

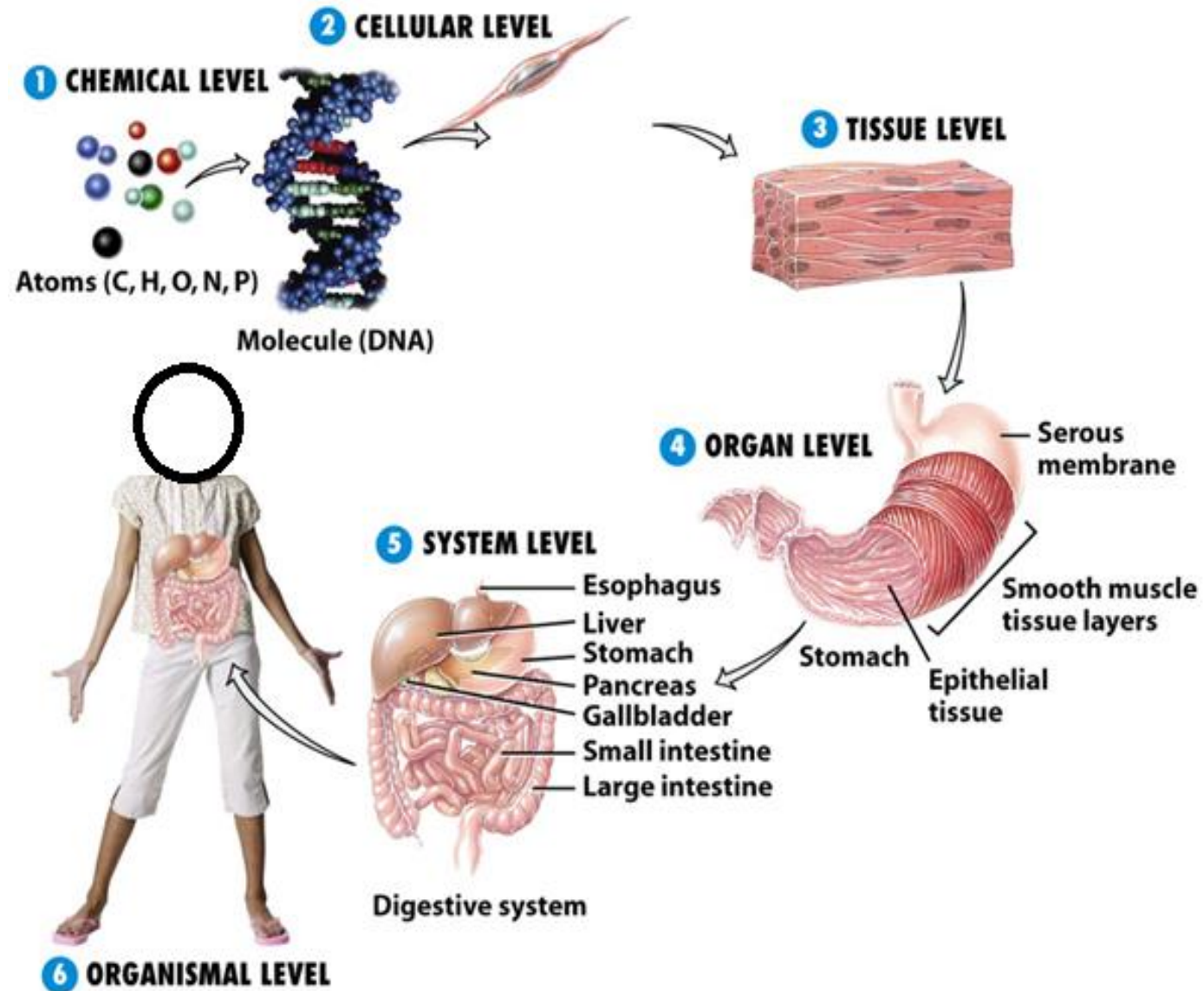
Introduction to Human Anatomy

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LEVELS OF ORGANIZATION



The word Anatomy: In Greek to cut up, or dissect.

Anatomy definition: It is the study of the structure of the body.

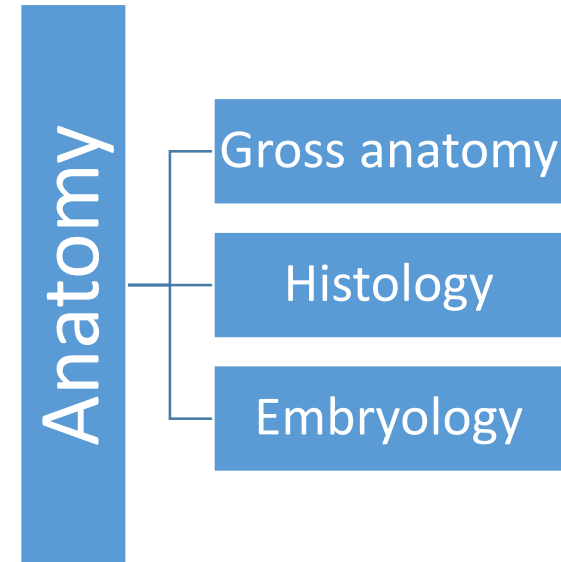
BRANCHES OF ANATOMY

1- **Gross anatomy** (Topographical or macroscopic anatomy) which may be further divided into:

- A- Regional anatomy
- B- Surface anatomy
- C- Neuroanatomy
- D- Endoscopic anatomy
- E- Imaging anatomy

2- **Embryology** (Developmental anatomy) which includes embryogenesis and subsequent organogenesis.

3- **Histology**: microscopic and submicroscopic structure.



ANATOMICAL POSITION

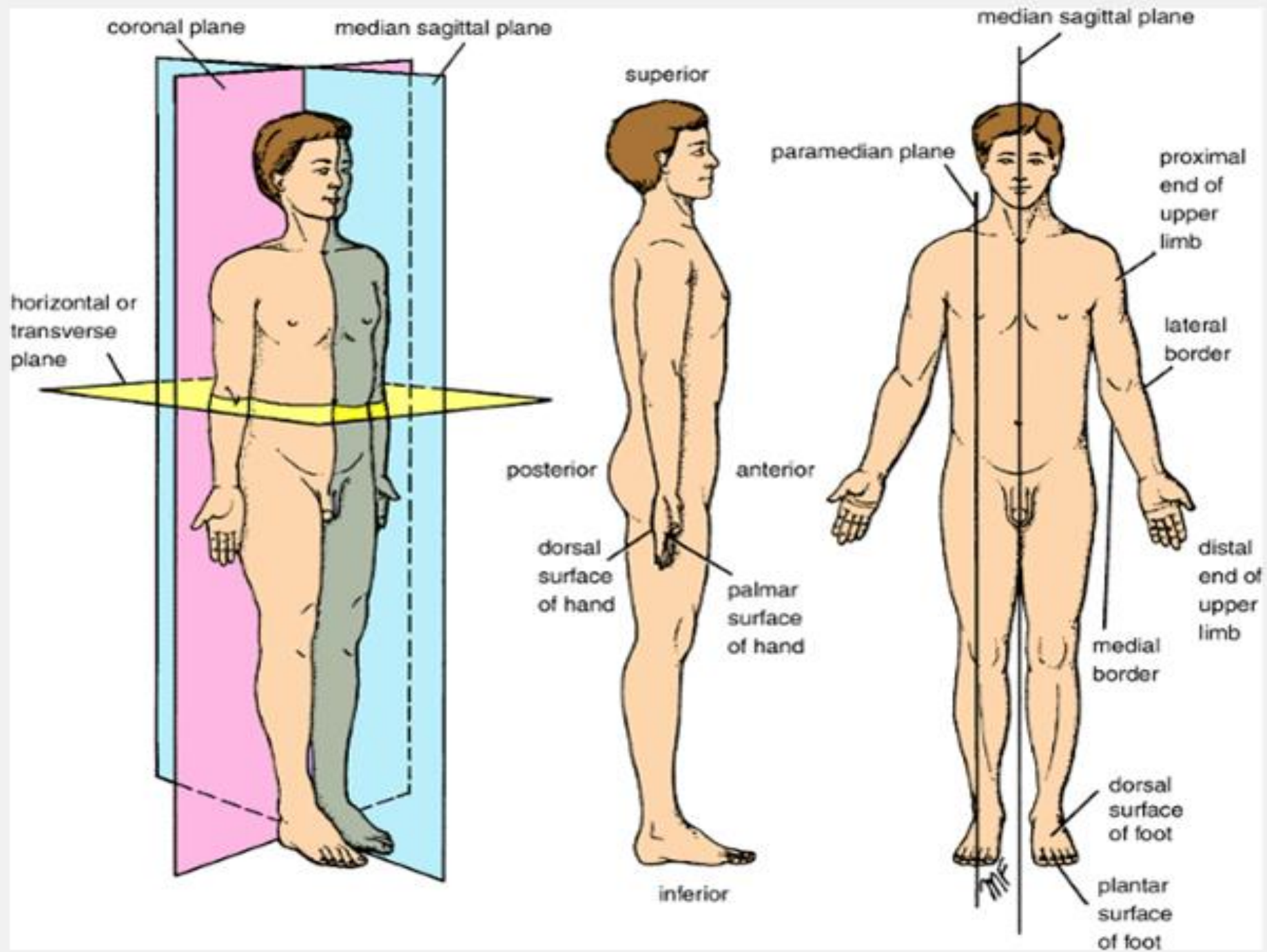
- Standing erect
- Head, gaze (eyes) directed forward.
- Arms adjacent to the sides with the palms facing forwards.
- Lower limbs close together with the feet parallel and the toes facing forwards

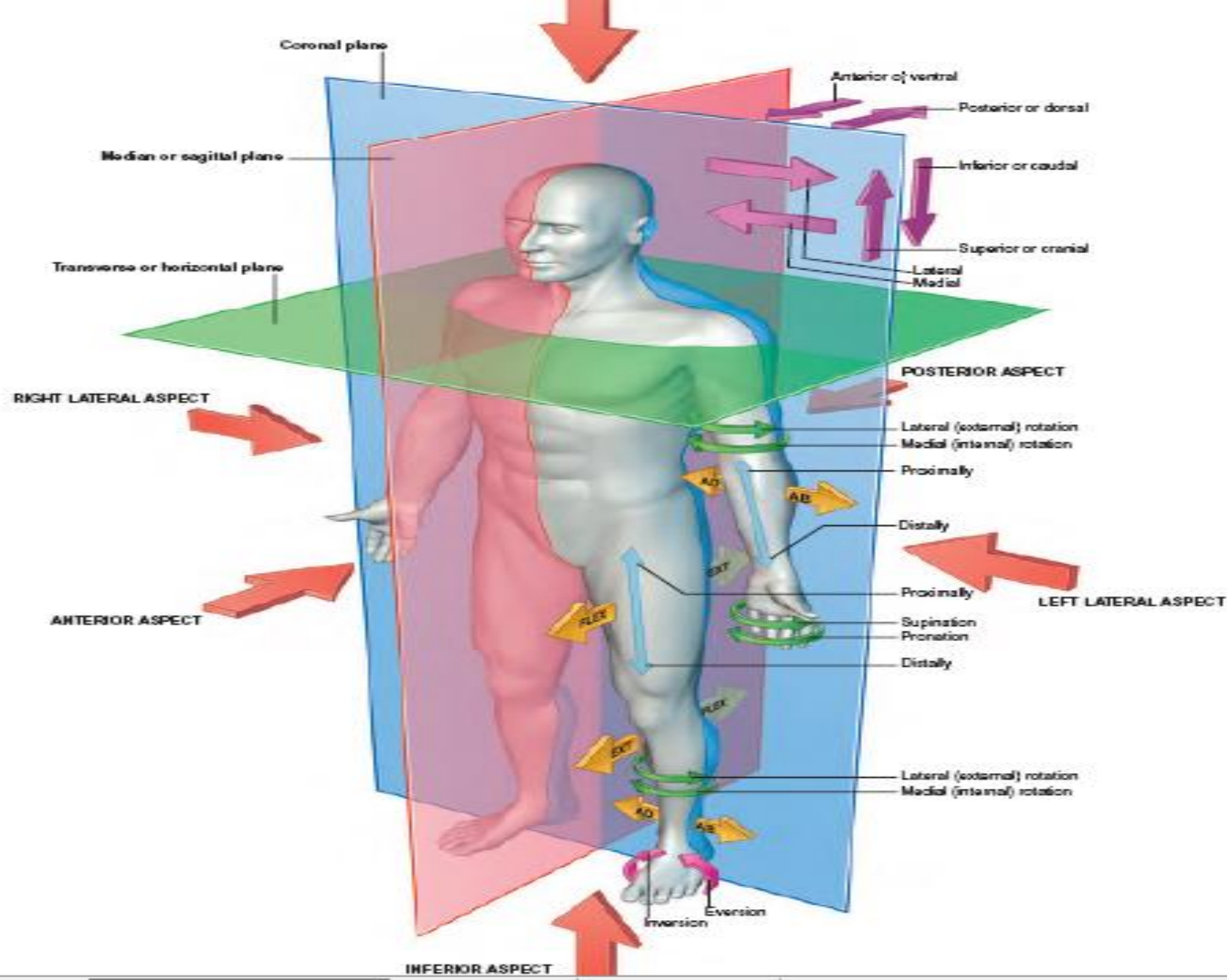
Body Planes

❖ The various parts of the body are described in relation to certain imaginary planes that slice the body into specific sections.

❖ The three major anatomical planes are:

- 1- Sagittal (Median) plane
- 2- Coronal (Frontal) plane
- 3- Transverse (Horizontal) plane



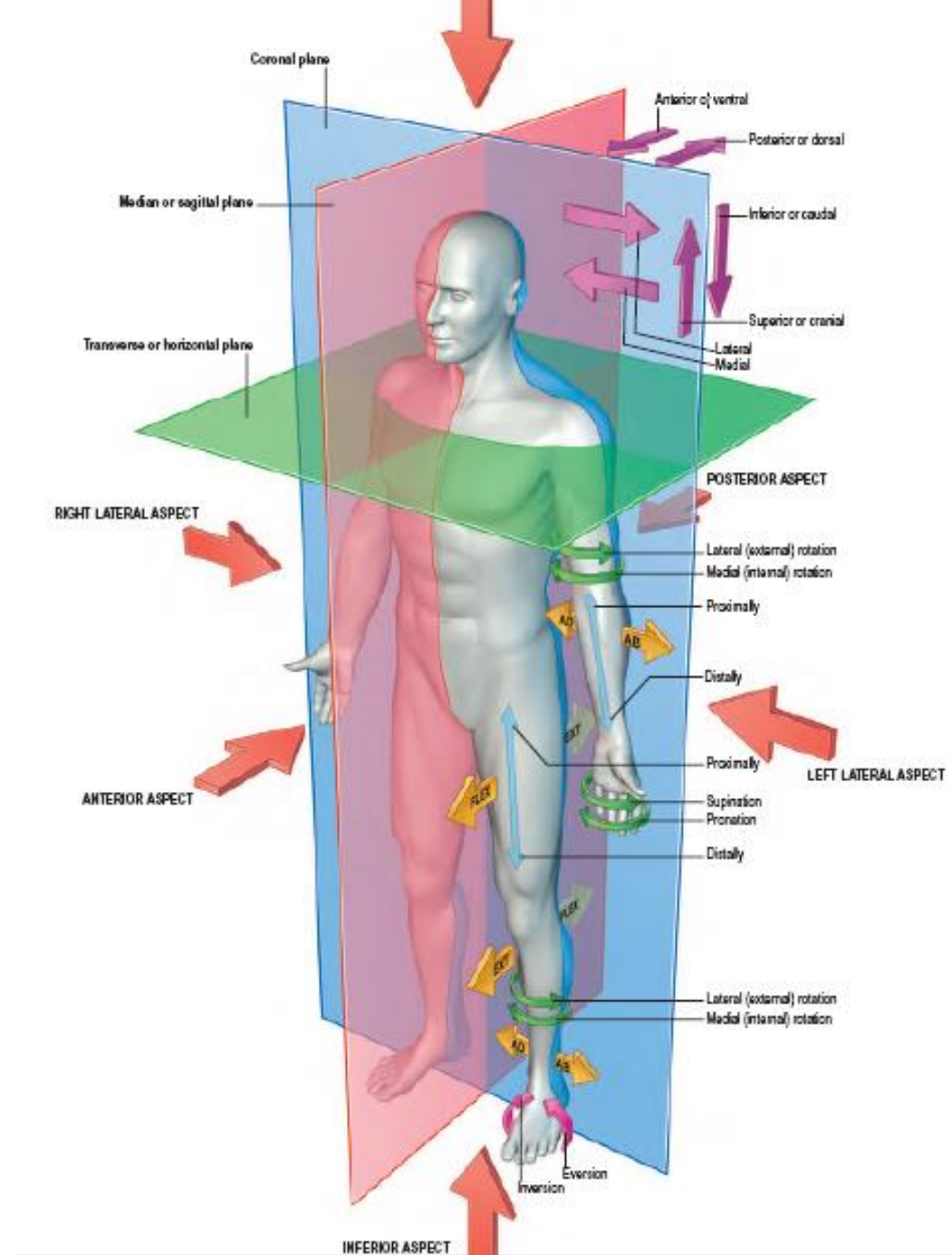


Sagittal Planes

Sagittal (Median) plane extends through the body or organ vertically and divides the structure into right and left halves.

