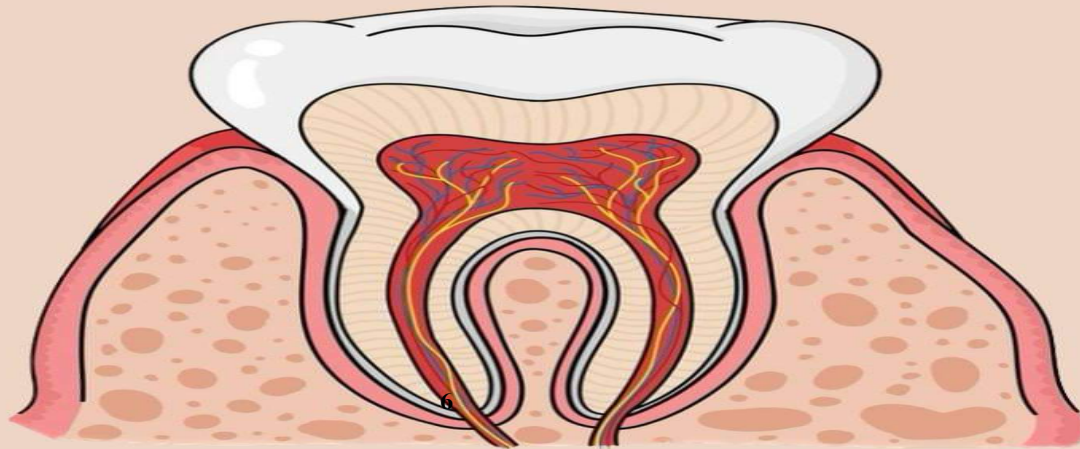




ANATOMY



LEC NO. : 6
DONE BY : Nour Al-amoush.

