INTRODUCTION TO GROSS ANATOMY

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What is gross anatomy?

The study of the gross structure of the human body with the naked eyes and as well as microscopy.

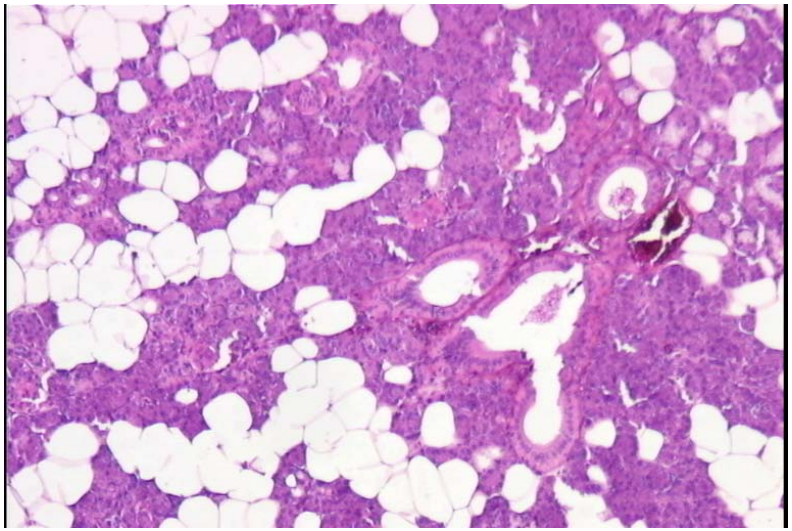
Why study anatomy?

- Anatomy is one of the basis for the practice of medicine
- It leads the physician towards an understanding of a patient's disease
- It helps in making diagnosis and in planning treatment.

Divisions of anatomy

Gross Anatomy
(Macroscopic Anatomy)

Histology
(Microscopic Anatomy)



How can anatomy be studied?

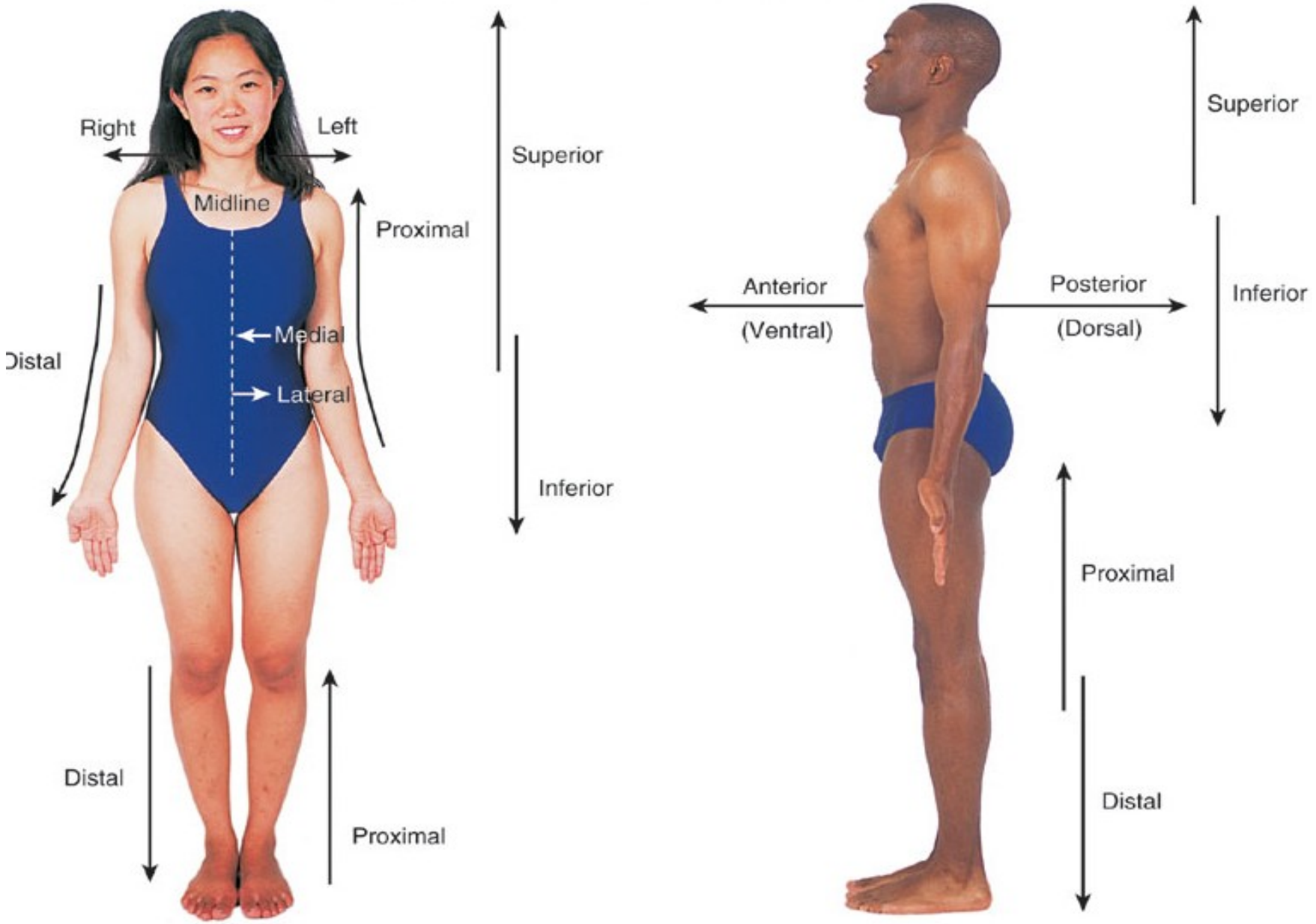
1. **Regional Anatomy**: Each region of the body is studied separately, and all aspects of that region are studied at the same time
2. **Systemic Anatomy**: Each system of the body is studied and followed throughout the entire body.

ANATOMICAL POSITION

Anatomical position is when

- The person is **standing erect**
- The **upper-limbs** are **by the sides**, with the **palm** of the **hands** facing **forwards**
- The **head, eyes, and toes** directed **forward**
- **Lower limbs** are together with the **feet** directed **anteriorly**

ANATOMICAL POSITION



ANATOMICAL PLANES and SECTIONS

- It is often useful to show a figure of a sectioned/cut human body or organ.

SECTION - refers to a part cut along a plane.

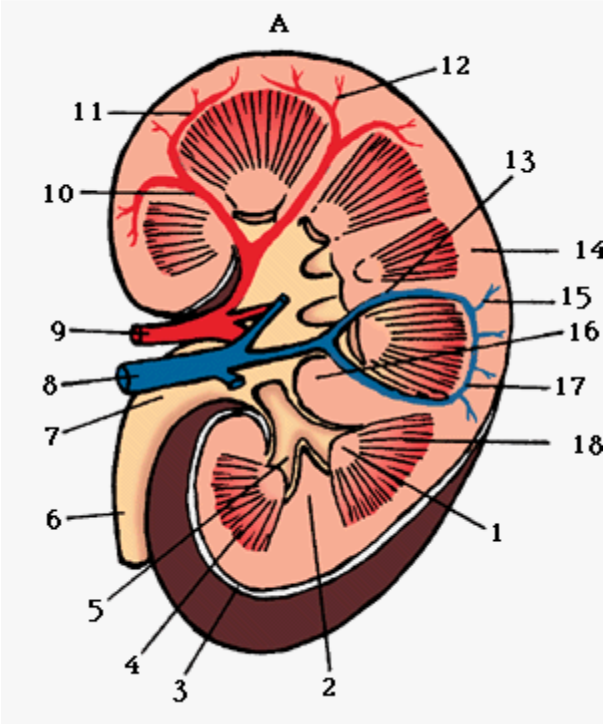
- 3 Types of sections;
  i. Transverse section
  ii. Longitudinal section
  iii. Oblique section

ANATOMICAL SECTIONS

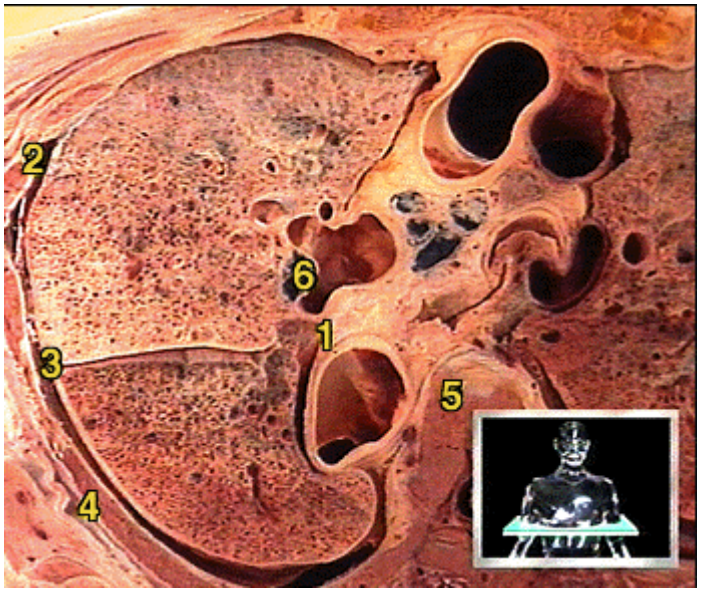
- Transverse section – (also called cross-section) refers to a part cut crosswise/ "width wise"
- Longitudinal section – is a cut made along the long axis (length wise) of the organ.
- Oblique section – refers to a cut which is neither longitudinal nor transverse.

ANATOMICAL SECTIONS

Longitudinal section of kidney



Transverse section of lungs



Limitations of anatomical section

- The term is limited in its usefulness because it does not tell us how the cut was made.
  - was the cut made from "top-to-bottom" or front-to-back" or "side-to-side"?

- This is the reason why we have **anatomical planes**

ANATOMICAL PLANES

- Overcomes the limitation of anatomical sections by indicating the direction of the cut
- Geometrical concept referring to an imagined flat surface.
- They are used to describe the sections of the body.