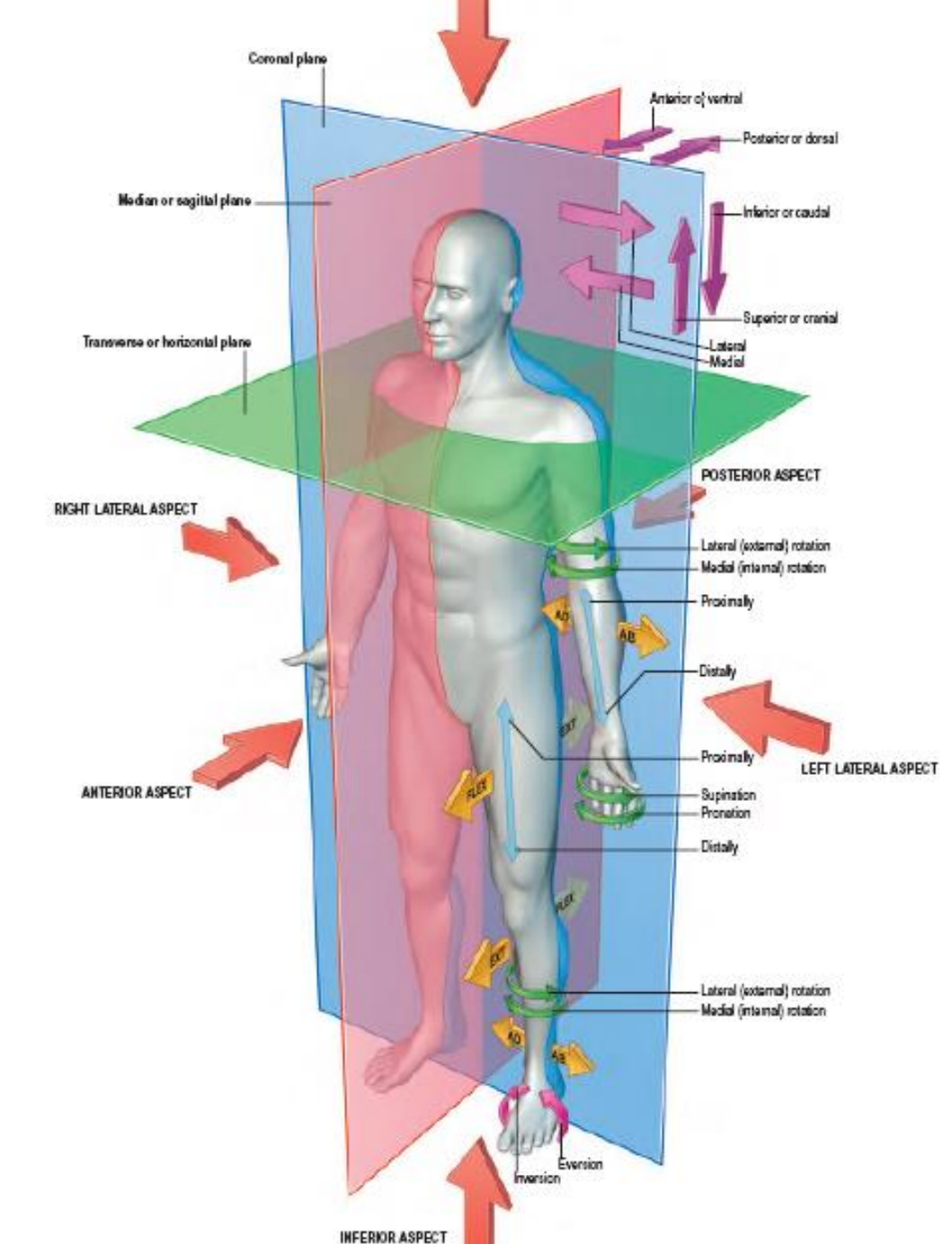
If it is exactly at the midline it is called **midsagittal plane**.

If it is parallel to the midsagittal plane, but either to the left or the right of it, is termed a **parasagittal plane**.



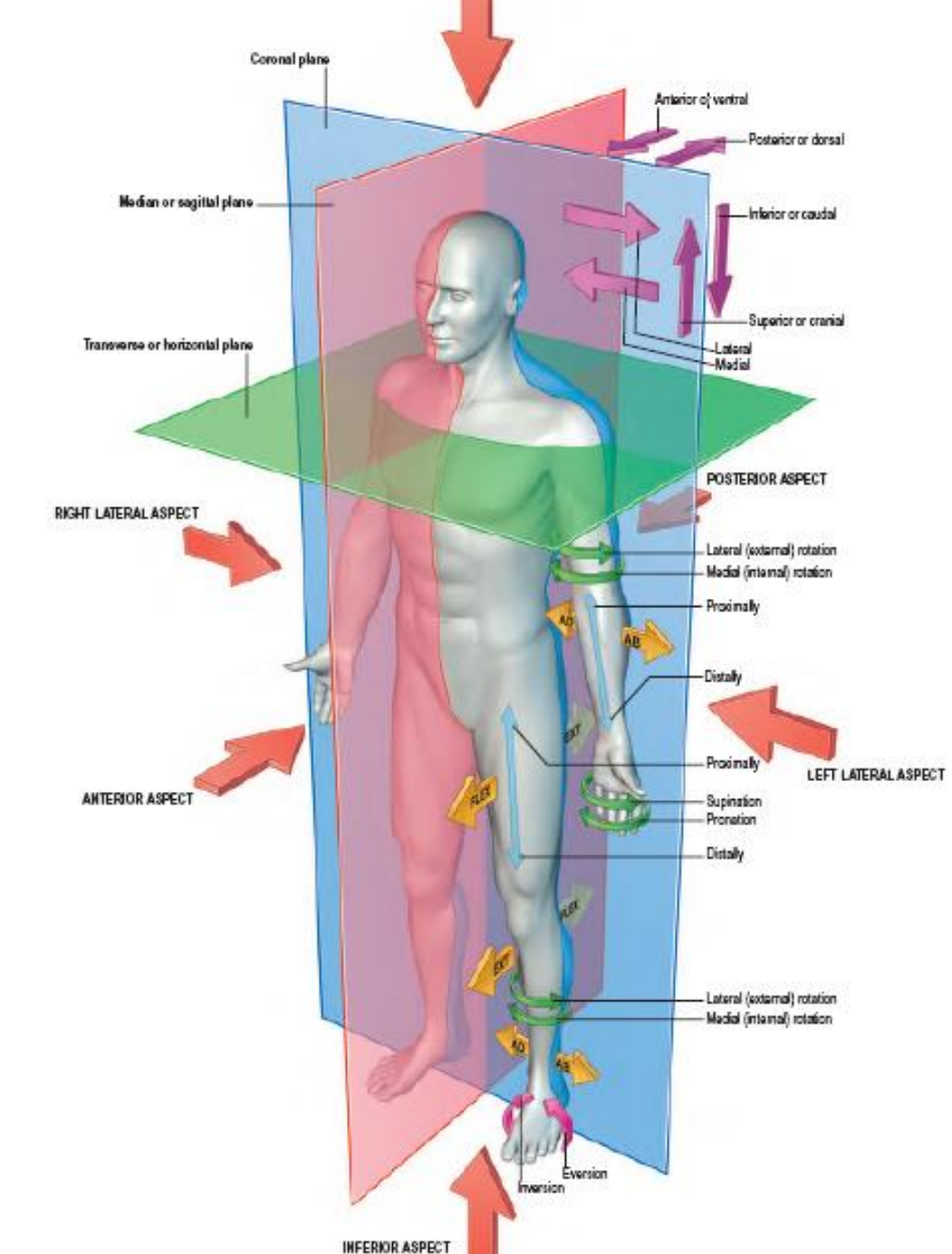
Coronal Plane

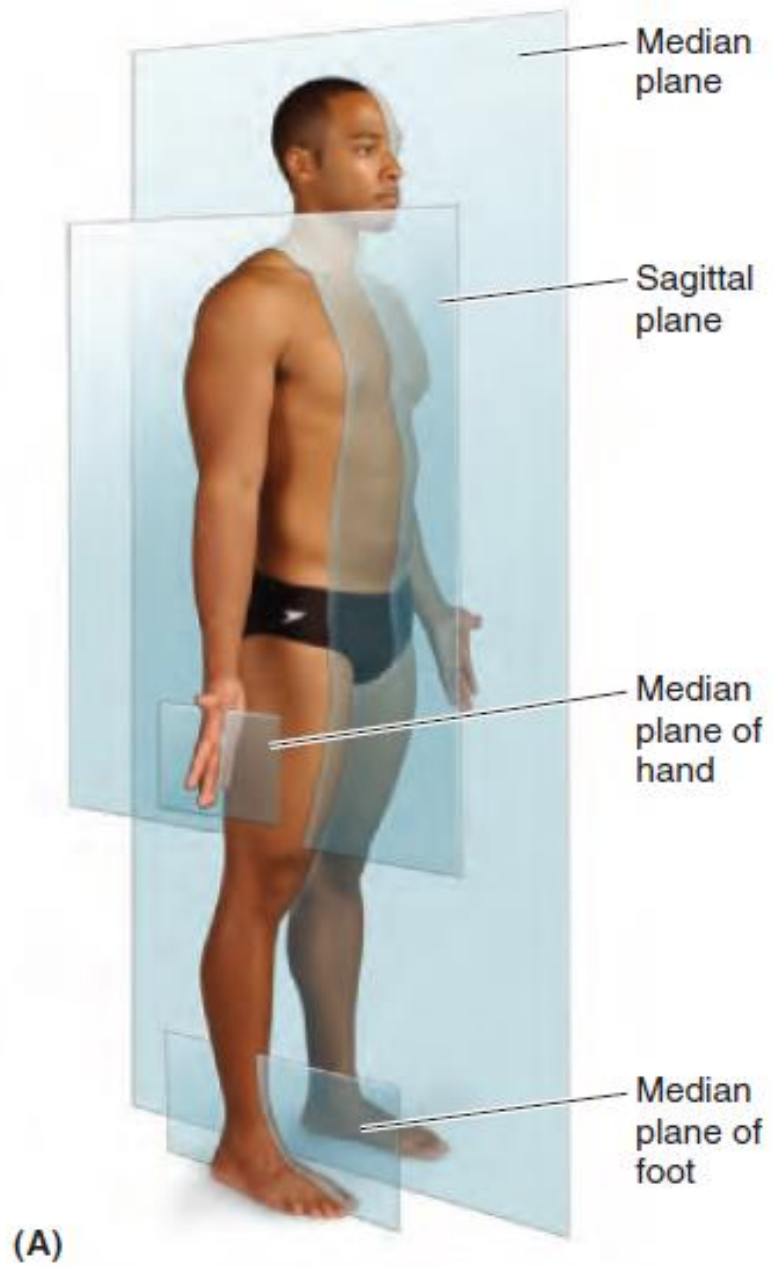
Coronal plane, also called a **frontal plane**, is a **vertical plane** that divides the body into anterior (front) and posterior (back) parts.



Transverse Plane

- ❖ A transverse plane, also called **axial or horizontal plane** or horizontal plane, cuts perpendicularly along the long axis of the body or organ separating it into both superior (upper) and inferior (lower) parts.
- ❖ A minor plane, called the **oblique** plane, passes through the specimen at an angle.





Terms related to position

- **Anterior (Ventral)** : the front of the body
- **Posterior (Dorsal)** : the back of the body
- **Superior(Cranial)** : upper
- **Inferior(Caudal)** : lower
- **Lateral** : away from the midline
- **Medial** : close to the midline
- **Median** : at the midline
- **Proximal** : near to the root
- **Distal** : away from the root

Terms related to position

- **Superficial** : near to the surface
- **Deep** : away from the surface
- **Internal (inner)**: near to the center of an organ or cavity
- **External (outer)**: away from the center of an organ or cavity
- **Ipsilateral**: the same side of the body
- **Contralateral**: the opposite side of the body
- **Bilateral**: the two sides
- The **supine** position of the body is lying on the back
- The **prone** position is lying face downward.

Terms to describe location

1. Anterior or (ventral)

2. posterior or (dorsal)

describe the position of structures relative to the 'front' and 'back' of the body. For example, the nose is anterior to the ears and the vertebral column is posterior to the sternum.

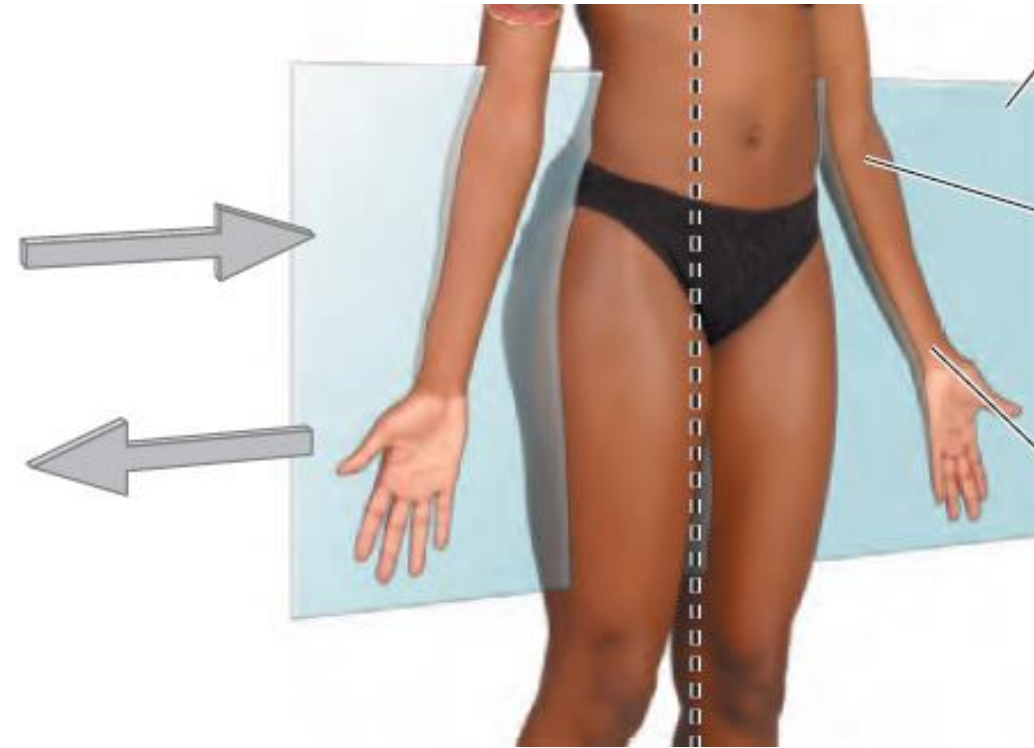


Medial and **lateral** describe the position of structures relative to the median sagittal plane and the sides of the body.

For example, the thumb is lateral to the little finger. The nose is in the median sagittal plane and is medial to the eyes, which are in turn medial to the ears.

Medial
Nearer to median plane
The 5th digit (little finger) is on the medial side of the hand.

Lateral
Farther from median plane
The 1st digit (thumb) is on the lateral side of the hand.



Superior and **inferior** describe structures in reference to the vertical axis of the body.

For example, the head is superior to the shoulders and the knee joint is inferior to the hip joint



Proximal and **distal** are used with reference to being closer or farther from a structure's origin, particularly in the limbs.

For example, the hand is distal to the elbow joint.

These terms are also used to describe the relative positions of branches along the course of linear structures, such as airways, vessels, and nerves.

For example, distal branches occur farther away towards the ends of the system whereas proximal branches occur closer and towards the origin of the system.



Proximal

Nearer to trunk or point of origin (e.g., of a limb)

The elbow is proximal to the wrist, and the proximal part of an artery is its beginning.

Distal

Farther from trunk or point of origin (e.g., of a limb)

The wrist is distal to the elbow, and the distal part of the upper limb is the hand.