General Anatomy

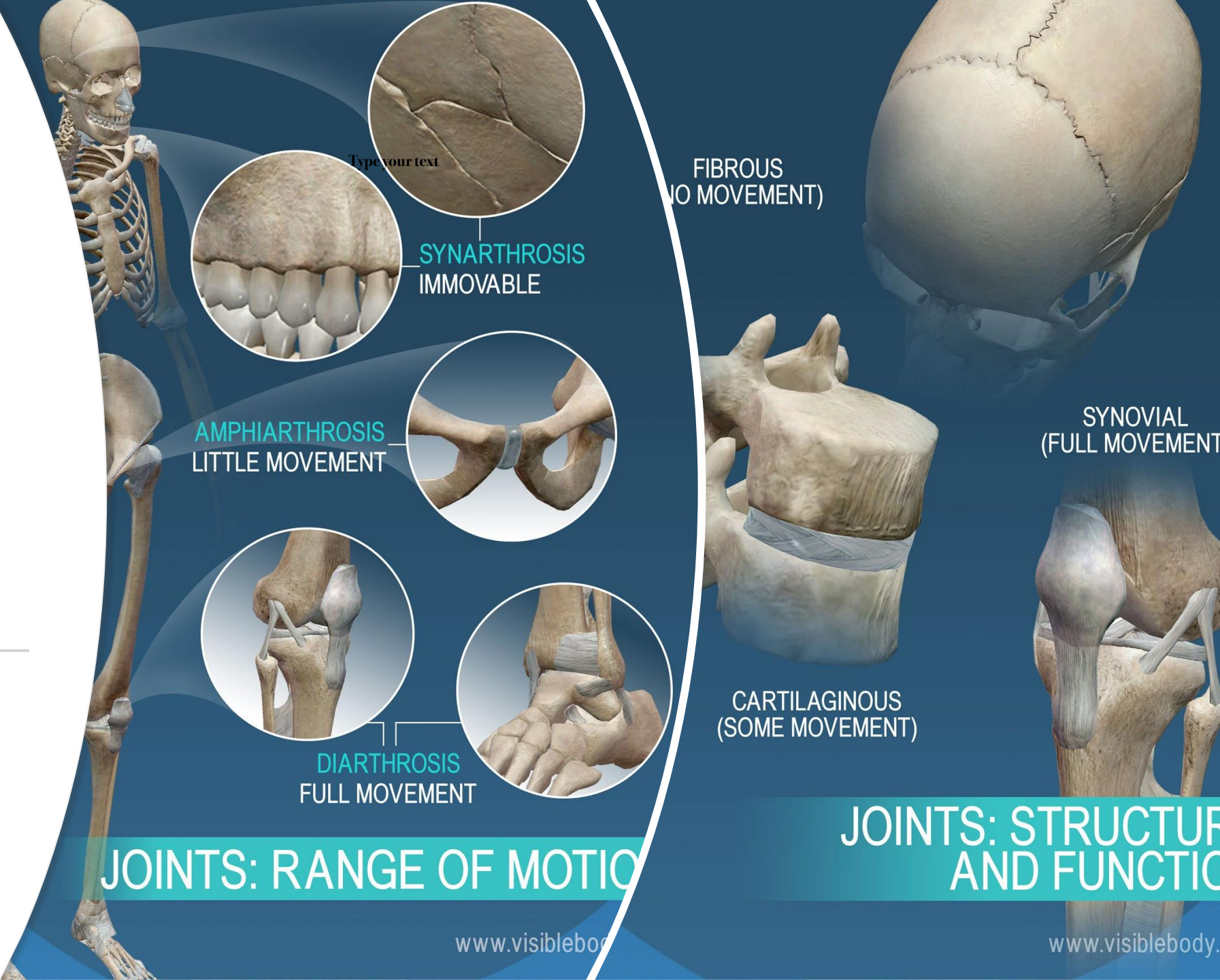
Jointس . المفصّل

