General Anatomy

Joints

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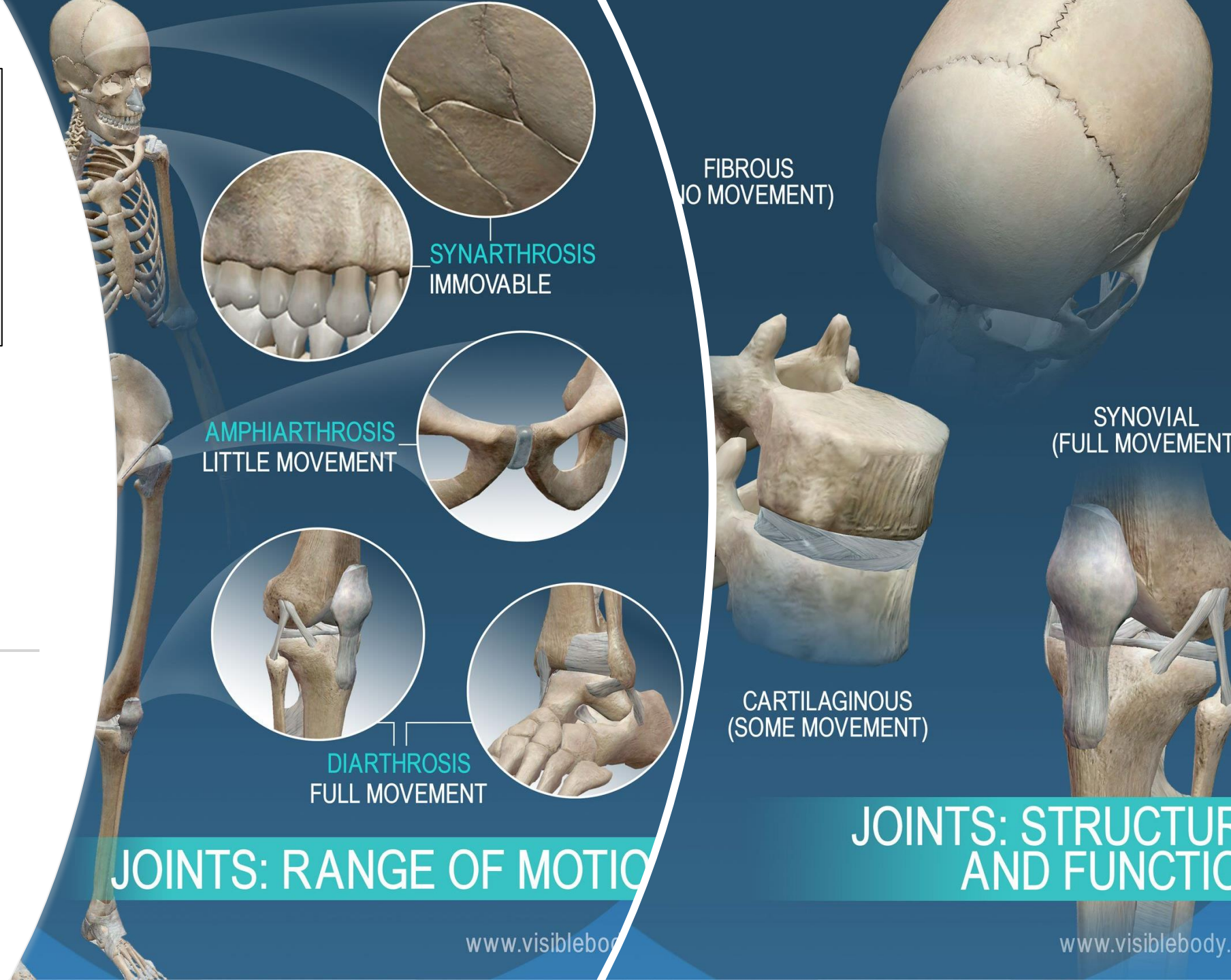


Definition: a joint is a point where two bones or a bone and cartilage make contact.
Arthrology: is the science of studying the anatomy and function of joints.

Can be classified **Structurally**:

- **1. Fibrous joints**
- **2. Cartilaginous joints**
- **3. Synovial joints**

Or **Functionally**:

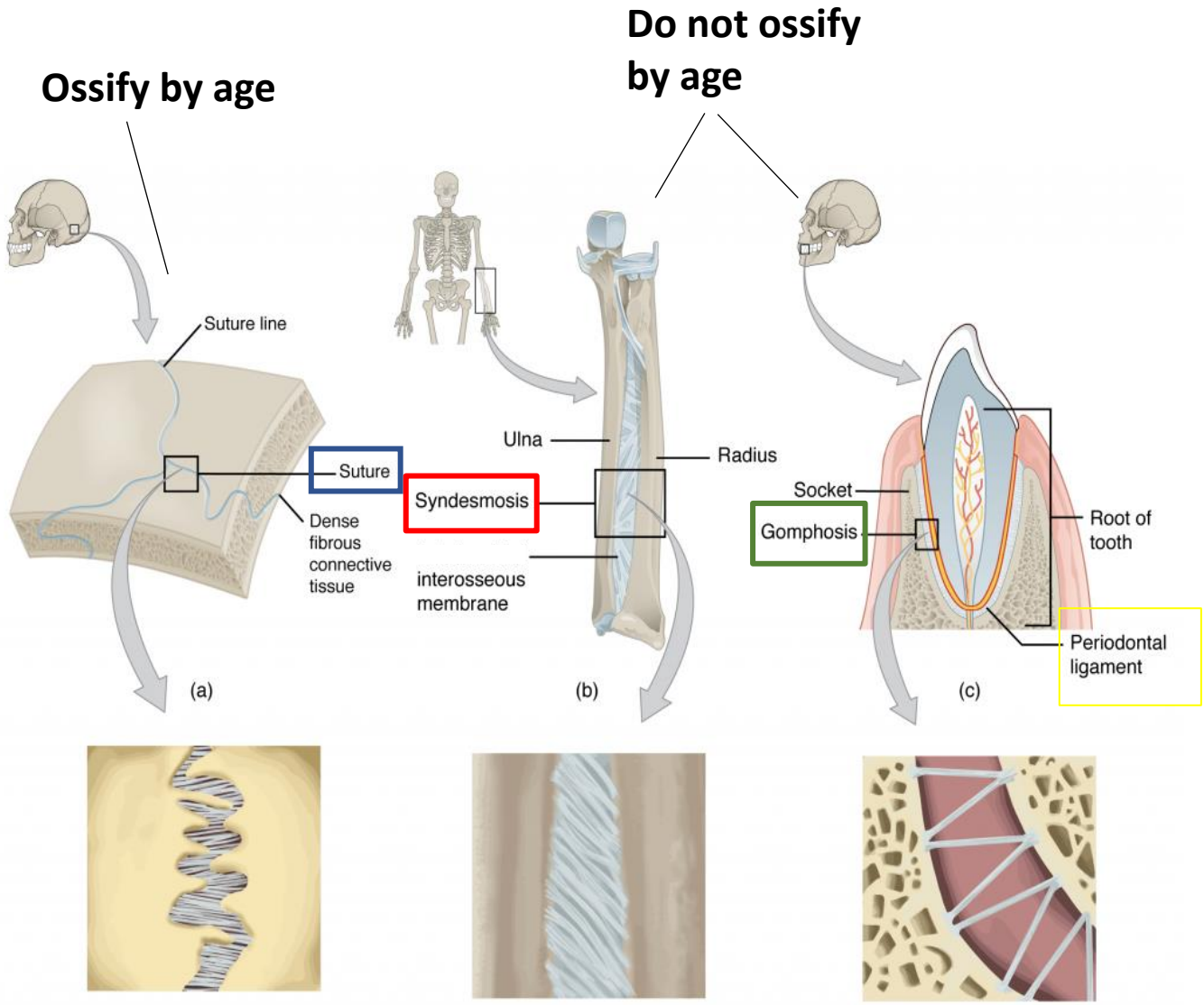
- **1. Synarthrosis (immovable)**
- **2. Amphiarthrosis (slightly movable)**
- **3. Diarthrosis (freely movable)**

1.**Fibrous joints**>>immobile to slightly mobile joints
2. **Cartilaginous joints** >> immobile to slight movement
3. **Synovial joints** >> freely movable joints

Fibrous joints

- Immovable or limited movement
- No joint cavity
- Types:

1. Sutures of skull (immobile).
2. Syndesmoses; two bones are connected by strong fibrous tissue (slight movement)
    1. **Interosseous membrane**, between radius and ulna.
    2. **Ligament**, Distal tibiofibular joint.
3. Gomphoses; fibrous joints between the roots of the teeth and the alveolar part of the maxilla and mandible (immobile).

