General Anatomy

Joints

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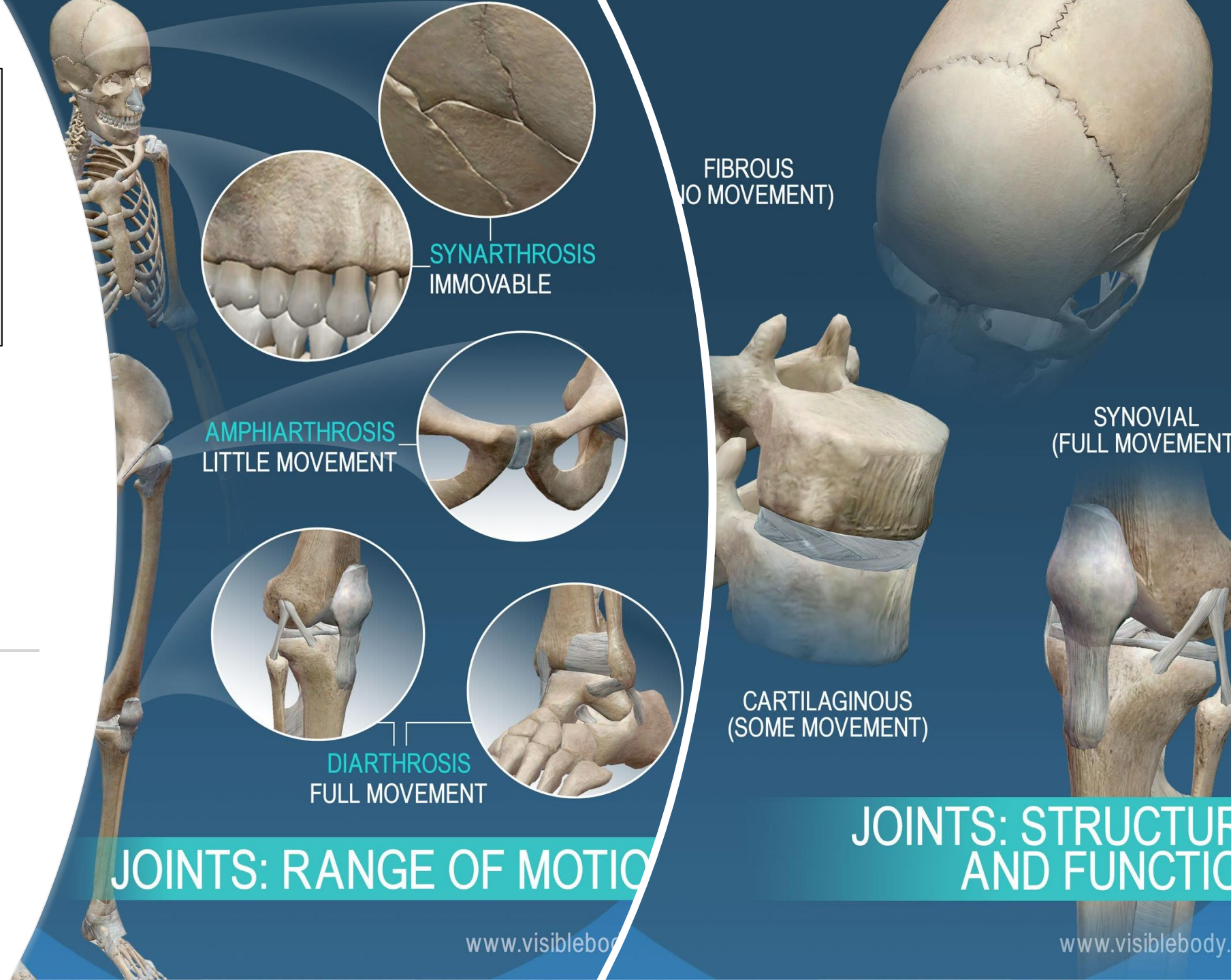
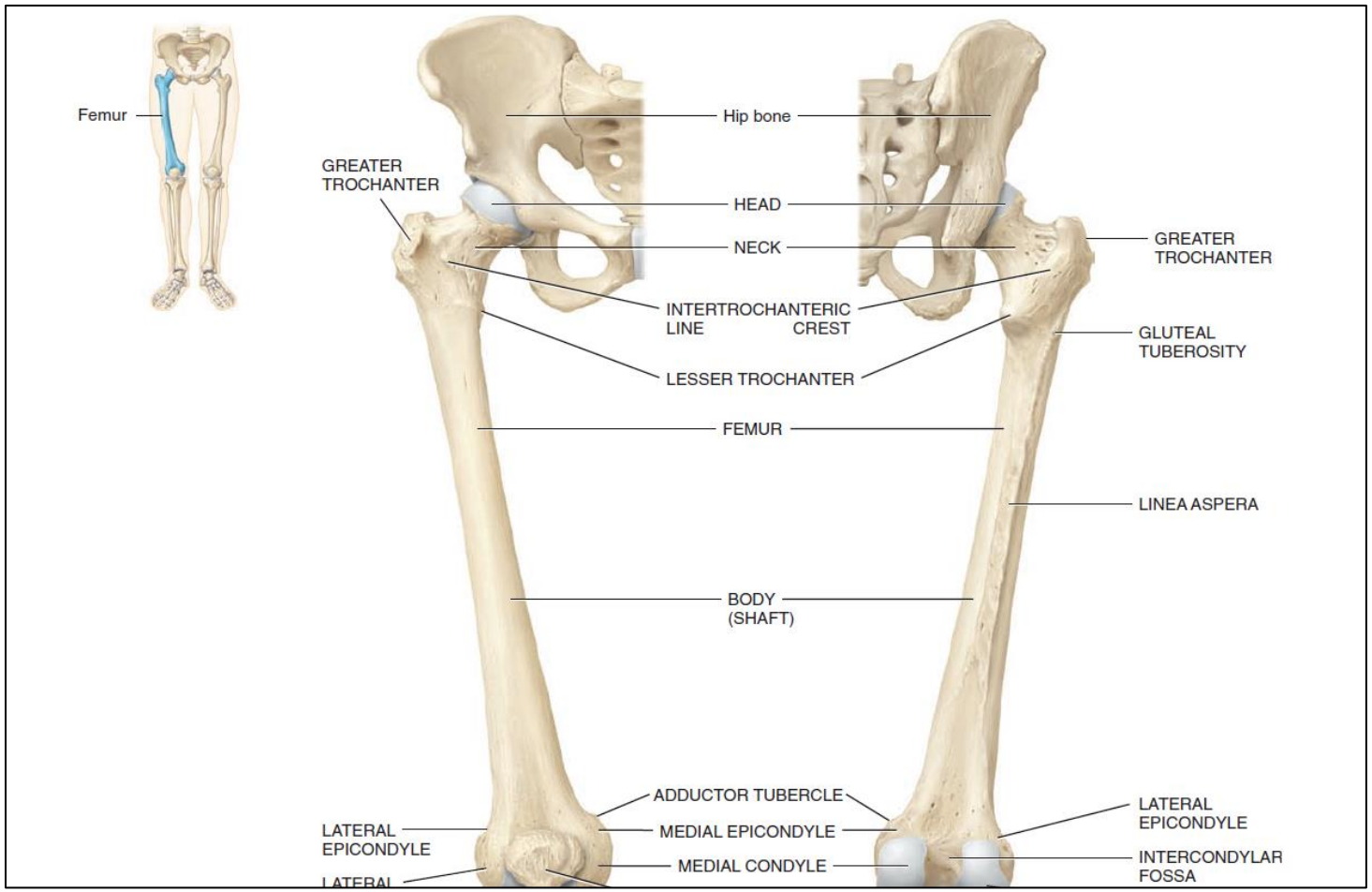
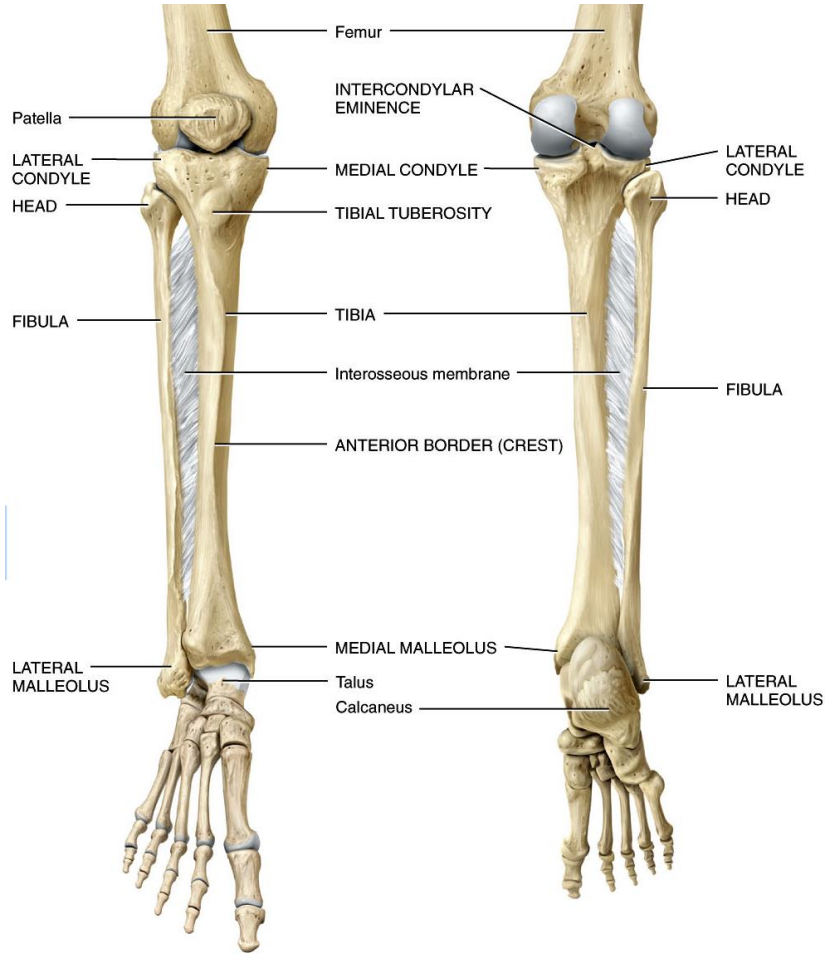