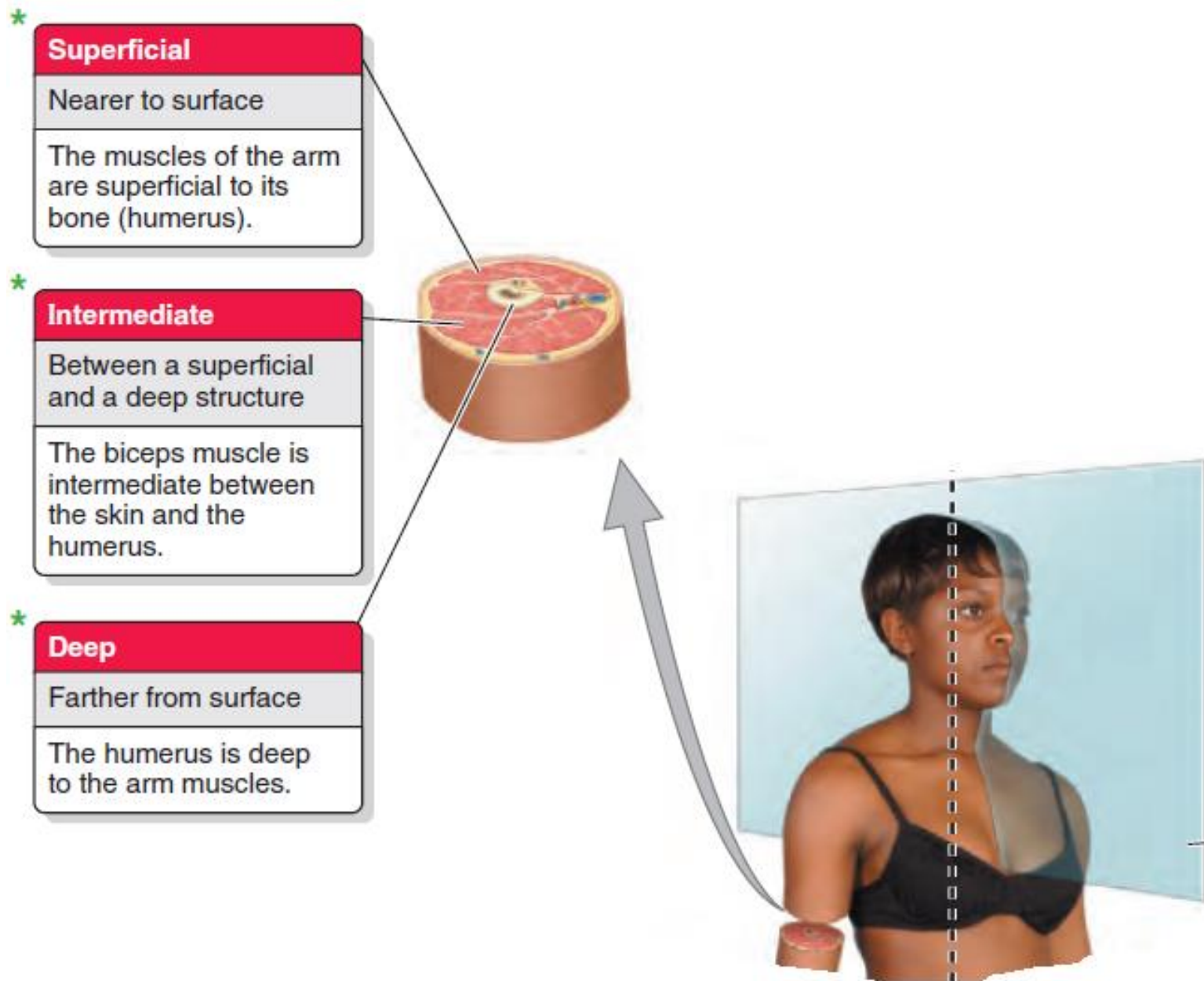
Cranial (towards the head) and **caudal** (towards the tail) are sometimes used instead of **superior** and **inferior** respectively.

Rostral is used, particularly in the head, to describe the position of a structure with reference to the nose.

For example, the forebrain is rostral to the hindbrain.

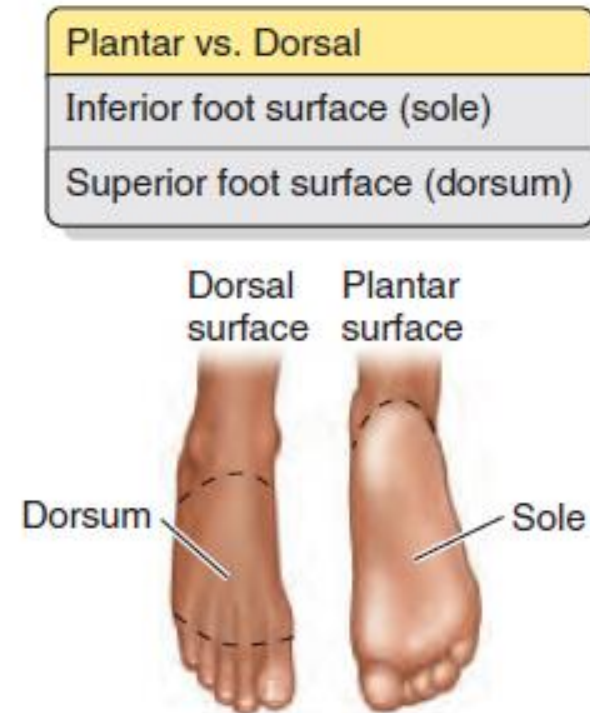
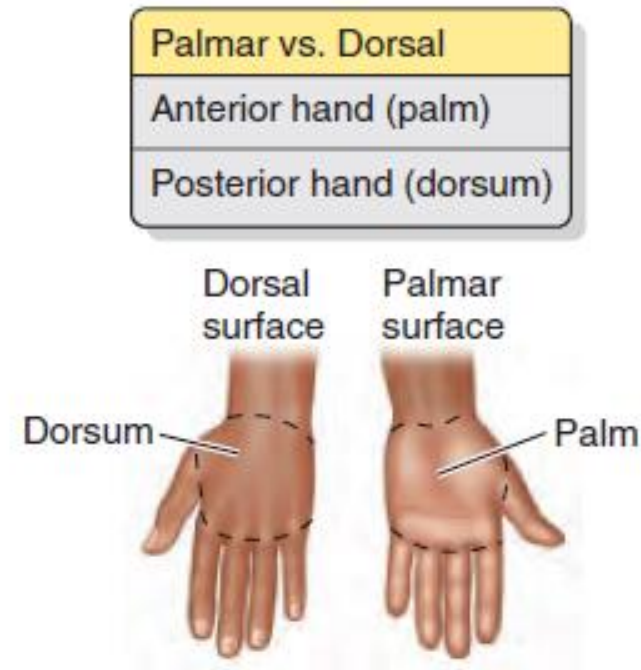
Superficial and **deep** are used to describe the relative positions of two structures with respect to the surface of the body.

For example, the sternum is superficial to the heart and the stomach is deep to the abdominal wall.



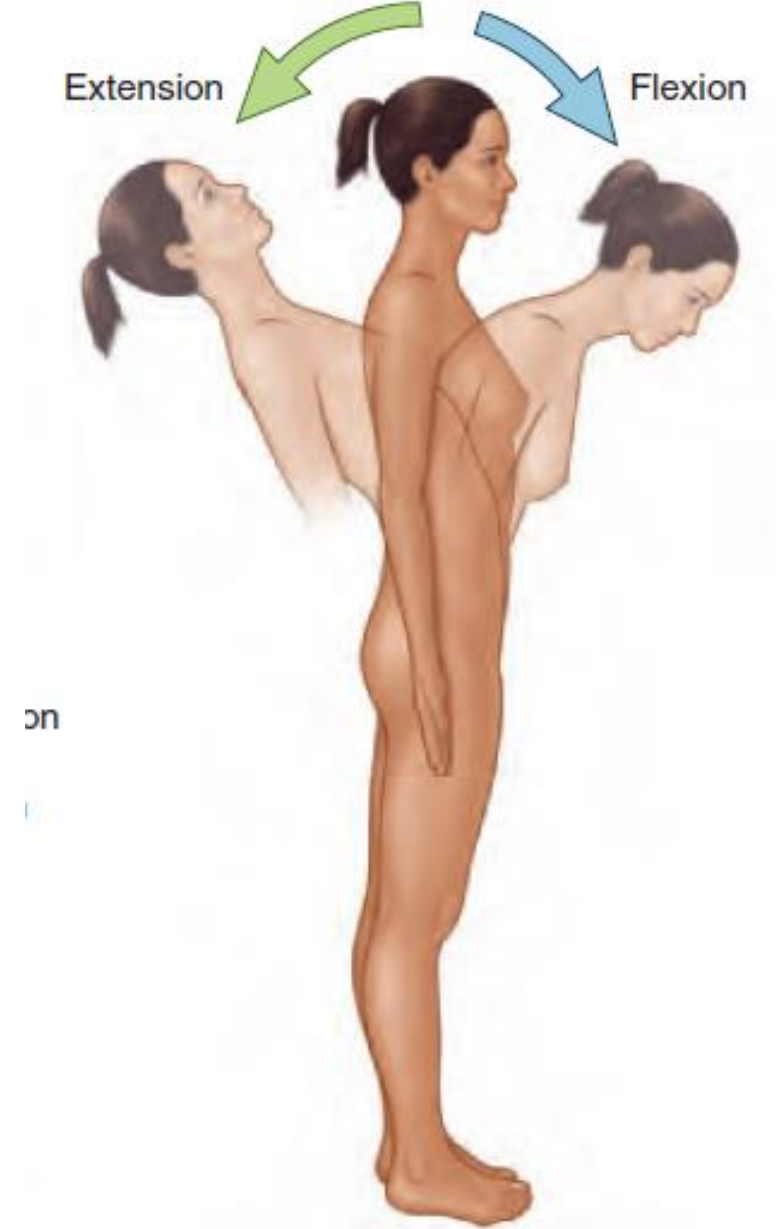
Palmar and **dorsal** surfaces: anterior and posterior surfaces of the hand.

Plantar and **dorsal** surfaces: anterior and posterior surfaces of foot.



Terms related to movement

- **Flexion and extension:** movement takes place in a sagittal plane anteriorly or posteriorly.

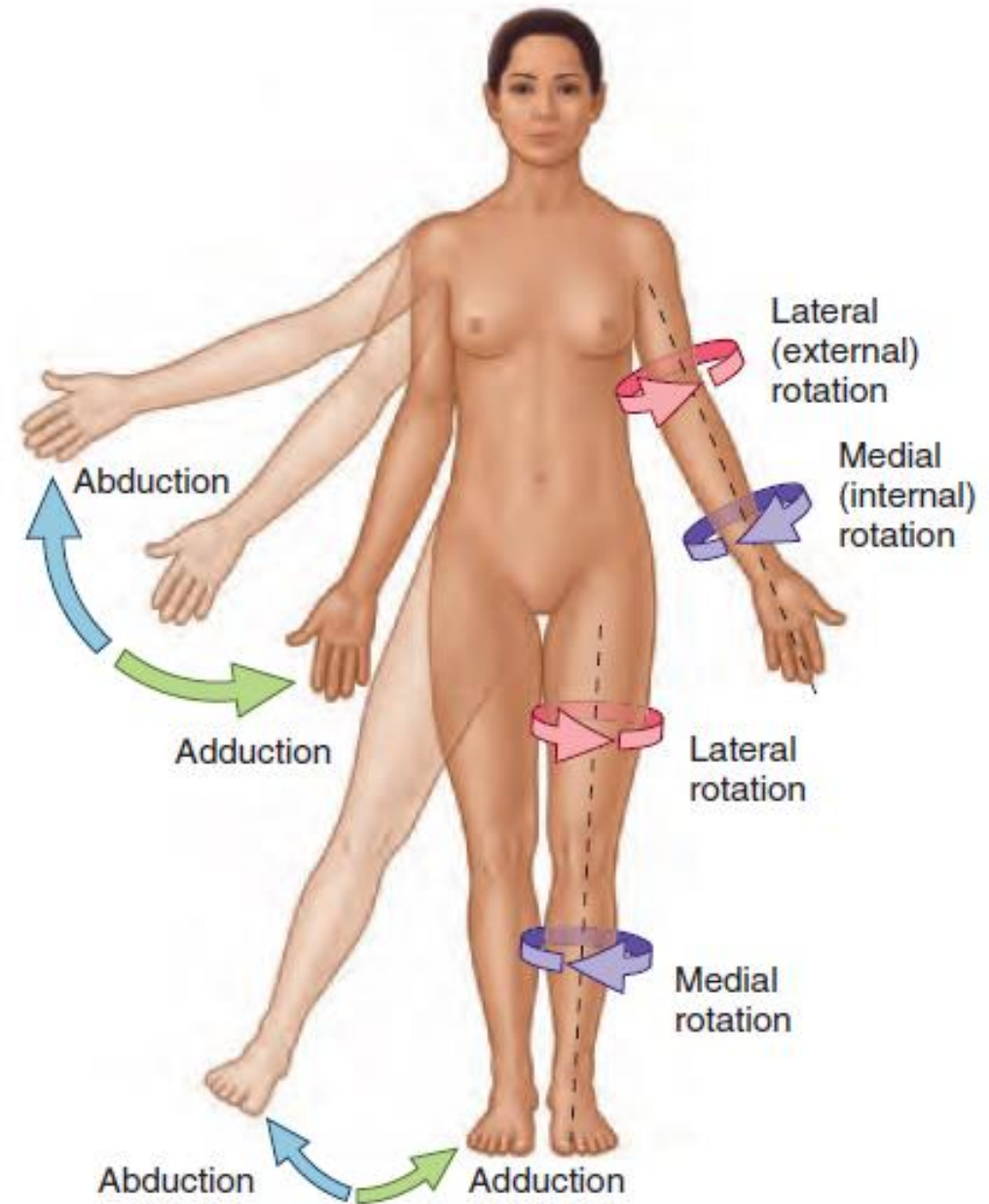


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Flexion and extension of vertebral column at intervertebral joints

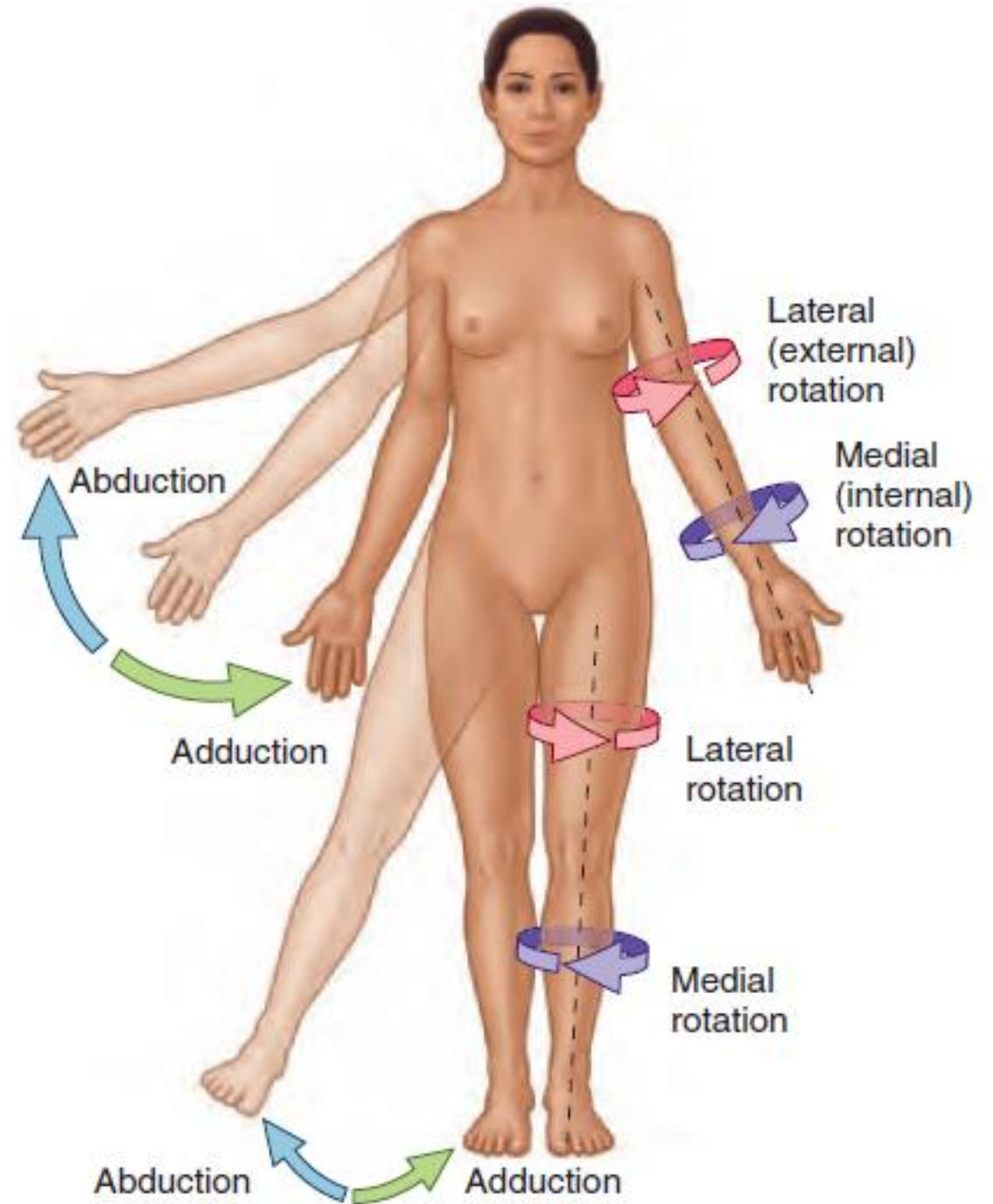
Terms related to movement

- **Abduction:** a limb moves away from the midline of the body.
- **Adduction:** a limb moves towards the body.



Terms related to movement

- **Medial rotation:**
movement results in the anterior surface of the part facing medially.
- **Lateral rotation:**
movement results in the anterior surface of the part facing laterally.