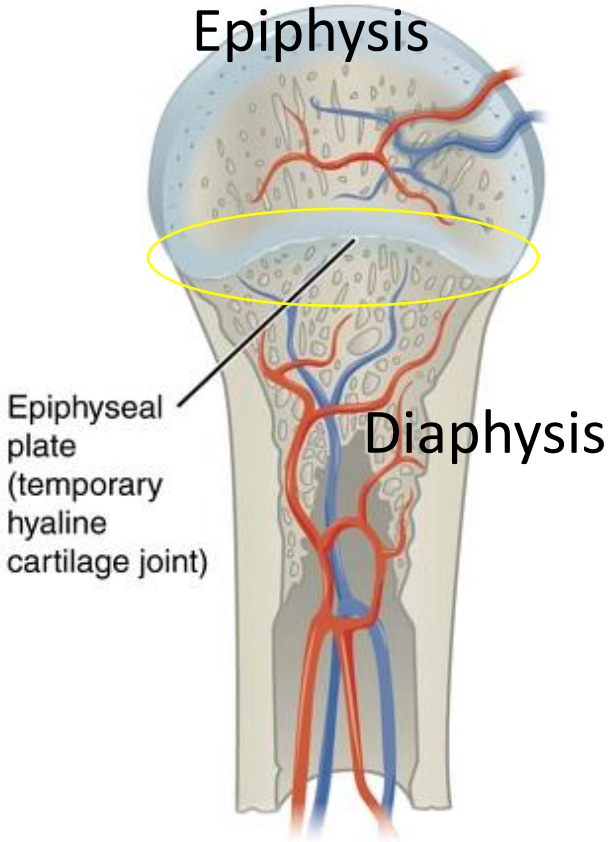


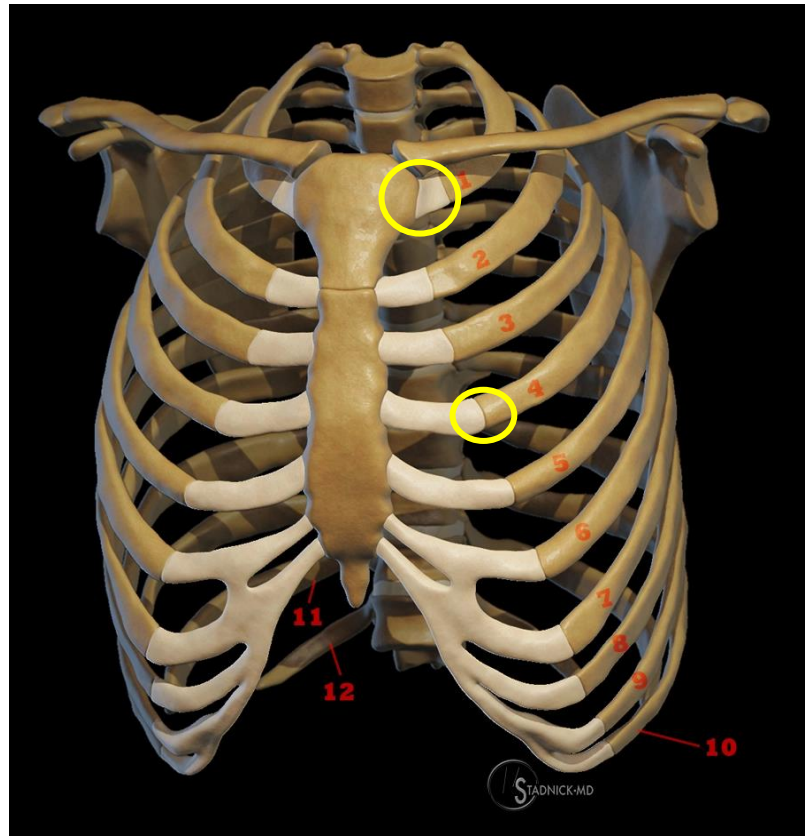
Cartilaginous joints

- When two bones articulate with each others by cartilage
- **Hyaline cartilage** and **fibrocartilage**

1.**Primary (synchondroses)** will ossify with age, e.g., joint between first costal cartilage and sternum and joints between epiphysis and diaphysis in growing long bone.

Synchondrosis

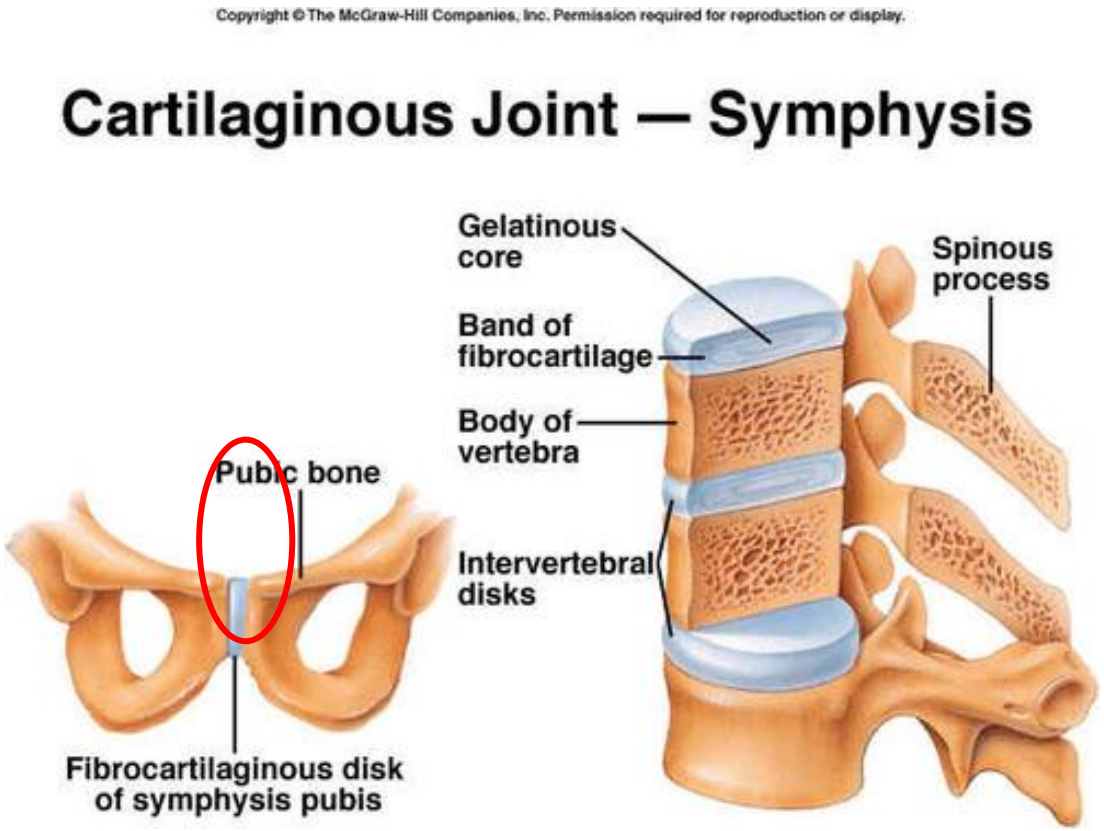




The costochondral joints are hyaline cartilaginous joints between the ribs and costal cartilage

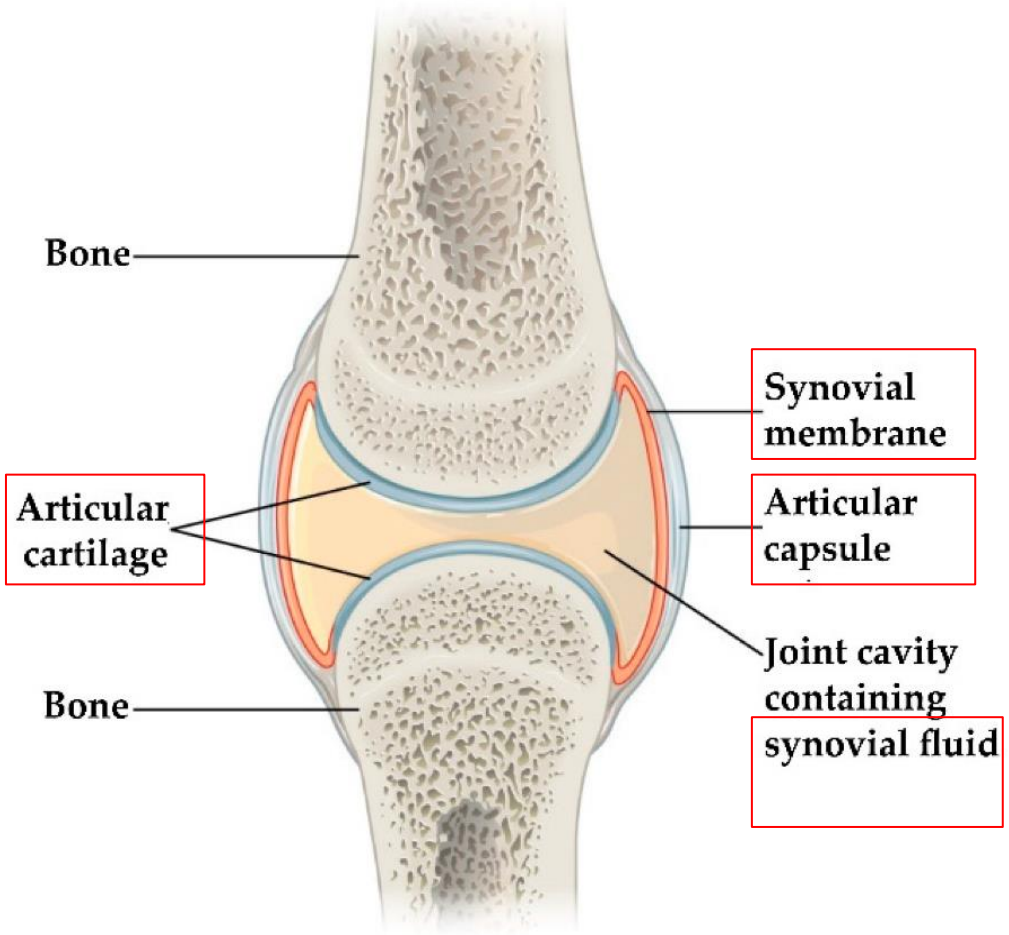
Cartilaginous joints

2. **Secondary cartilaginous joints (symphysis):**
when two bones are joined with fibrocartilage. e.g., **intervertebral disk** and **pubic symphysis** .



Synovial joints

1. Freely movable and has a joint cavity
2. Consists of:
   - **Articular hyaline cartilage** covering the articular surfaces of bone
   - **Fibrous capsule**
   - **Synovial membrane:** lines the fibrous capsule from inside and the margins of the articular surfaces
   - **Synovial fluid (Synovia)** the synovial membrane secretes synovial fluid



Hyaline cartilage is avascular !