(a) Anterior view

(b) Posterior view

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**:

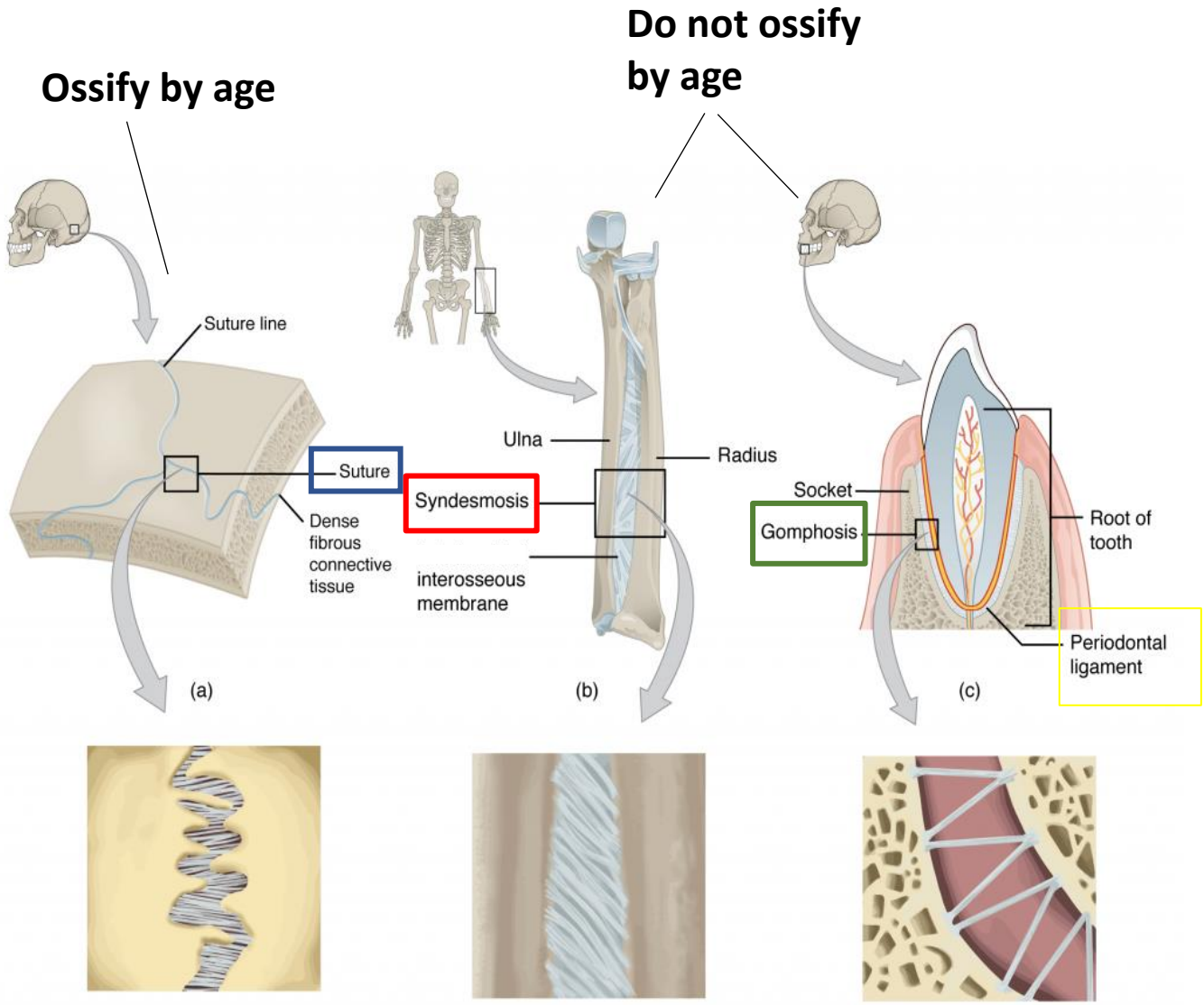
- **1. Synarthrosis (immovable)**
- **2. Amphiarthrosis (slightly movable)**
- **3. Diarthrosis (freely movable)**

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).

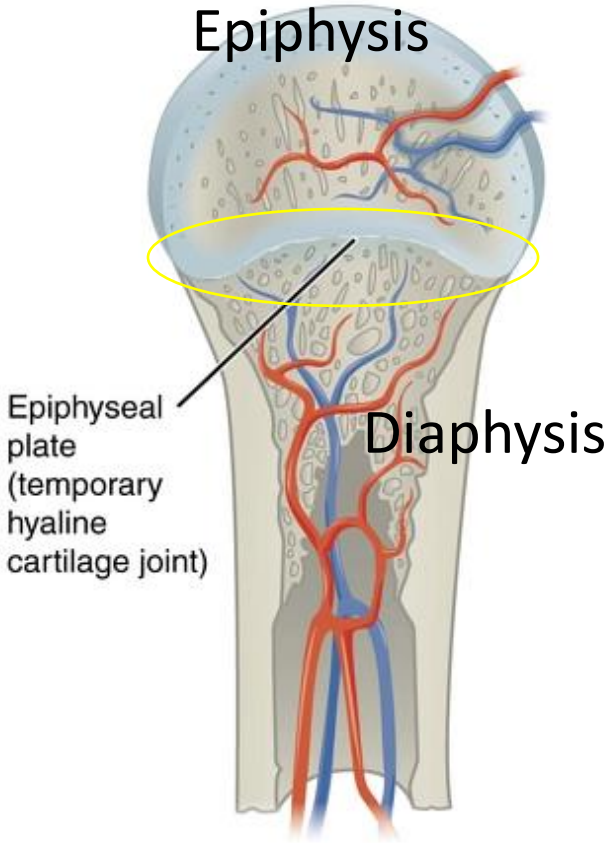


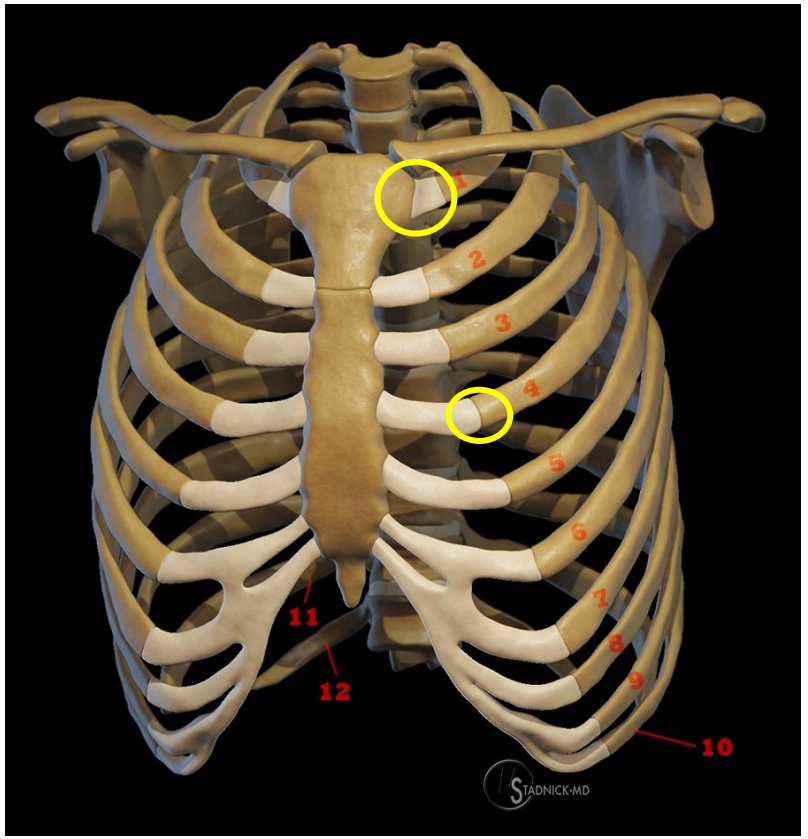
Cartilaginous joints

- 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.