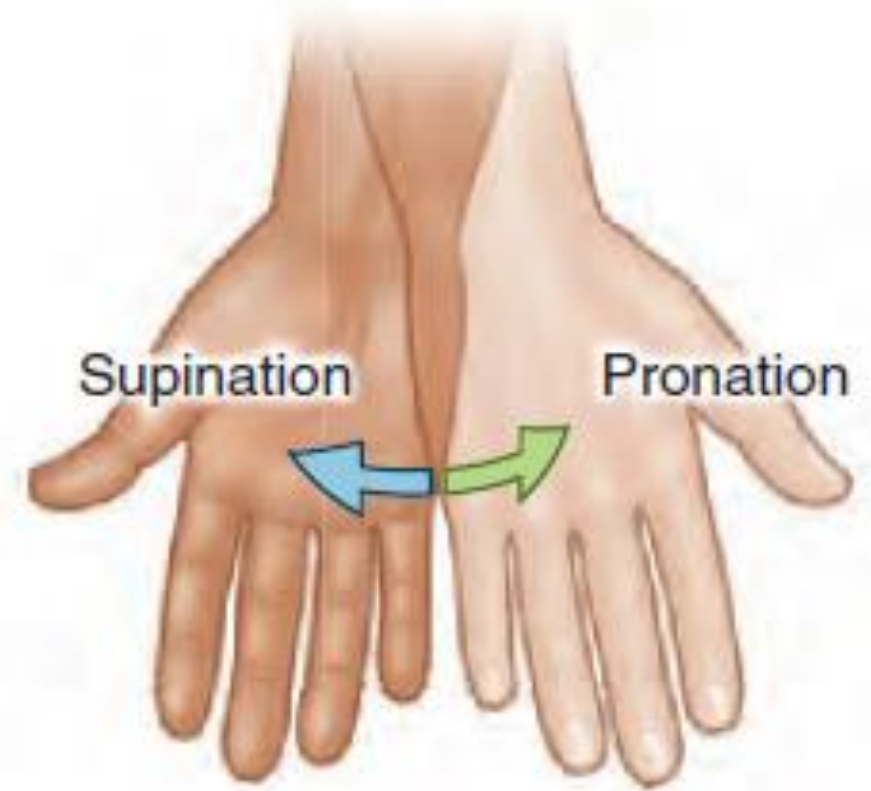
Terms related to movement

- **Pronation** of the forearm:

is a medial rotation of the forearm in such a manner that the palm of the hand faces posteriorly.

- **Supination** of the forearm:

is a lateral rotation of the forearm from the pronated position so that the palm of the hand faces anteriorly.



(D) Pronation and supination of forearm at radio-lunar joints

Terms related to movement

- **Circumduction:**
combination of
flexion, extension,
abduction and
adduction.



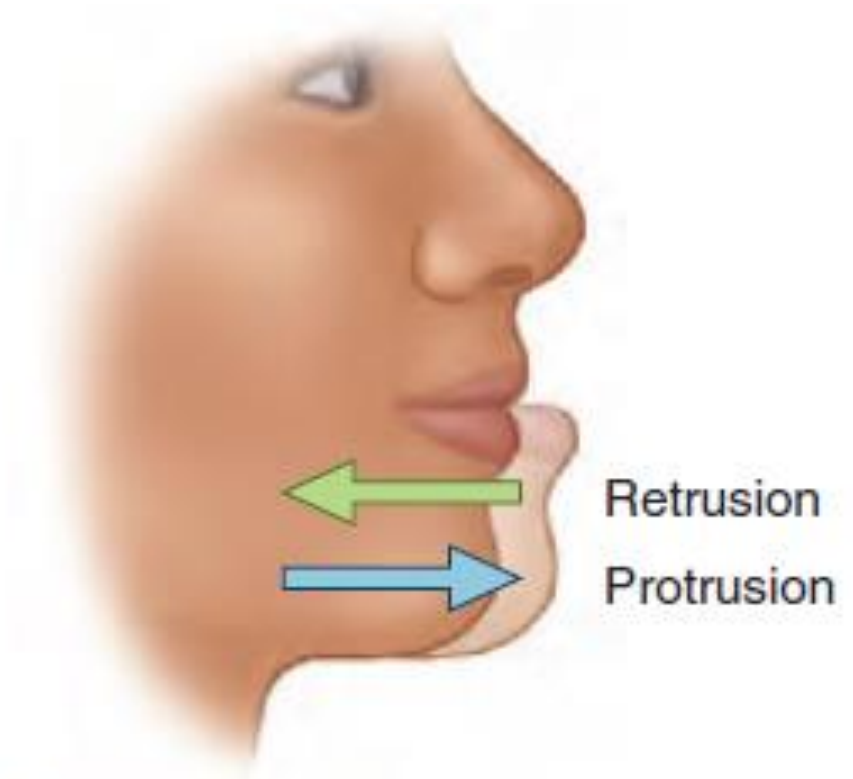
Circumduction

Terms related to movement

- **Protraction:** to move forward.
- **Retraction:** to move backward.



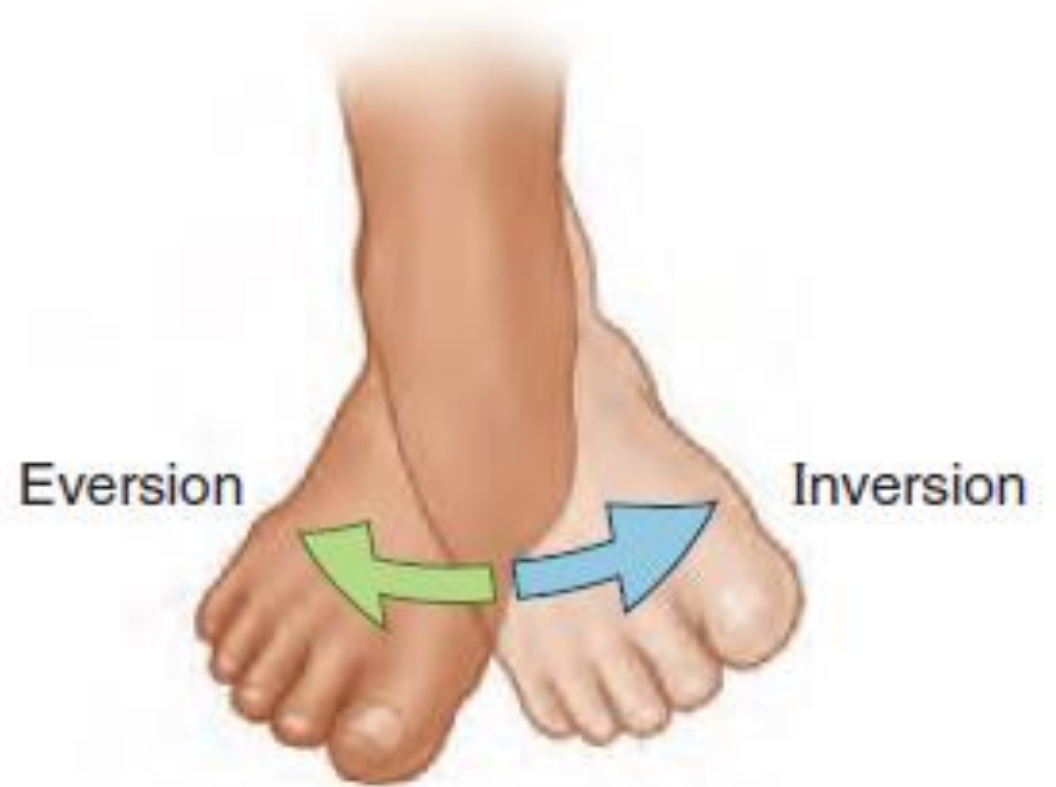
(M) Protraction and retraction of scapula on thoracic wall



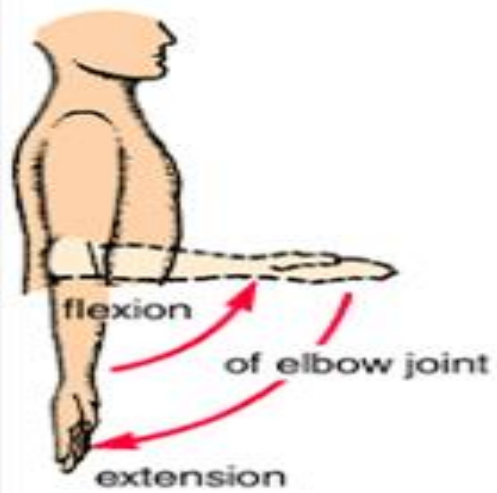
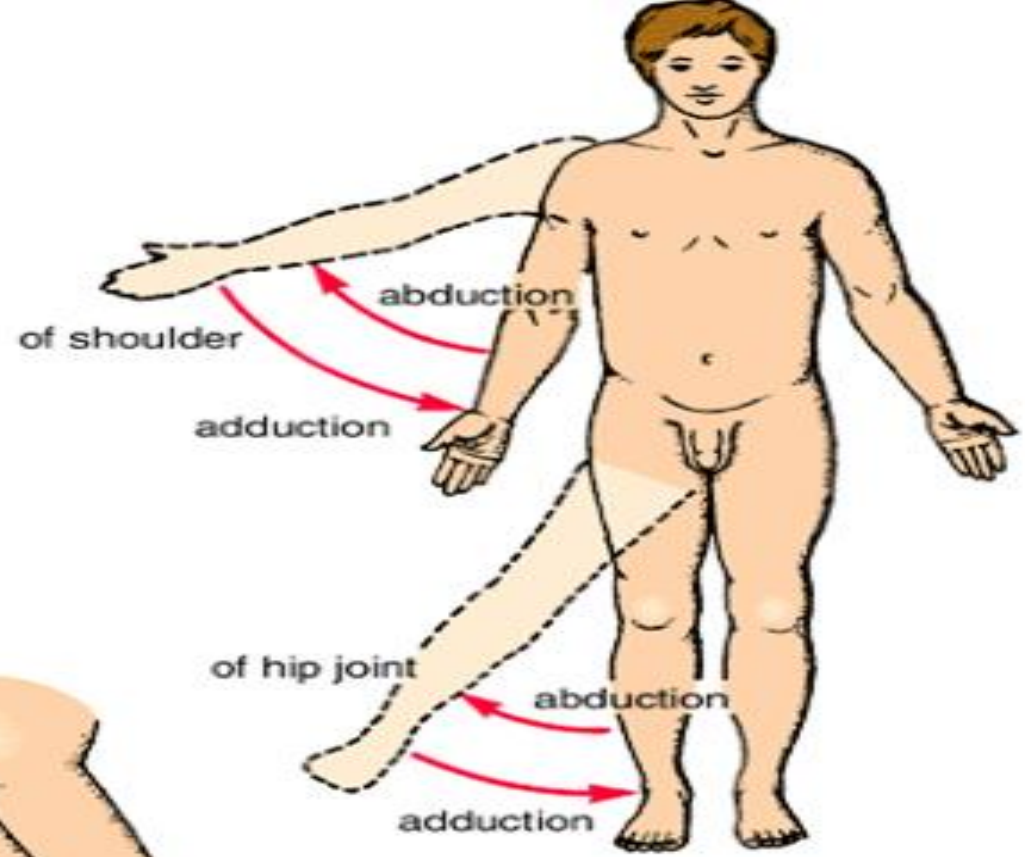
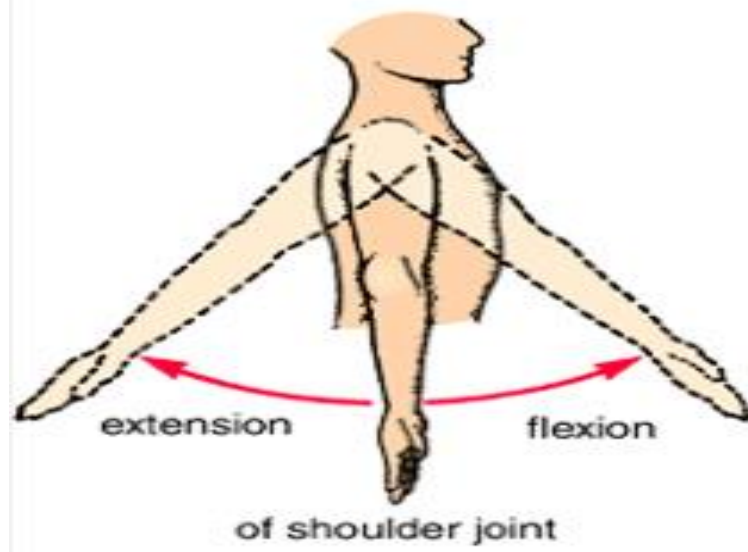
(L) Protrusion and retrusion of jaw at temporomandibular joints

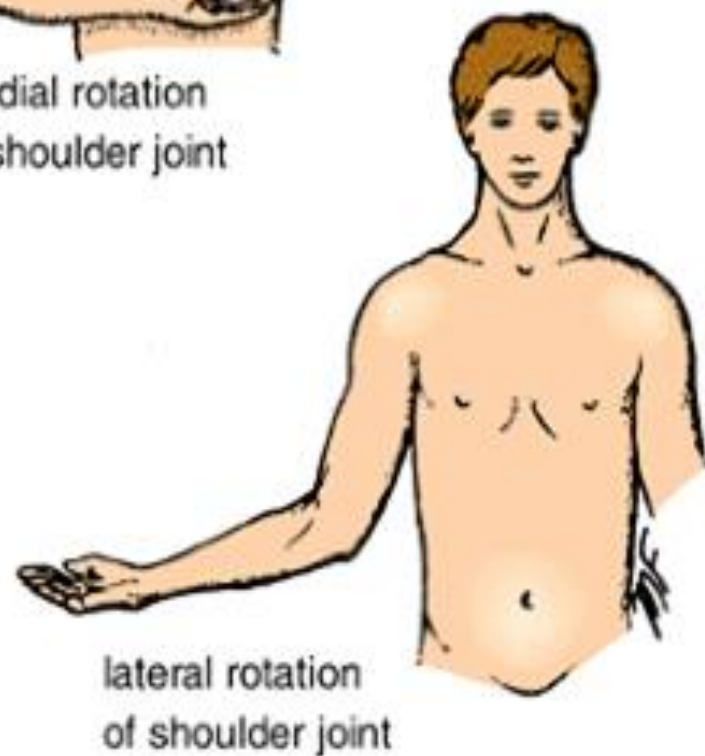
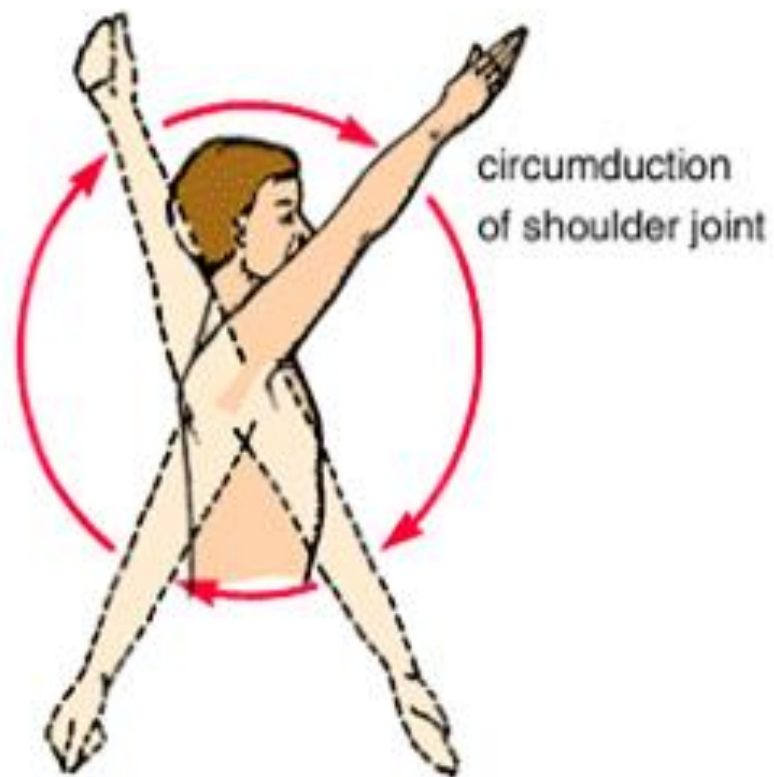
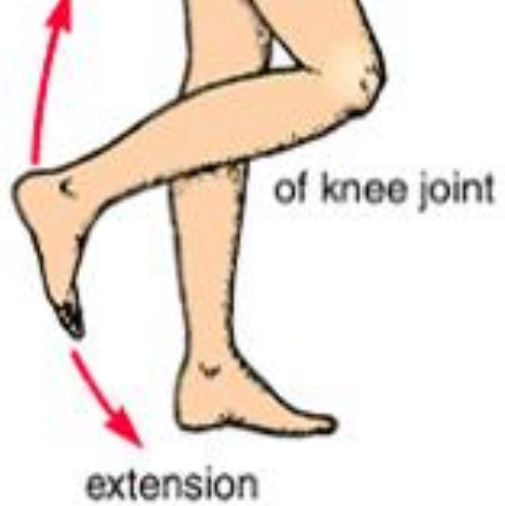
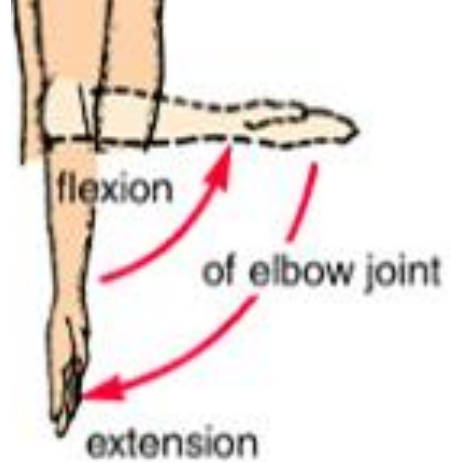
Terms related to movement

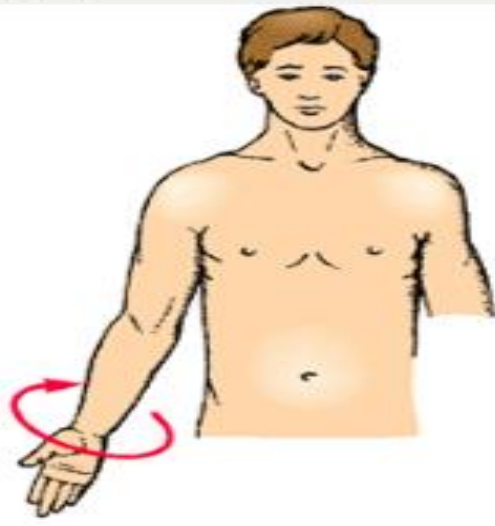
- **Inversion:** movement of the foot so that the sole faces in a medial direction.
- **Eversion:** the sole faces in a lateral direction.