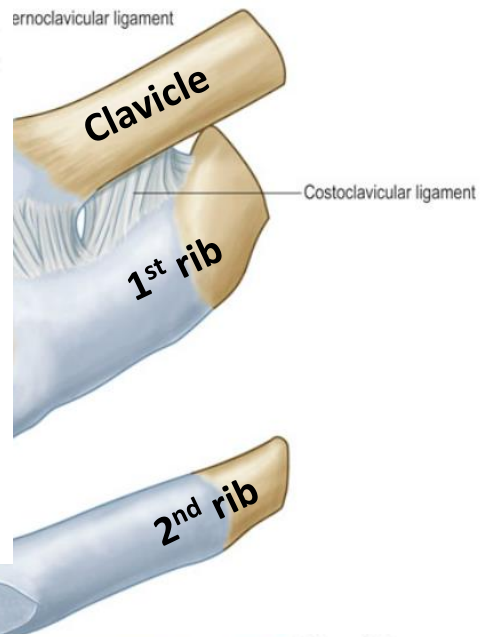
Synovial joints

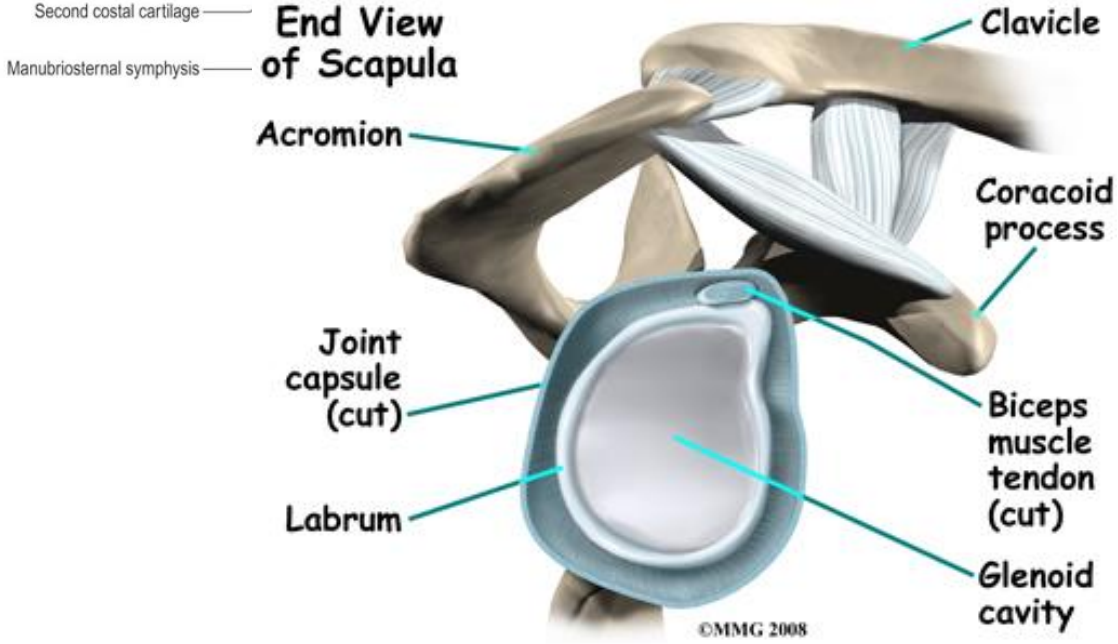
➢**Accessory Ligaments and Articular Discs**

- **Articular disks** (TMJ and sternoclavicular joint)

- **Menisci** Pads of cartilage lie between the articular surfaces of the bones, allow bones of different shapes to fit together more tightly (**Knee joint)**

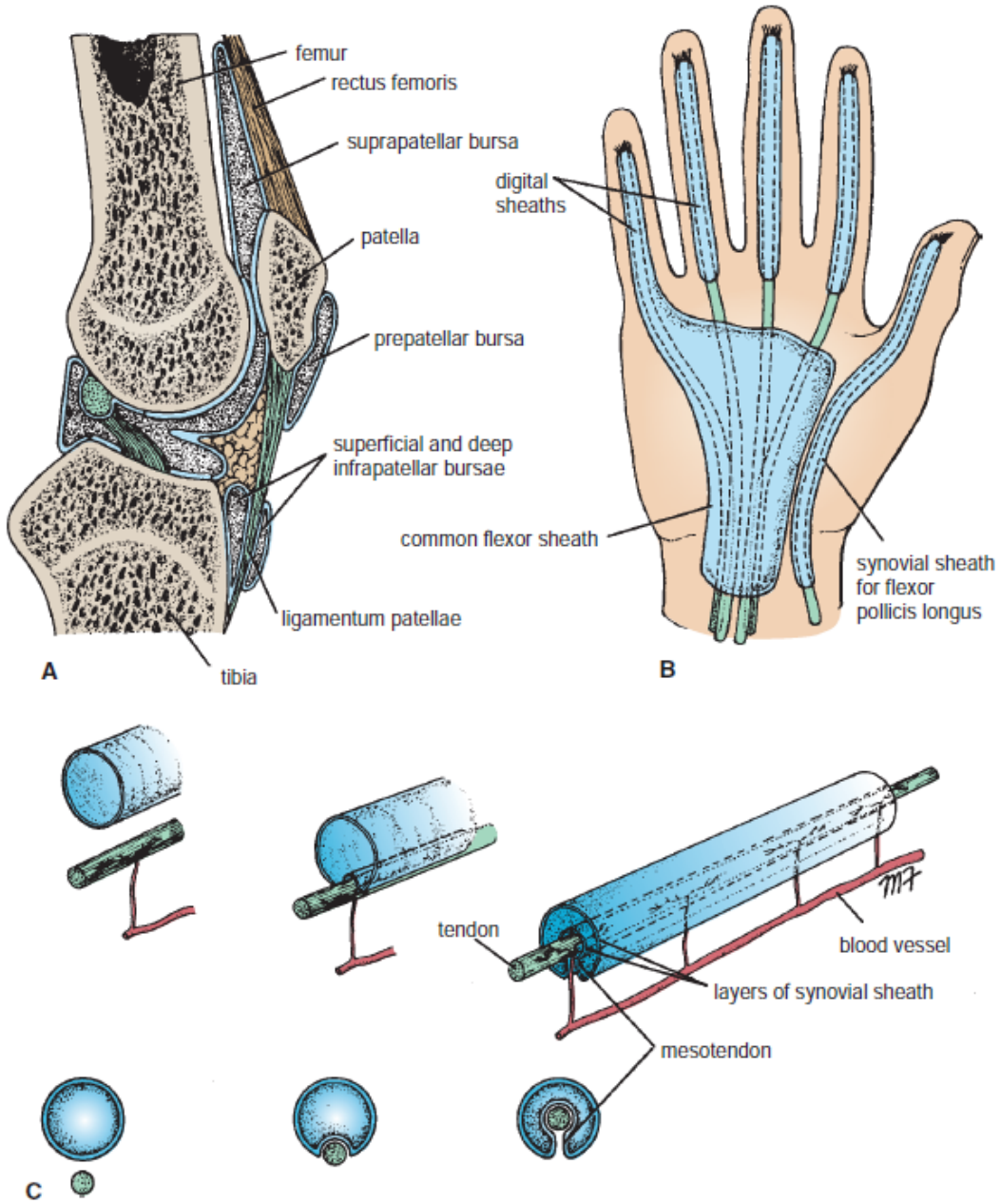
- **Collateral ligaments** & **cruciate ligaments**
- **Tendons; tendon of long head of biceps brachii.**





➢Bursae and Tendon Sheaths

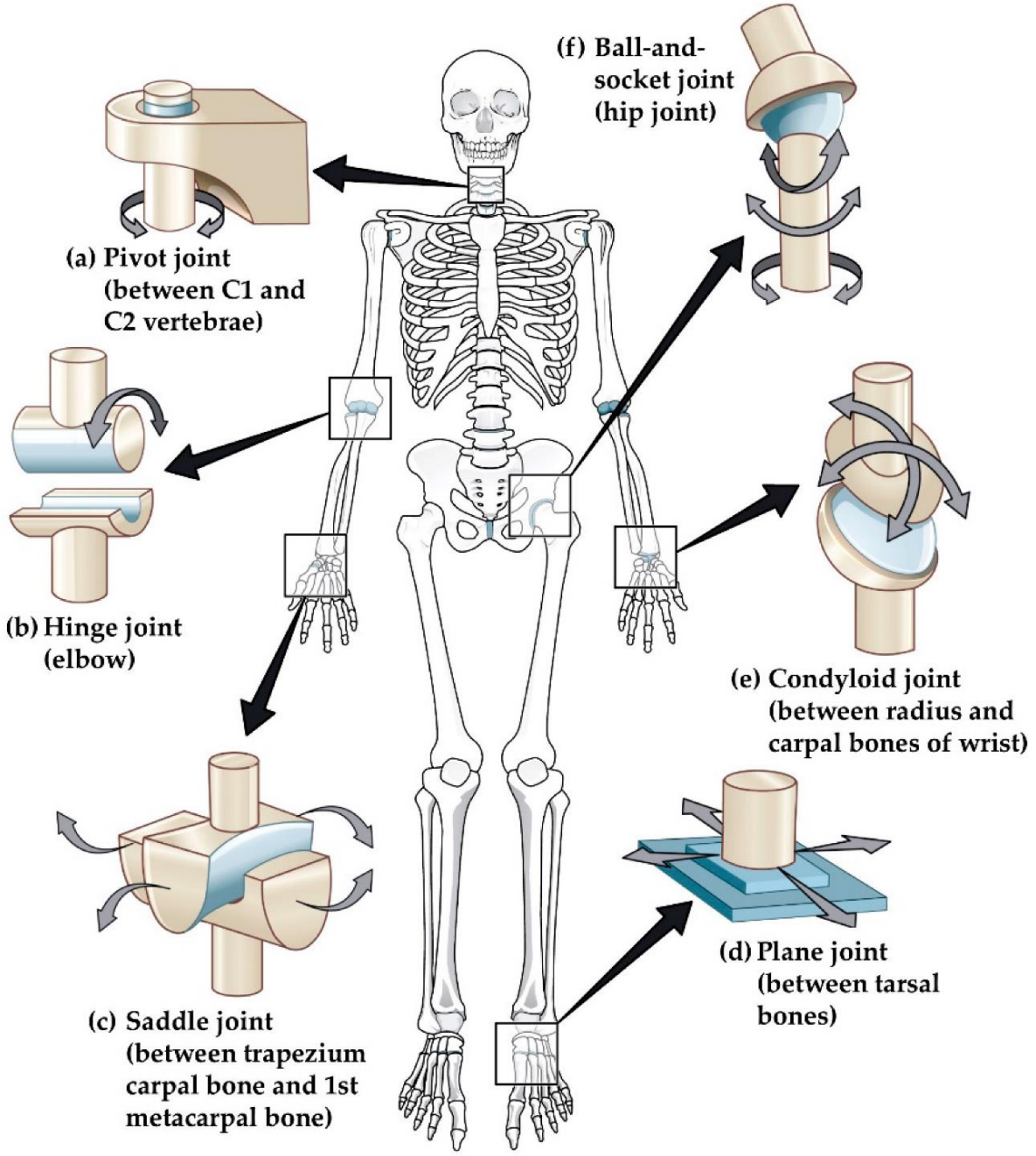
- **Bursae**: sac-like structures containing fluid similar to synovial fluid
- Located between tendons, ligaments and bones
- Cushion the movement of these body parts
- **Tendon sheaths:** Tube-like bursae that rap around tendons to reduce friction at joints