- There are 3 main anatomical planes:
  i. Sagittal plane
  ii. Coronal plane (also called Frontal plane)
  iii. Horizontal plane (also called Transverse plane)

ANATOMICAL PLANES

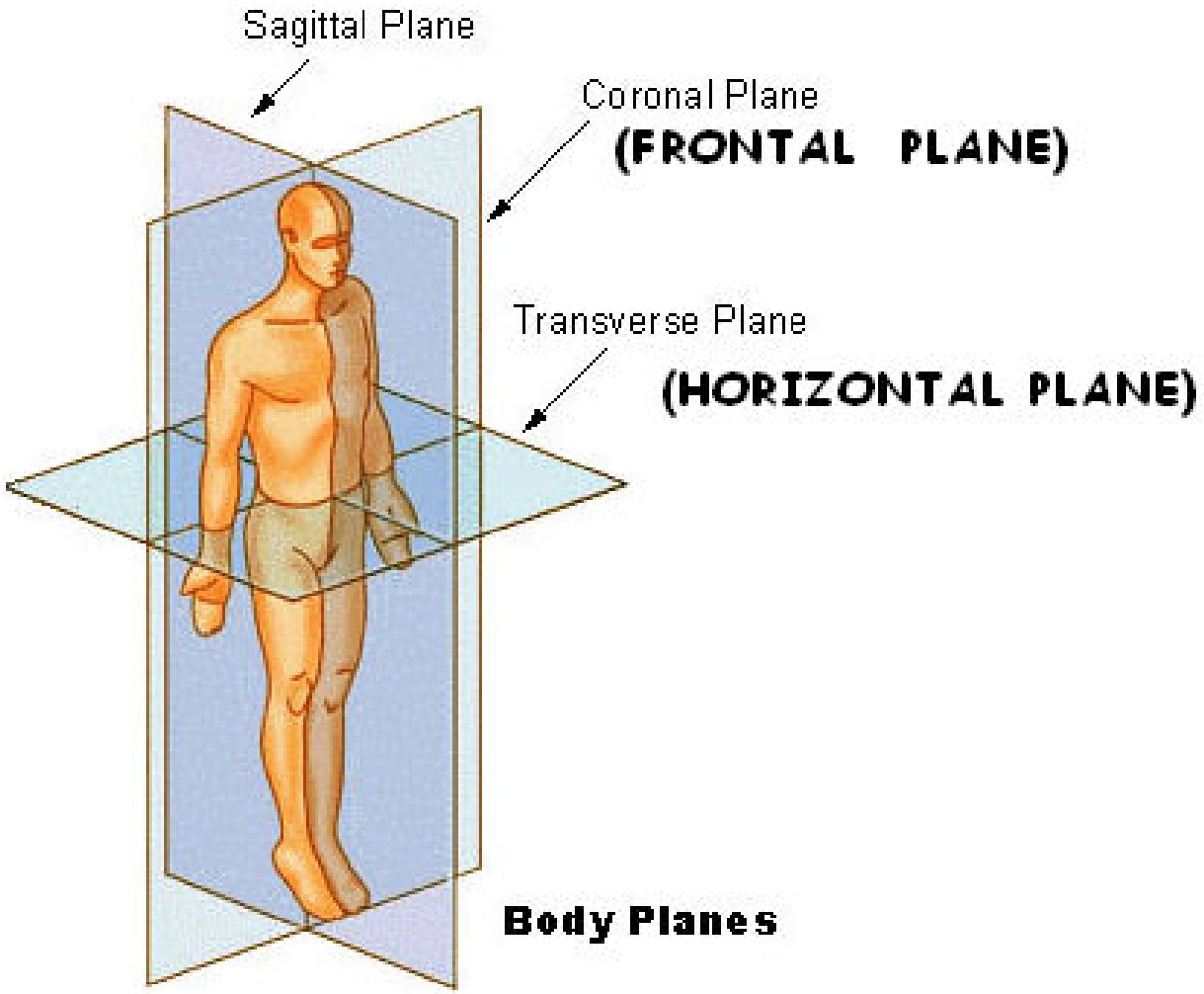
- Sagittal plane – it is an imaginary vertical plane (extending from front to back and top to bottom), dividing the body into left and right portions.
- Variances of sagittal plane
  - Midsagittal plane – (also called Median plane) refers to a sagittal plane that divides the body into exactly equal right and left portions.
  - Parasagittal – any plane parallel to the medial plane (often used by neurologists)

ANATOMICAL PLANES (Contd)

- Frontal plane – (also called the coronal plane)
  - A vertical plane passing through the body (at right angles to sagittal plane) and divides the body into front (anterior) and back (posterior) portions

- Horizontal plane – (also called transverse plane)
  - It divided the body into top (superior) and bottom (inferior) portions

ANATOMICAL PLANES



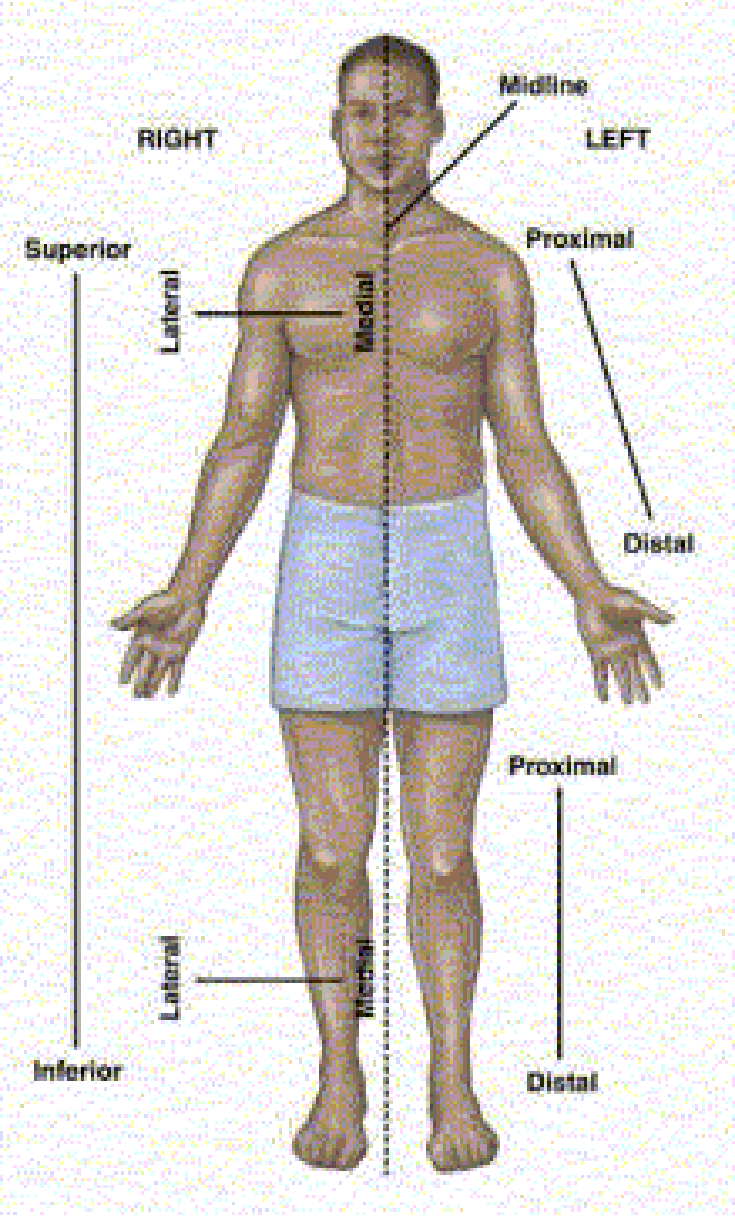
ANATOMICAL DIRECTIONS

- Used to locate structures in the body.

ANATOMICAL DIRECTIONS

- LEFT - To the left of the body (not your left, the subject's) e.g. The stomach is to the left of the liver
- RIGHT – To the right of the body or structure being studied. e.g. The right kidney is damaged
- LATERAL – Toward the side; away from the midsagittal plane. e.g. The eyes are lateral to the nose.
- MEDIAL – Toward the midsagittal plane; away from the side e.g. The eyes are medial to the ears.

ANATOMICAL DIRECTIONS



ANATOMICAL DIRECTIONS

- ANTERIOR :- Toward the front of the body .e.g. The nose is on the anterior aspect of the head.
- POSTERIOR :- Toward the back (rear) of the body e.g. The heel is posterior to the toes.
- SUPERIOR :- Toward the top of the body e.g. The shoulders are superior to the hips.
- INFERIOR:-Toward the bottom of the body e.g. The ankles are inferior to the knees.

ANATOMICAL DIRECTIONS

- DORSAL – Along (or toward) the vertebral surface of the body. e.g. Her scar is along the dorsal surface.
- VENTRAL – Along (toward) the belly surface of the body. e.g. The navel is on the ventral surface.
- CAUDAD (caudal) – Toward the tail. e.g. The neck is caudad to the skull.
- CEPHALAD –Toward the head e.g. The neck is cephalad to the tail.

ANATOMICAL DIRECTIONS

- DEEP – Toward the inside of a part; away from the surface
- e.g., the thigh muscles are deep to the skin

- SUPERFICIAL – Toward the surface of a part; away from the inside. e.g., the skin is a superficial organ

- MEDULLARY – Refers to an inner region, or medulla e.g., the medullary portion of the kidney contains the calyces

- CORTICAL – Refers to an outer region, or cortex. e.g., the cortical area of the kidney contains glomeruli

BODY CAVITIES

- DORSAL BODY CAVITIES – are cavities in the "back" half of the body

- 2 main groups;

  1. CRANIAL CAVITIES

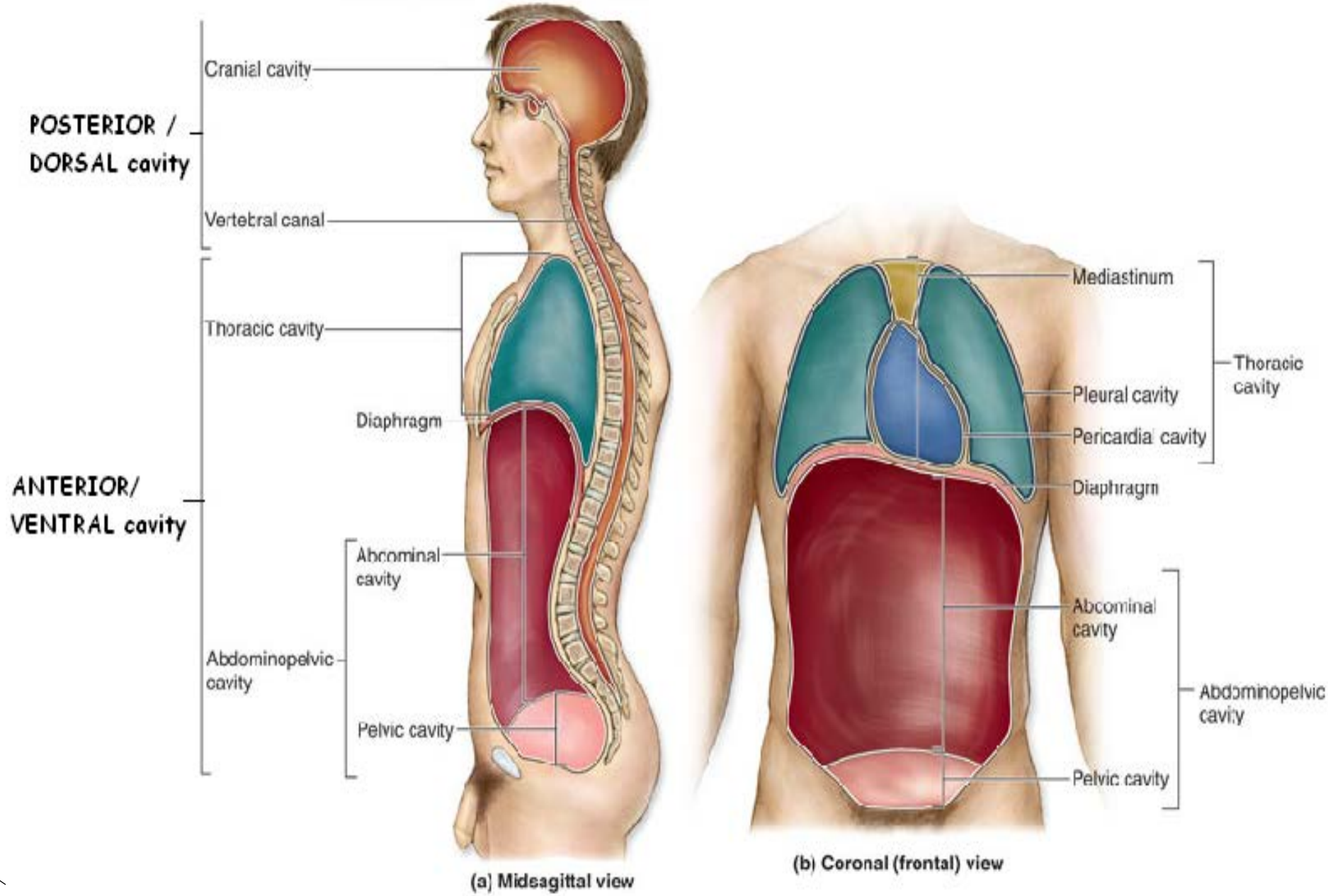
  2. SPINAL CAVITY

DORSAL BODY CAVITIES

- CRANIAL CAVITIES – Within the skull
  Contains the brain

- SPINAL CAVITY – Within the vertebral column
  Contains the spinal cord

BODY CAVITIES



BODY CAVITIES

- VENTRAL BODY CAVITIES – are cavities in the "front" half of the body. Have six main groups;