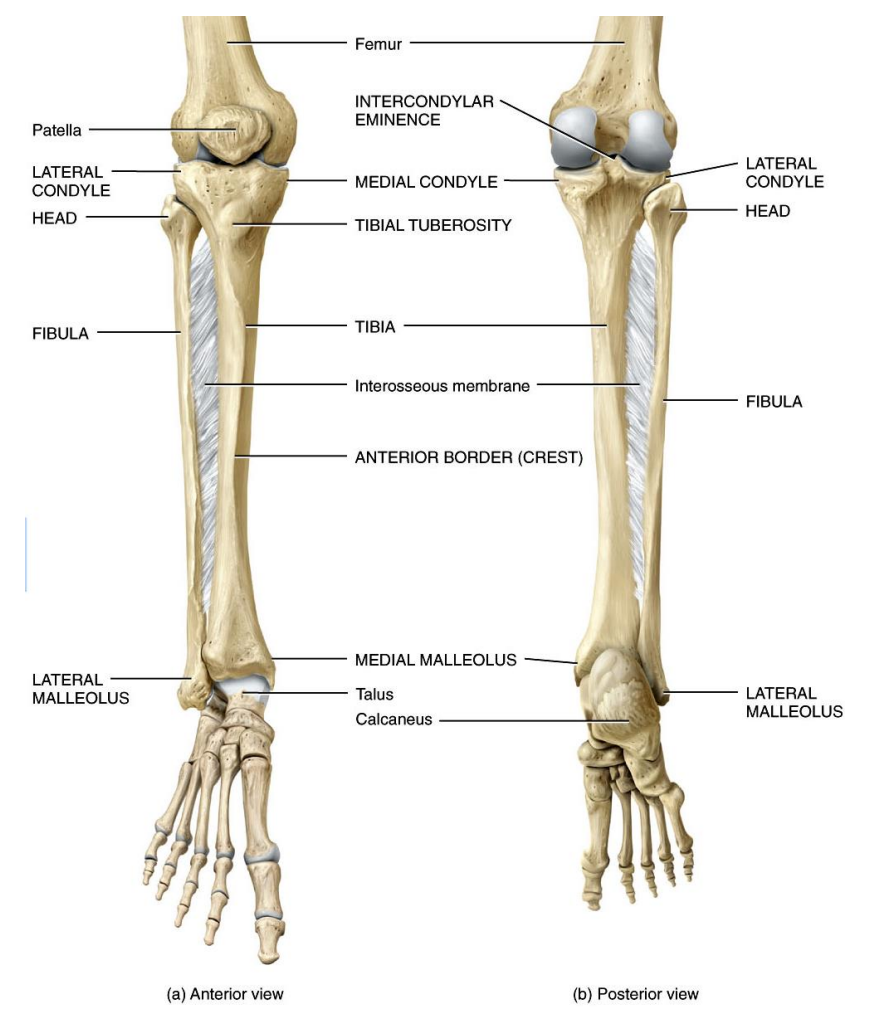
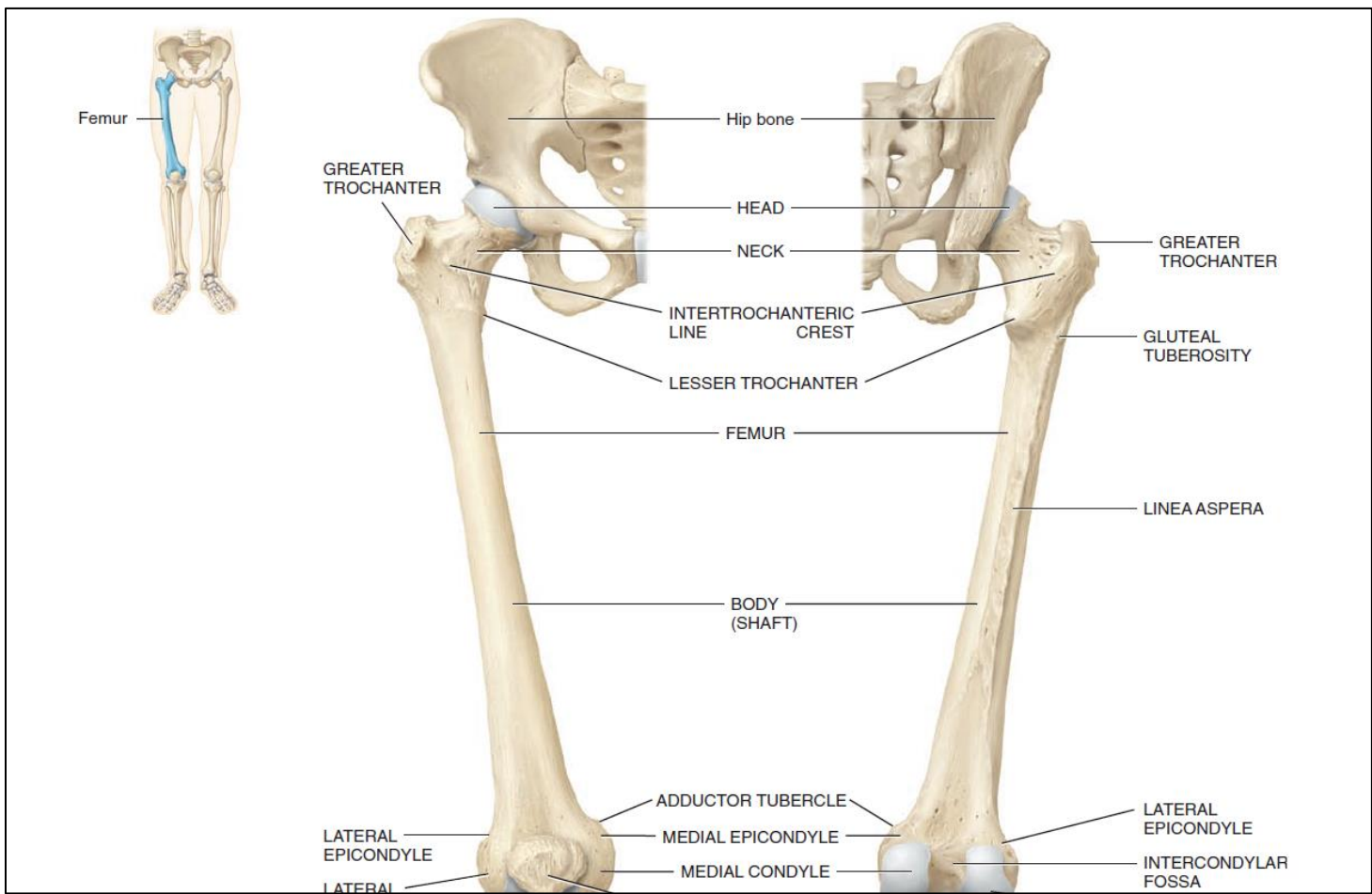
Heba Ali

