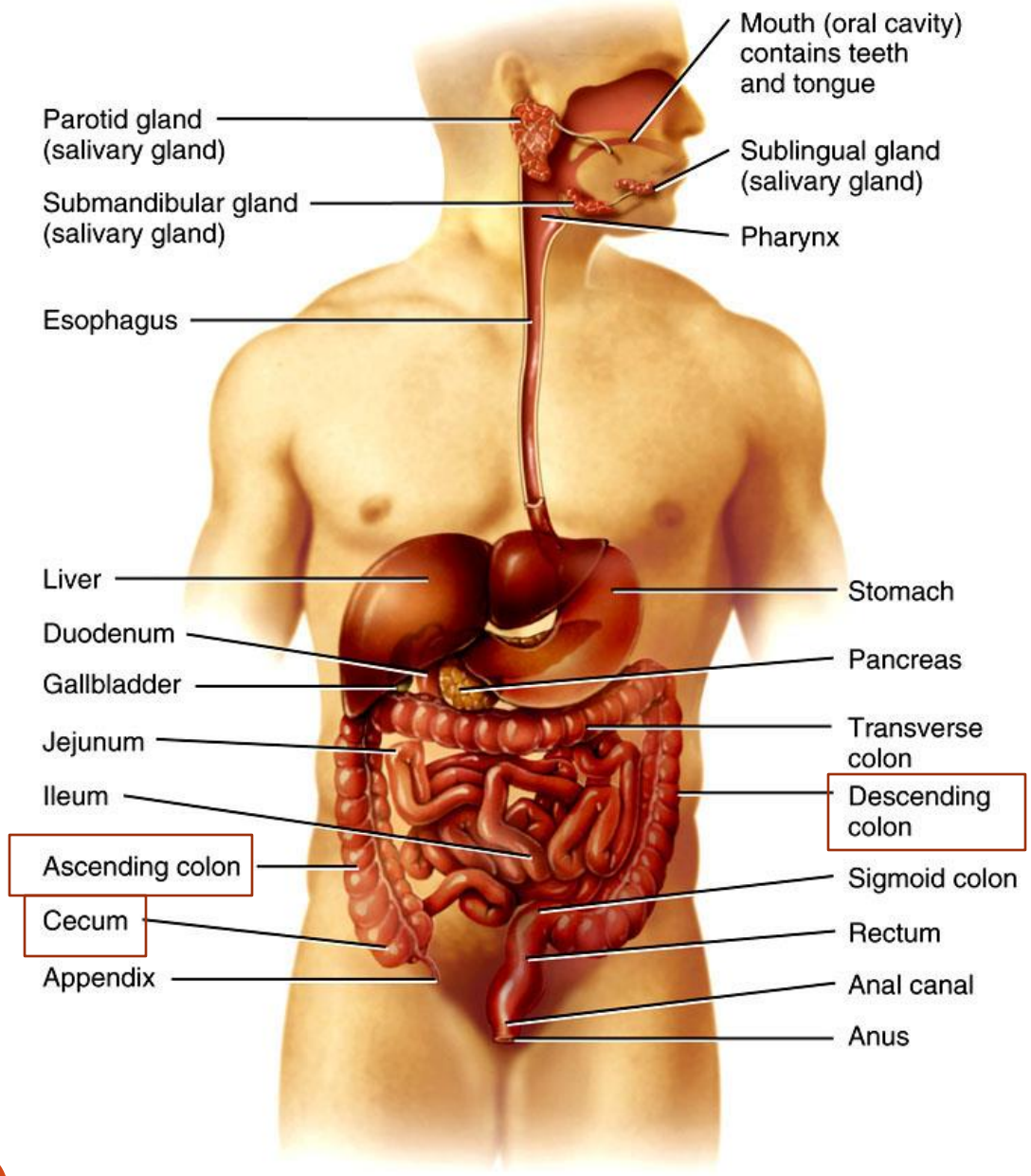


Fig.9: The Digestive system. Note that the Cecum is ipsilateral to the ascending colon and contralateral to the descending colon.