1. THORACIC CAVITY
    i. PLEURAL CAVITY
    ii. MEDIASTINUM
2. ABDOMINOPELVIC CAVITY
    i. ABDOMINAL CAVITY
    ii. PELVIC CAVITY

VENTRAL BODY CAVITIES

- Thoracic cavity – within the rib cage. Contains the pleural cavities and the mediastinum
  i. Pleural cavities – Left one third and right one third of the thoracic cavity. Contains the lung
  ii. Mediastinum – Middle one third of thorax . Contains the Heart, Trachea and the Oesophagus

VENTRAL BODY CAVITIES

- Abdominopelvic cavity – From the diaphragm to the bottom of the trunk. Made up of the following cavities

    i. Abdominal cavity – From the diaphragm to the rim of the pelvic bones contains stomach, liver, most of the intestines, pancreas, spleen and kidneys

    ii. Pelvic cavity – From the pelvic rim to the floor of the trunk contains portions of the intestines, ovaries, uterus, urinary bladder.

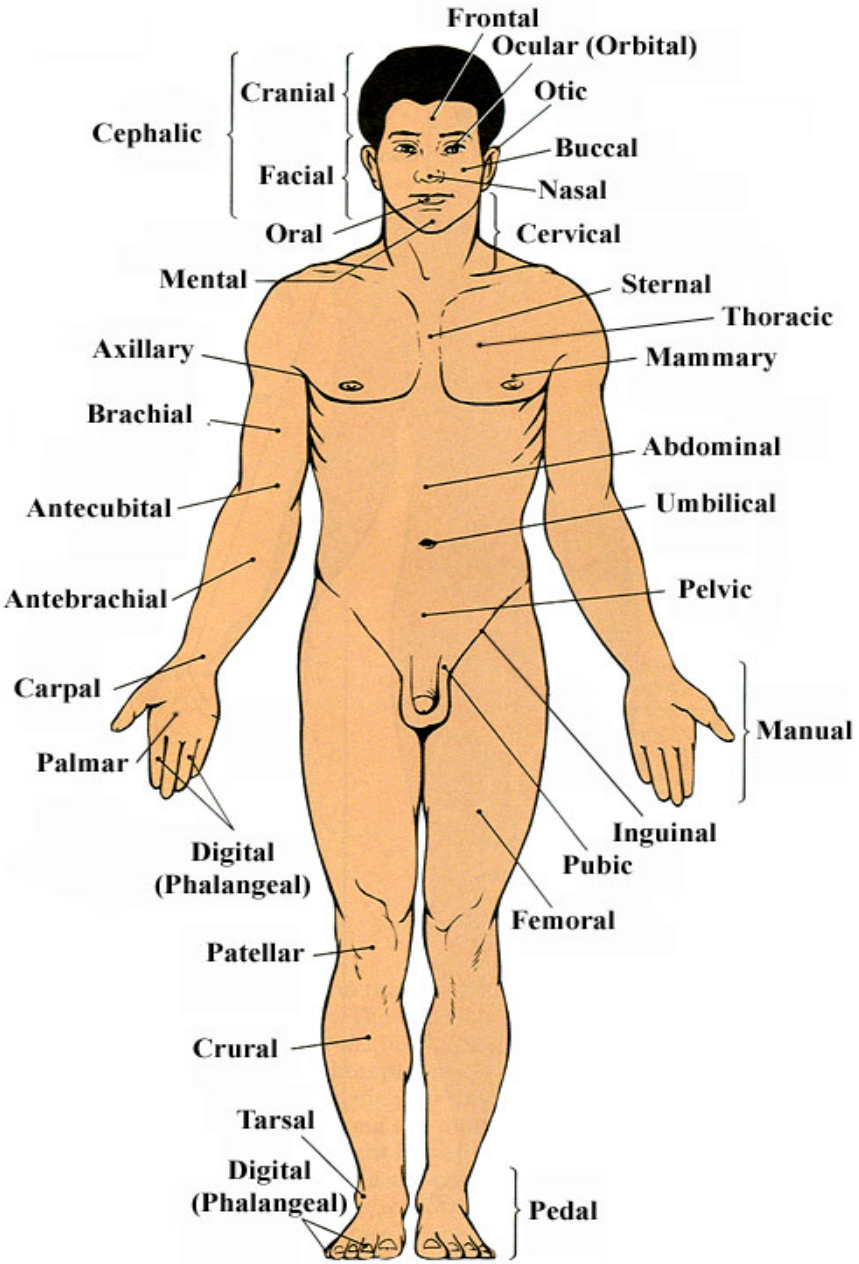
SURFACE REGIONS

- Special terms used to describe specific regions of the body

SURFACE REGIONS: Anterior Aspect

1. ABDOMINAL – Area overlying the abdominal cavity
2. ANTEBRACHIAL – forearm
3. AXILLARY – Armpit
4. BRACHIAL – Upper arm
5. BUCCAL – cheek
6. CARPAL – wrist
7. CERVICAL – Neck
8. COXAL - Hip
9. CRURAL – Anterior lower legs (shin)
10. CUBITAL – Anterior elbow joint
11. FEMORAL – Upper leg (thigh)
12. MENTAL – Chin
13. ORBITAL – Eye
14. PATELLA – Anterior knee joint
15. PUBIC – Lower front of trunk, between legs
16. TARSAL – ankle
17. THORACIC - Chest

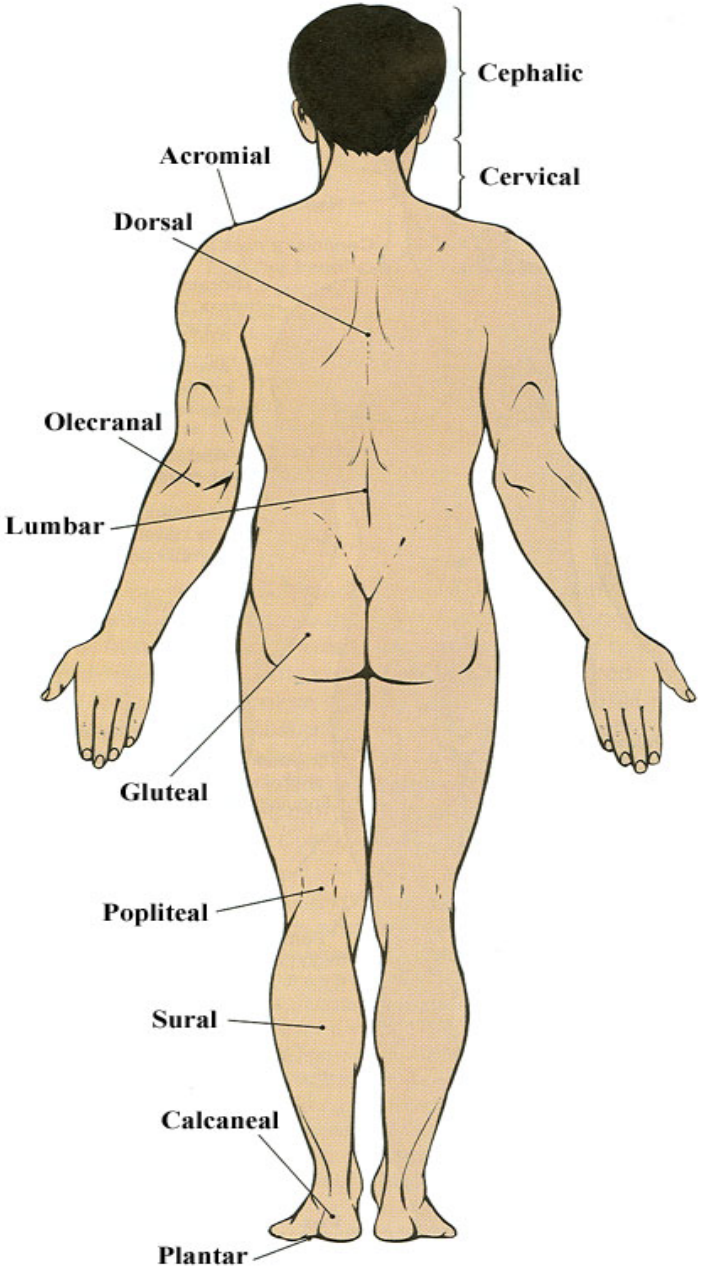
Surface regions: Anterior aspect



SURFACE REGIONS: POSTERIOR ASPECT

1. CERVICAL – Neck
2. GLUTEAL – Buttocks
3. LUMBAR – lower back
4. OCCIPITAL – Posterior of head
5. POPLITEAL – Posterior knee joint
6. SCAPULAR – shoulder blade
7. SURAL – calf
8. THORACIC – upper back

Surface regions: Posterior aspect



MOVEMENTS

- Movements take place at joints where two or more bones or cartilages articulate with one another.