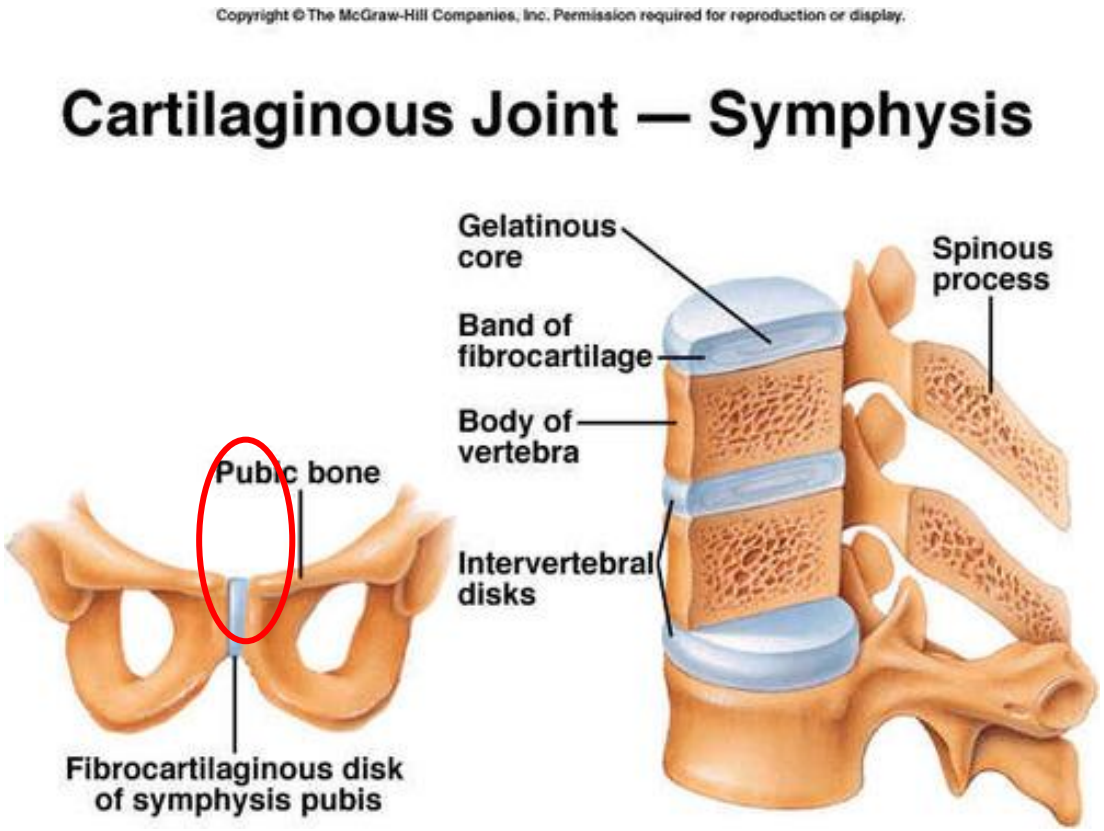
Synchondrosis





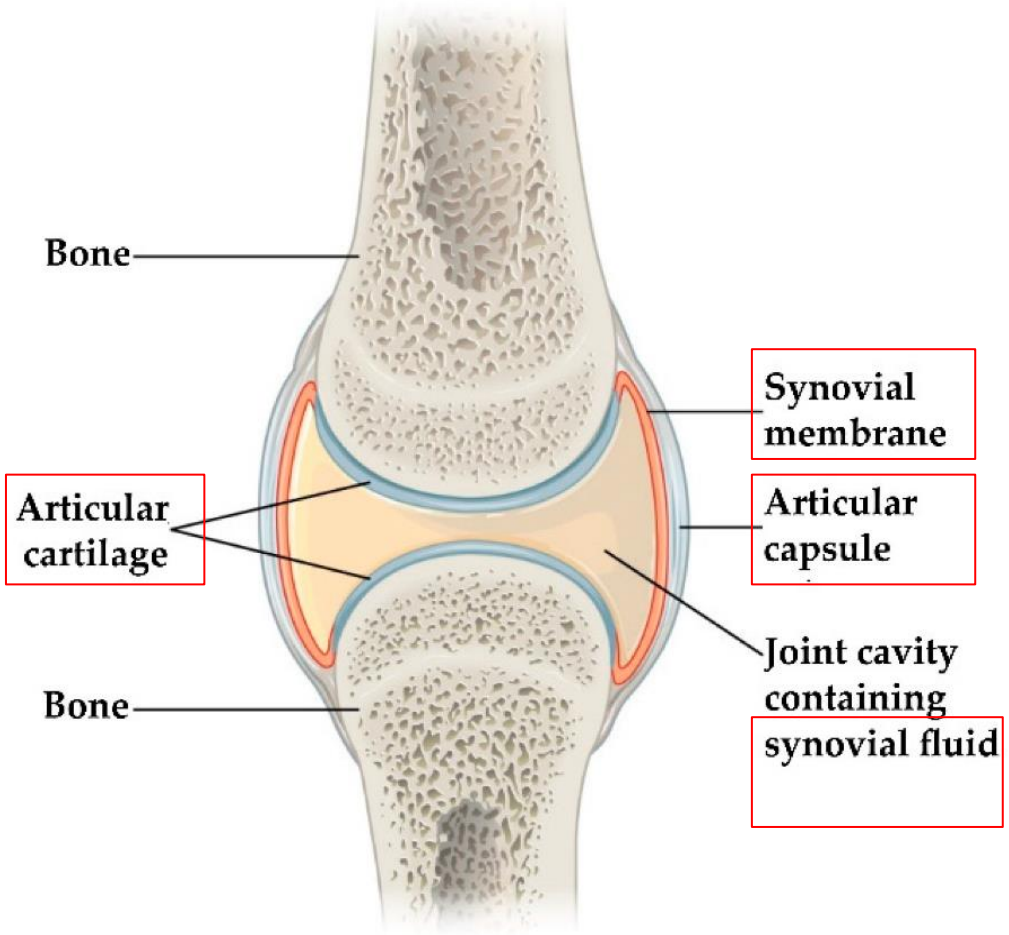
Cartilaginous joints

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 !

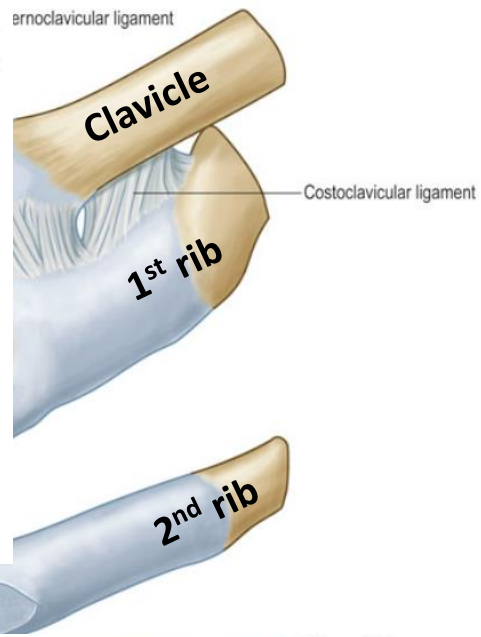
Synovial joints

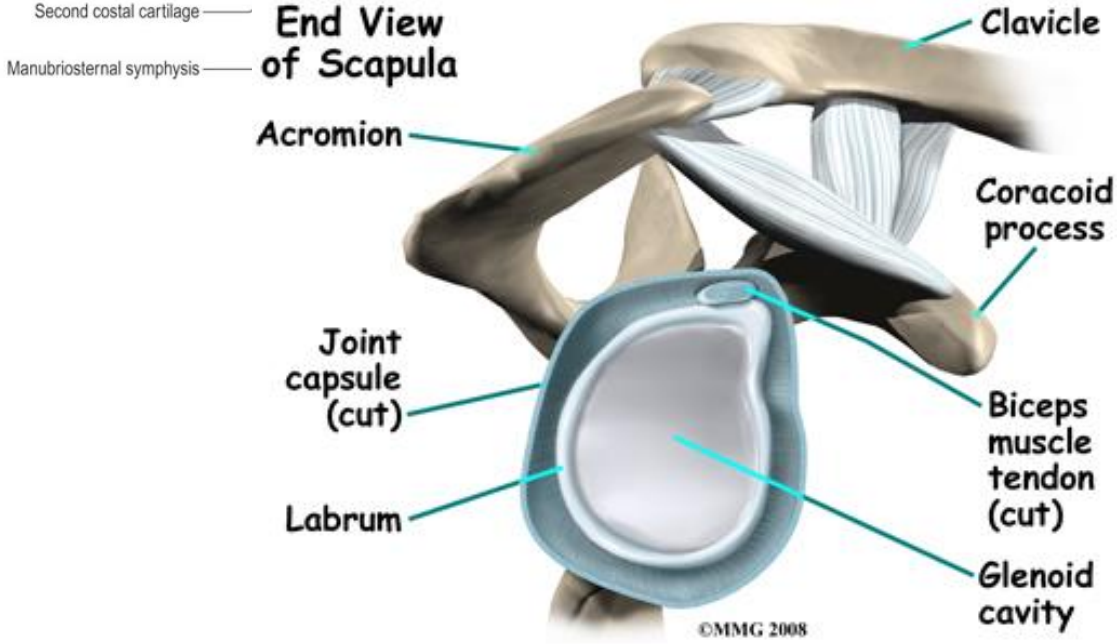
➢**Accessory Ligaments and Articular Discs**

- **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)**

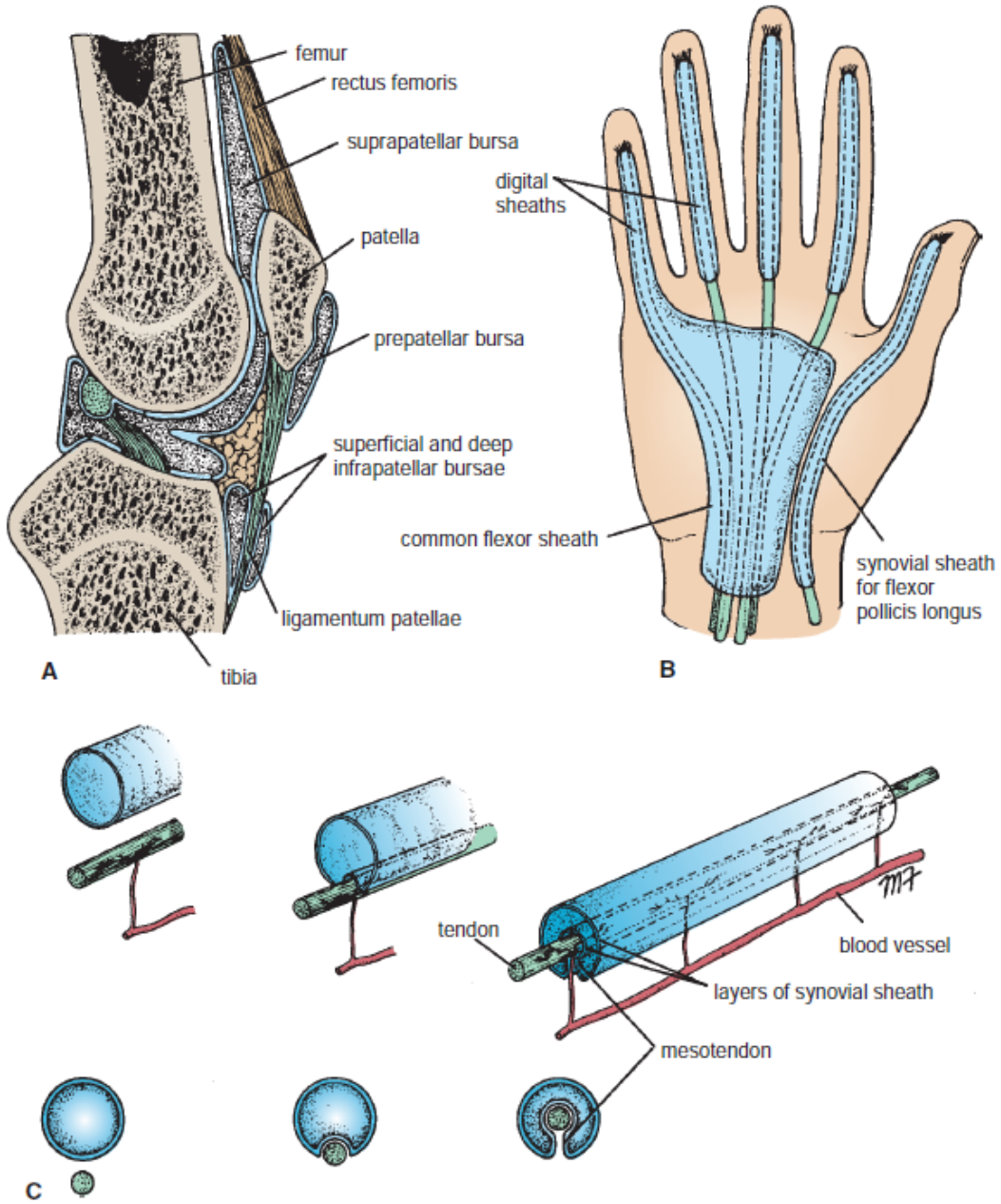
- **Collateral ligaments** & **cruciate ligaments**
- **Tendons; tendon of long head of biceps brachii.**