- Can be classified according to the **shape of articular surfaces:**
  - **Pivot joint**
  - **Hinge joint**
  - **Saddle joint**
  - **Plane joint**
  - **Condyloid joint**
  - **Ball and socket joint**

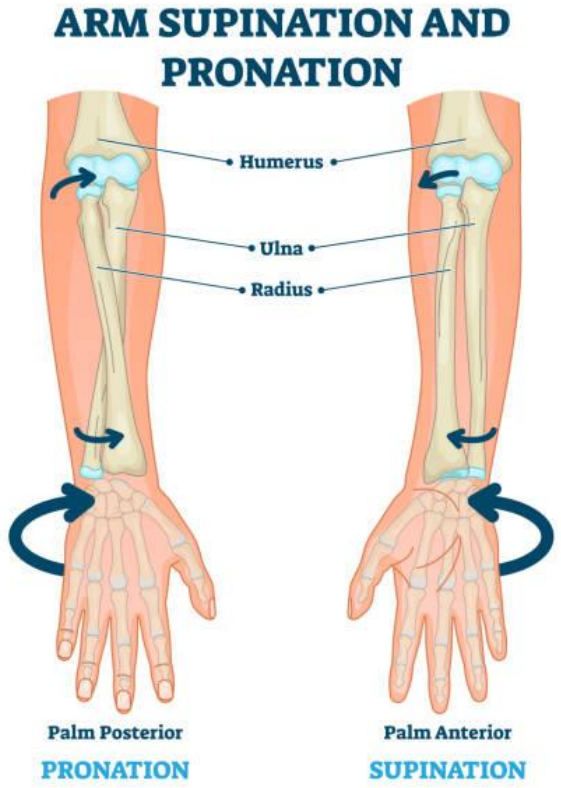
Or according to **the axis around which the movement occur:**

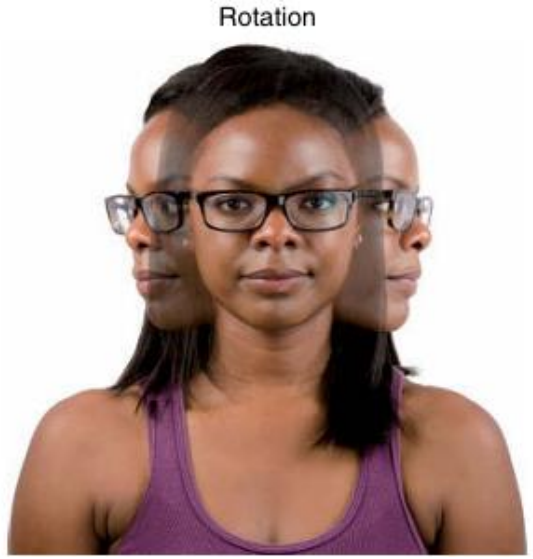
- **Uniaxial** movement around one axis only
- **Biaxial** movement around two axes
- **Multiaxial** movement around more than two axes



Pivot joints

- Uniaxial joints
- Rotation around longitudinal axis
- Examples: **median atlanto-axial** joint and **proximal radioulnar joint.**



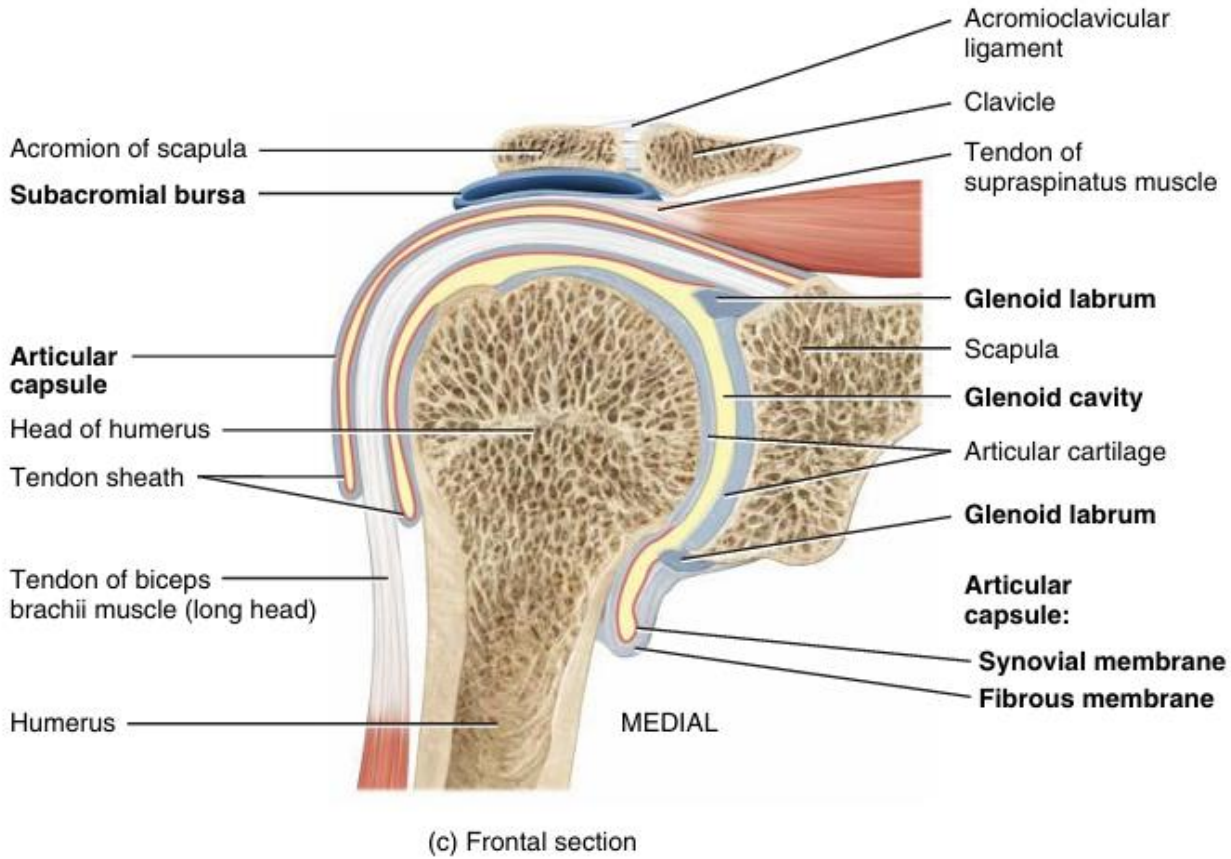


(h) Radioulnar joints

Ball and socket joints

Glenohumeral joint (shoulder joint)

- Head of humerus and glenoid cavity of the scapula
- Most mobile and most frequently dislocated
- **Ball and socket joint, multiaxial**
- A fibrocartilaginous rim named **glenoid labrum** deepens the glenoid cavity



(c) Frontal section

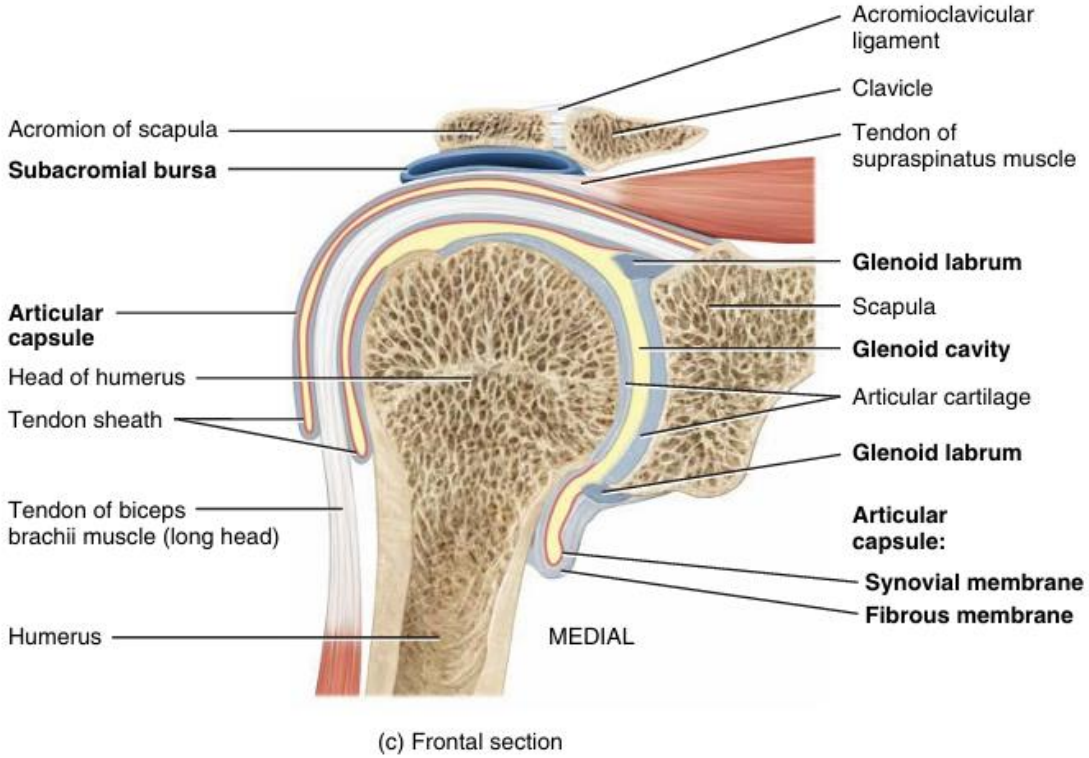
Ball and socket joints

Glenohumeral joint (shoulder joint)