The different types of movements are;

1. FLEXION
2. EXTENSION
3. DORSIFLEXION
4. PLANTARFLEXION
5. ABDUCTION
6. ADDUCTION
7. ROTATION – MEDIAL and RADIAL ROTATION
8. OPPOSITION

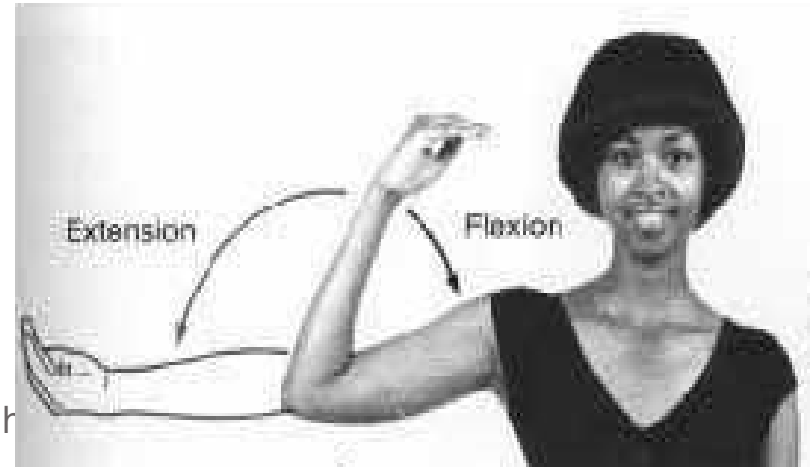
MOVEMENTS

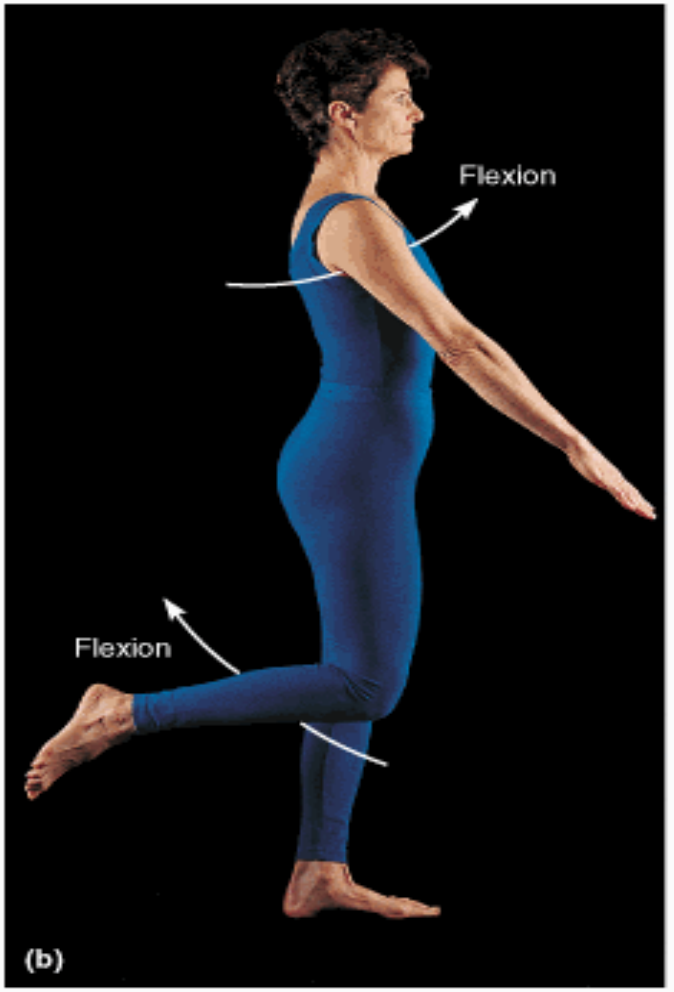
9. PROTRACTION
10. RETRACTION
11. ELEVATION
12. DEPRESSION
13. EVERSION
14. INVERSION
15. PRONATION
16. SUPINATION

MOVEMENTS

- FLEXION – Bending or decreasing the angle between the bones or parts of the body.

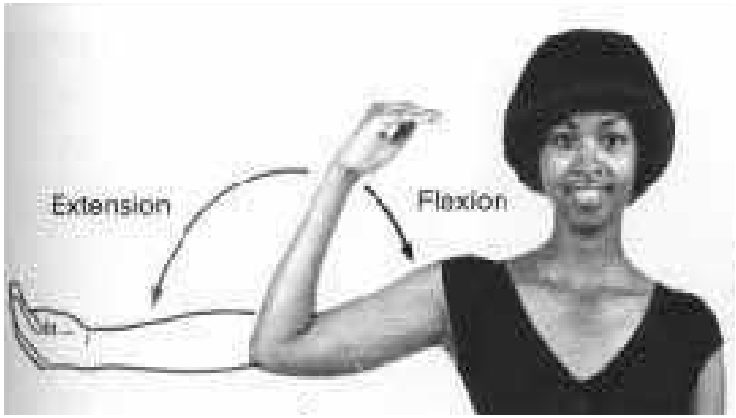
E.g., Flexion of the upper limb at elbow joint is an anterior bending; Flexion of the knee at the knee joint is a posterior bending.



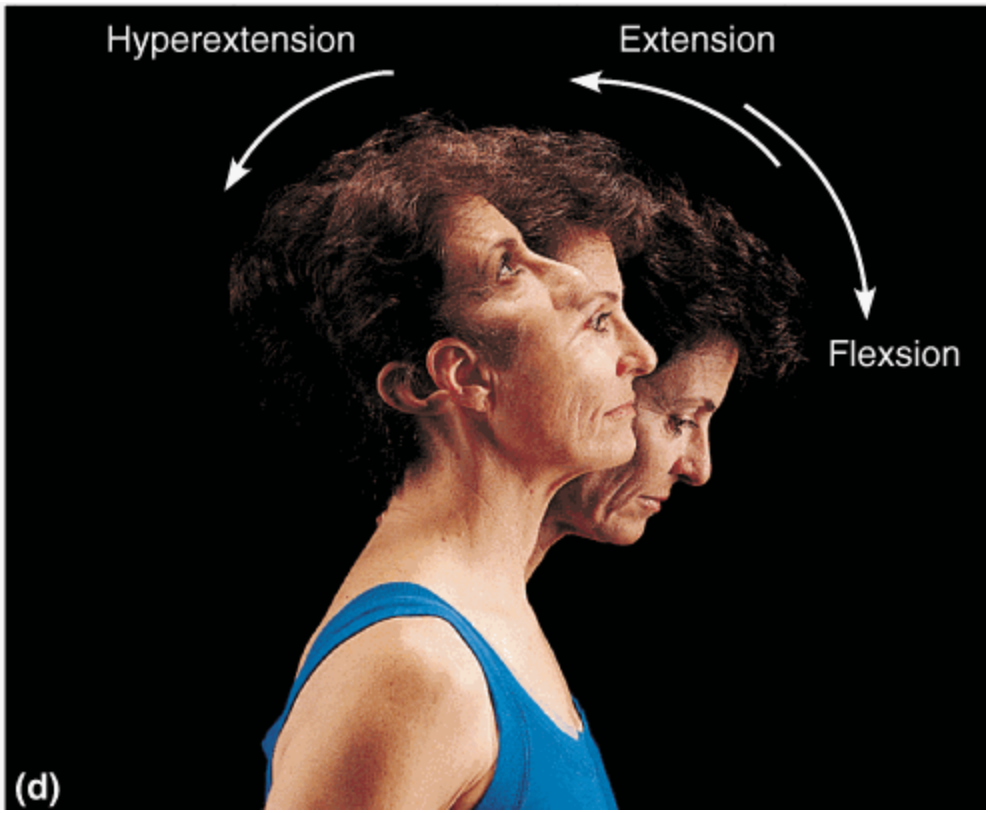


MOVEMENTS

- EXTENSION – indicates straightening or increasing the angle between the bones or parts of the body. e.g. Extension at elbow joint occurs at posterior direction. Extension at knee joint occurs in anterior direction.
- HYPEREXTENSION – (OVER EXTENSION beyond anatomical limit) - can cause injury e.g., Whiplash – hyperextension of the neck during rear- end automobile collision.



MOVEMENTS - EXTENSION



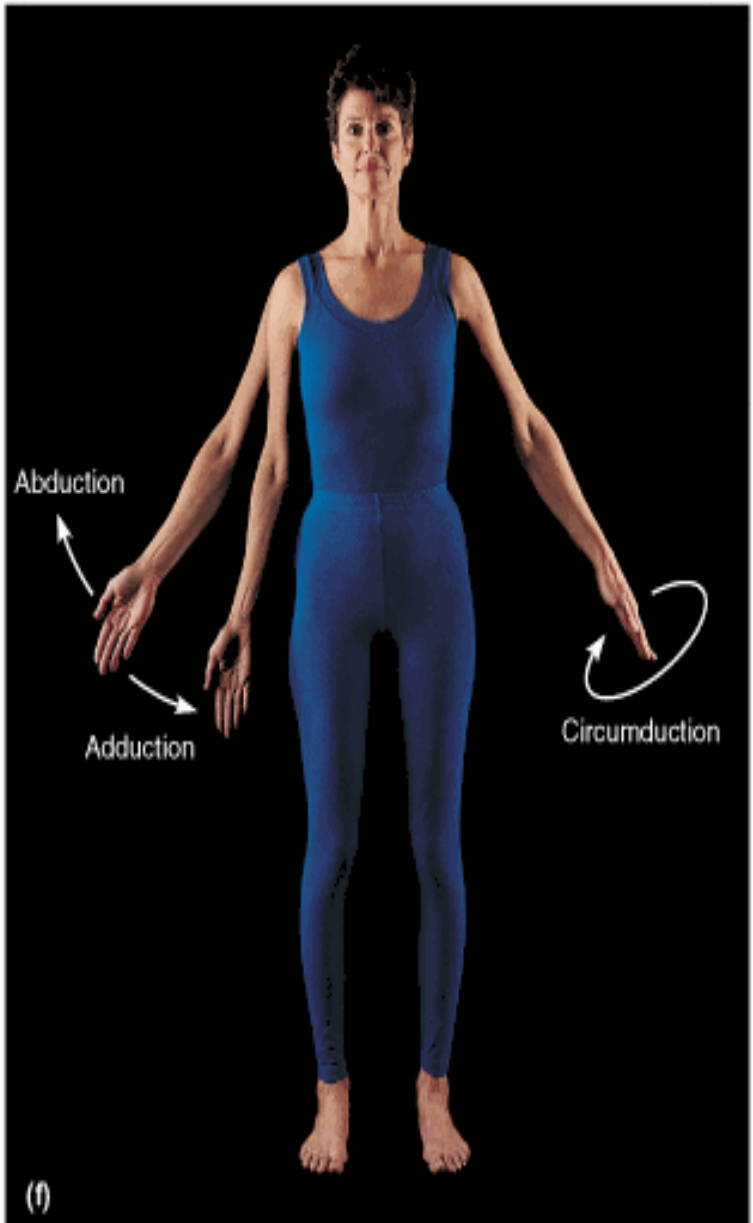
MOVEMENTS

- DORSIFLEXION – **Flexion at the ankle joint**, as occurs when walking uphill or lifting the toes off ground
- PLANTARFLEXION – **Turns the foot or toes** toward the **plantar surface**.

  E.g., When standing on your toes)

MOVEMENTS

- ABDUCTION – means moving away from body midline. E.g., Moving an upper-limb away from the side of the body.
- ADDUCTION – means moving toward the body midline
  E.g., Moving an upper-limb toward the side of the body.