➢Bursae and Tendon Sheaths

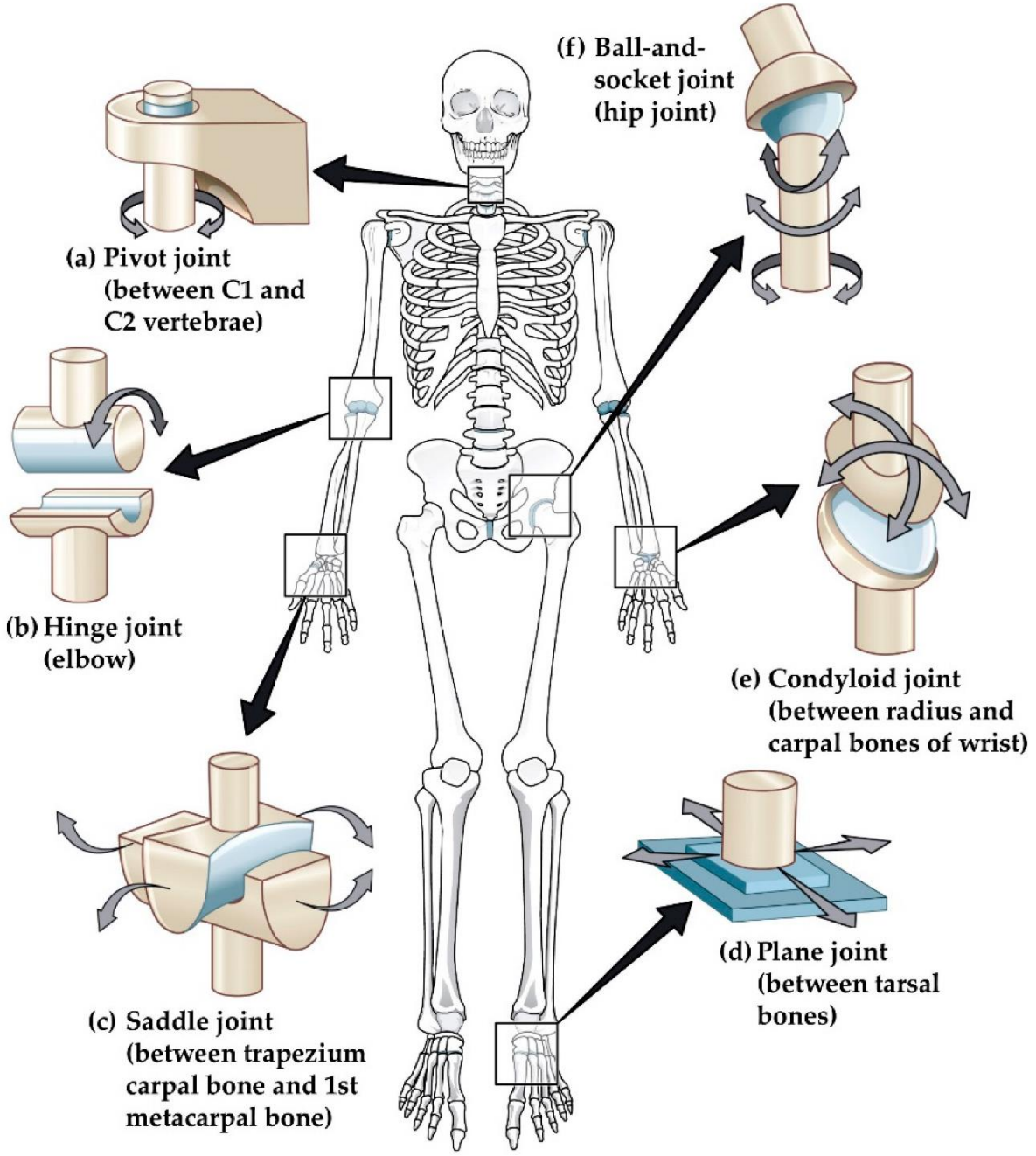
- **Bursae**: sac-like structures containing fluid similar to synovial fluid
- Located between tendons, ligaments and bones
- Cushion the movement of these body parts
- **Tendon sheaths:** Tube-like bursae that rap around tendons to reduce friction at joints



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

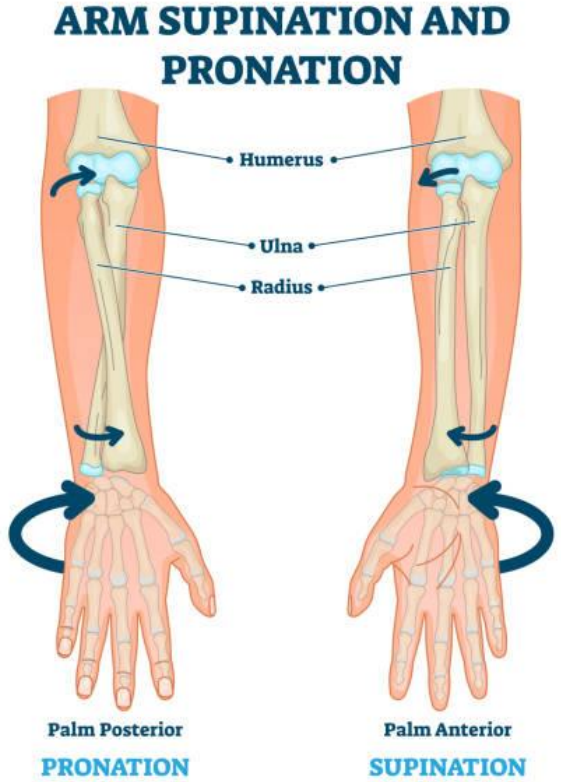
Or according to **the axis around which the movement occur:**

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



Pivot joints

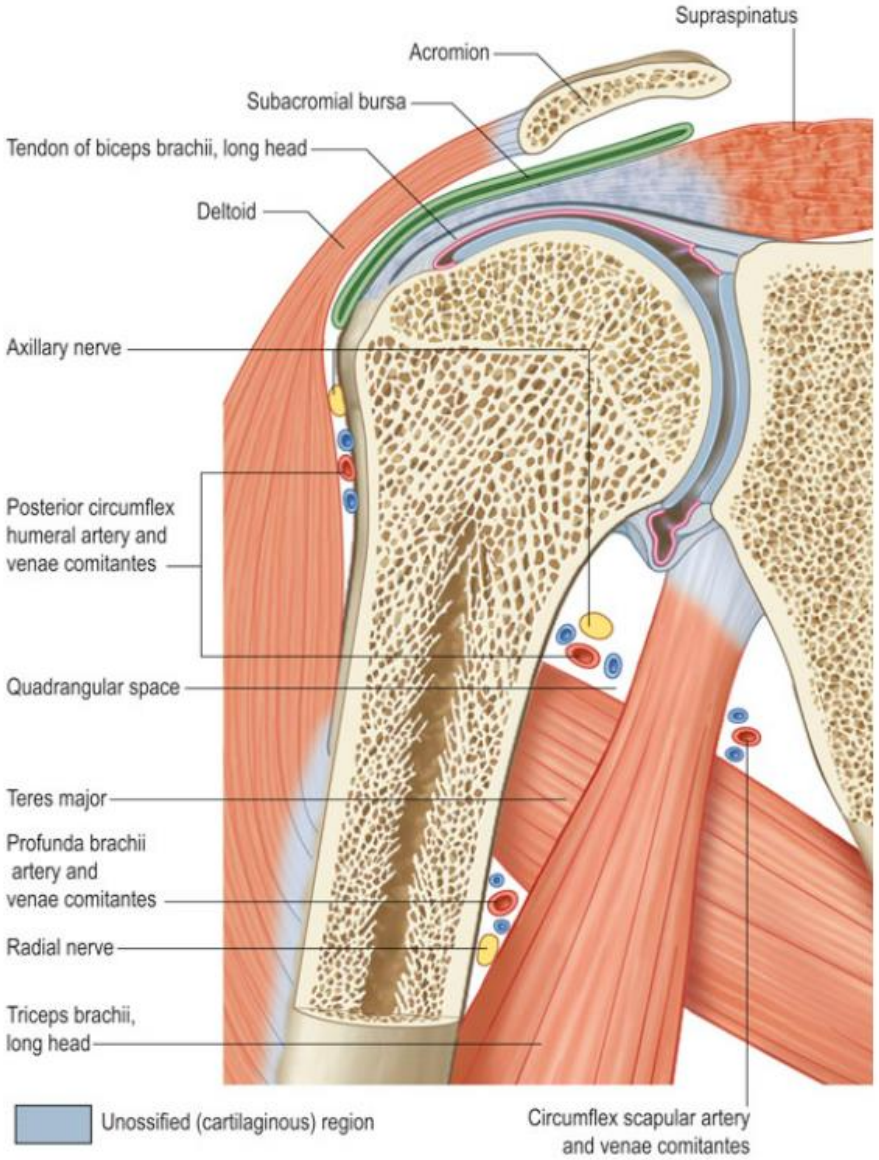
- Uniaxial joints
- Rotation around longitudinal axis
- Examples: **median atlanto-axial** joint and **proximal radioulnar joint.**