BDS, M.Sc.(Anatomy), Ph.D.
(Anatomy)

JOINTS: RANGE OF MOTION

JOINTS: STRUCTURE AND FUNCTION





(a) Anterior view

(b) Posterior view

Definition: a joint is a point where two bones or a bone and cartilage make contact. *They articulate.*

Arthrology: is the science of studying the anatomy and function of joints. *علم دراسة المفاصل*

Can be classified **Structurally:** ①
من شو يتكون →

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

Or **Functionally:** ② → *كيف يتحرك*

- 1. Synarthrosis (immovable) *لا تتحرك*
- 2. Amphiarthrosis (slightly movable) *حركة بسيطة*
- 3. Diarthrosis (freely movable)

1. Fibrous joints >> immobile to slightly mobile joints
Immovable

2. Cartilaginous joints >> immobile to slight movement

3. Synovial joints >> freely movable joints
دائماً يتحرك

Fibrous joints

Very tough, strong tissue

- Immovable or limited movement

- No joint cavity

No space between articulating bones,
No fluids, bones almost attached to each other

- Types:

In infant, there is fontanells which separate skull bones
تكون بتكون tough fibrous connective tissue connecting these bones

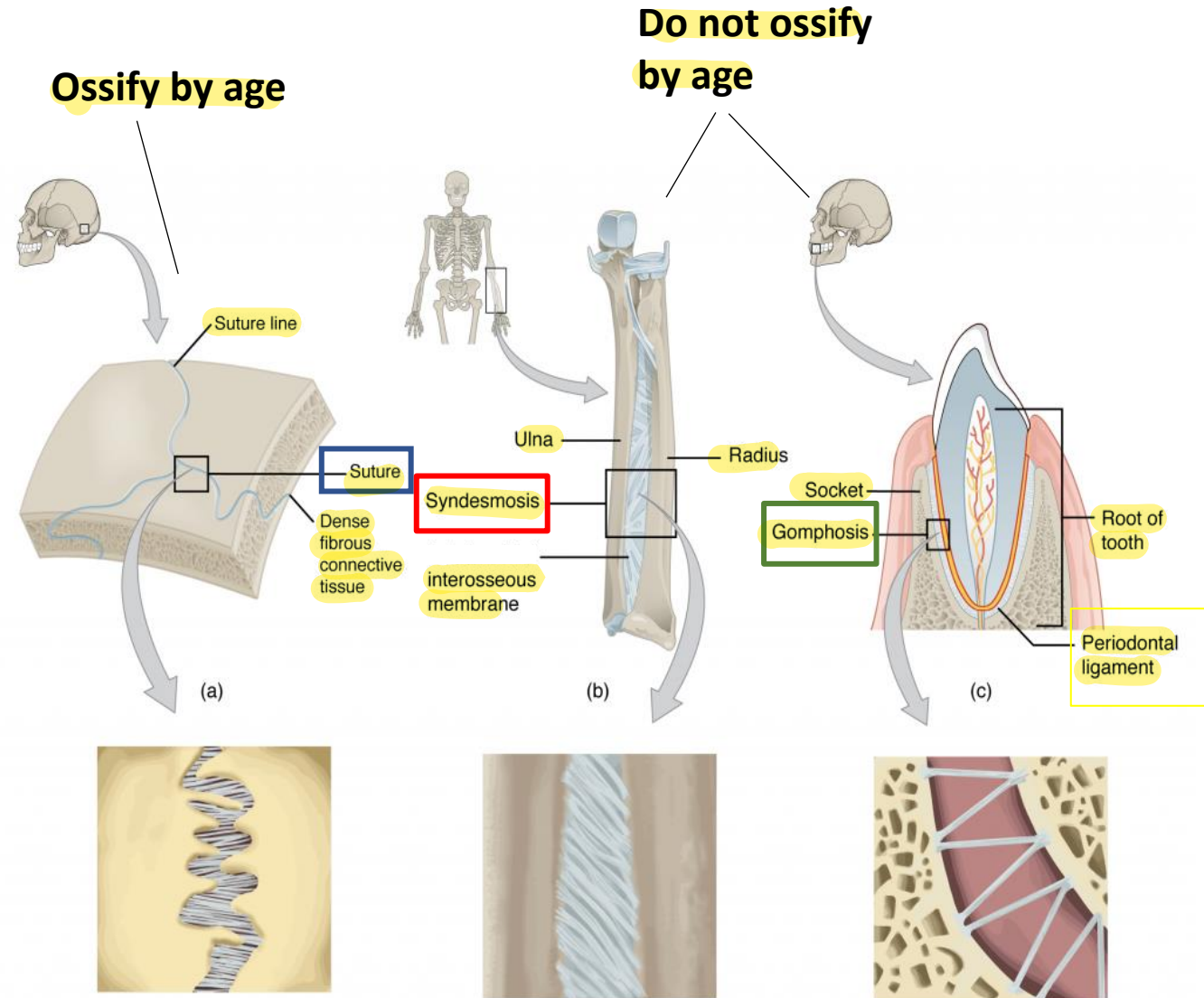
1. Sutures of skull (immobile).

2. Syndesmoses; two bones are connected by strong fibrous tissue (slight movement)

1. Interosseous membrane, between radius and ulna. *برضو موجود ف بين fibula and tibia lower limb*
2. Ligament, Distal tibiofibular joint. *قوي جدًا*

3. Gomphoses; fibrous joints between the roots of the teeth and the alveolar part of the maxilla and mandible (immobile).

جاية من Gum و هي الاسم العامي للثة
يكون في fibrous tissue ما بين alveolar و يكون
spongy bone يحتوي على spaces