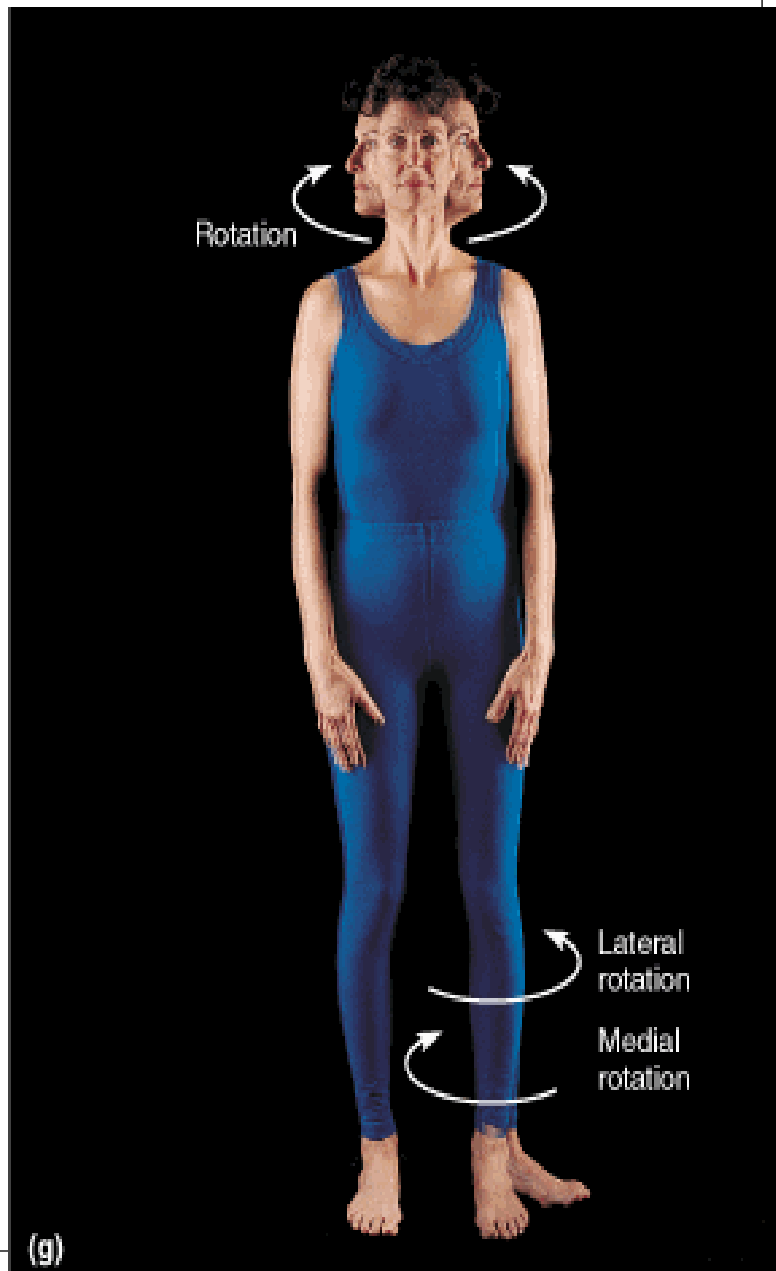


MOVEMENTS

- ROTATION – involves turning or revolving a part of the body around its longitudinal axis

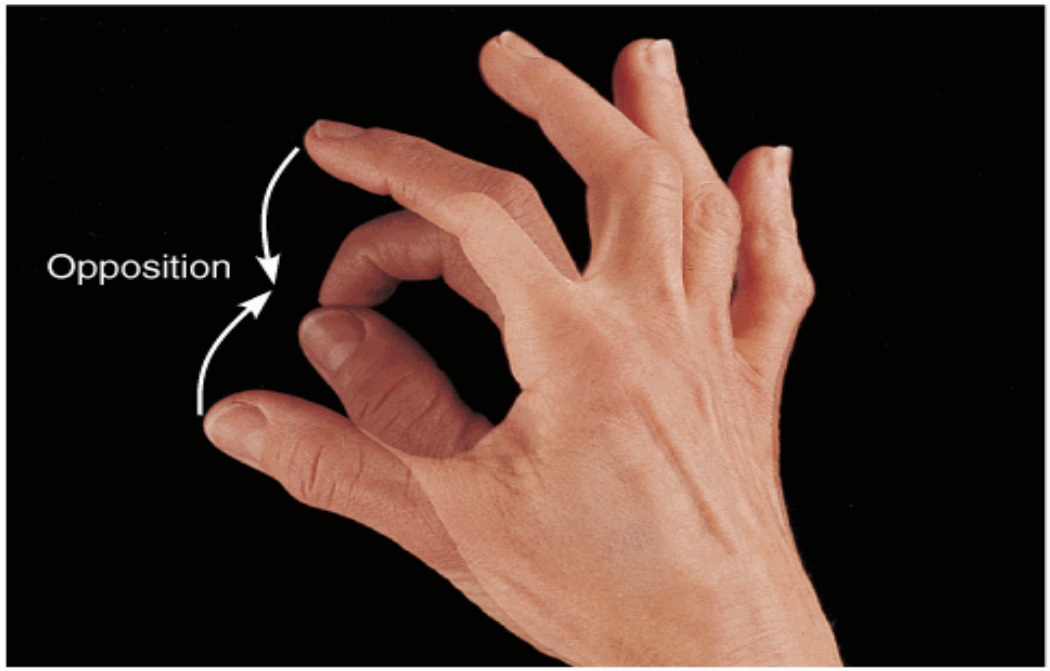
(E.g., turnings one's head to the side)

- MEDIAL ROTATION – Rotation toward the midline of the body.
- LATERAL ROTATION – Rotation away from the midline of the body



MOVEMENTS

- OPPOSITION – Seen only in the hand. It is the movement by which the pad of the thumb is brought to another digit pad. E.g. We use this movement to pinch, button a shirt.



(e) Opposition

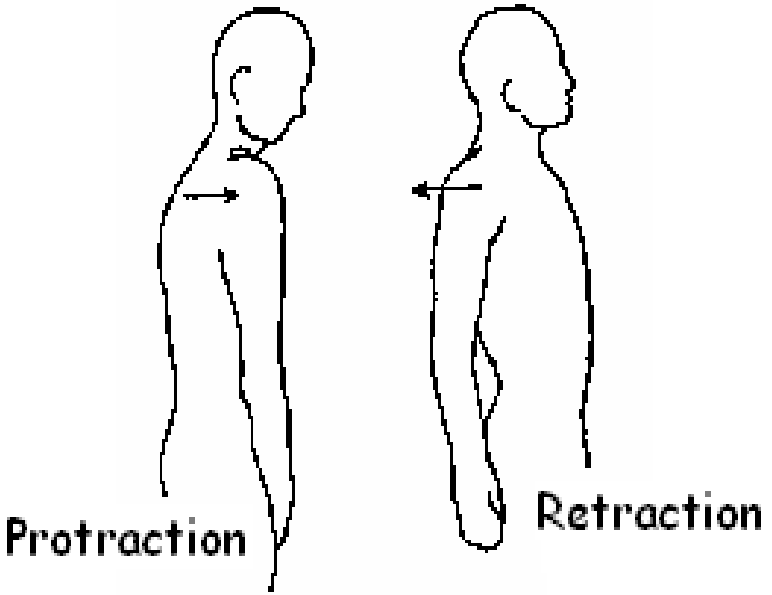
MOVEMENTS

- PROTRACTION – Anterior (forward) movement.
  E.g., Sticking the chin out.

- RETRACTION – Posterior (backward) movement.
  E.g., Tucking the chin in.

MOVEMENTS

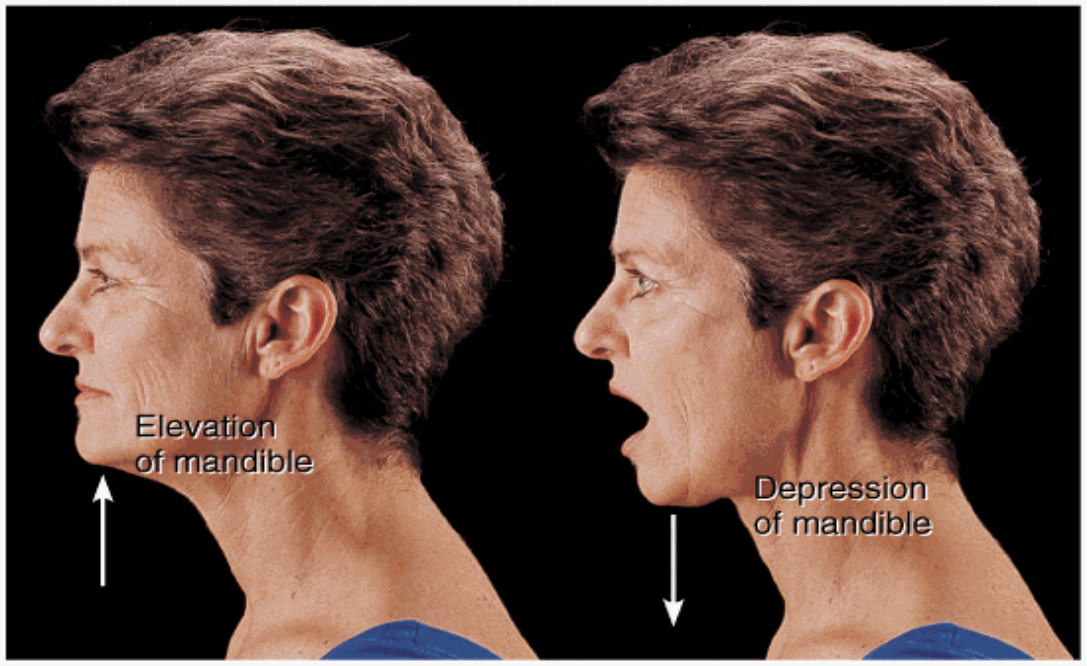
- PROTRACTION- (SCAPULAR ABDUCTION) Shoulder girdle moves forward to or from anatomical position.
- RETRACTION – (SCAPULAR ADDUCTION) Shoulder girdle moves backward from anatomical position.