Term	Meaning
Superficial	Closer to or on the surface of the body.
Deep	Away from the surface of the body.
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Cranial or Cephalic	Relating to the skull or head; towards the head (in humans = superior).
Caudal	Relating to the tail; at or near the tail (in humans = inferior).
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Ventral	Towards the belly (in humans = anterior)
Dorsal	Towards the back (in humans = posterior)

Mostly used in embryology and animals

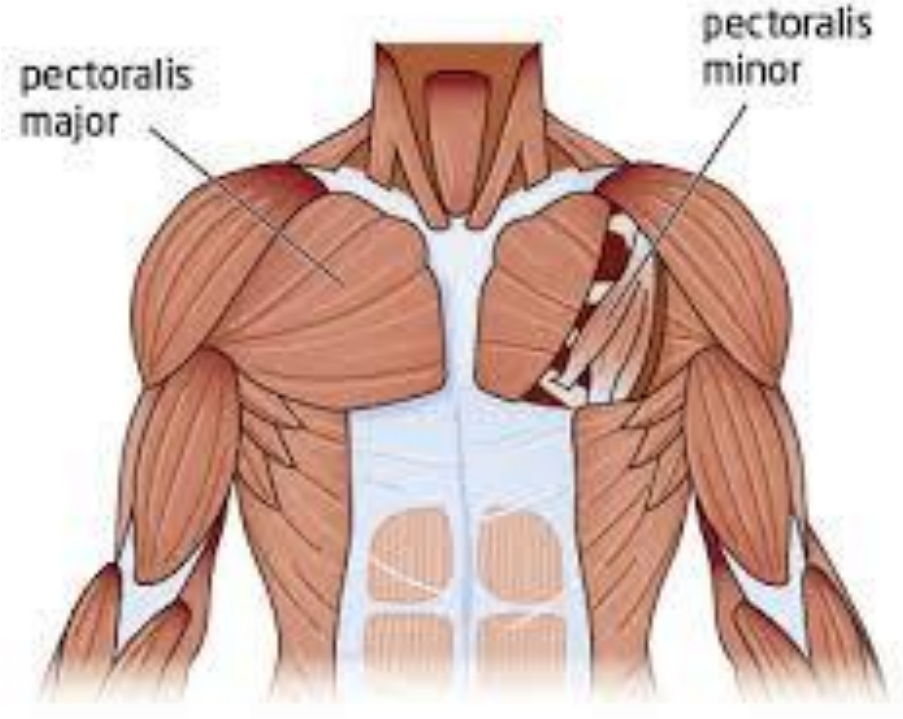

Fig.10: Muscles of chest wall. On the right side we can see the pectoralis major muscle. On the left side, a part of the pectoralis major was removed to show the pectoralis minor muscle. The pectoralis major muscle is superficial to the pectoralis minor. (Pectoralis major is also anterior to the pectoralis minor).

Abdominopelvic Regions:

- The abdomen and pelvis are divided into regions to facilitate the description of the position of various organs.
- Two methods are used: the 4-quadrant method and the 9-region method.
- In the 4-quadrant method, two lines are used to divide the abdomen into 4 quadrants. These lines are the **midsagittal** line and the **transverse umbilical** line (pass through the umbilicus). These lines meet at the umbilicus.