Cartilaginous joints

articulation between bone and cartilage او يكون

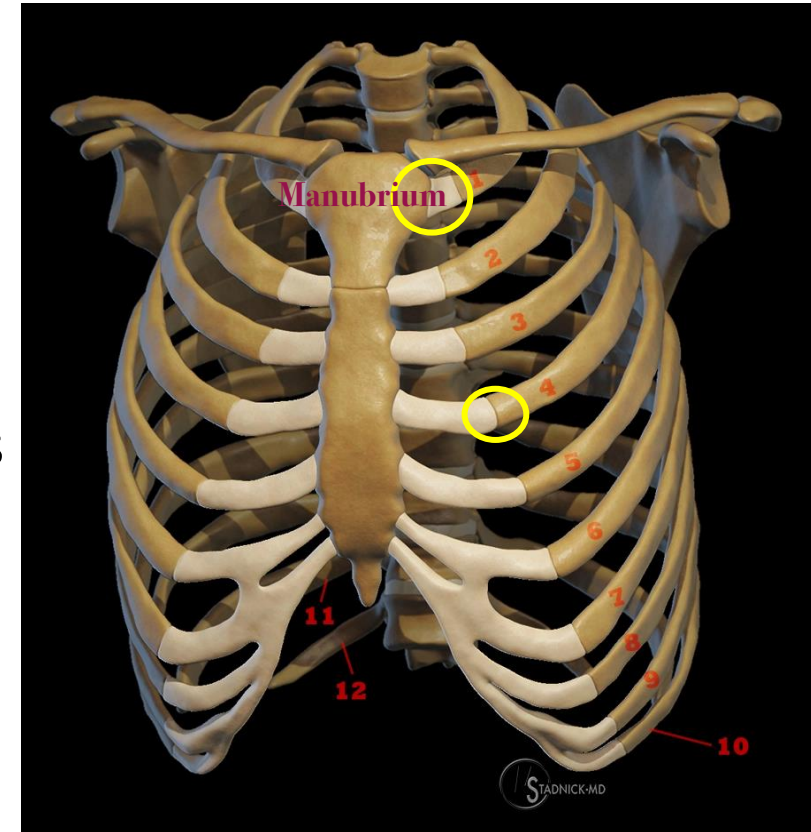
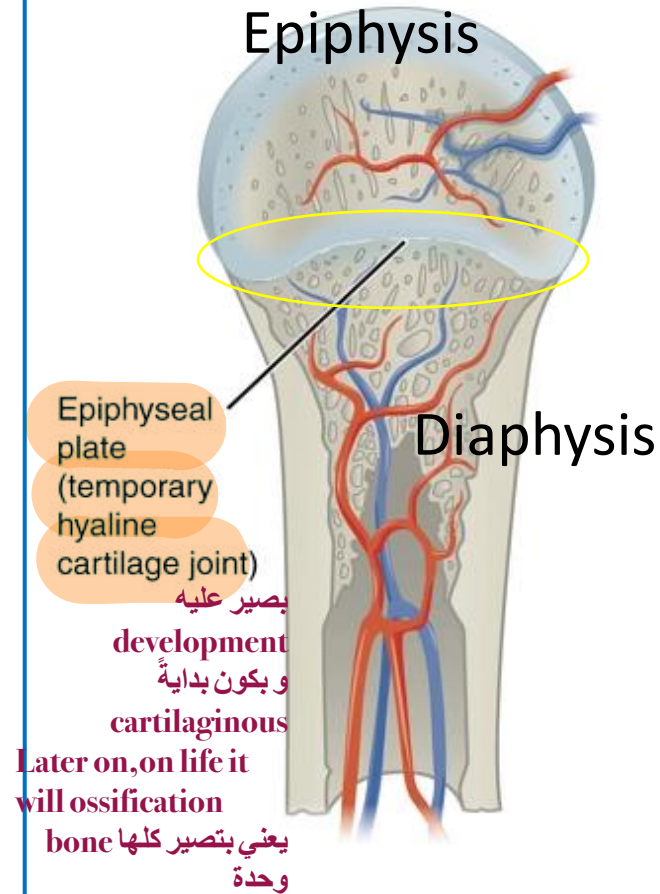
- When two bones articulate with each others by cartilage

- Hyaline cartilage and fibrocartilage

Types of cartilage
elongation process of long bones during مهم جدًا في development

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

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Cartilaginous Joint — Symphysis

2. Secondary cartilaginous joints

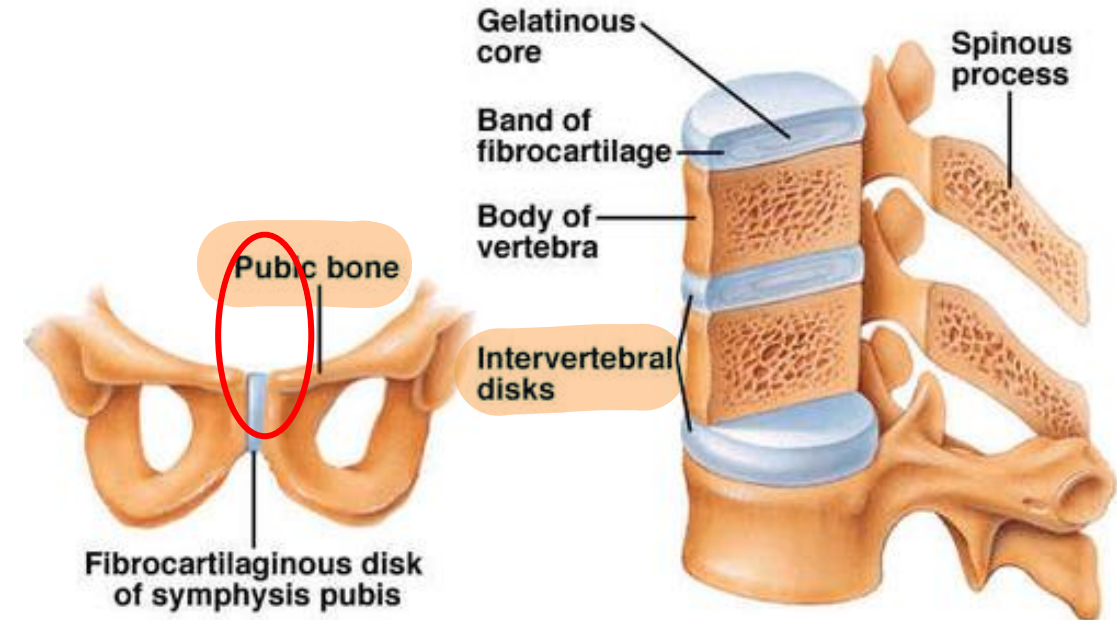
(**symphysis**):

when two bones are joined with fibrocartilage. e.g., **intervertebral disk** and **pubic symphysis**.