MOVEMENTS

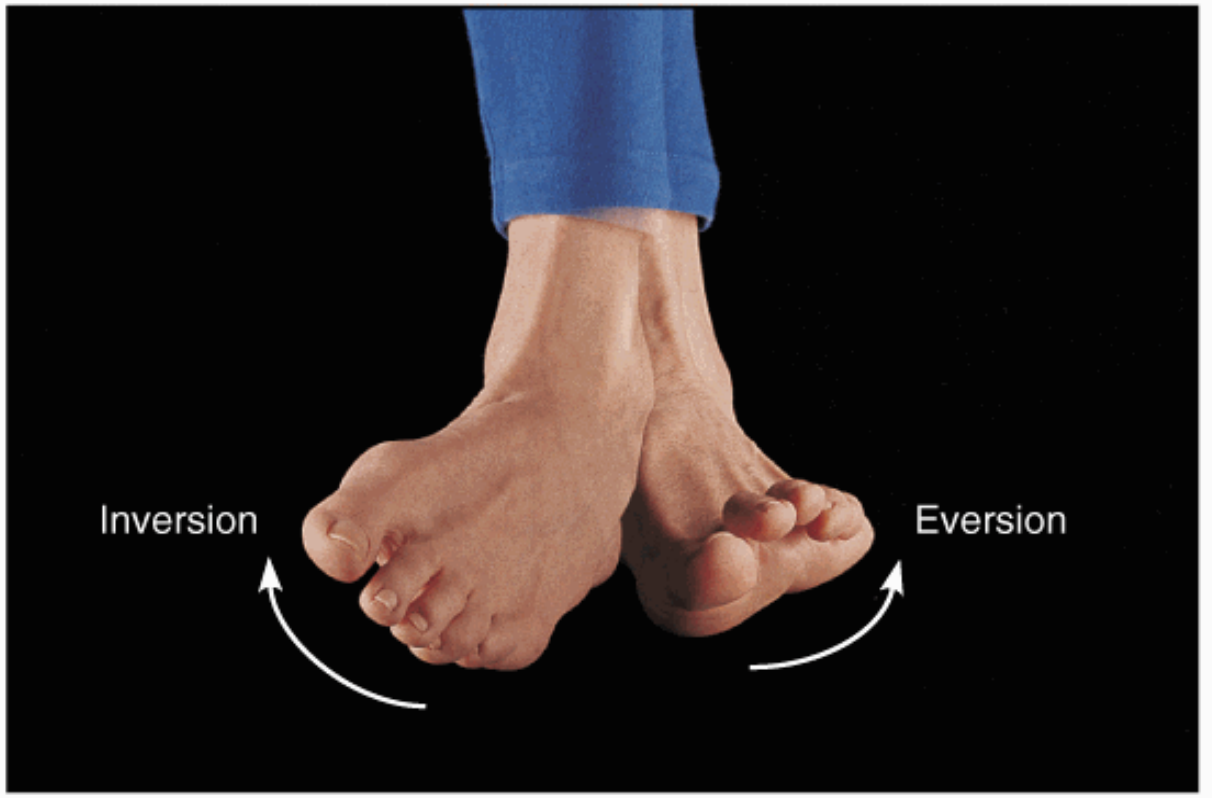
- ELEVATION – Raises or moves a part superiorly (upward) E.g. Elevating the shoulders when shrugging.

- DEPRESSION – Lowers or moves a part inferiorly .
  E.g. Depressing the shoulders when standing at ease.



MOVEMENTS

- EVERSION – **Lateral** (outward) **rotation** of sole of foot.
- INVERSION – **Medial** (inward) **rotation** of the sole of foot.

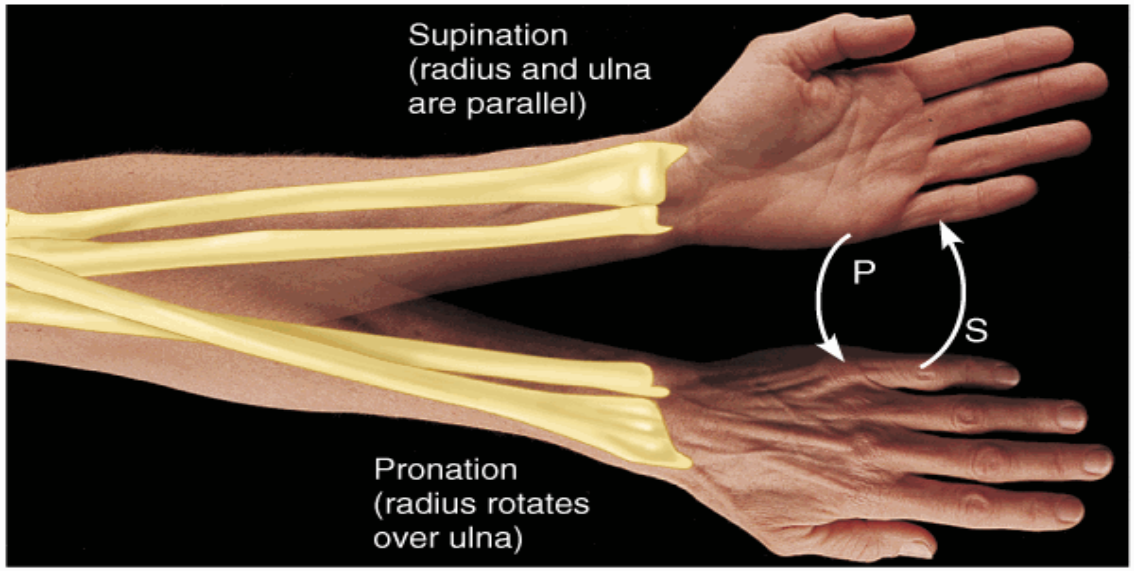


(b) Inversion and eversion

MOVEMENTS

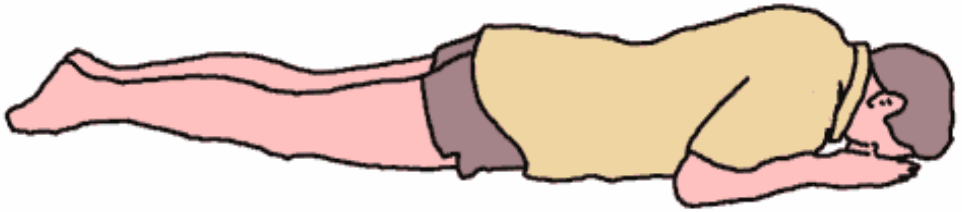
- PRONATION – Movement of the forearm and hand so that the it is rotated medially along the longitudinal axis - so that the palm of the hand faces posteriorly (backward)

- SUPINATION – Movement of the forearm and hand so that it is rotated laterally along the longitudinal axis – so the palm of the hand faces anteriorly (frontward). This is the anatomical position of the forearm and the hand

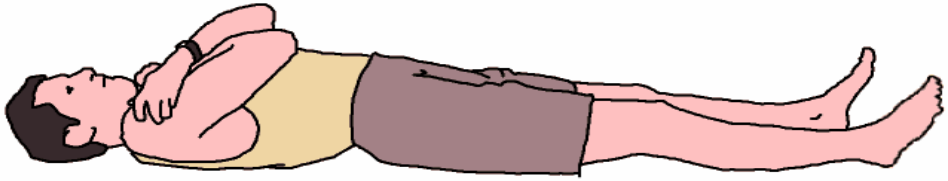


Positioning

- PRONE – Face down



- SUPINE – Face up



JOINTS

- Is an articulation, the place of union or junction between two or more bones or parts of bones of the skeleton
  - They show a variety of form and function
    - some joints have NO movements
    - some allow slight movements
    - some are freely movable

JOINTS

- CLASSIFICATION OF JOINTS : Classified according to the manner or type of material by which the articulating bones are united. There are three types;

1. SYNOVIAL JOINTS
2. FIBROUS JOINTS
3. CARTILAGENOUS JOINT

JOINTS

1. SYNOVIAL JOINTS

- Are movable joints containing lubricating fluid called synovial fluid.

- 3 main parts of a synovial joint;
    i) Joint cavity
    ii) Bone ends covered with articular cartilage (made of hyaline cartilage)
    iii) Articular Capsule; This encloses the articulating surfaces and joint cavity. They are lined by synovial membranes

TYPES OF SYNOVIAL JOINTS

- SIX types of synovial joints;

  Classification is according to the shape of articulating surface and/or type of movement they permit

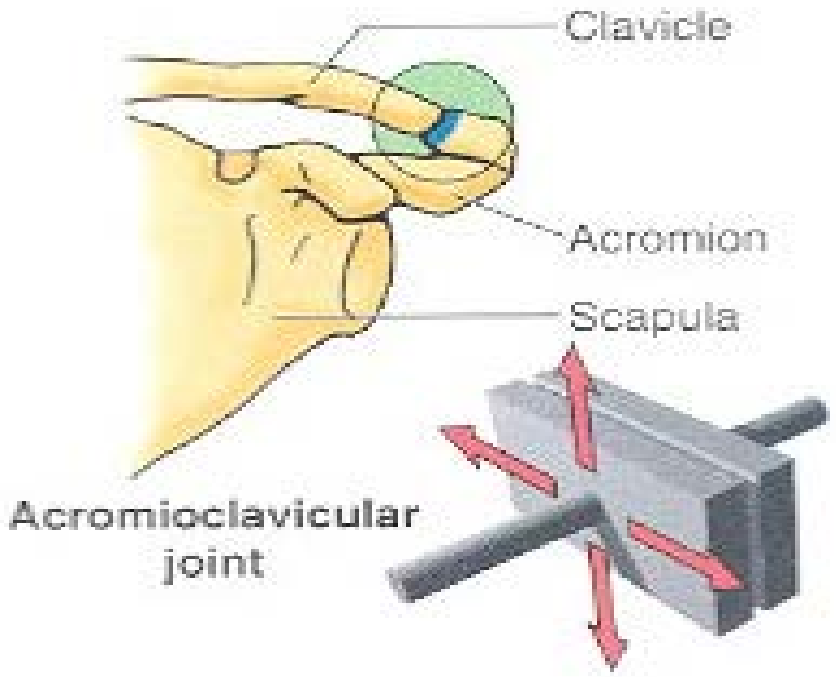
1. PLANE JOINT
2. HINGE JOINTS
3. SADDLE JOINTS
4. CONDYLOID JOINTS
5. BALL AND SOCKET JOINT
6. PIVOT JOINT

SYNOVIAL JOINTS

1. **PLANE JOINTS**

- Usually uniaxial
- Permits gliding or sliding movements

E.g. acromiumclavicular joint



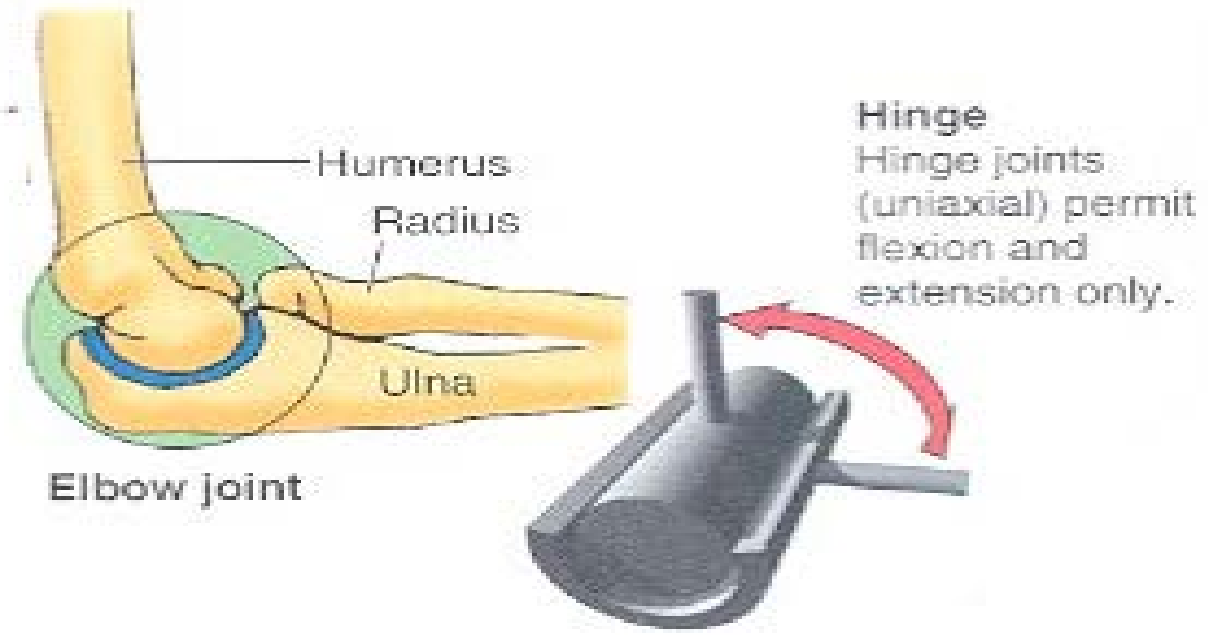
Plane
Plane joints (usually uniaxial) permit gliding or sliding movements.