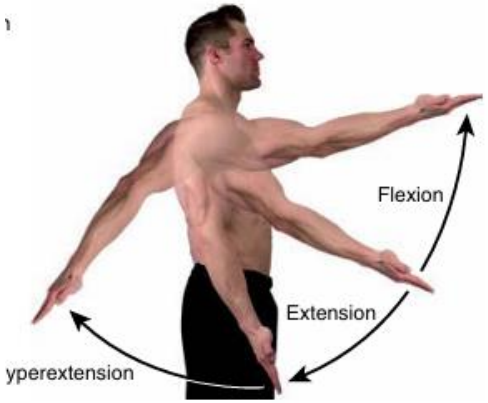
Bursae is a synovial fluid-filled sac develops at points of friction

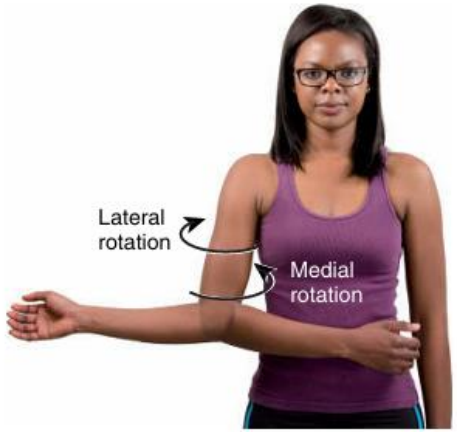
Movements:

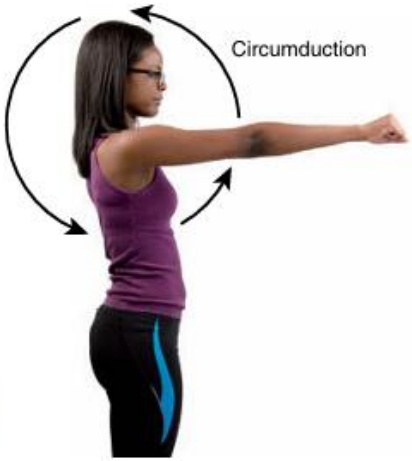
- Flexion-Extension
- Adduction-Abduction
- Medial rotation-Lateral rotation
- Circumduction



(c) Frontal section



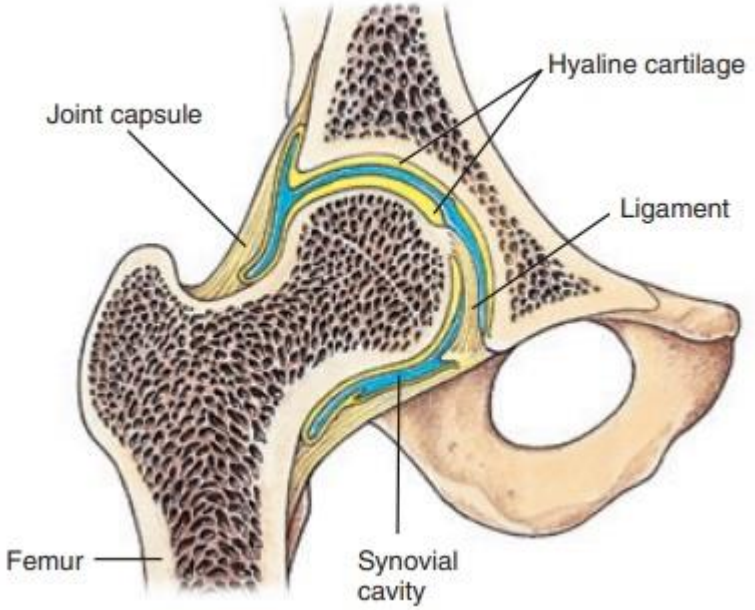


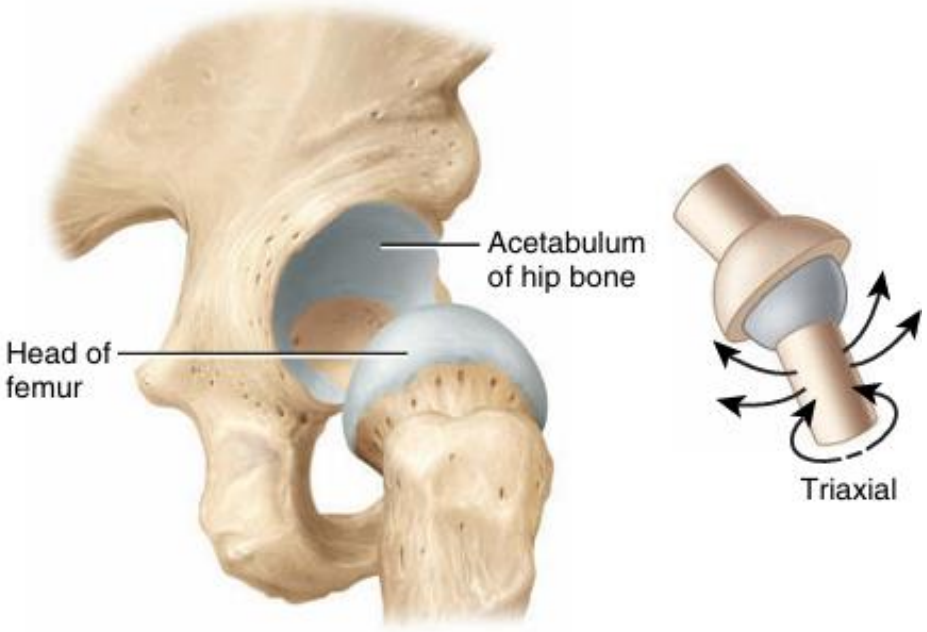


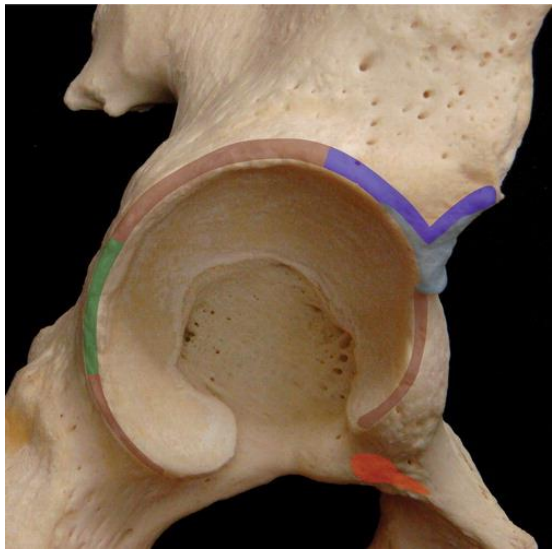
Ball and socket joints

Acetabulo-femoral joint (Hip joint)

- Between **head of femur** and **acetabulum** of hip bone
- More stable compared to shoulder joint (shape of articular surfaces).







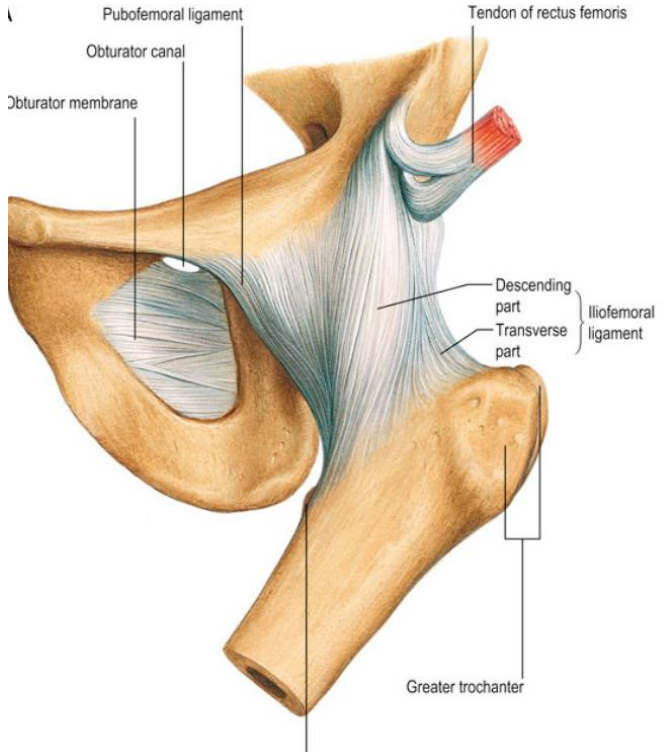
Ball and socket joints

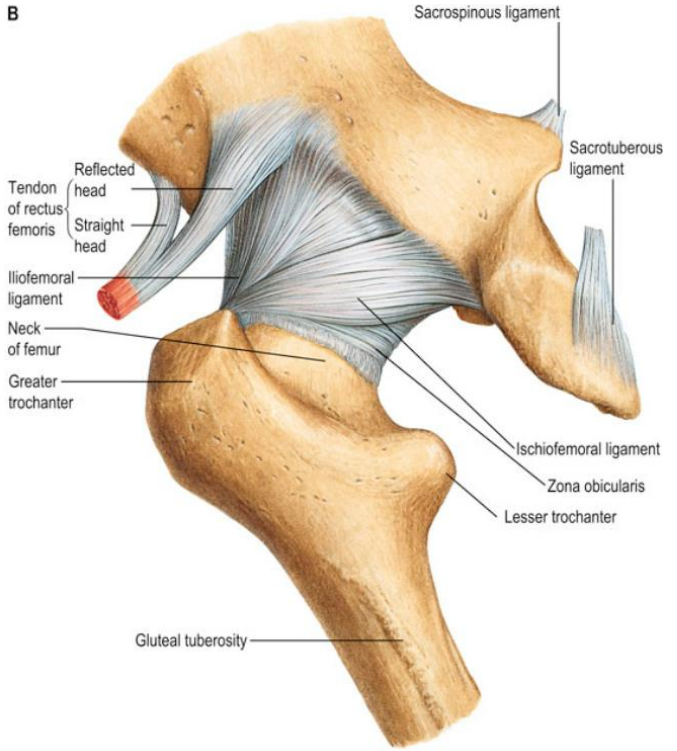
Acetabulo-femoral joint (Hip joint)