Intervertebral disk : shock absorber, help in movement

بيتحمل الضغط لكن لحد معين ممكن ال contents يلي فيه تطلع و تأثر على spinal nerves

Pubic symphysis : between 2 hip bones



1- articulating surfaces are covered with a layer of hyaline cartilage

لازم يكون في اشي اسمه fibrous capsule و هو outer coverage of this joint

2- Any synovial joint must have a cavity filled with synovial fluid

The importance of fluid to allow the movement being smooth

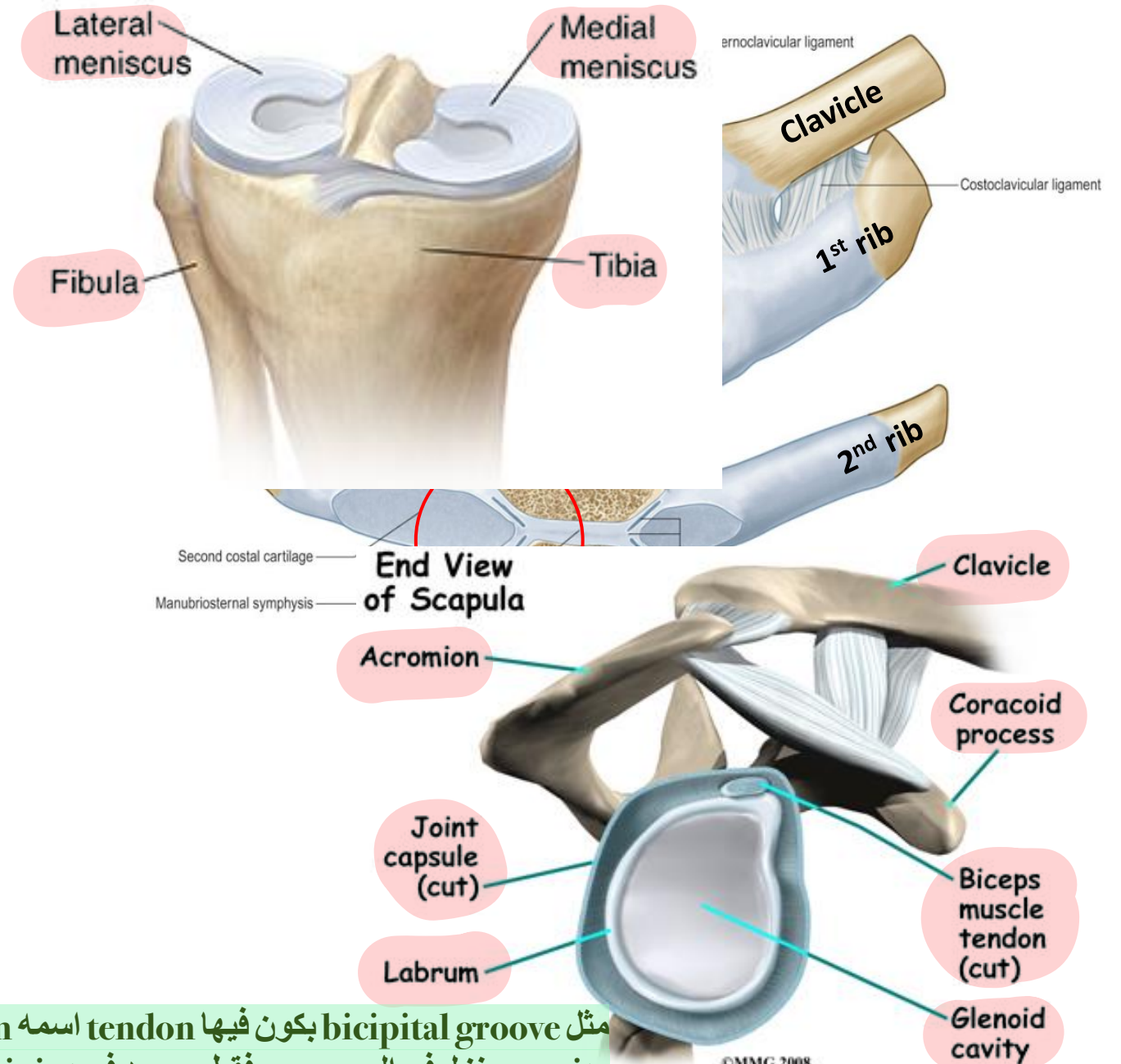
مثال عليها، الناس الكبيرة بالعمر لما يصير عندهم مشاكل بالمفاصل يكون عندهم نشفان لانهم خسروا هاد ال fluid.