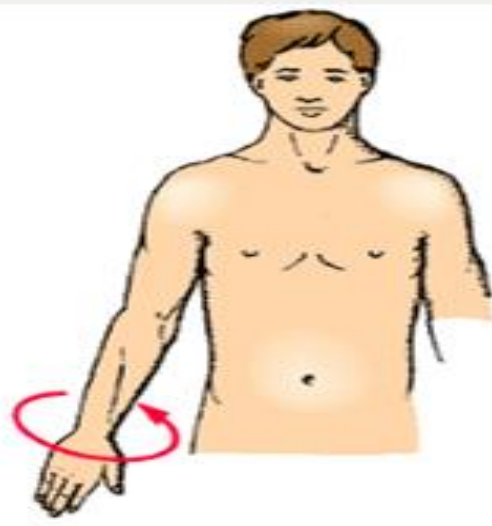
(I) Inversion and eversion of foot at subtalar and transverse tarsal joints







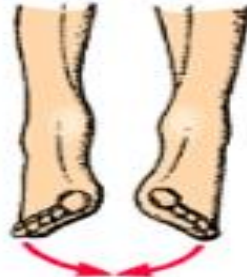
supination of forearm



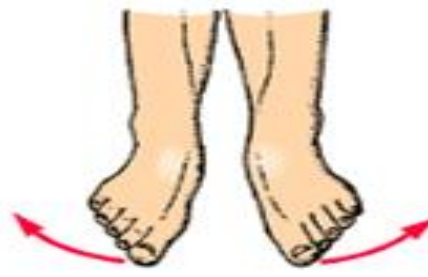
pronation of forearm



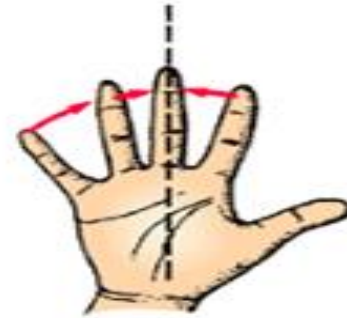
lateral flexion of trunk



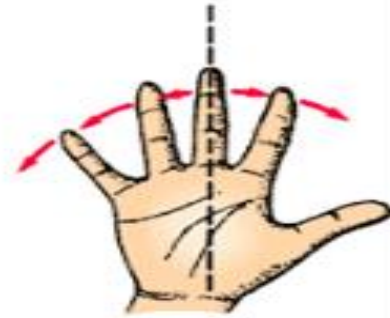
inversion of foot



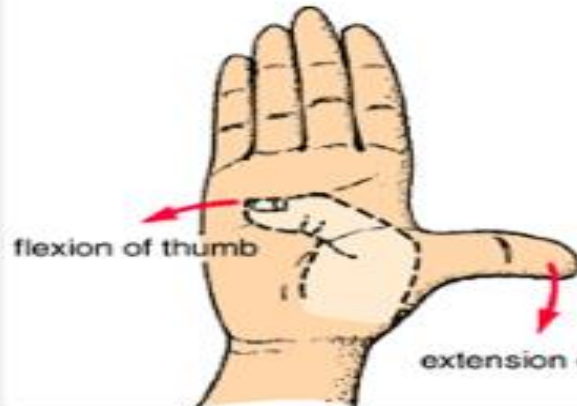
eversion of foot



adduction of fingers

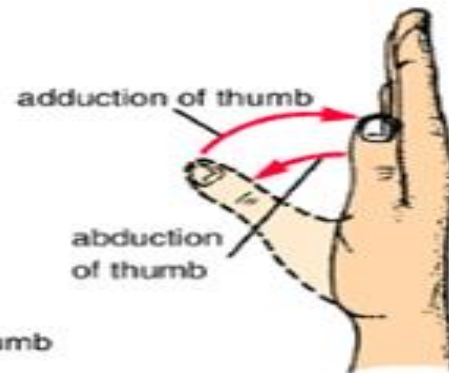


abduction of fingers



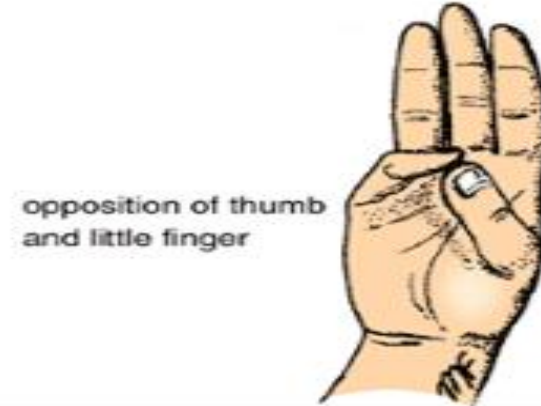
flexion of thumb

extension of thumb



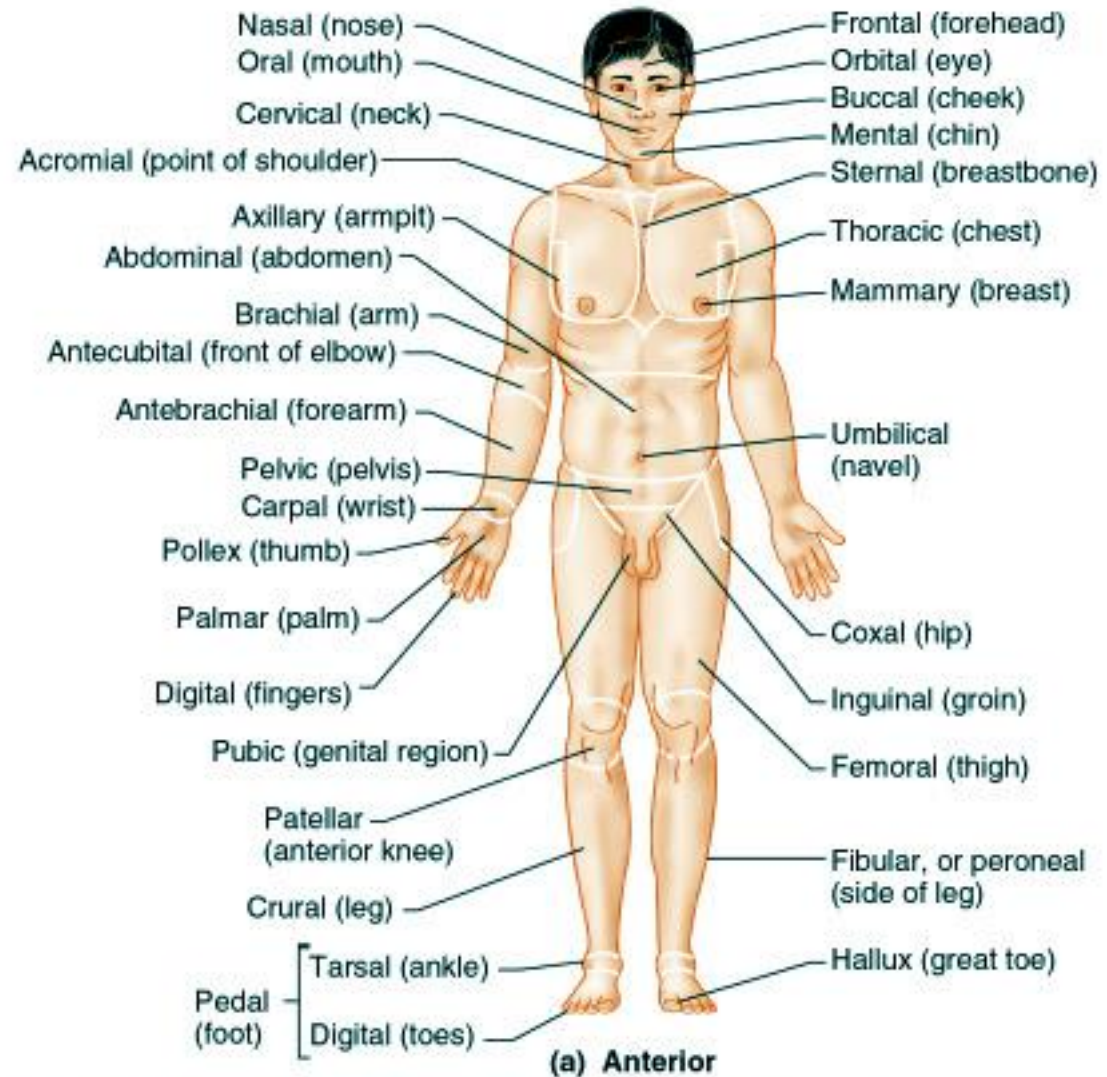
adduction of thumb

abduction of thumb



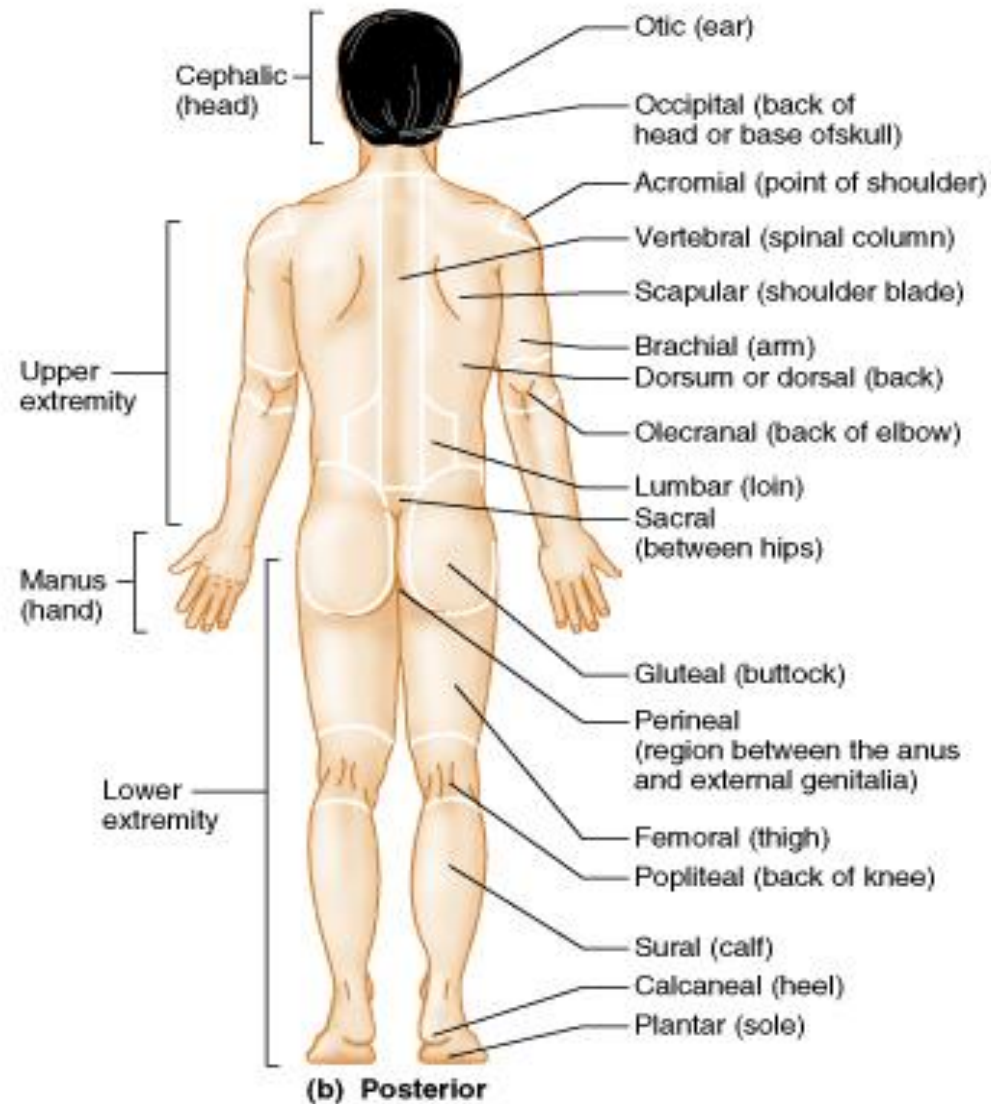
opposition of thumb and little finger

Terms used to describe different body regions



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Terms used to describe different body regions



APPROACHES FOR STUDYING GROSS ANATOMY

- Regional.
- Systemic.

The Regions of the Body

- **Trunk**

- Head & Neck
- Thorax
- Abdomen
- Pelvis

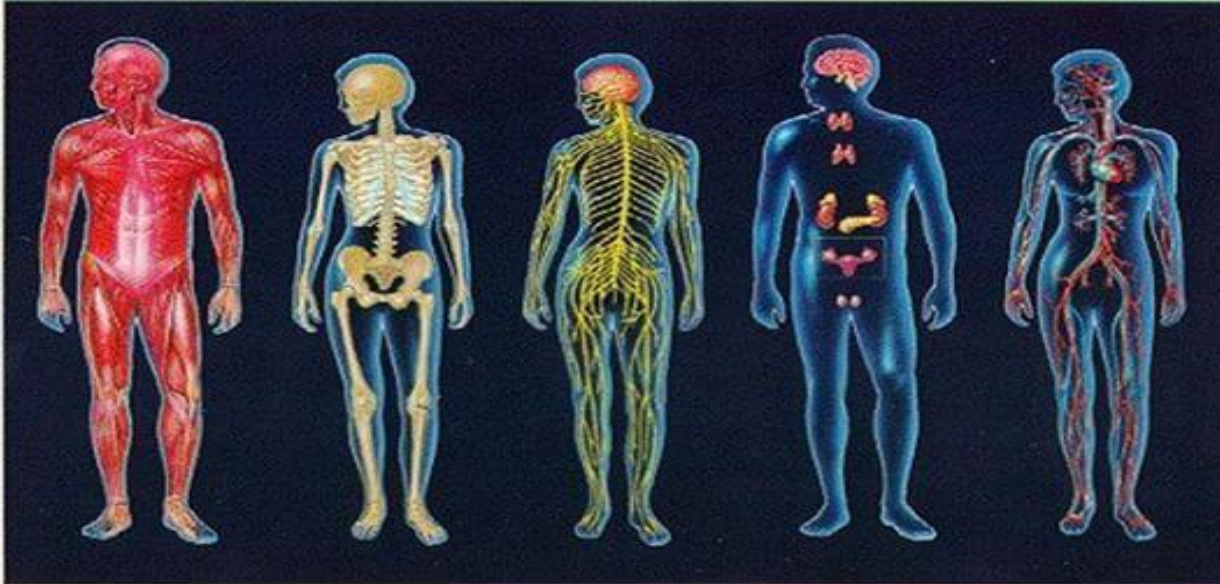
- **Limbs**

- Upper limbs
- Lower Limbs





**Integu-
mentary
System**



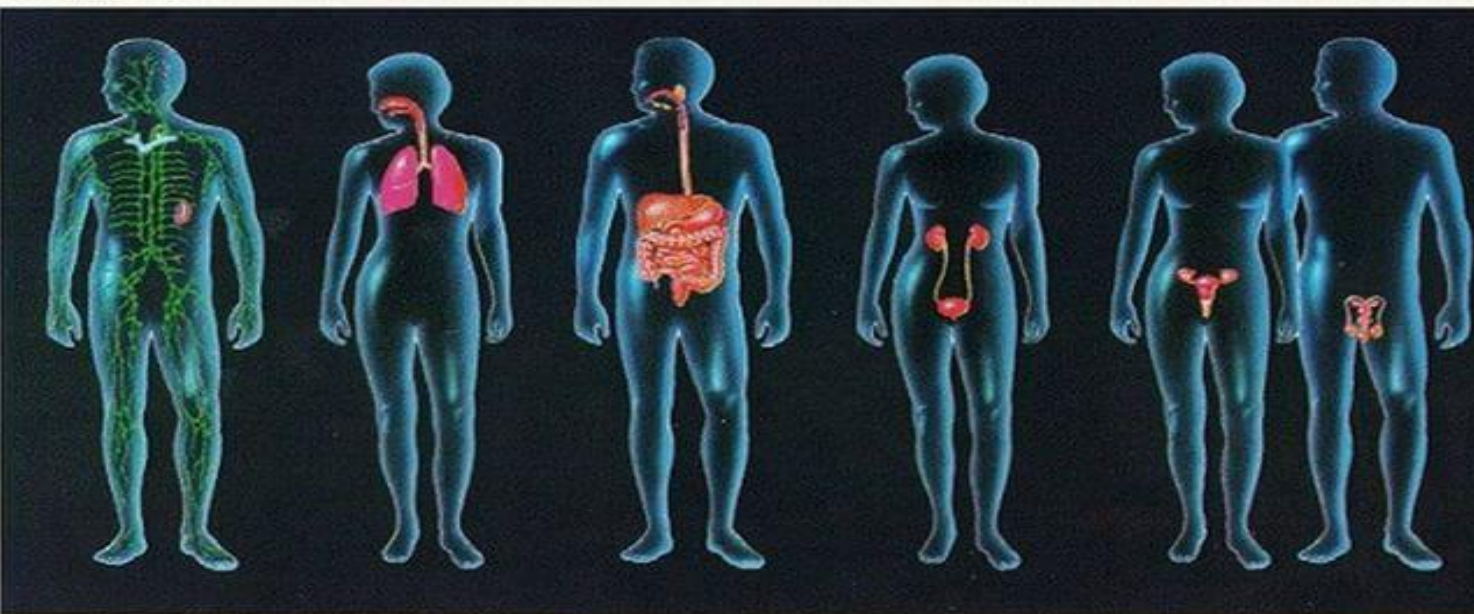
**Muscular
System**

**Skeletal
System**

**Nervous
System**

**Endocrine
System**

**Circulatory
System**



**Lymphatic
System**

**Respiratory
System**

**Digestive
System**

**Urinary
System**

**Reproductive
System**

Organ Systems

1. Integumentary
2. Skeletal
3. Muscular
4. Nervous
5. Endocrine
6. Cardiovascular
7. Lymphatic
8. Respiratory
9. Digestive
10. Urinary
11. Reproductive