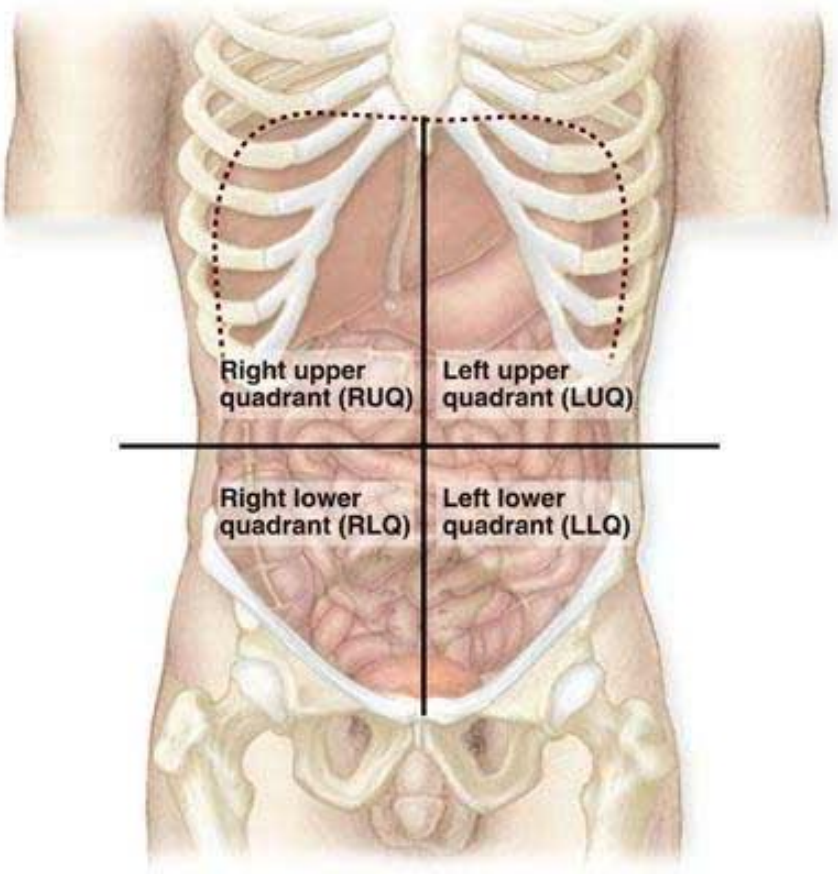

Fig.11: The 4 quadrants of the abdomen.

- In the 9-region method, 2 vertical and 2 transverse lines divide the abdomen into 9 regions.
  - The upper transverse (**subcostal**) line is drawn just inferior to the ribcage. The lower transverse (**transtubercular**) line intersects the right and left iliac tubercles.
  - The two vertical lines are the right and left **midclavicular** lines. These pass through the middle of the right and left clavicles.

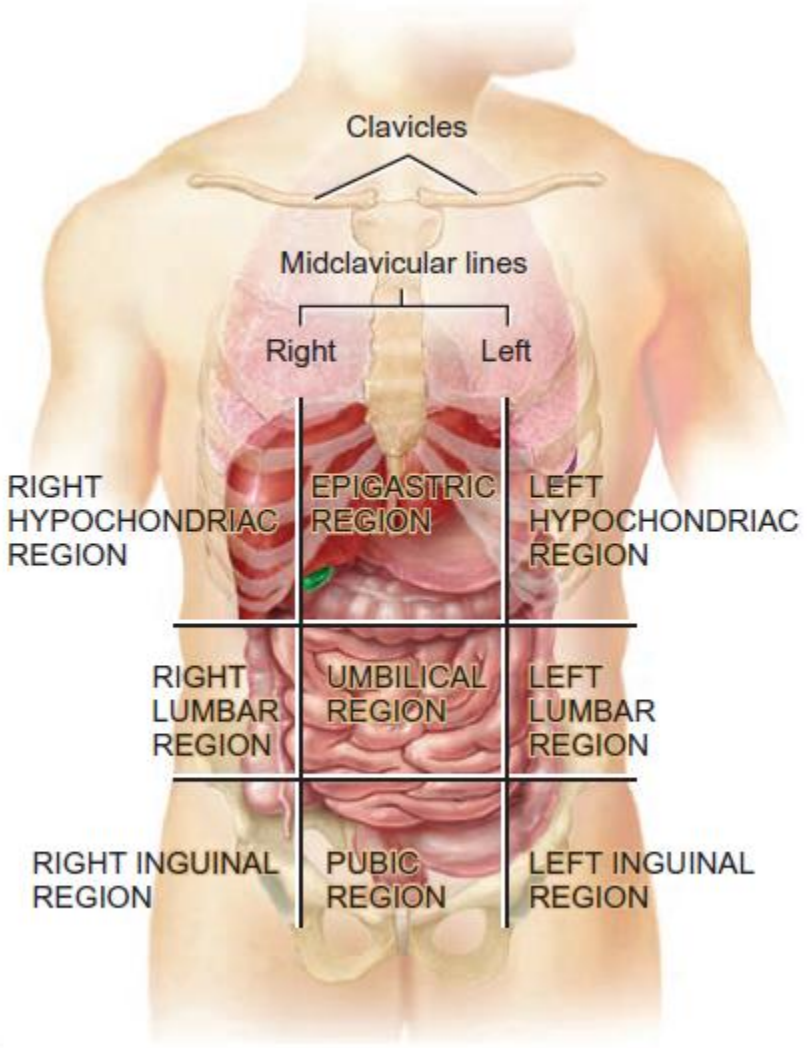

Fig.12: The 9 regions of the abdomen.