SYNOVIAL JOINTS

2. **HINGE JOINT**

- Uniaxial joint
- Permits flexion and extension only

  E.g. Elbow joint

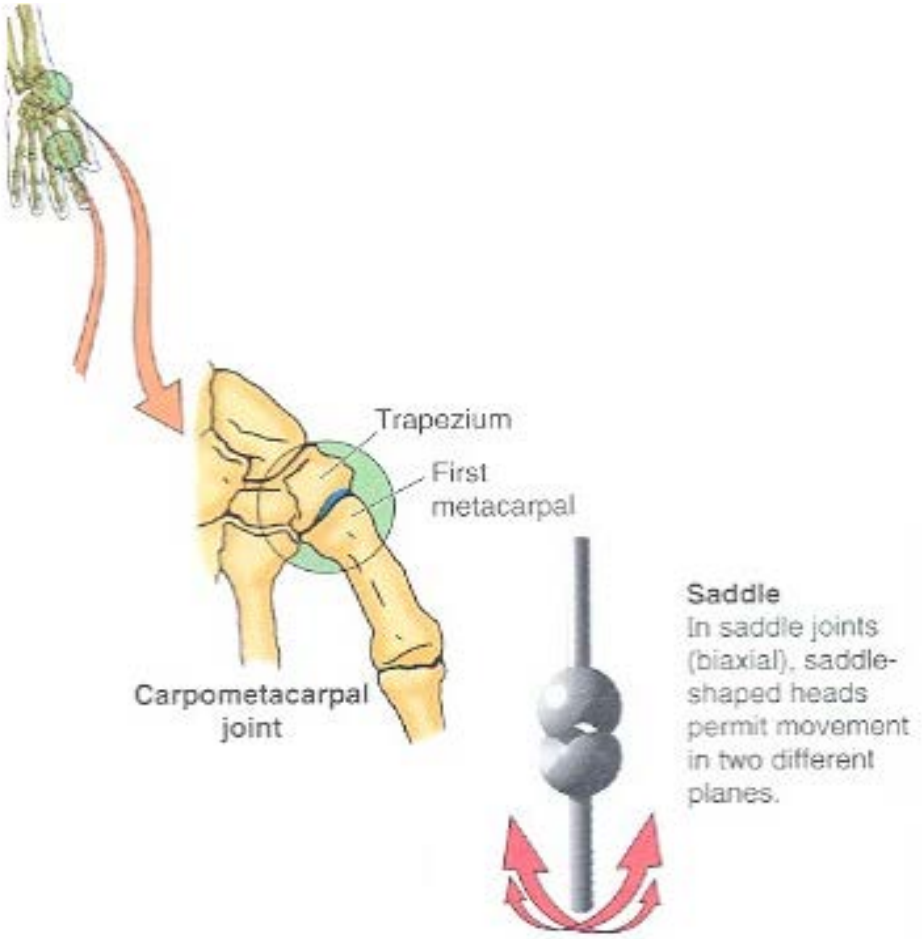


SYNOVIAL JOINTS

3. **SADDLE JOINT**

- Biaxial
- Saddle-shaped heads permit movement in two different planes.

  E.g. Carpometacarpal joint



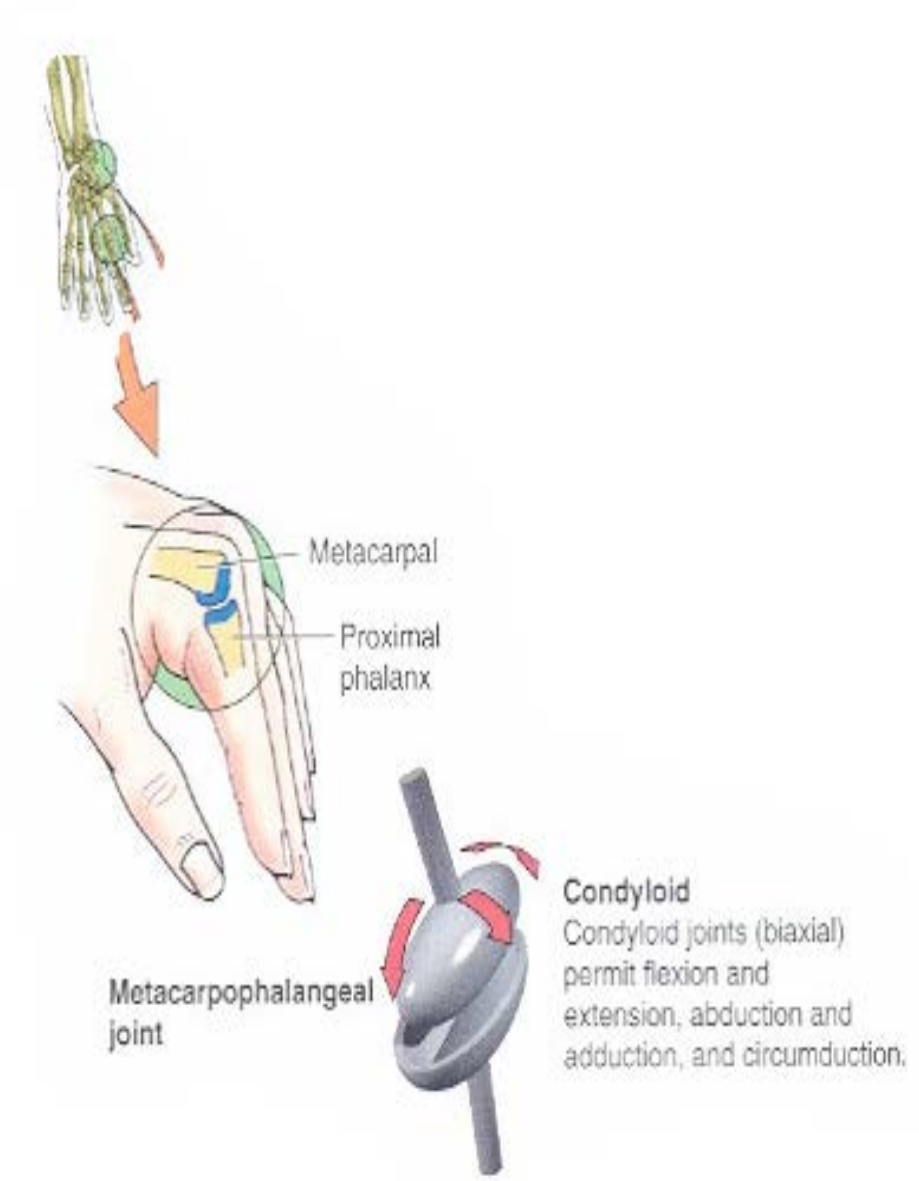
SYNOVIAL JOINTS

4. CONDYLOID JOINT

- Biaxial
- Permit flexion and extension,

abduction and adduction and c

E.g. metacarpophalangeal joint

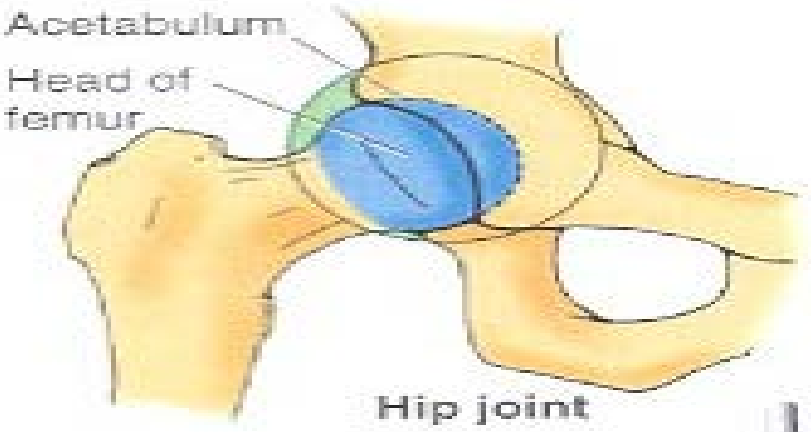


SYNOVIAL JOINTS

5. **BALL AND SOCKET JOINTS**

- Multiaxial
- A rounded head fits into a concavity which permits movement on several axis.

  E.g. Hip joint

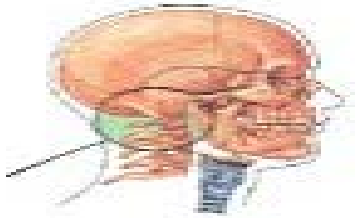


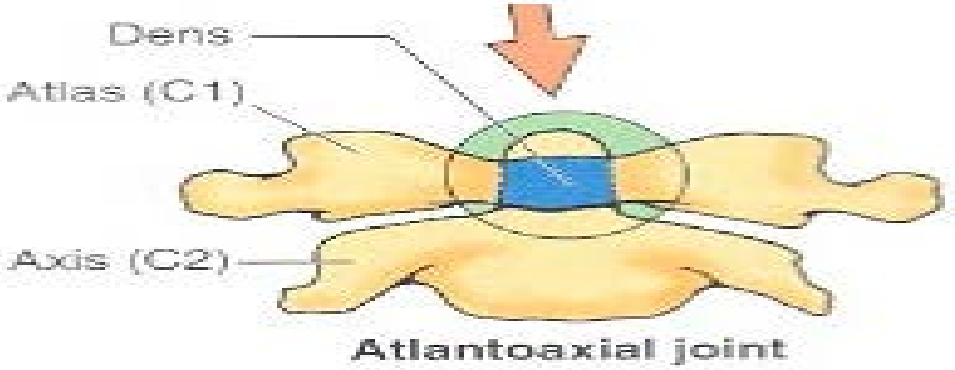
SYNOVIAL JOINTS

6. PIVOT JOINT

- Uniaxial joint
- A round process of bone fits into a bony ligamentous socket allows rotation.

  E.g. Atlantoaxial joint.





Atlantoaxial joint

Pivot
In pivot joints (uniaxial), a round process of bone that fits into a bony ligamentous socket allows rotation.