1- Skeletal System

Components

Bones ,cartilages and joints

Functions

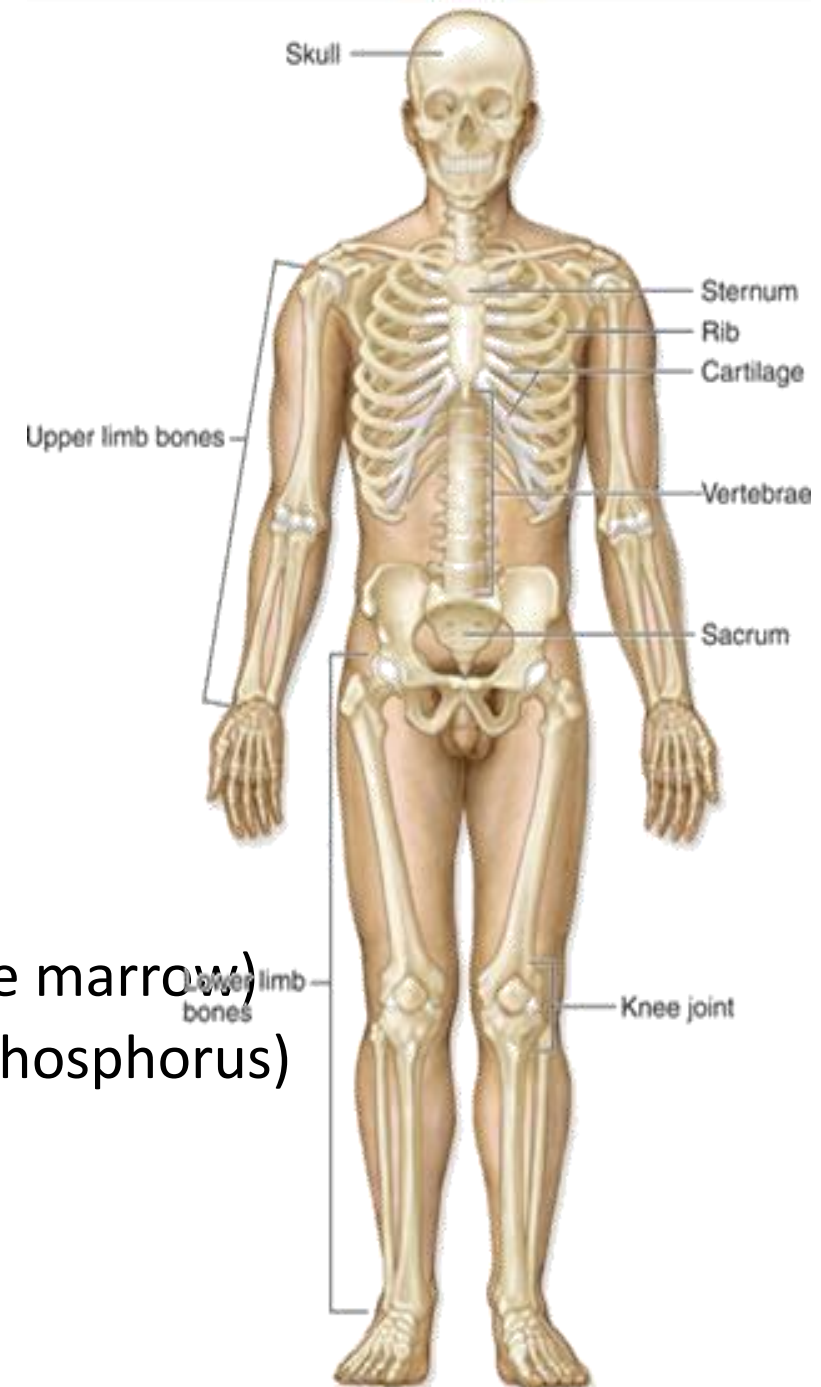
Support

Protection

Movement

Blood cell production (red bone marrow)

Mineral storage (calcium and phosphorus)



Classification of Bones

According to the shape and surface features:

1- **Long bones:** Have two **ends** connected by **shaft**

e.g., the humerus, radius, ulna, femur, tibia and fibula.

2- **Short bones :** have no shaft

e.g. carpals and tarsals

3- **Flat bones:** have flat surfaces

e.g., the cranial bones, ribs, and bones of the shoulder girdle).

4- **Irregular bones:-** have varied shapes

e.g., the vertebrae and certain bones of the skull).

5- **Sesamoid bones:** like a sesame seed and formed in a tendon

e.g., the patella.

Three types of cartilage:

1-Hyaline cartilage: most common form, the, type II collagen is the principal collagen type, associated with synovial joints, most bones first modeled in hyaline cartilage.

Examples: costal cartilages, epiphyseal plates of long bones and nasal cartilages

2-Elastic cartilage: more pliable and distensible possesses abundant elastic fibers in addition to collagen type II

Examples: ear and epiglottis.

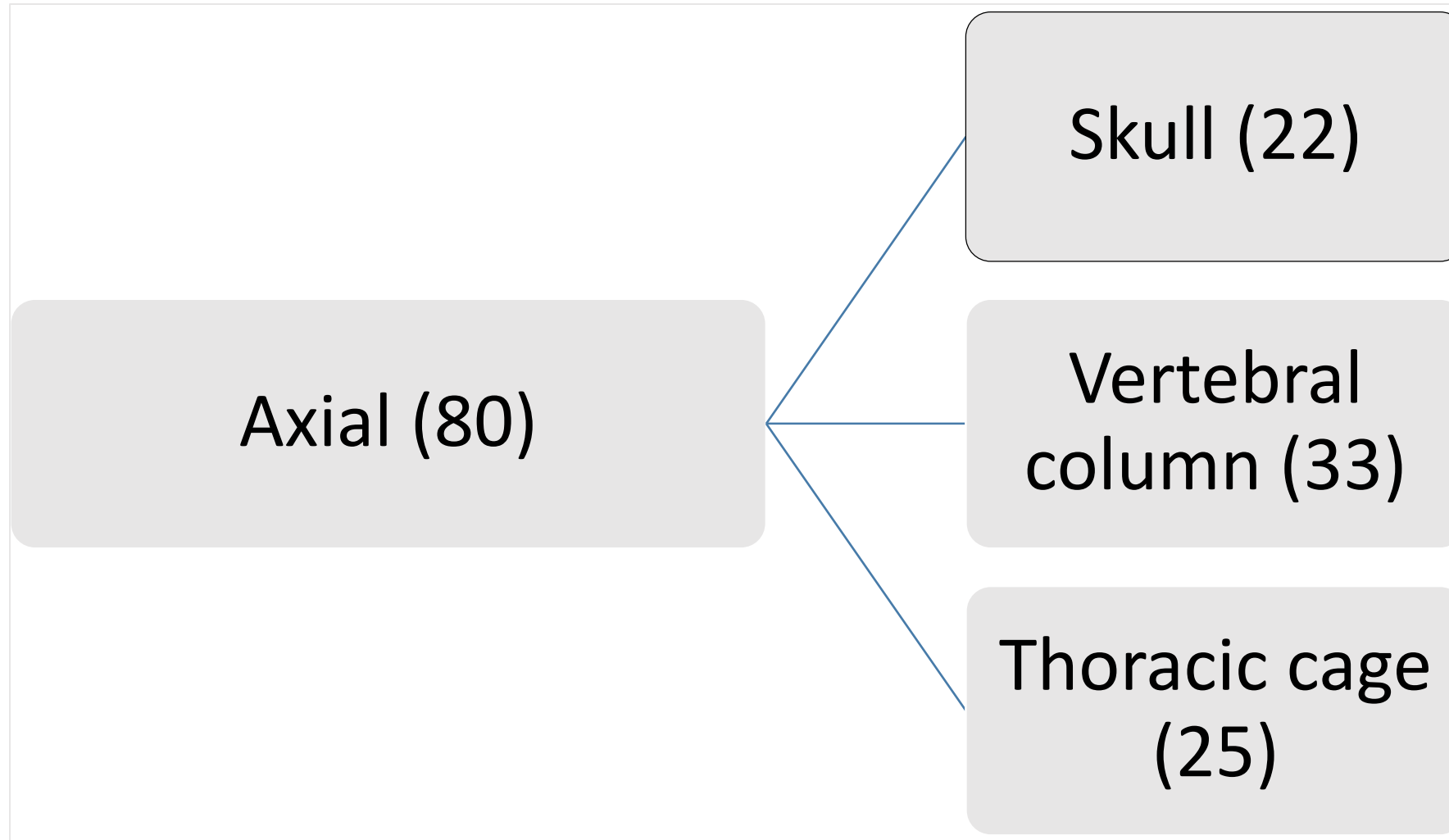
3-Fibrocartilage: Has a dense network of coarse type I collagen fibers

Examples: intervertebral discs and pubic symphysis.

The human skeleton consists of 206 bones divided into two groups:

1- Axial skeleton (80)

2- Appendicular skeleton (126)



* Also we can add the hyoid bone at the neck and ossicle of the middle ear (Maleus, Incus and Stapes)



(A) Anterior view



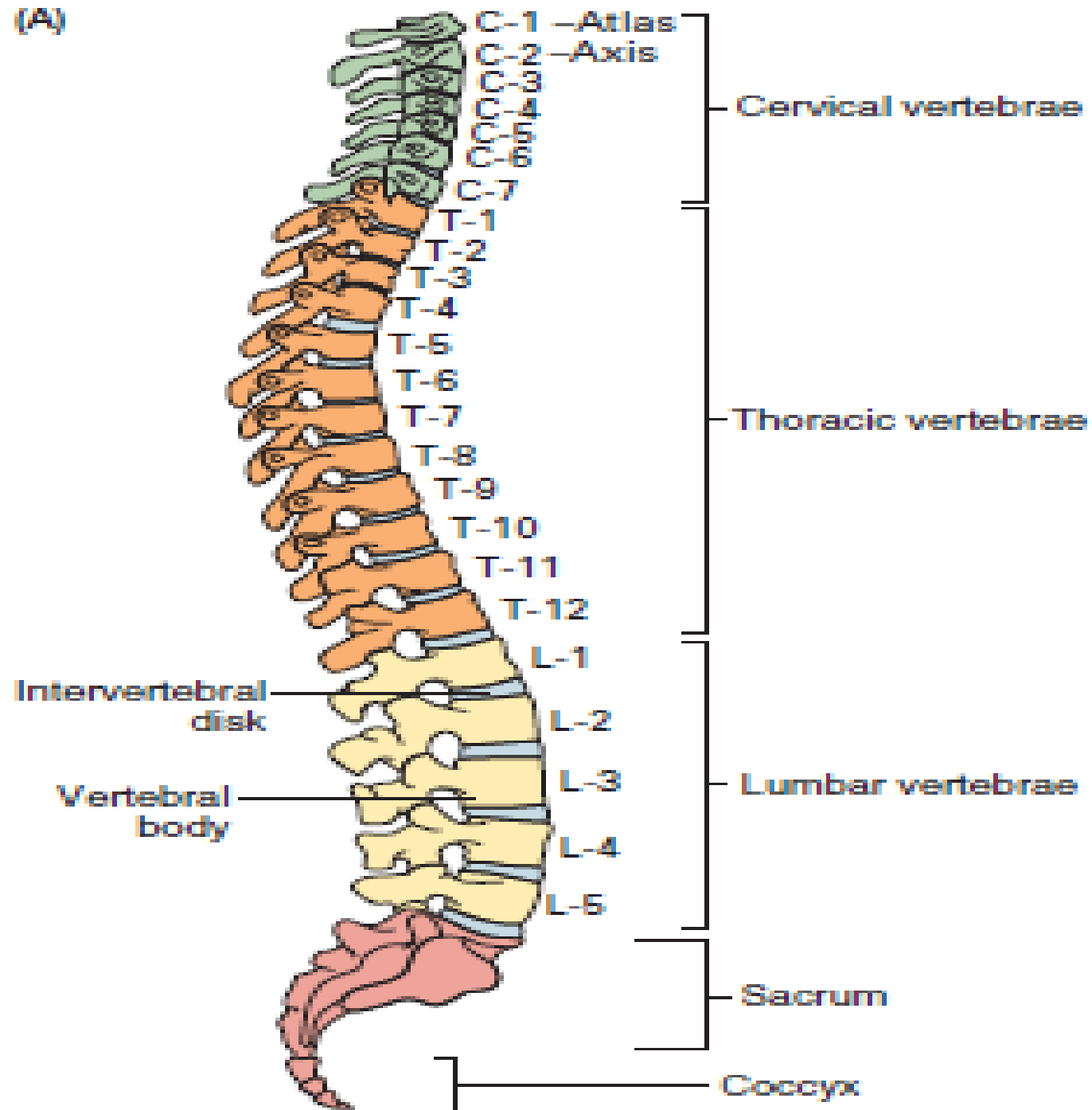
(B) Posterior view

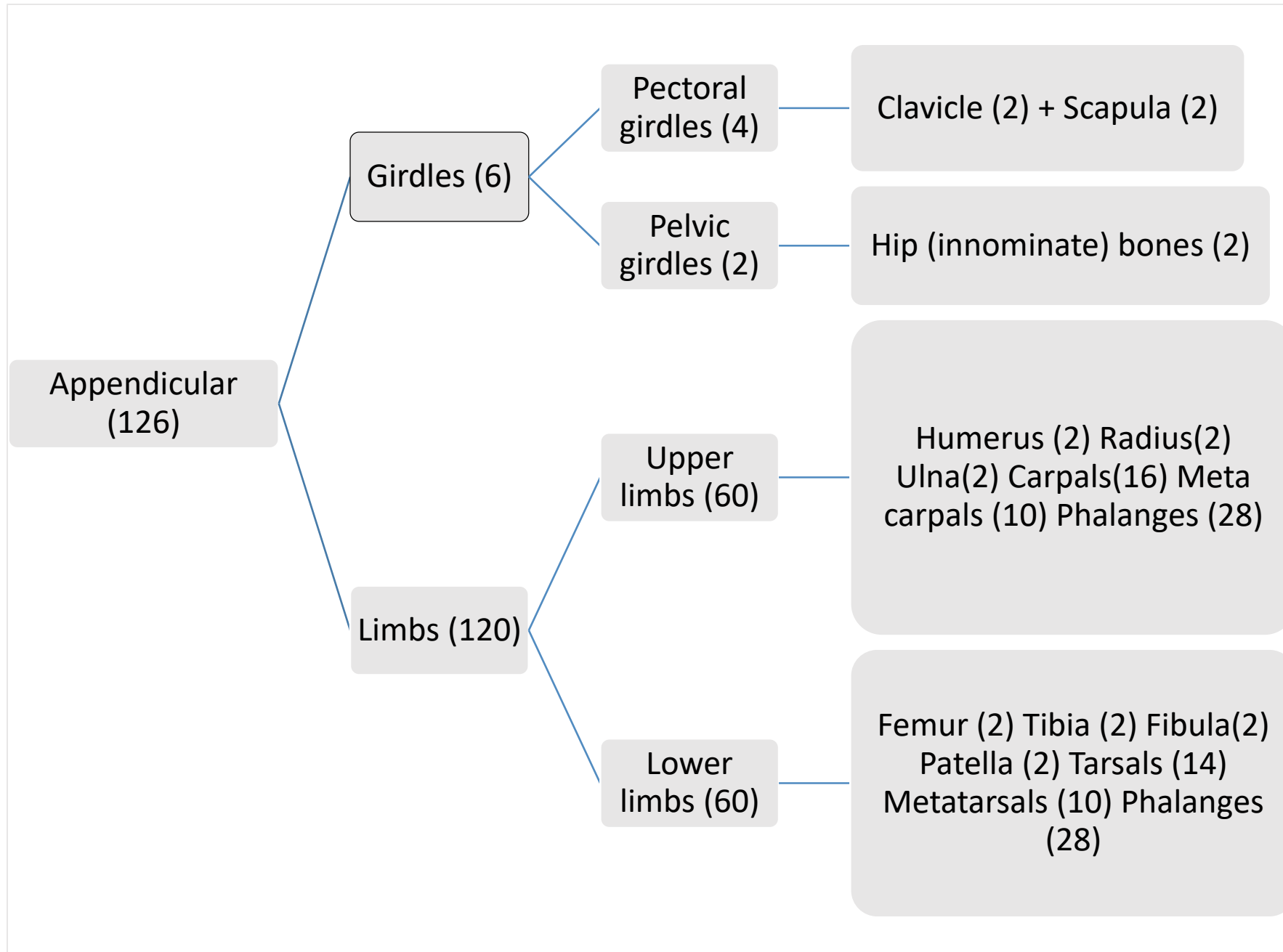
Vertebral column

The vertebral column is divided into five sections there are 33 vertebrae :-

1. **Cervical vertebrae (7)** at the neck.
2. **Thoracic vertebrae (12)** at the chest.
3. **Lumbar vertebrae (5)** at the abdomen.
4. **Sacrum (5)** wedge-shaped bone formed by five fused bones.
5. **Coccyx (4)** also known as the **tailbone** formed by four fused bones.