Ball and socket joints

Glenohumeral joint (shoulder joint)

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

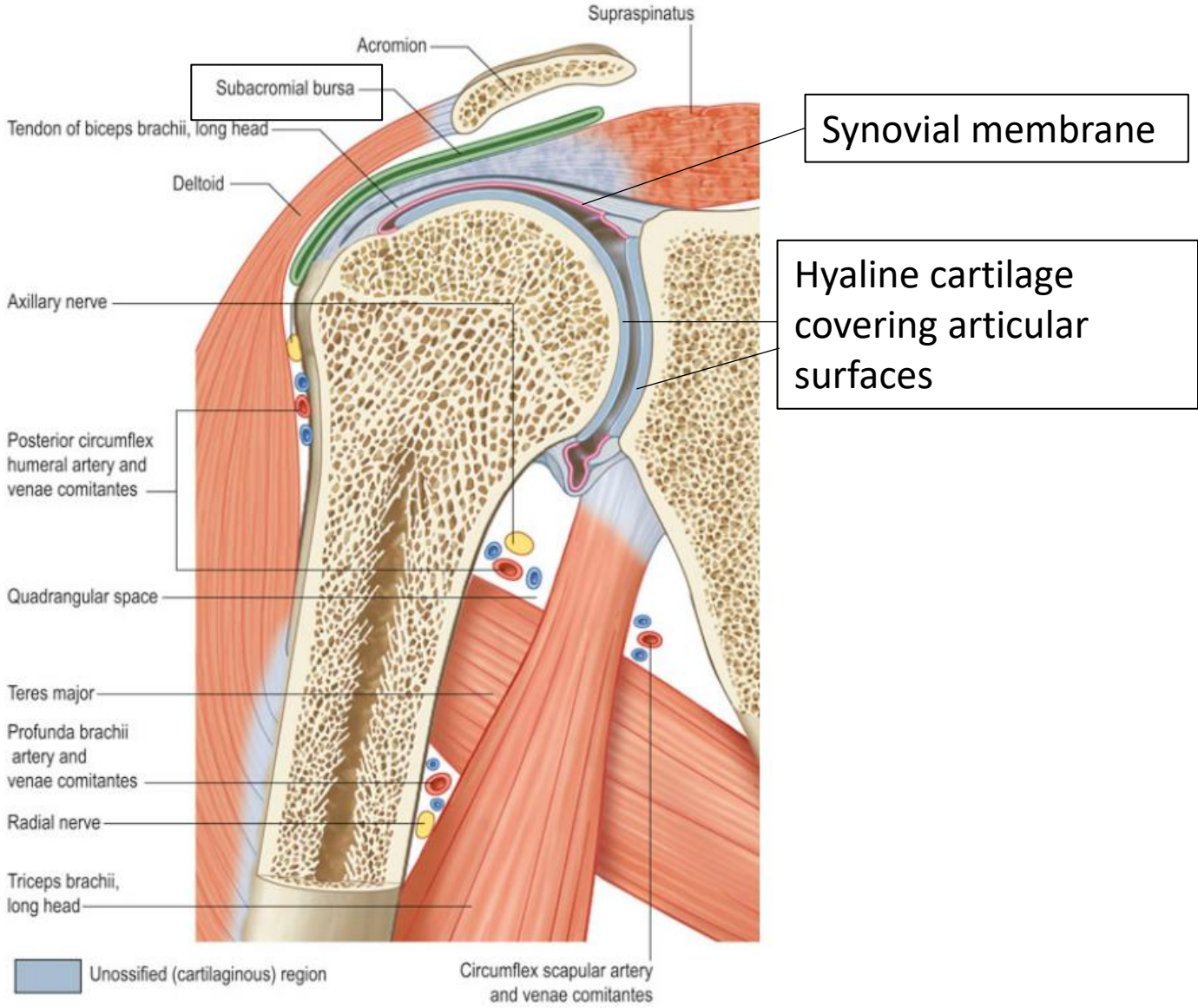


Ball and socket joints

Glenohumeral joint (shoulder joint)

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

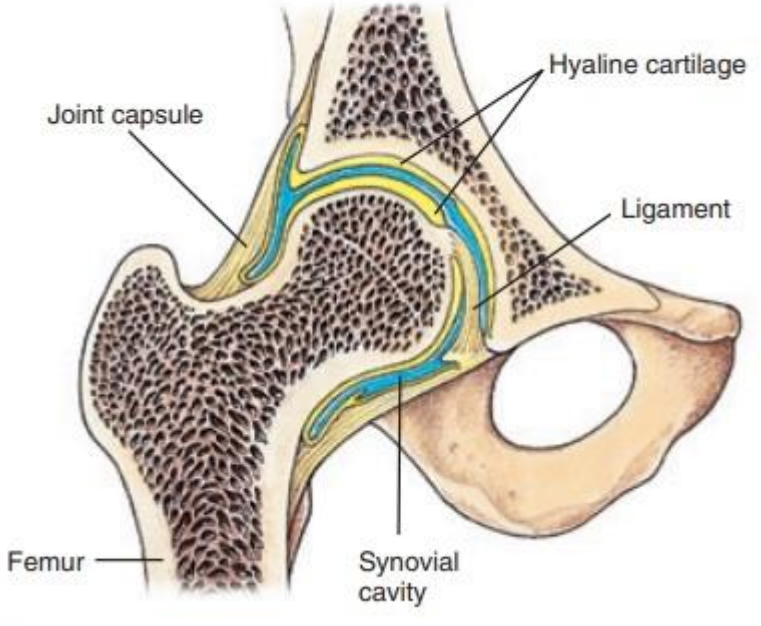
Movements:
Flexion-Extension
Adduction-Abduction
Medial rotation-Lateral rotation

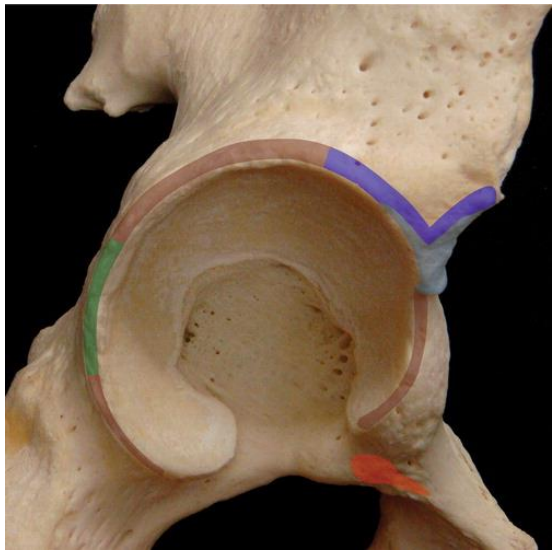


Ball and socket joints

Acetabulo-femoral joint (Hip joint)

- More stable compared to shoulder joint (shape of articular surfaces).