Synovial joints

➤ Accessory Ligaments and Articular Discs

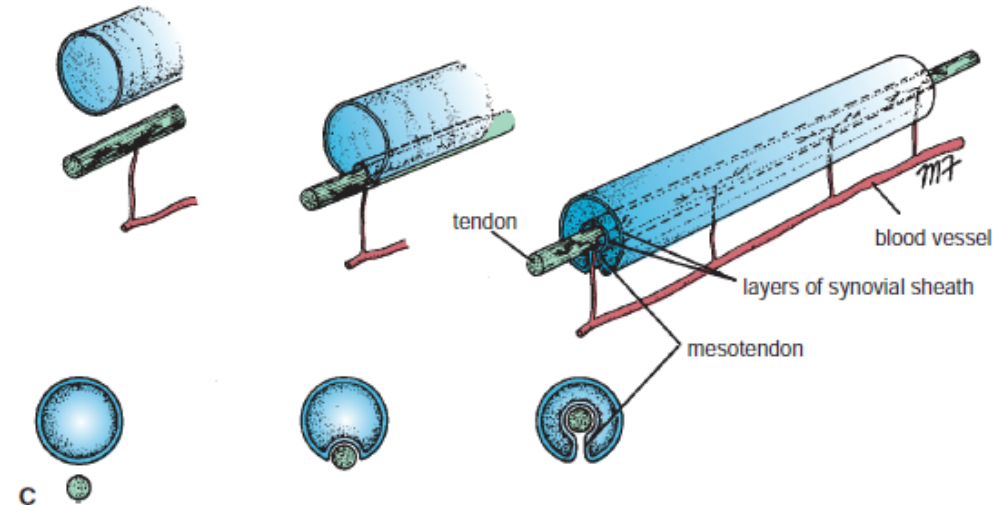
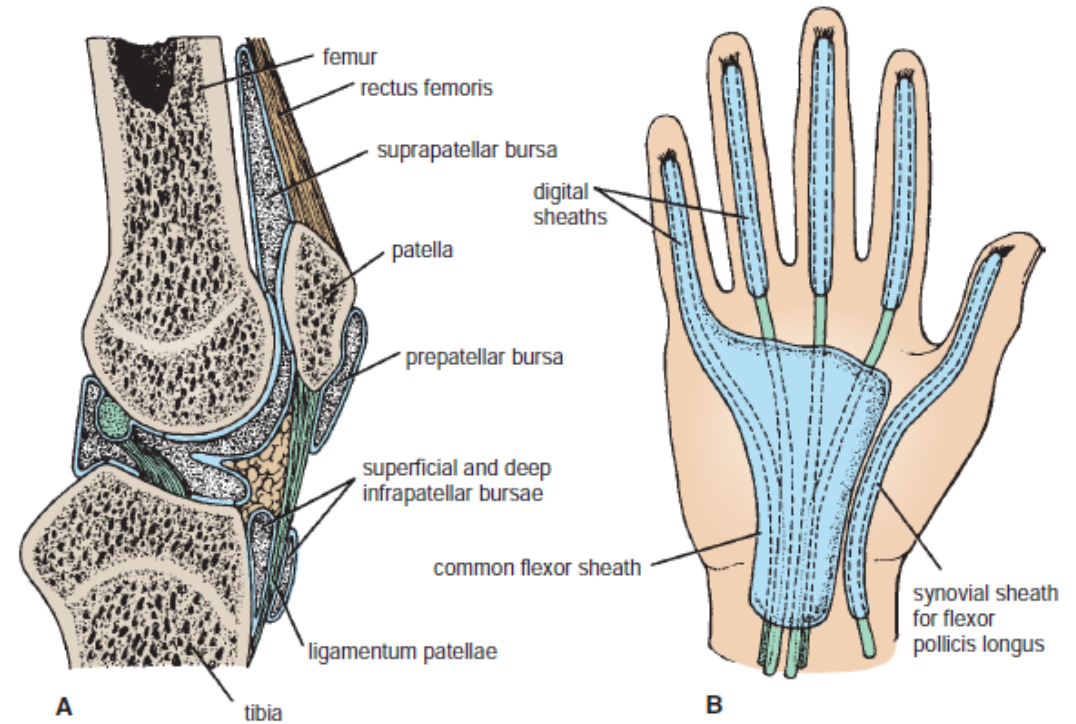
ممکن تكون موجودة او لا هدفها تخلي ال joint في مكانه

- **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** ^{الرباط الصليبي} Exist in knee joint
- **Tendons; tendon of long head of biceps brachii.** مثل bicipital groove يكون فيها tendon اسمه long tendon بيحي من glenoid cavity و بنزل في ال groove فقط موجود في shoulder joint



➤ Bursae and Tendon Sheaths

- **Bursae:** sac-like structures containing fluid similar to synovial fluid
شو وظيفة؟ وين ما بصير friction لازم يكون في sac عشان يمنع، اكثر اشي بصير ب knee&shoulder joint
- Located between tendons, ligaments and bones
أوتار أربطة
- Cushion the movement of these body parts
تمنع friction
- **Tendon sheaths:** Tube-like bursae that rap around tendons to reduce friction at joints
Exist in hands