(A)

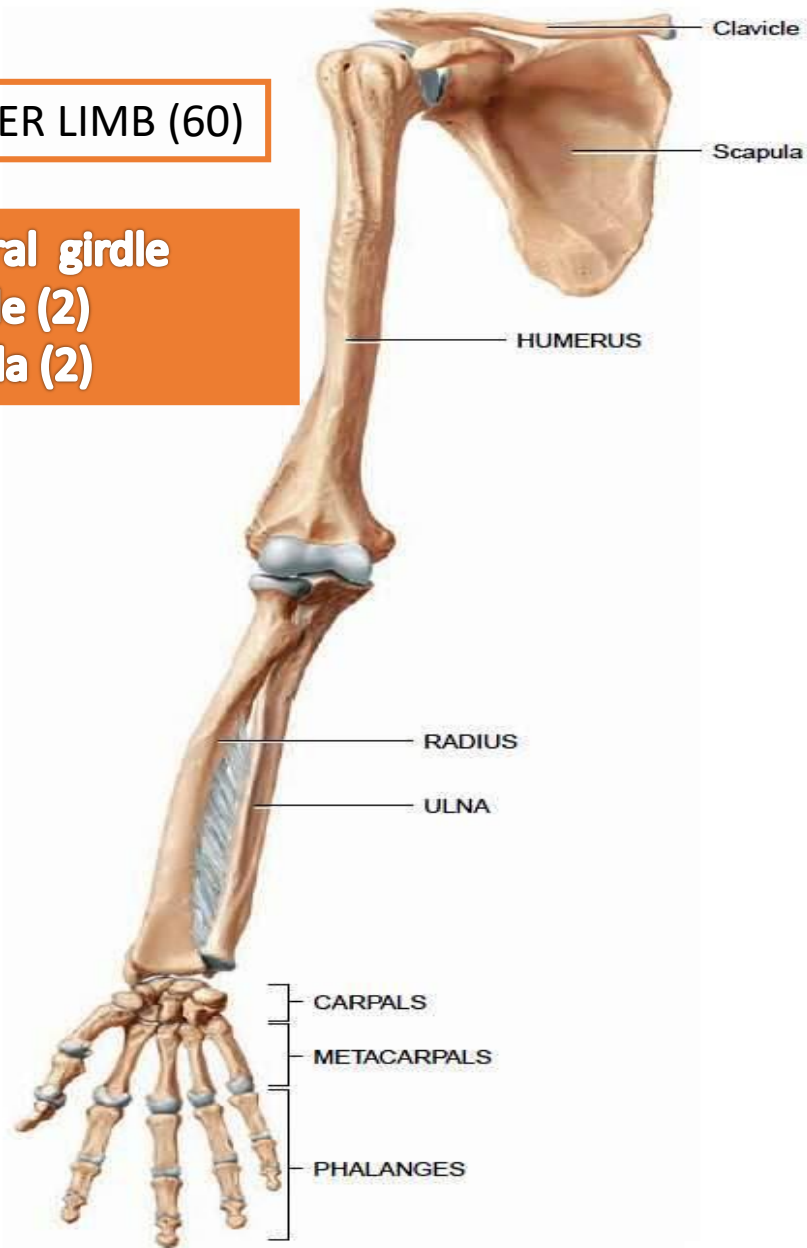




⑥ Each upper limb includes a humerus, ulna, radius, carpals, metacarpals, and phalanges.

UPPER LIMB (60)

Pectoral girdle
Clavicle (2)
Scapula (2)



Anterior view of upper limb

⑥ Each lower limb includes a femur, patella (kneecap), tibia, fibula, tarsals (ankle bones), metatarsals, and phalanges (bones of the digits).

LOWER LIMB (60)

Pelvic girdle
Hip bones (2)



Anterior view of lower limb

2- Muscular System

Components

Muscles

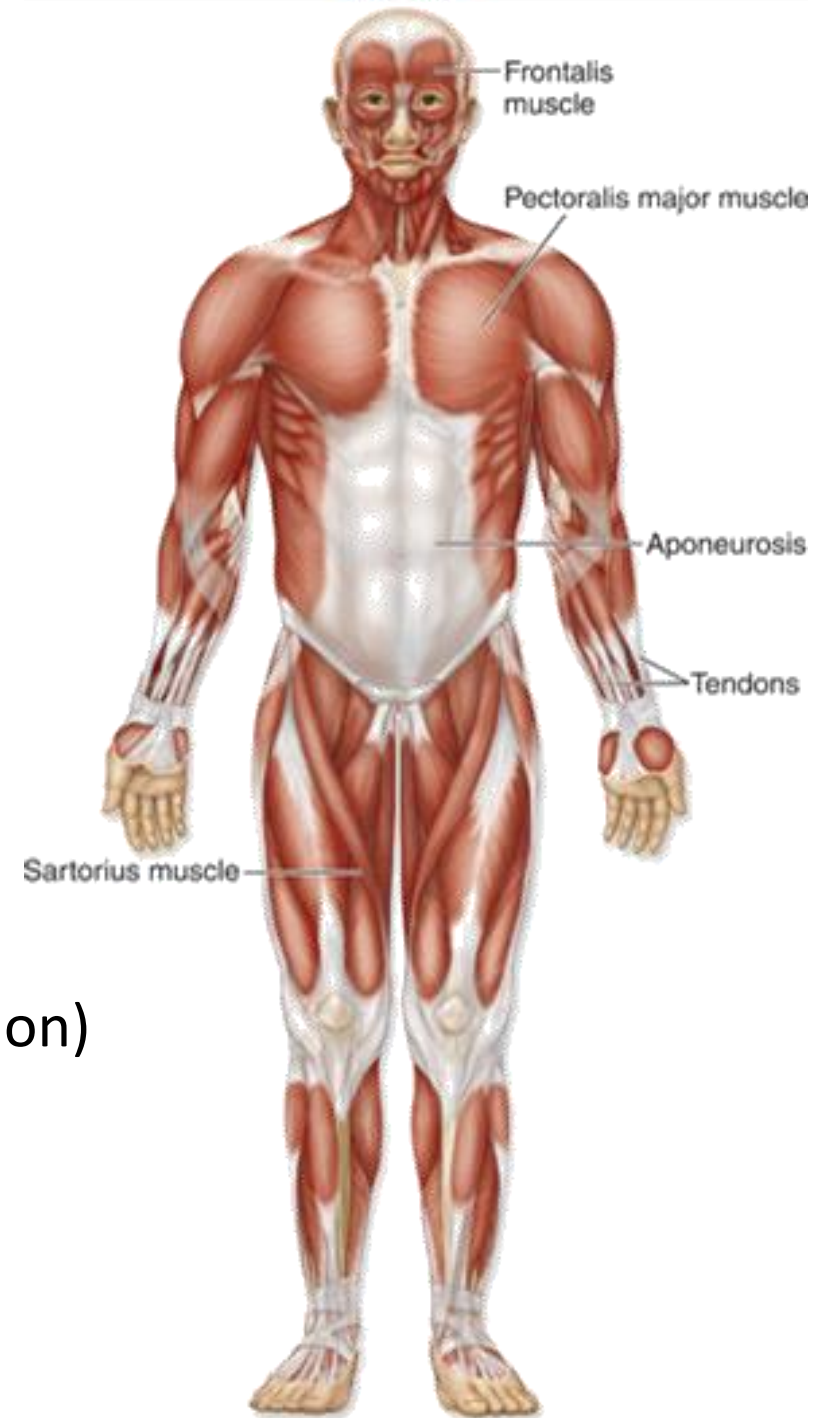
Associated Connective Tissues
(tendons)

Functions

Locomotion

Facial expression (communication)

Maintain posture



The are three types of muscles in the body:

1-Skeletal muscle (voluntary & striated)

2-Cardiac muscle (involuntary, striated & branched)

3-Smooth muscle (involuntary & unstriated)

3- Cardiovascular System

Components

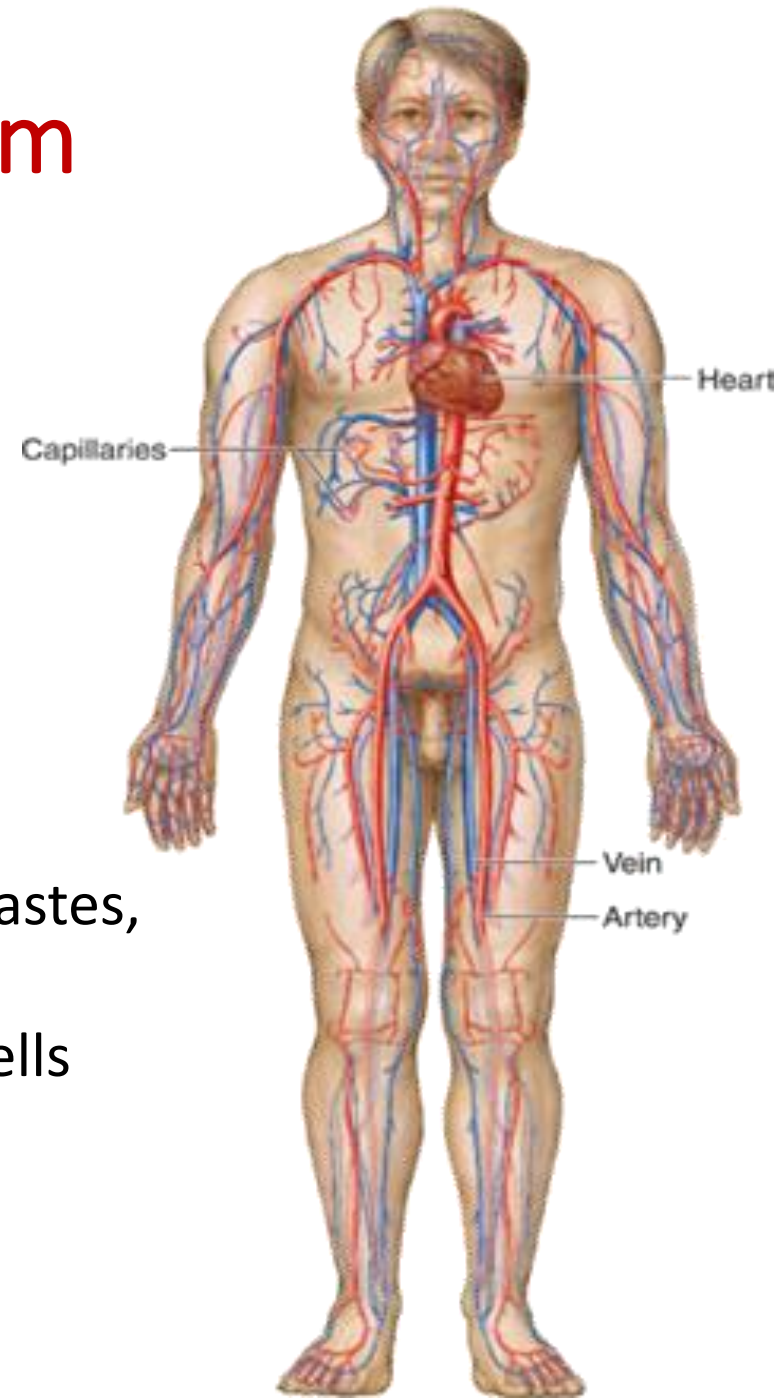
Heart

Blood vessels (arteries, veins and capillaries)

Functions

Transportation of blood
(contains O_2 and CO_2 , nutrients, wastes,
etc.)

Blood composed of plasma and cells



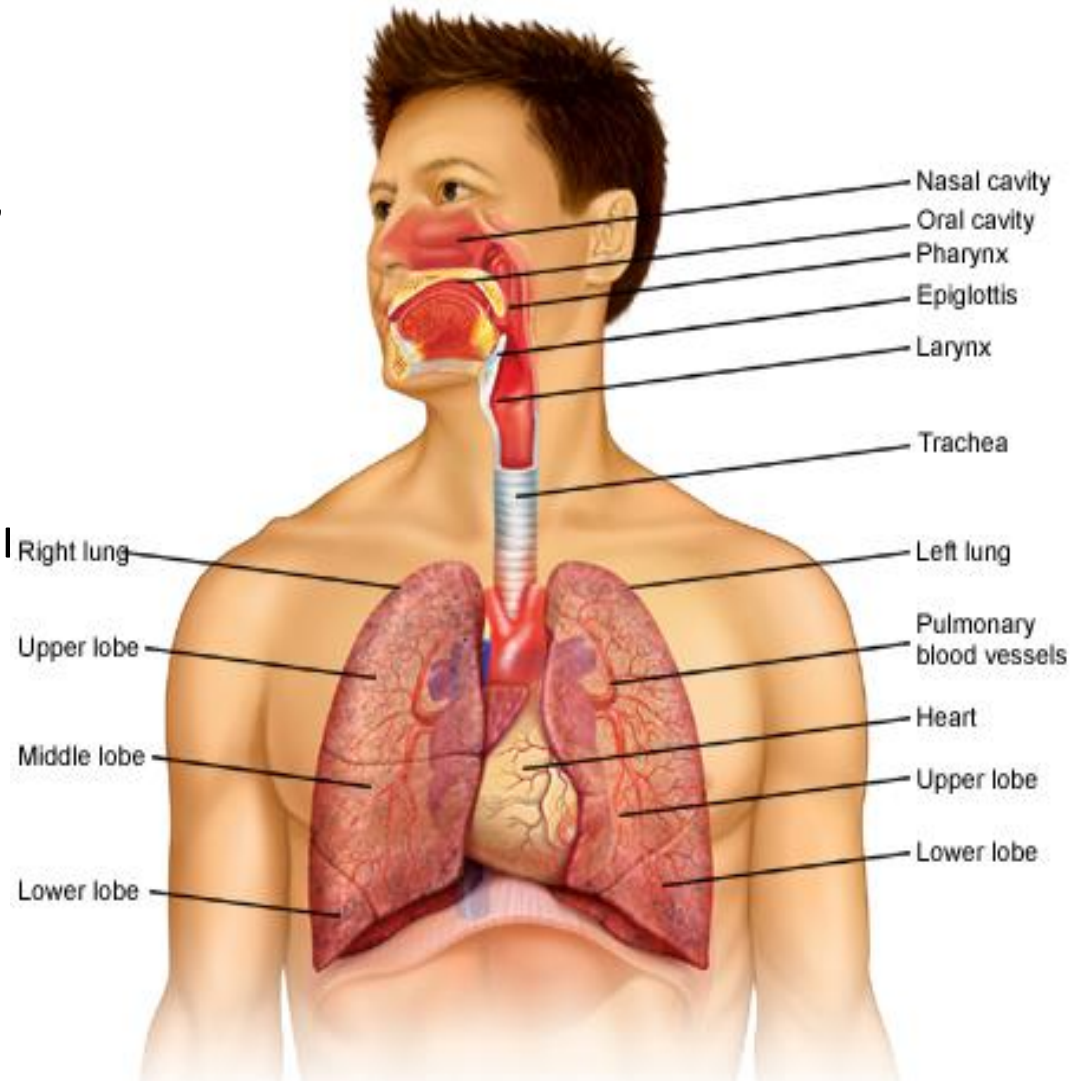
4- Respiratory System

Components

Nose, larynx, trachea, bronchi and lungs

Functions

Exchange of respiratory gases (O_2 and CO_2)
Between blood and atmosphere
Voice production