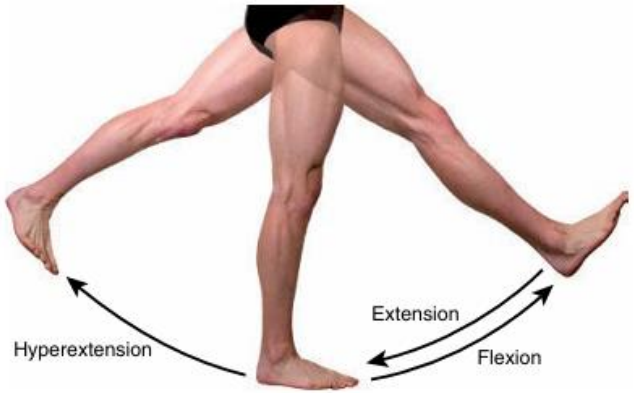
Ligaments of hip joint:

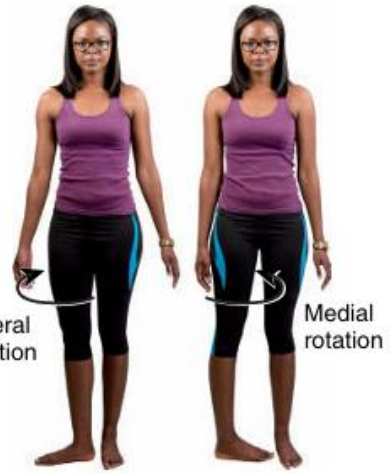
1. **Iliofemoral ligament**
2. **Pubofemoral**
3. **Ischiofemoral**

(provide support and stability)





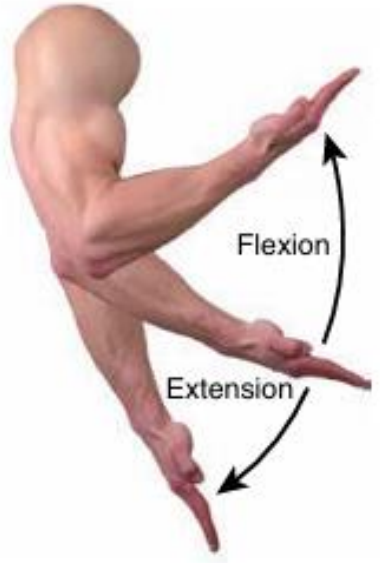


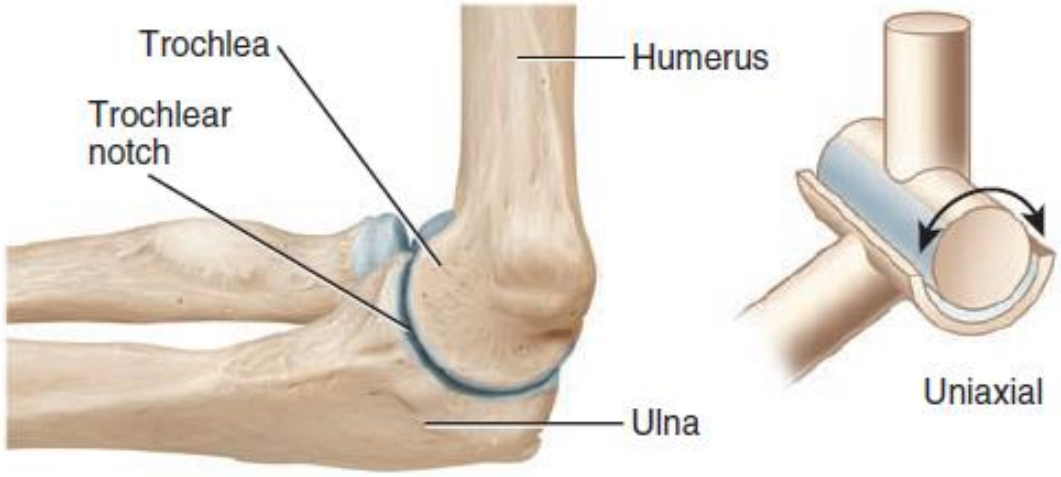


Hinge joints

Elbow joint

Humerus, radius and ulna.
Uniaxial joint
Movement: flexion-extension



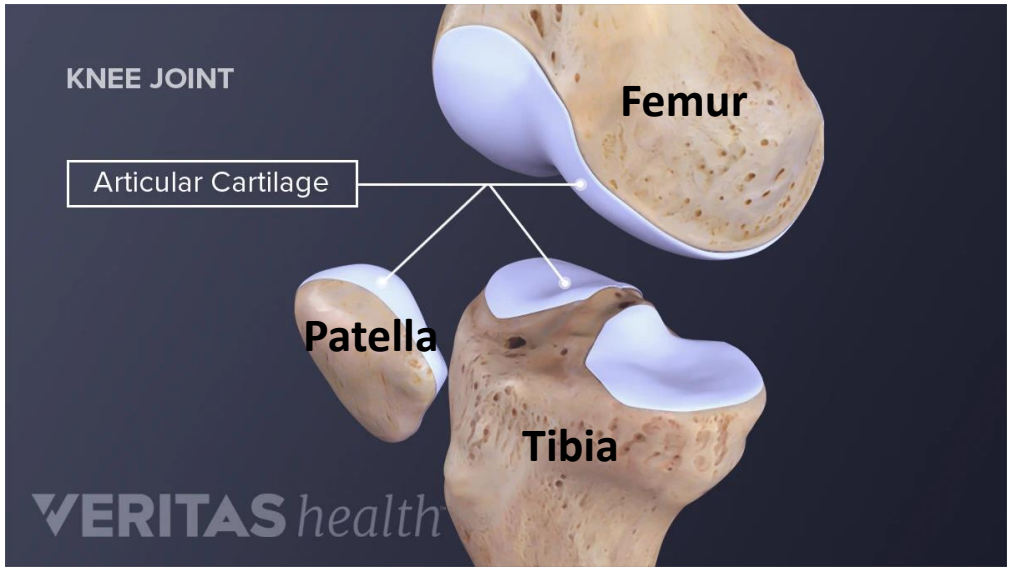


(b) Hinge joint between trochlea of humerus and trochlear notch of ulna at the elbow

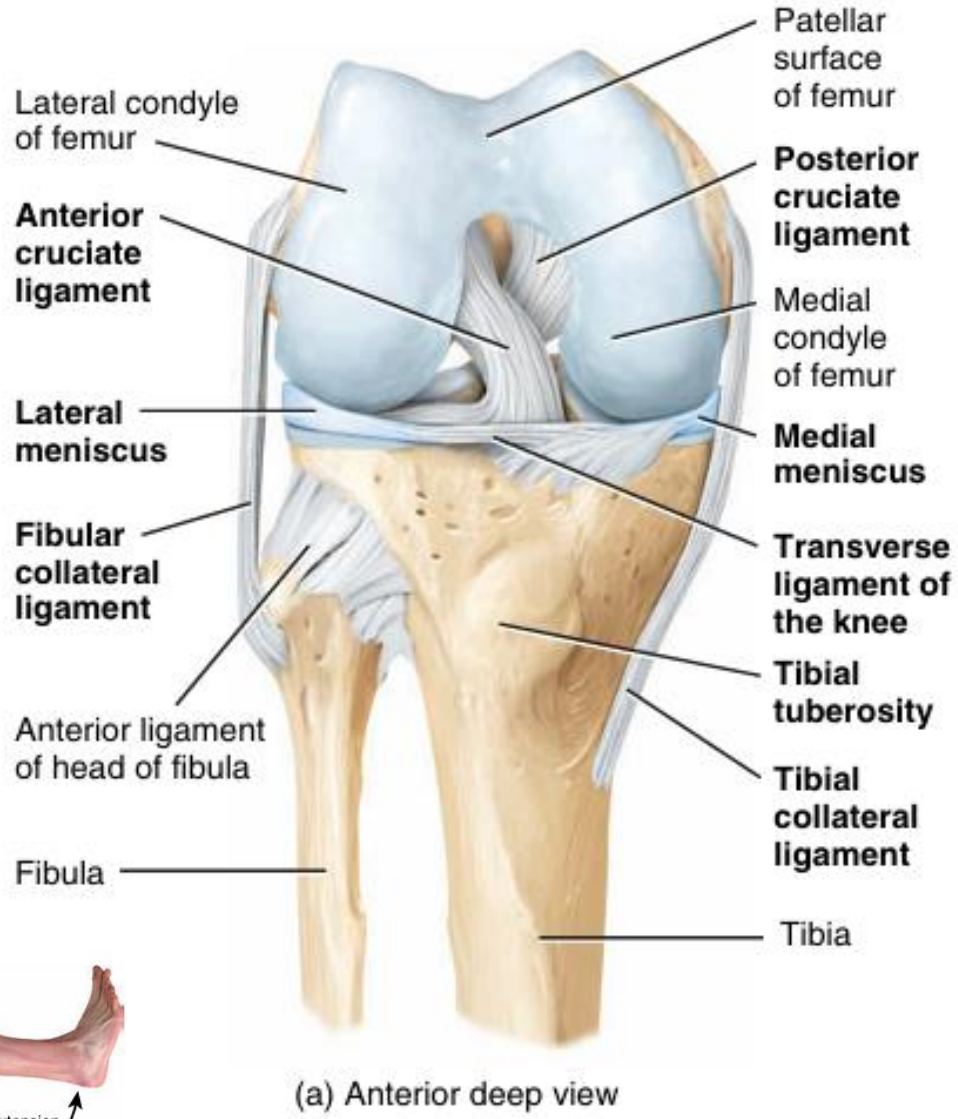
Hinge joints

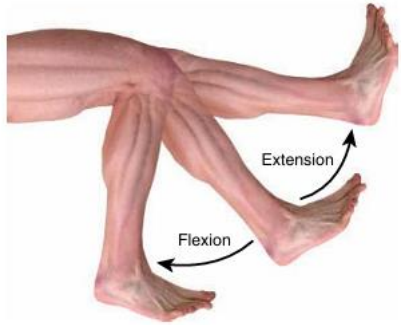
Knee joint

- The largest and most complex joint in the body
- The most commonly injured
- Modified hinge joint, uniaxial
- Minimal medial and lateral rotation



But not Fibula!!