Transverse ligament

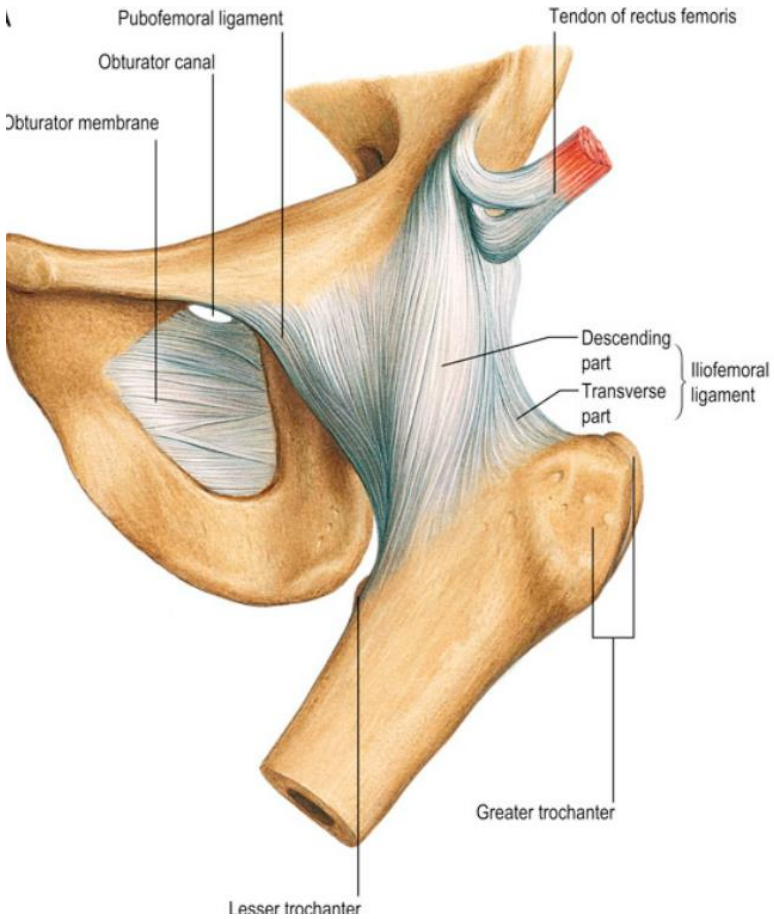
Ball and socket joints

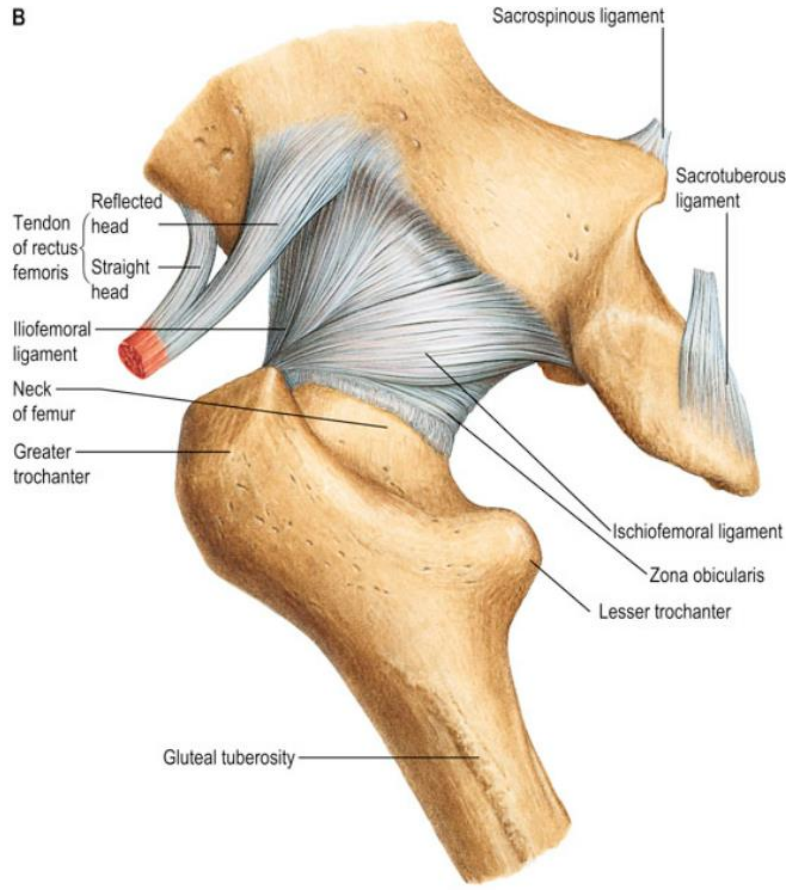
Acetabulo-femoral joint (Hip joint)

Ligaments of hip joint:

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

Ligaments are important in connecting bones and providing support and stability to the joint

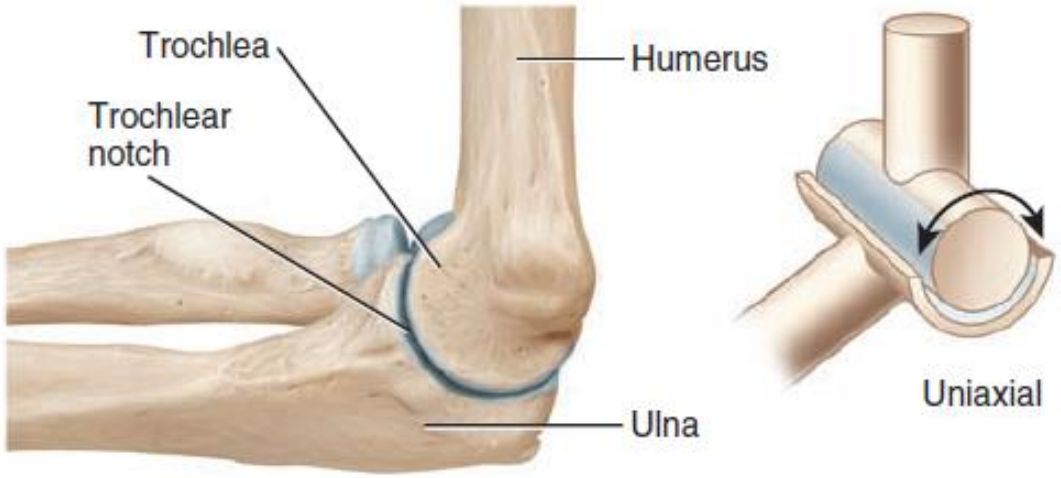




Hinge joints

Elbow joint

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

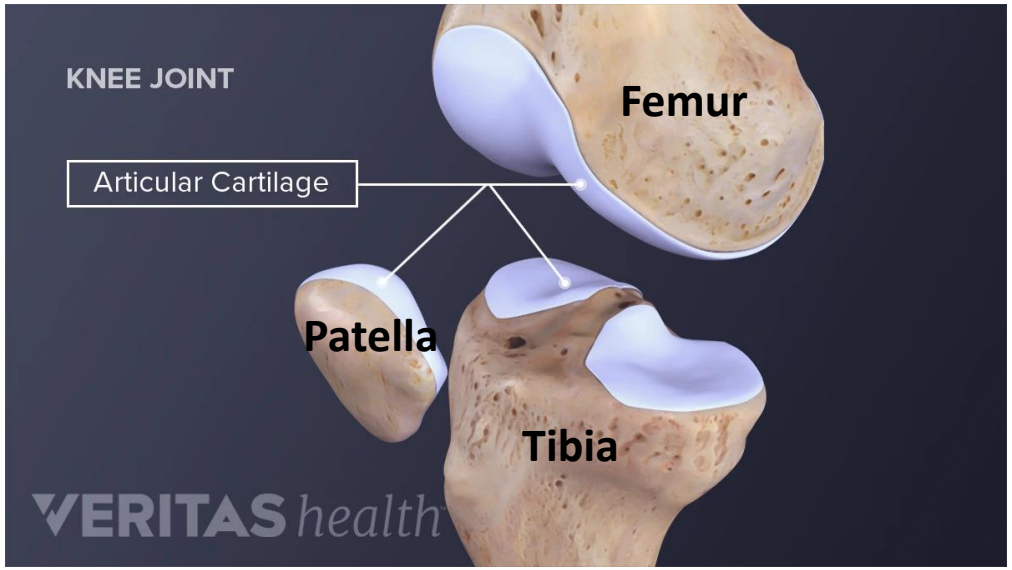


(b) Hinge joint between trochlea of humerus and trochlear notch of ulna at the elbow

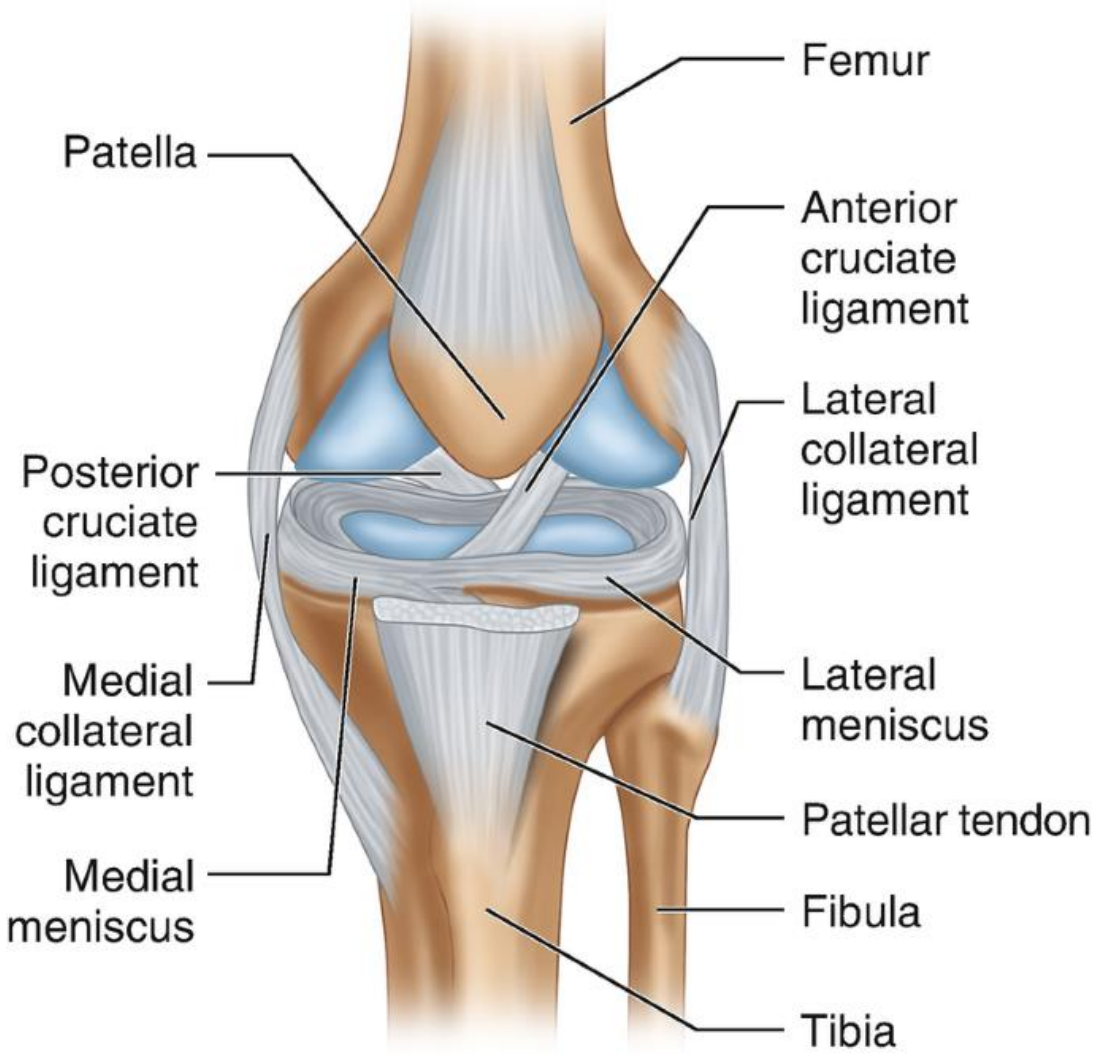
Hinge joints

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

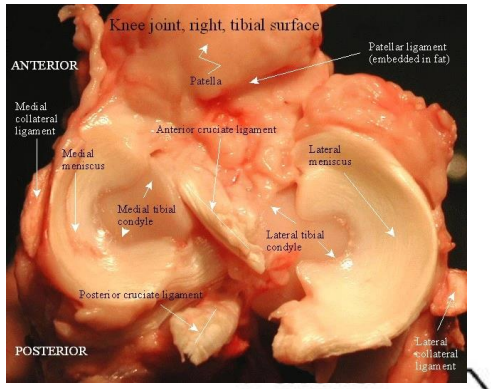
Intra-capsular structures:

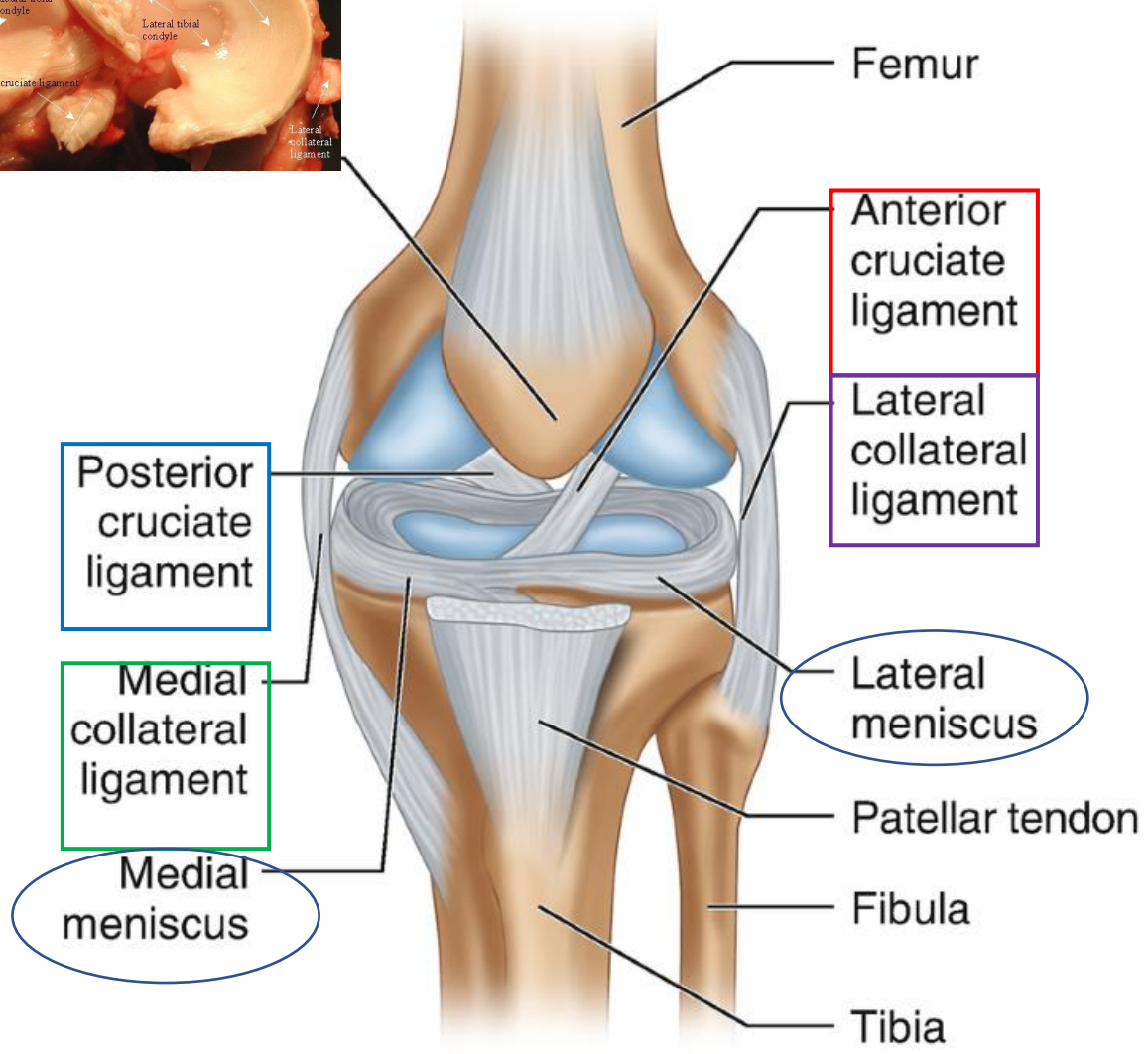
- **Ligaments**:
  1. **Anterior cruciate ligament (ACL)**
  2. **Posterior cruciate ligament (PCL)**
- **Menisci (crescent-shaped fibrocartilage), increase fit and act as cushion:**
  1. **Medial meniscus**
  2. **Lateral meniscus**

Extracapsular ligaments

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

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

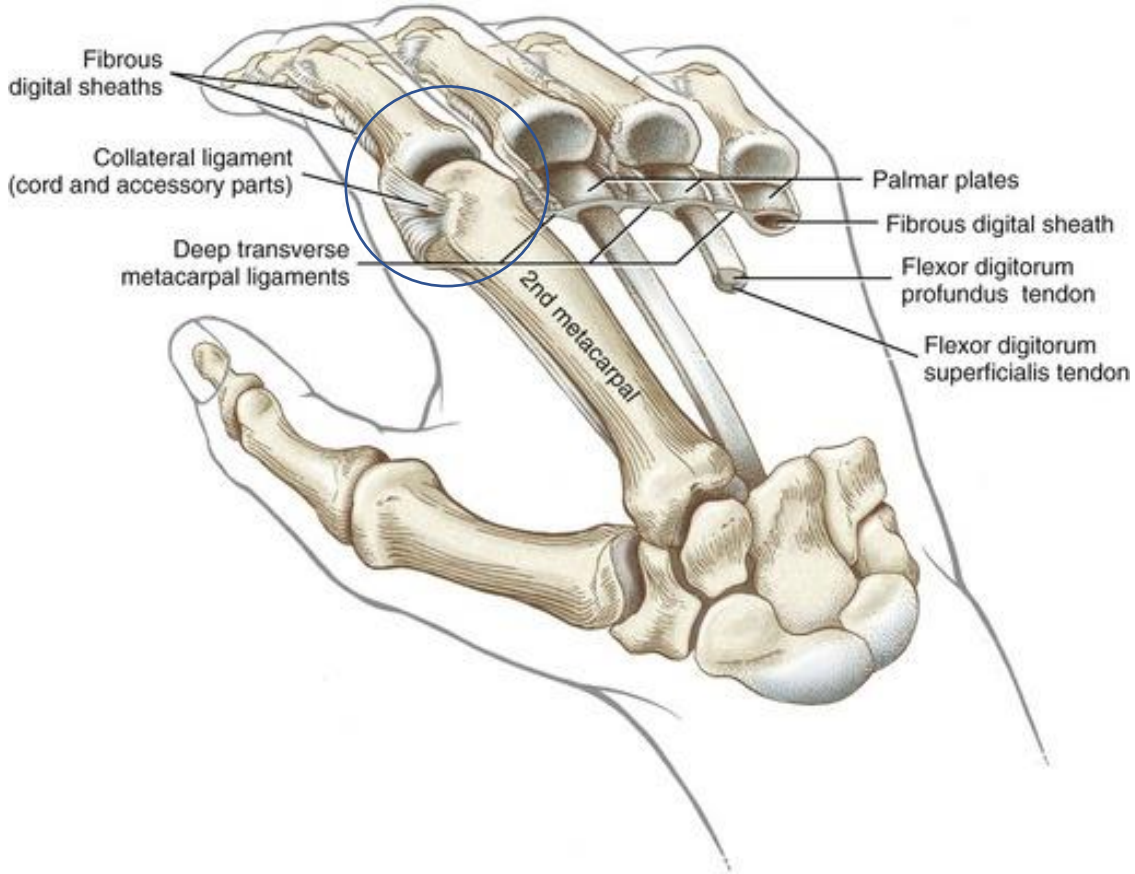




Condyloid and ellipsoid joints

- **Biaxial** joints
- **wrist joint** (ellipsoid).
- **Metacarpophalangeal joint** (knuckle joint) as condyloid joint.

Movement:
Flexion-Extension
Adduction-Abduction

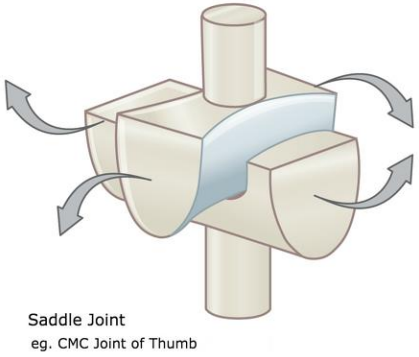


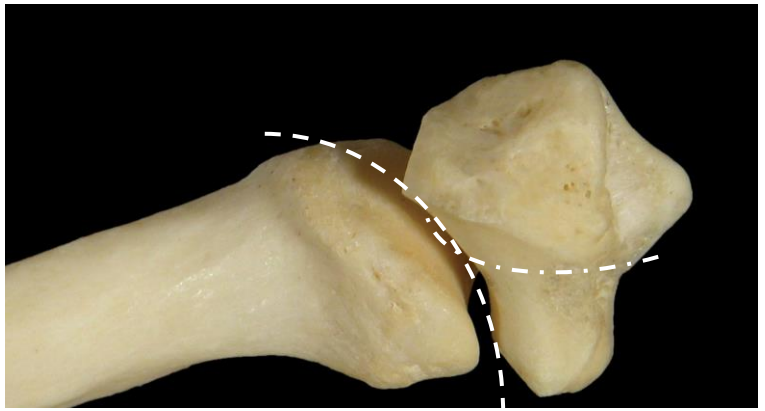
Saddle joints

- **Biaxial joints**
  1st carpometacarpal joint (thumb) and sternoclavicular joint.