5- Digestive System

Components

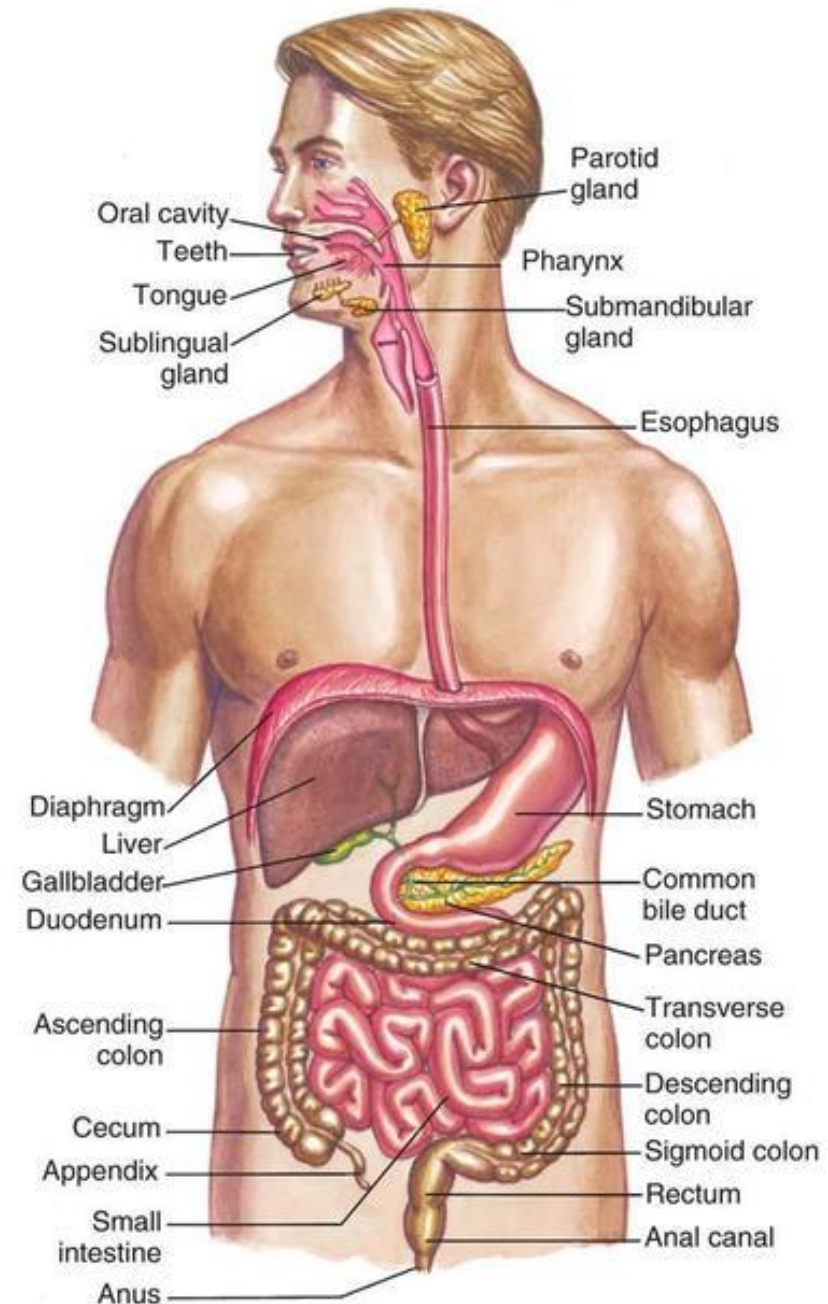
Alimentary canal (mouth, pharynx, esophagus, stomach, small intestine, large intestine)

Accessory structures(liver, saliv glands, etc.)

Functions

Break down food into small, absorbable pieces

Eliminate waste



6- Urinary System

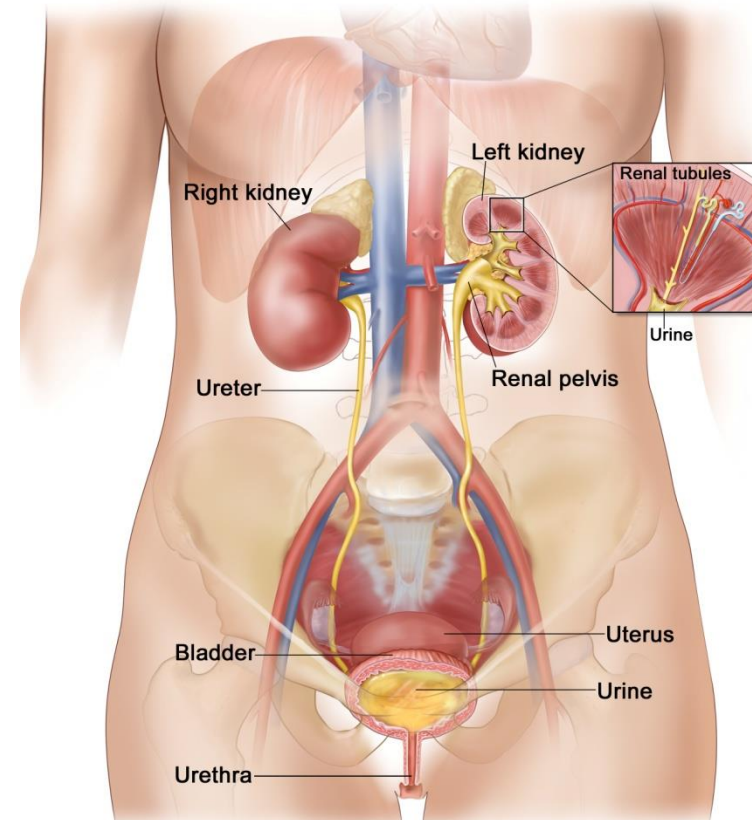
Components

Kidneys, Ureters, Urinary bladder and Urethra

Functions

Eliminate waste (nitrogen) from blood

Regulates water, electrolytes, acid/base



7- Reproductive System

Components

Male Reproductive System:

Scrotum, testis, epididymis, vas deferens, seminal vesicles, ejaculatory ducts and prostate

Female Reproductive System:

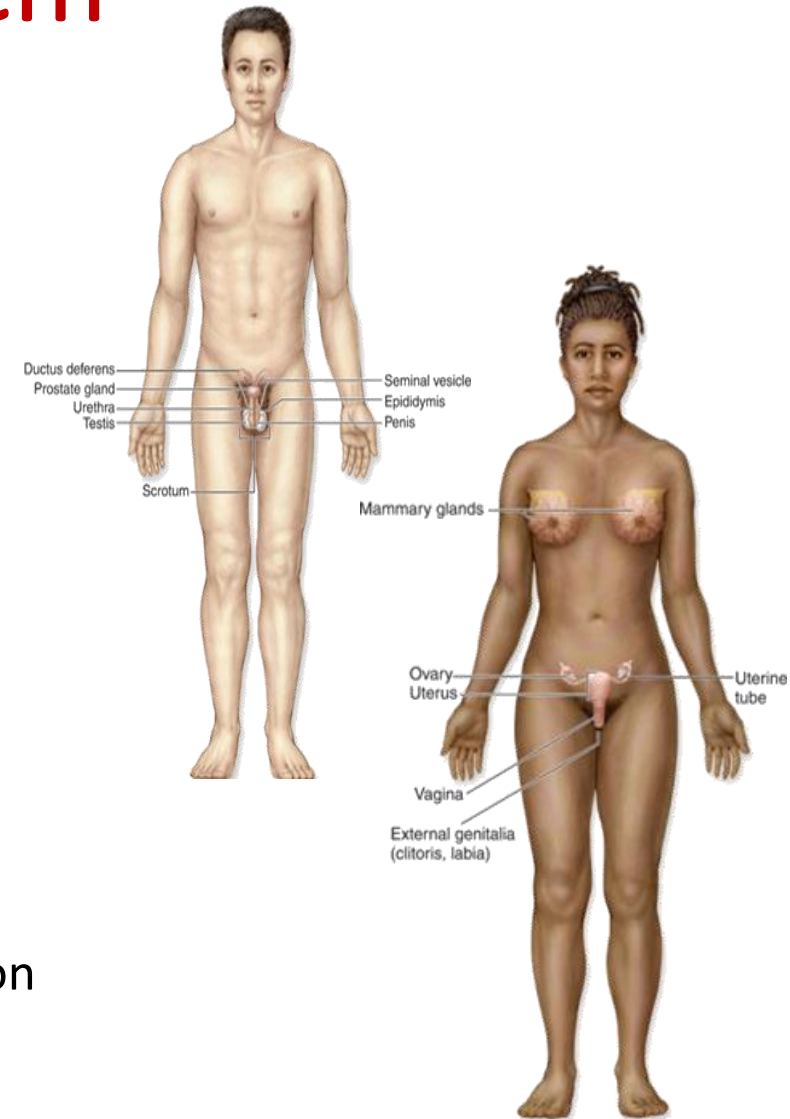
Ovaries, Fallopian tubes, uterus, vagina, vulva and Breast (Mammary glands)

Functions

Perpetuation of the kind

Hormones influence structure and function

Sexually dimorphic kind



8- Nervous System

Components

Brain, Spinal cord (CNS)

Nerves (PNS), sense receptors

Functions

Control system (fast, “hard wired”)

Response to external and internal environments



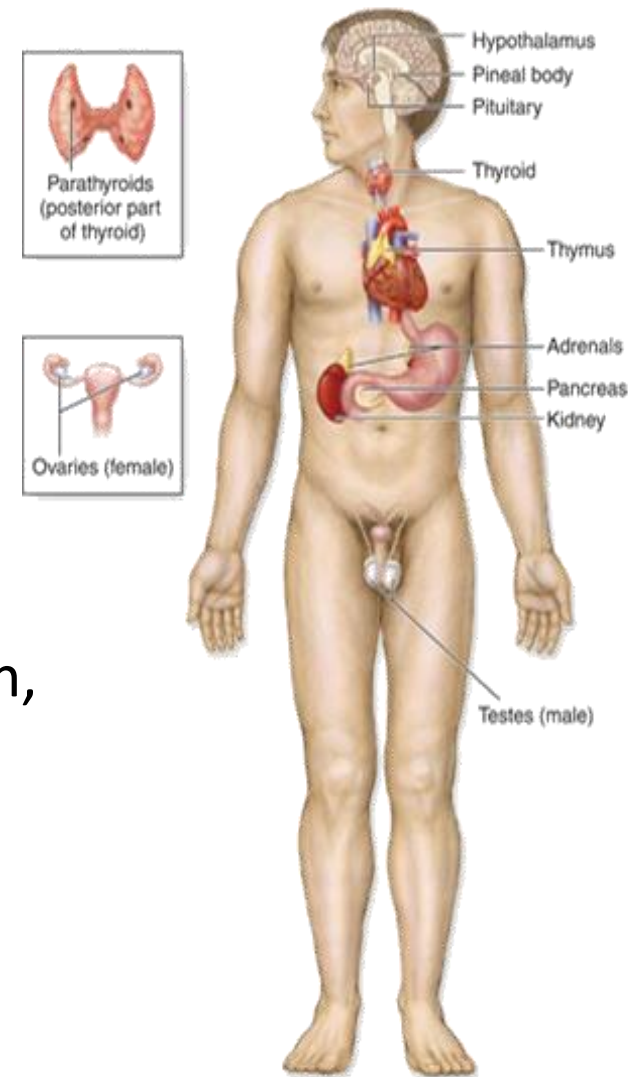
9- Endocrine System

Components

Glands that secrete hormones:
Hypothalamus, pituitary, pancreas,
thyroid, adrenal and gonads

Functions

Control system (slow, “chemical”)
Regulates processes such as growth,
reproduction and nutrient use



10- Lymphatic System

Components

Lymphatic Organs (spleen, lymph nodes, thymus, etc.)

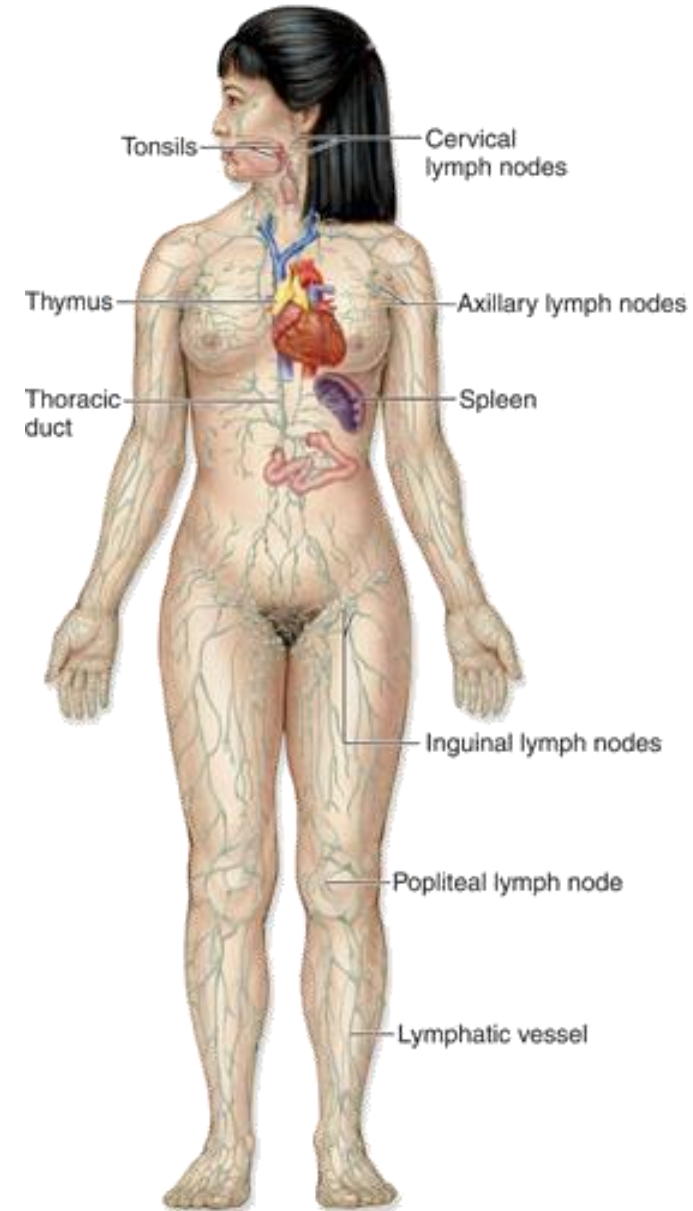
Lymphatic Vessels

Functions

Transportation of lymph

Lymphatic organs play an important part in the immune system

Houses white blood cells



11- Integumentary System

Components

Skin

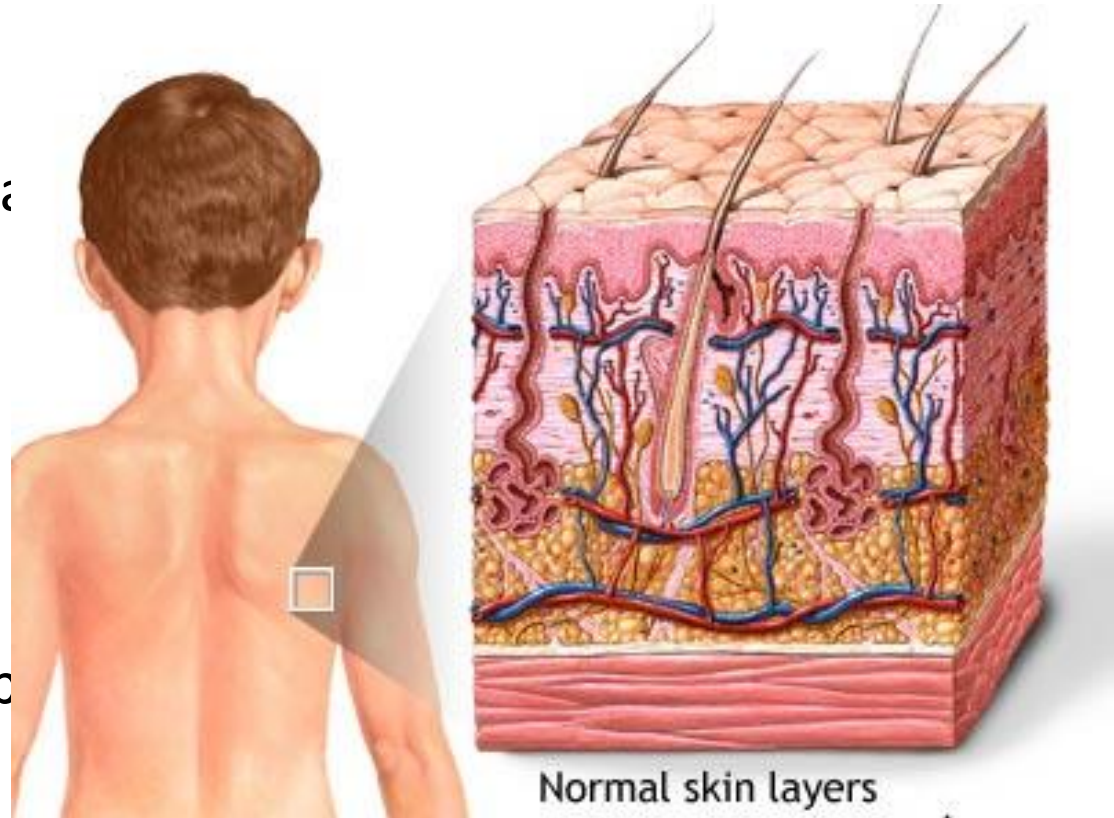
Skin derivatives: hair, nails, sweat and sebaceous glands.

Functions

External covering

Protection

Location of Sense receptors



References

- 1- Gray's Anatomy: the anatomical basis of clinical practice, forty first edition
- 2- Last's Anatomy Regional and Applied by Chummy S. Sinnatamby, twelfth edition.
- 3- Clinical Anatomy by region by Richard S. Snell, eighth edition

Thank you