Hinge joints

Knee joint

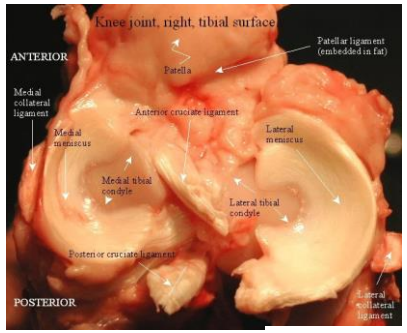
Intra-capsular structures:

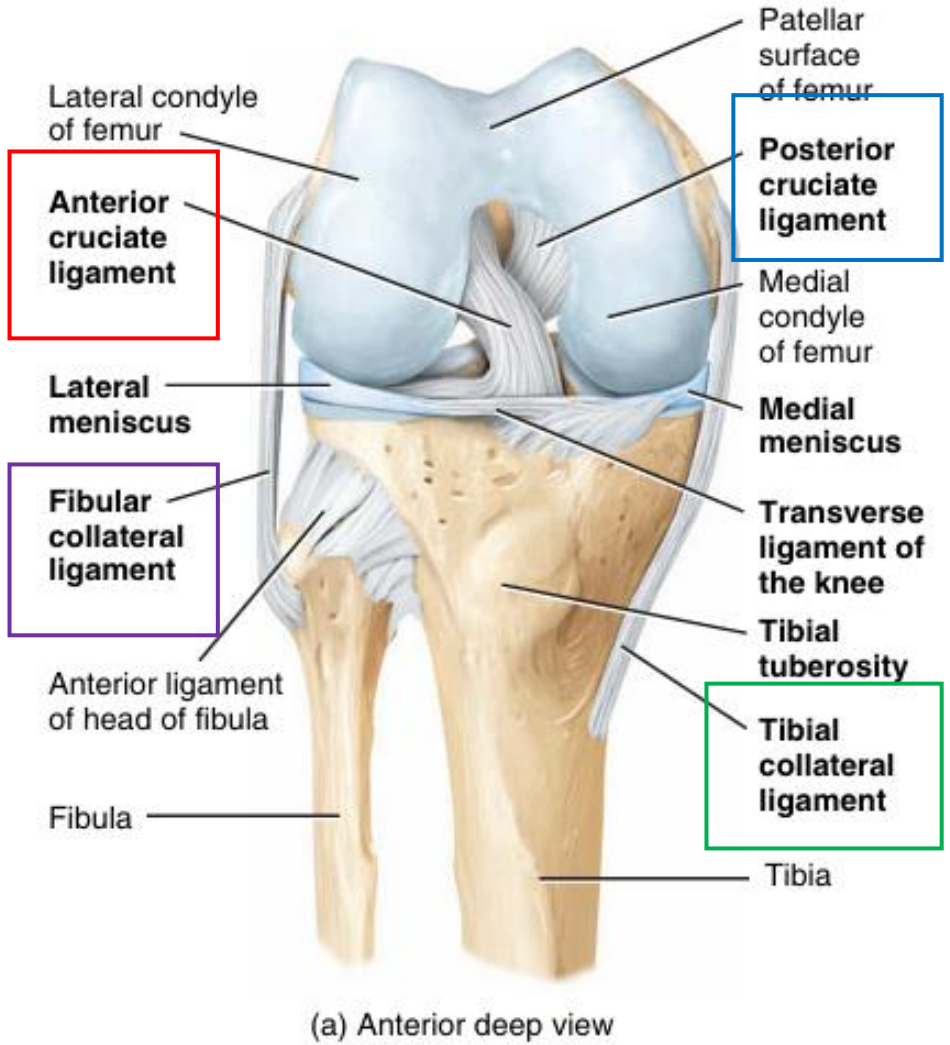
- **Ligaments**:
  1. **Anterior cruciate ligament (ACL)**
  2. **Posterior cruciate ligament (PCL)**
- **Menisci (crescent-shaped fibrocartilage), increase fit and act as cushion:**
  1. **Medial meniscus**
  2. **Lateral meniscus**

Extracapsular ligaments

1. **Medial collateral ligament**
2. **Lateral collateral ligaments**

There are a number of **bursae** that protect the knee joint.





(a) Anterior deep view

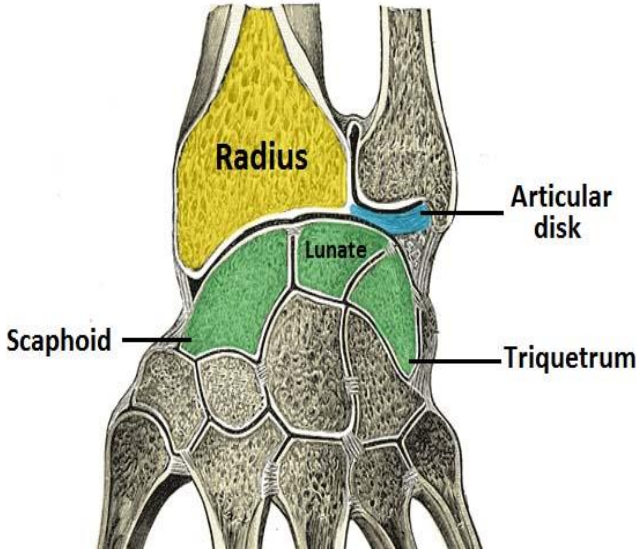
Condyloid and ellipsoid joints

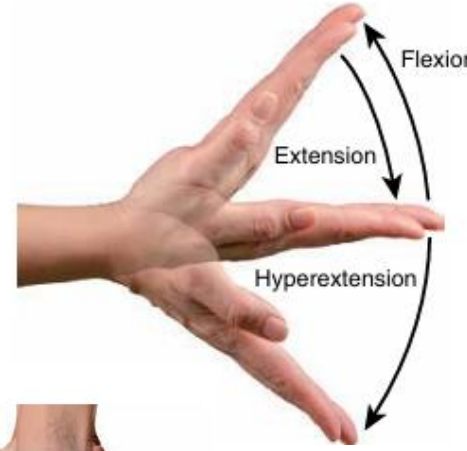
- **Biaxial** joints
- **Wrist joint** (ellipsoid)
  - Between distal end of radius and scaphoid and lunate.

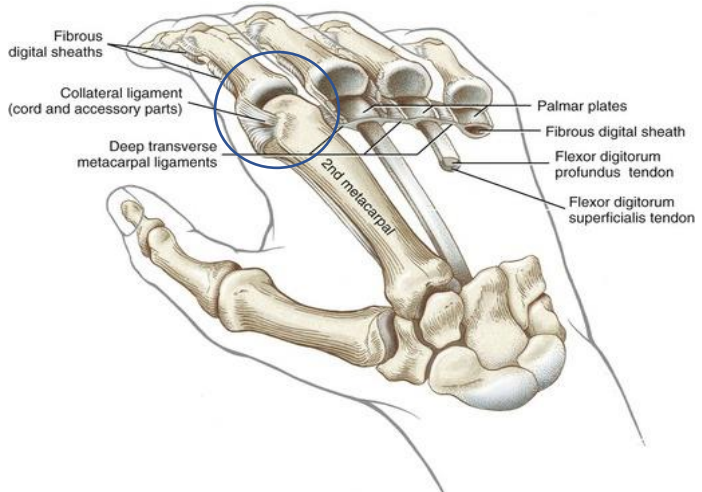
- **Metacarpophalangeal joint** (knuckle joint Between heads of metacarpals and bases of proximal phalanges) as condyloid joint.

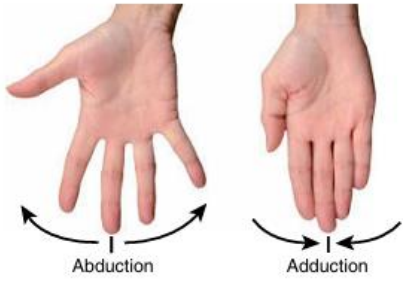
Movement:
Flexion-Extension
Adduction-Abduction

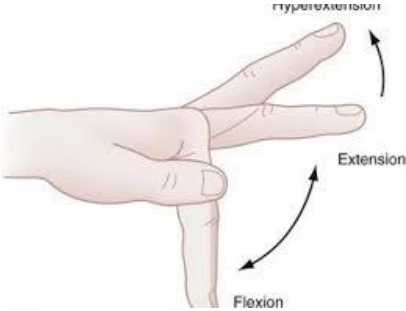
Wrist joint (ellipsoid joint)