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

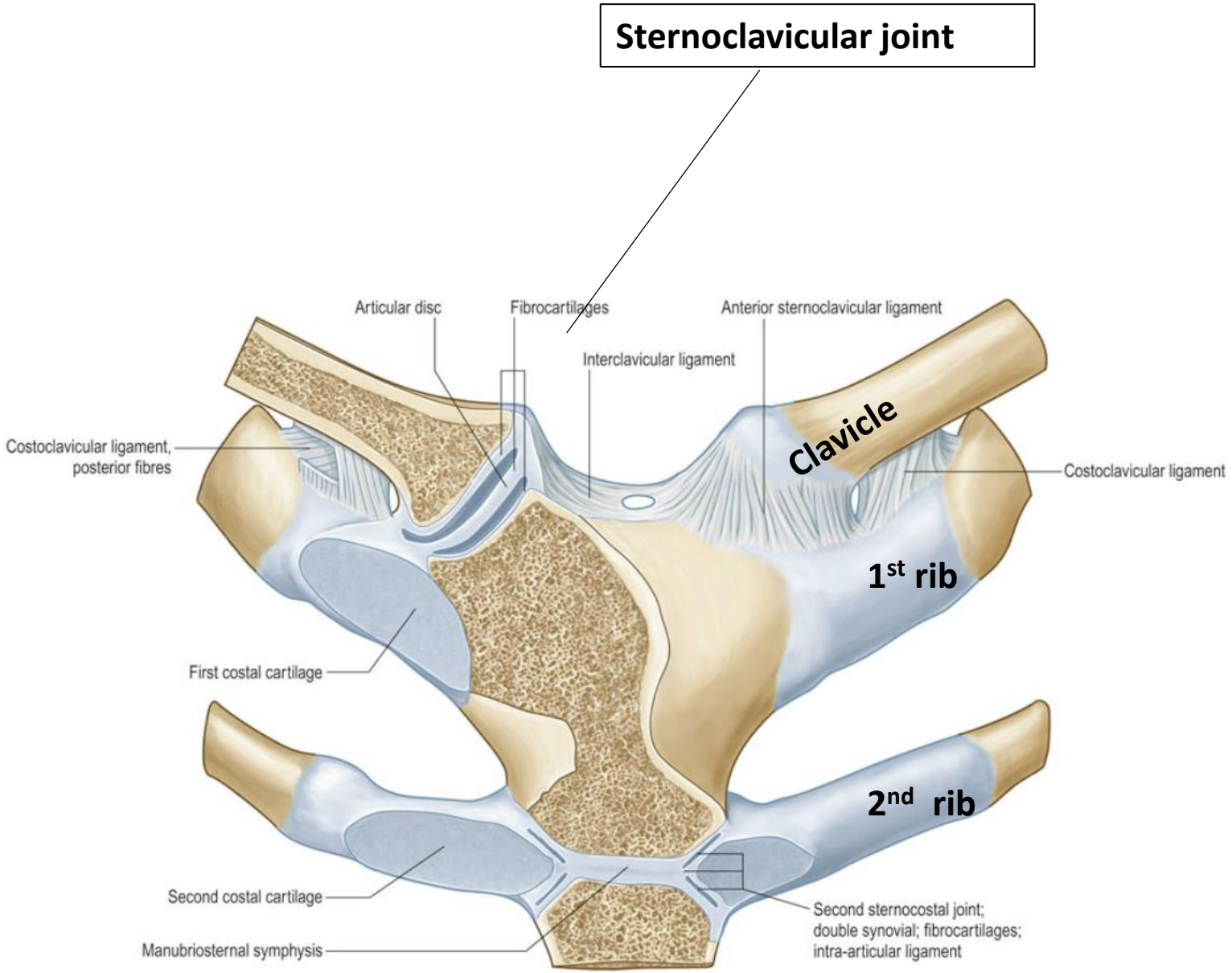
Movement:
Flexion-Extension
Adduction-Abduction
Opposition (thumb)





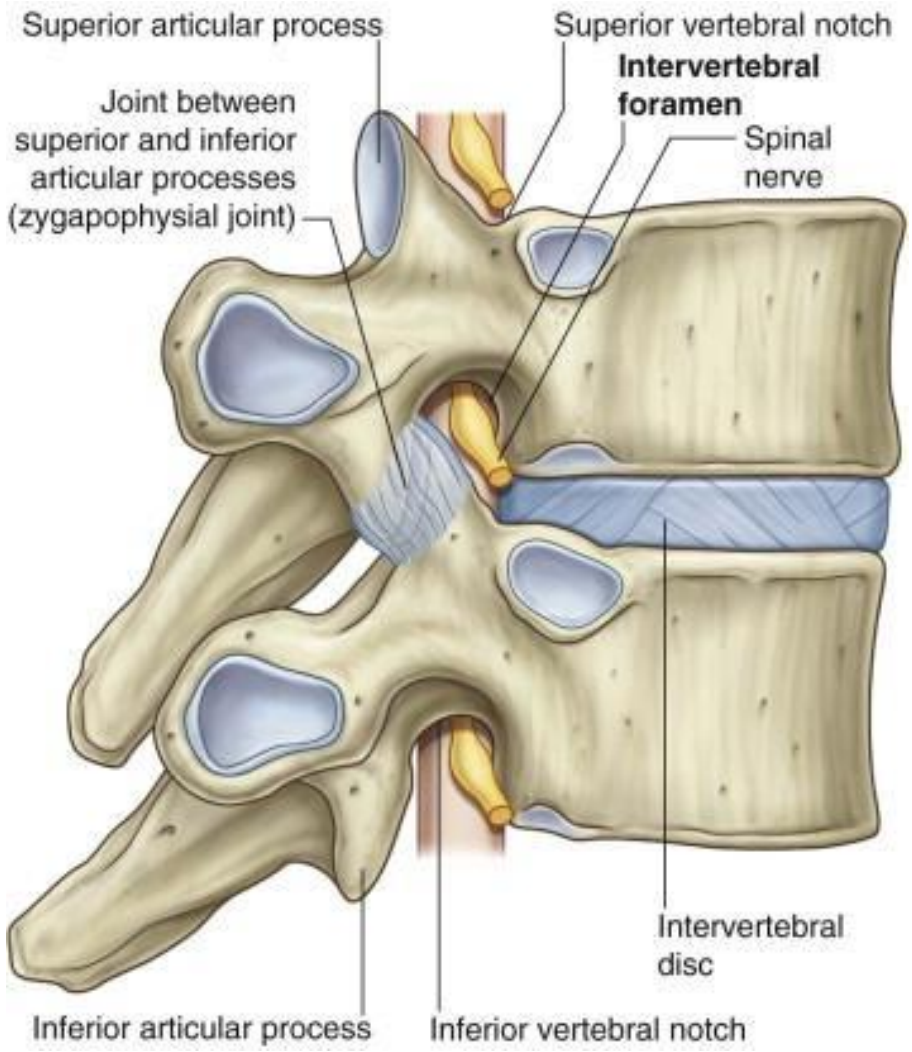
Saddle joints

Sternoclavicular joint is synovial saddle-type joint



Plane joints

- Gliding movement.
- between the **superior and inferior articular processes on adjoining vertebrae**.
- Between **carpal bones**
- Between **tarsal bones**

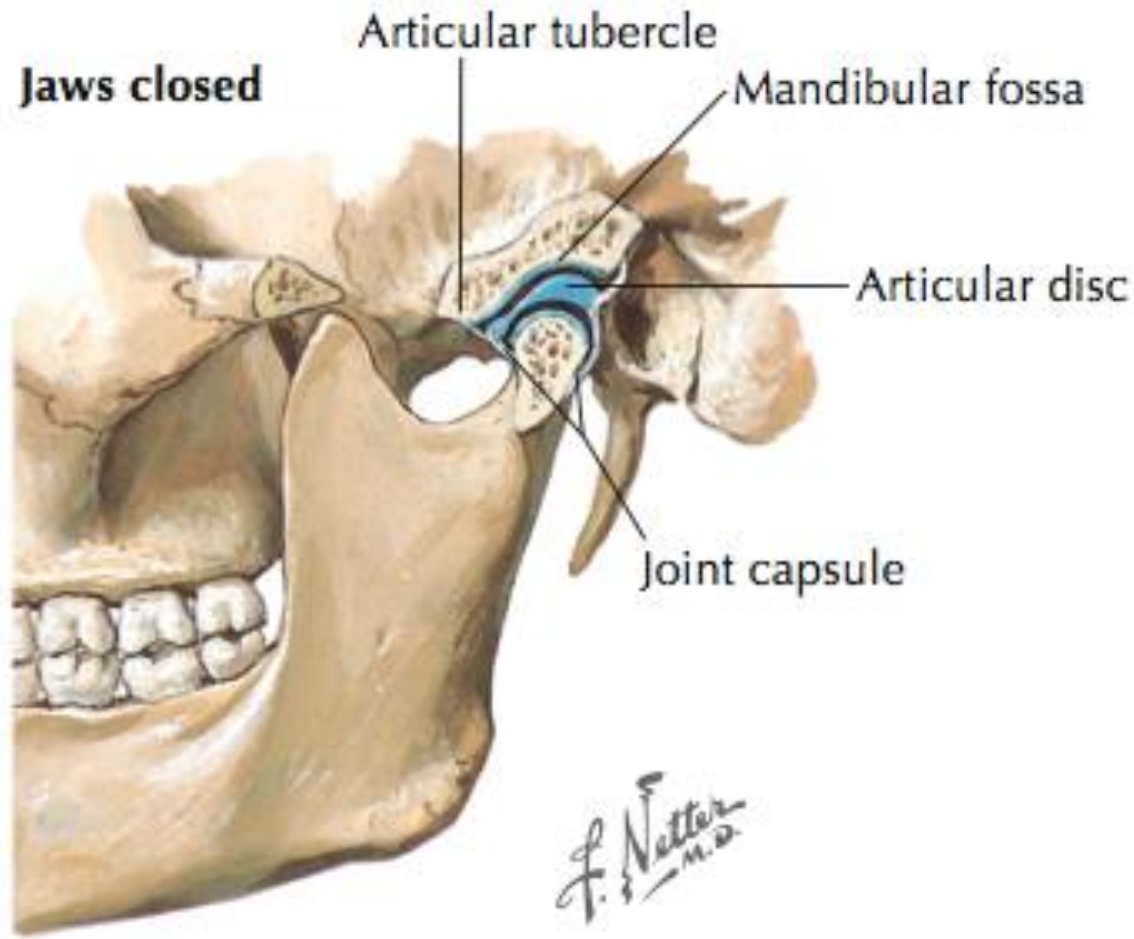


Remember!
Intervertebral disk is a cartilaginous joint

Temporomandibular Joint

- It is an articulation between the **articular tubercle and the anterior portion of the mandibular fossa** of the temporal bone above and the **head (condyloid process)** of the mandible.

- The **capsule** surrounds the joint and is attached above to the articular tubercle and the margins of the mandibular fossa and below to the neck of the mandible.
- **Articular Disc:** is a fibrocartilage articular disc intervenes between the bony surfaces and divides the TMJ into **upper and lower compartments**



Thank you!