JOINTS

2. FIBROUS JOINTS

- Are united by **fibrous tissue**
- The **amount of movement** depends on **length of fibers uniting articulating bone**

EXAMPLES;

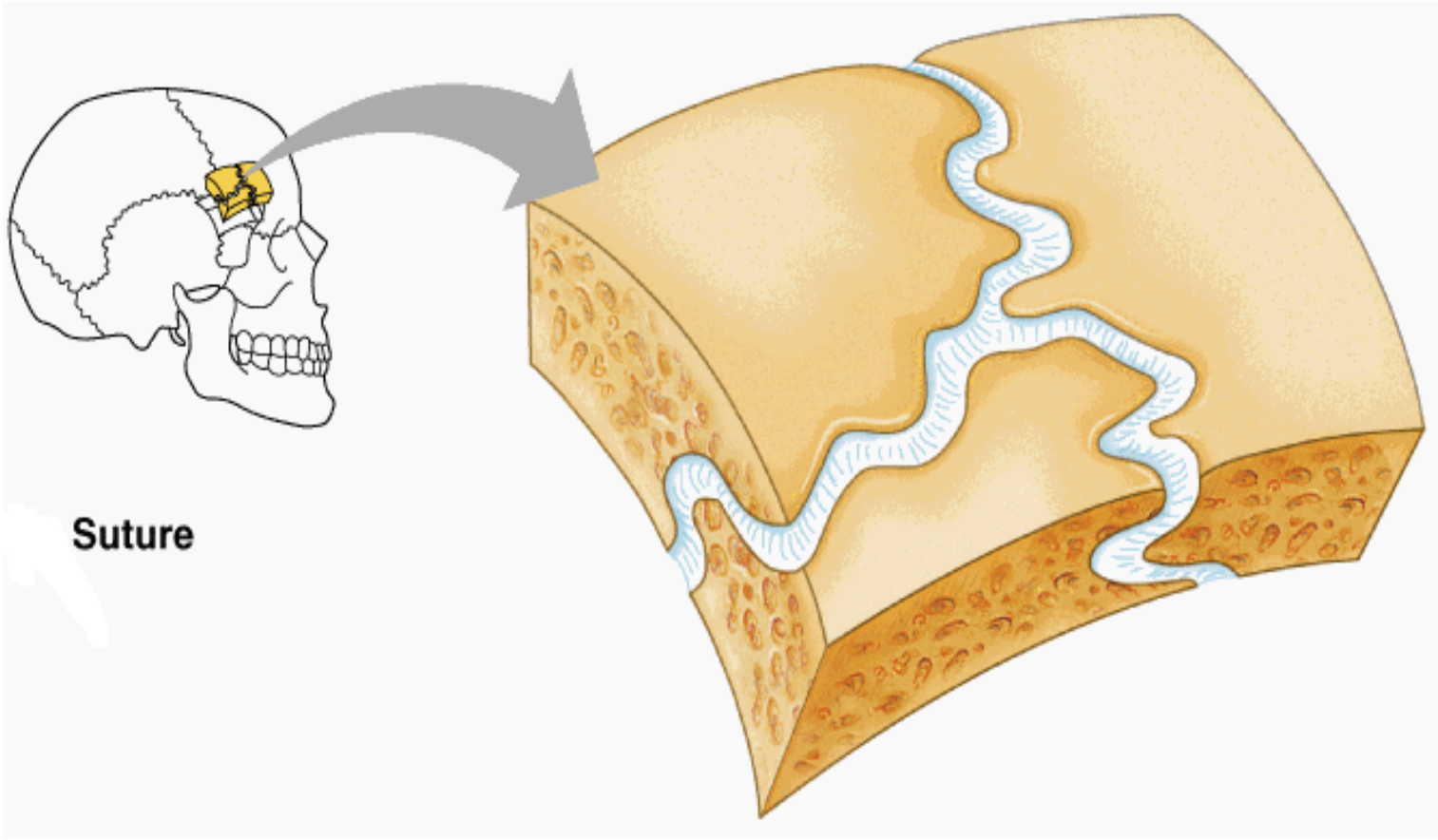
i) SUTURES of skull

ii) SYNDESMOSES of fibrous joint

iii) GOMPHOSIS

FIBROUS JOINTS

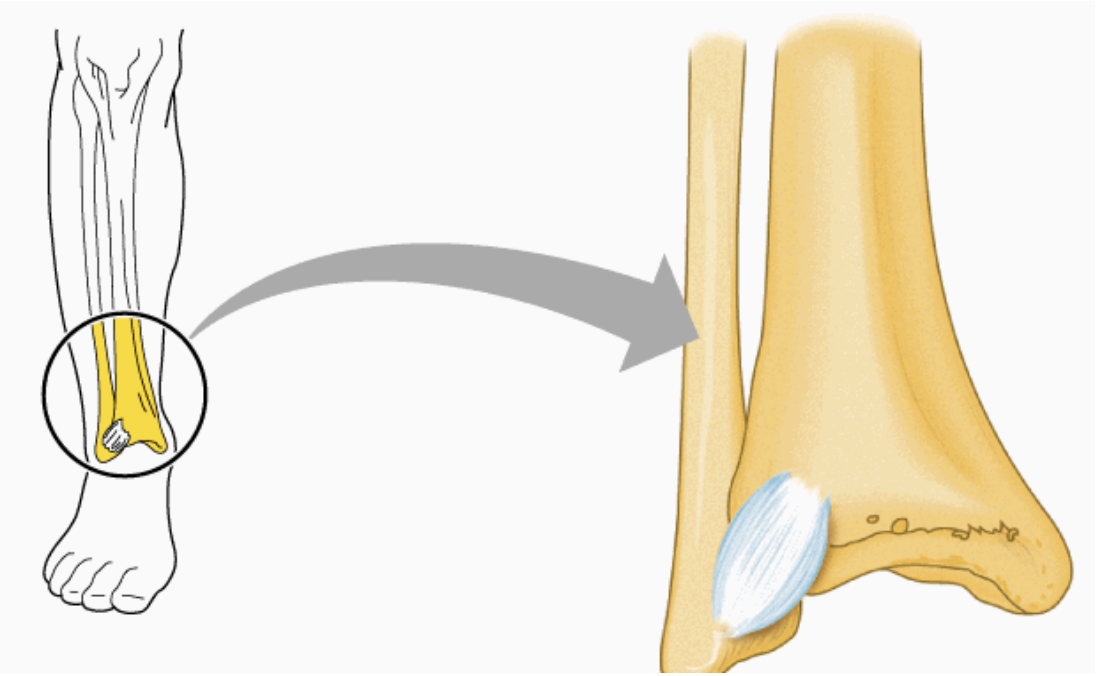
i) SUTURES of skull



FIBROUS JOINTS

ii) SYNDESMOSIS of fibrous joint

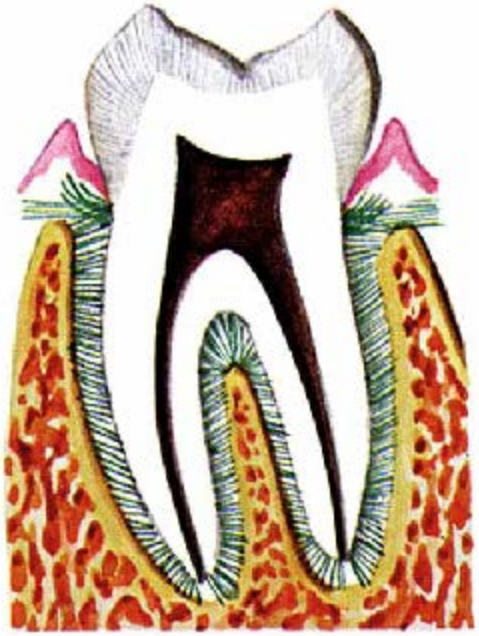
- Unites bones with a sheet of fibrous tissue)either ligament or fibrous membrane)
- Partially movable. e.g. tibio-fibula.



FIBROUS JOINTS

iii) **GOMPHOSIS** (Dentoalveolar syndesmosis)

- is a synarthrosis (joint) that binds the teeth to bony sockets in the maxillary bone and mandible.



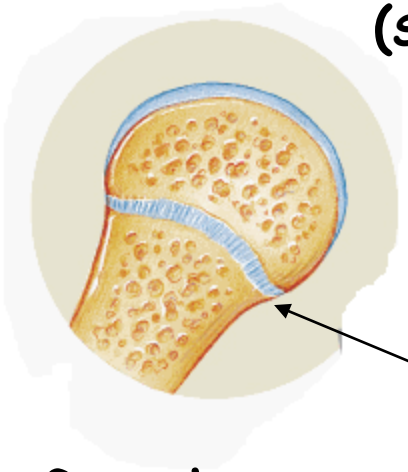
JOINTS

3) **CARTILAGENOUS JOINTS**

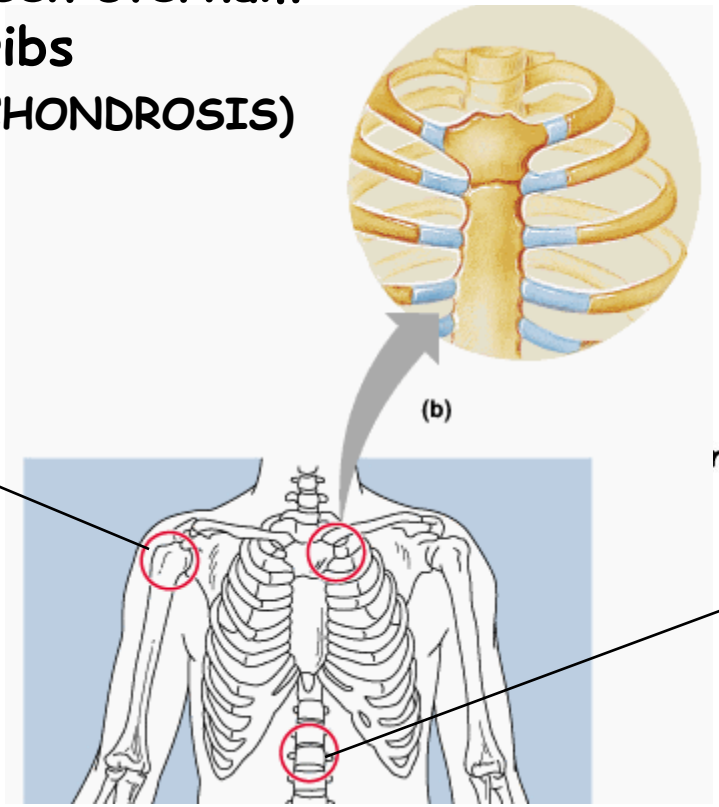
- Bone ends are united by hyaline cartilage or fibrocartilages

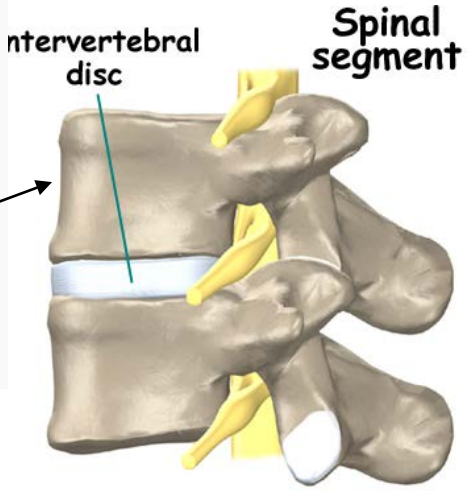
CARTILAGENOUS JOINTS

HYALINE
cartilage joints between sternum and ribs (SYNCHONDROSIS)



Growth regions of immature bones





Thank you.

- **Question?**

Please join the forum in oluwadiya.com to ask questions