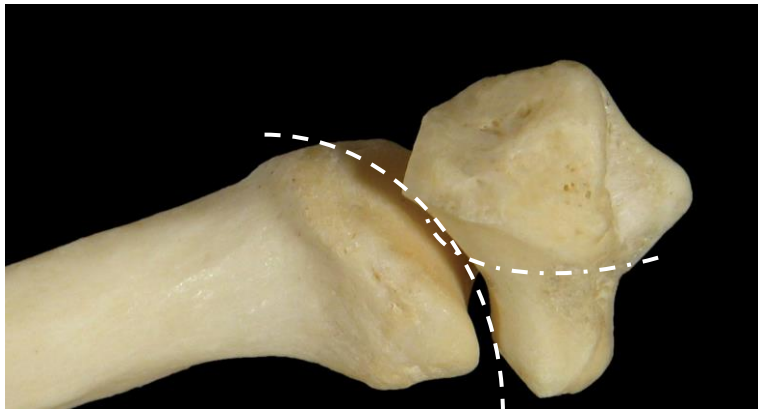


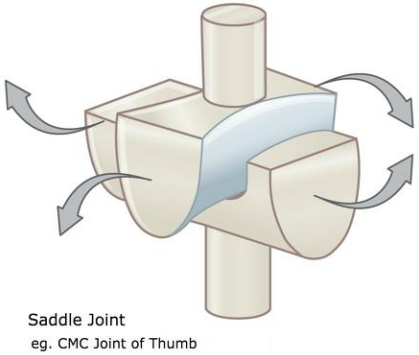


Saddle joints

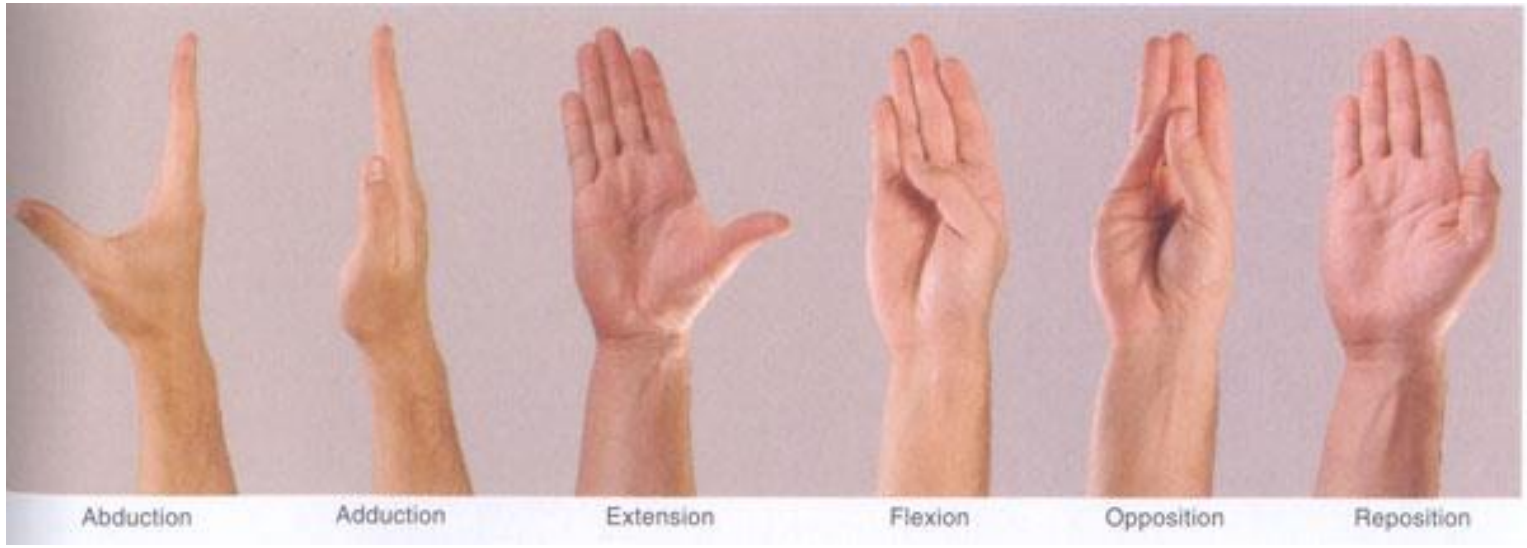
- **Biaxial joints**
  1st carpometacarpal joint (**between trapezium of carpus and first metacarpal bone**) and sternoclavicular joint.

  Bones have concave-convex articular surfaces and resemble a saddle on a hourse back



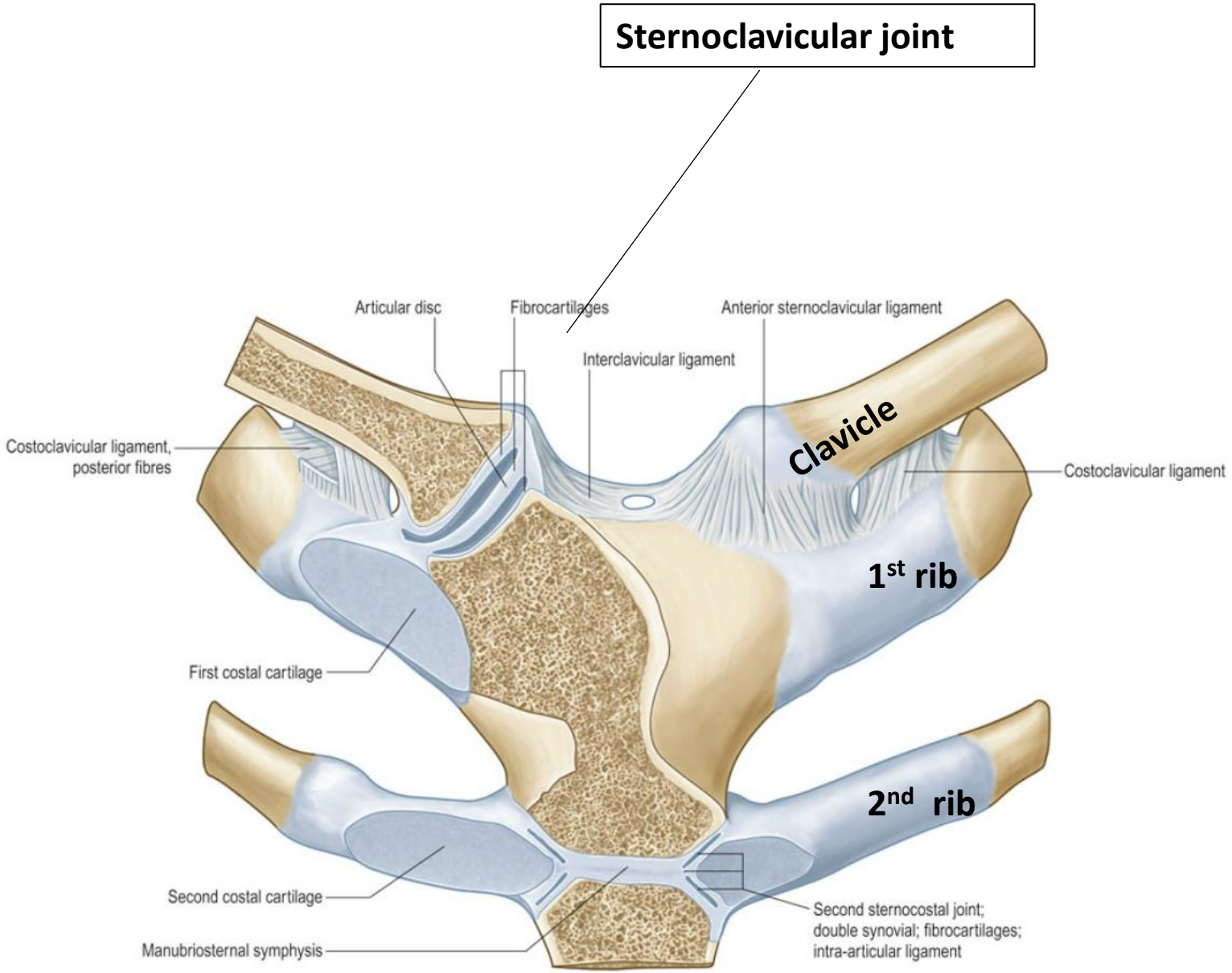


Movement:
Flexion-Extension
Adduction-Abduction
Opposition (thumb)



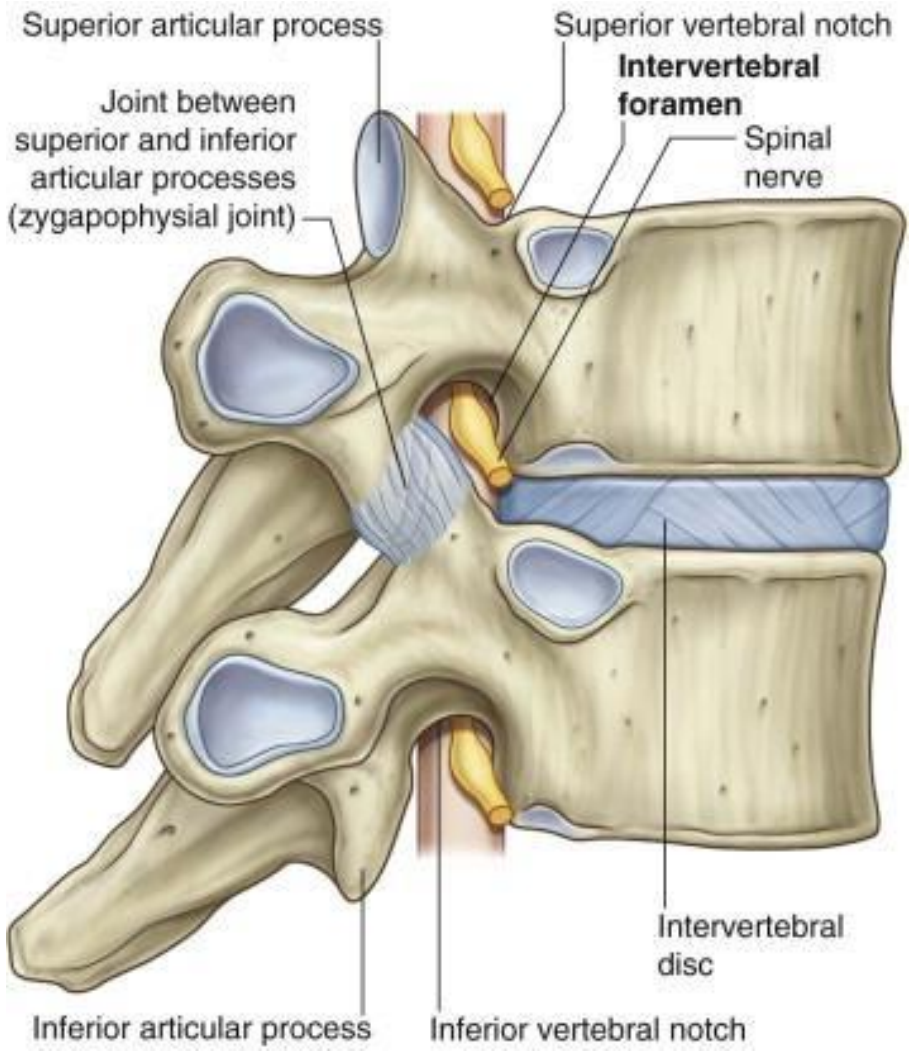
Saddle joints

Sternoclavicular joint is synovial saddle-type joint



Plane joints

- Gliding movement.
- between the **superior and inferior articular processes on adjoining vertebrae**.
- **Carpometacarpal joints of digits (2-5)**
- Between **carpal bones**
- Between **tarsal bones**



Remember!
Intervertebral disk is a cartilaginous joint

Thank you!