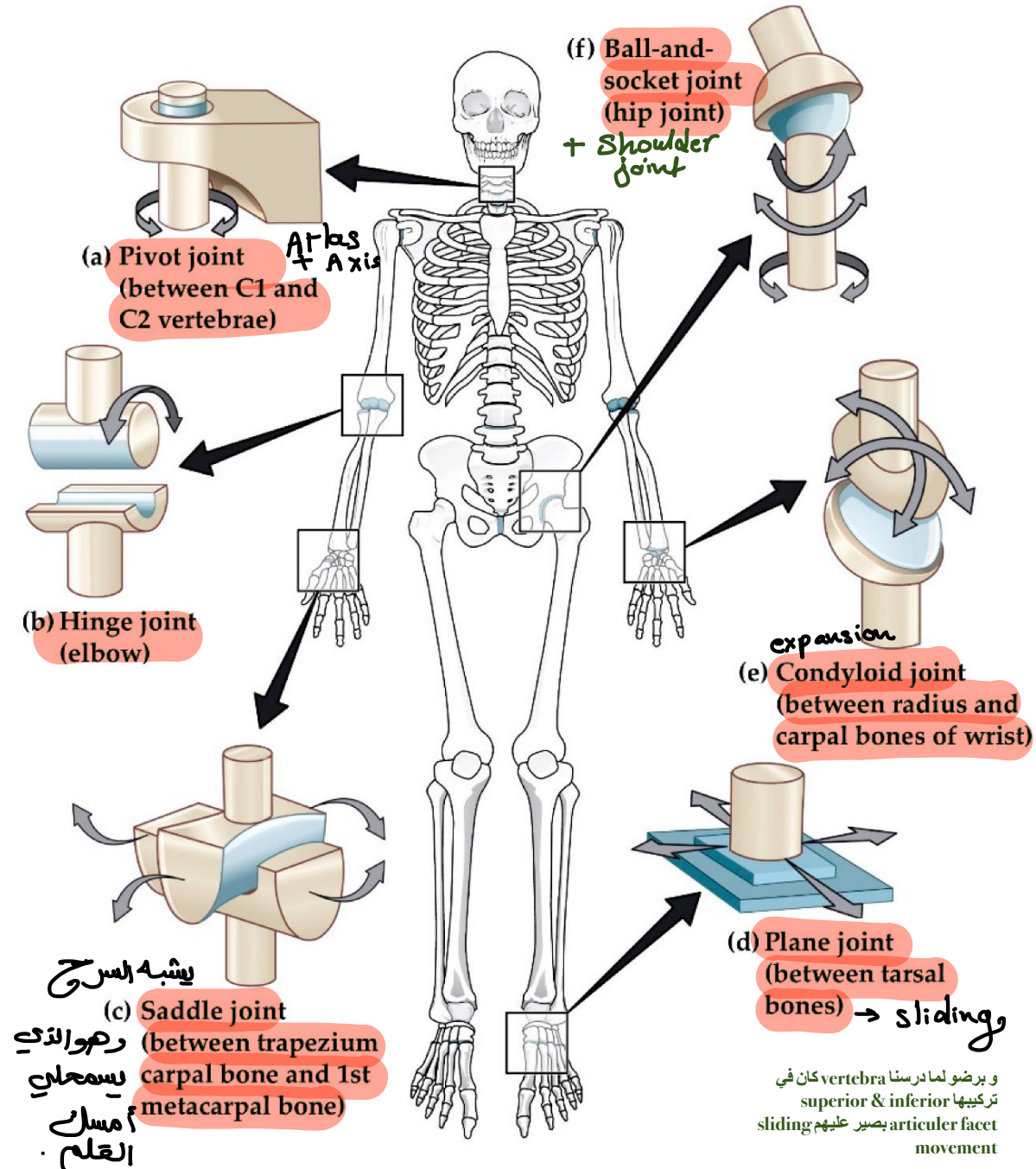
Special for synovial joints

- Can be classified according to the shape of articular surfaces:

- **Pivot joint**
- **Hinge joint** → بيشبه مفصل الزنبرك
- **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

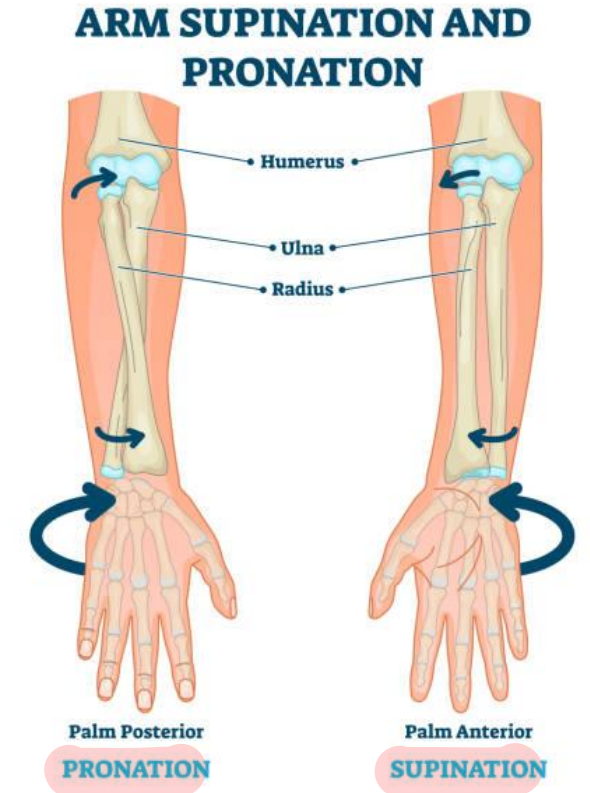


Pivot joints

اي joint بصير عليه rotation مثل ما
بين radius & ulna

Median atlanto axial joint :

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



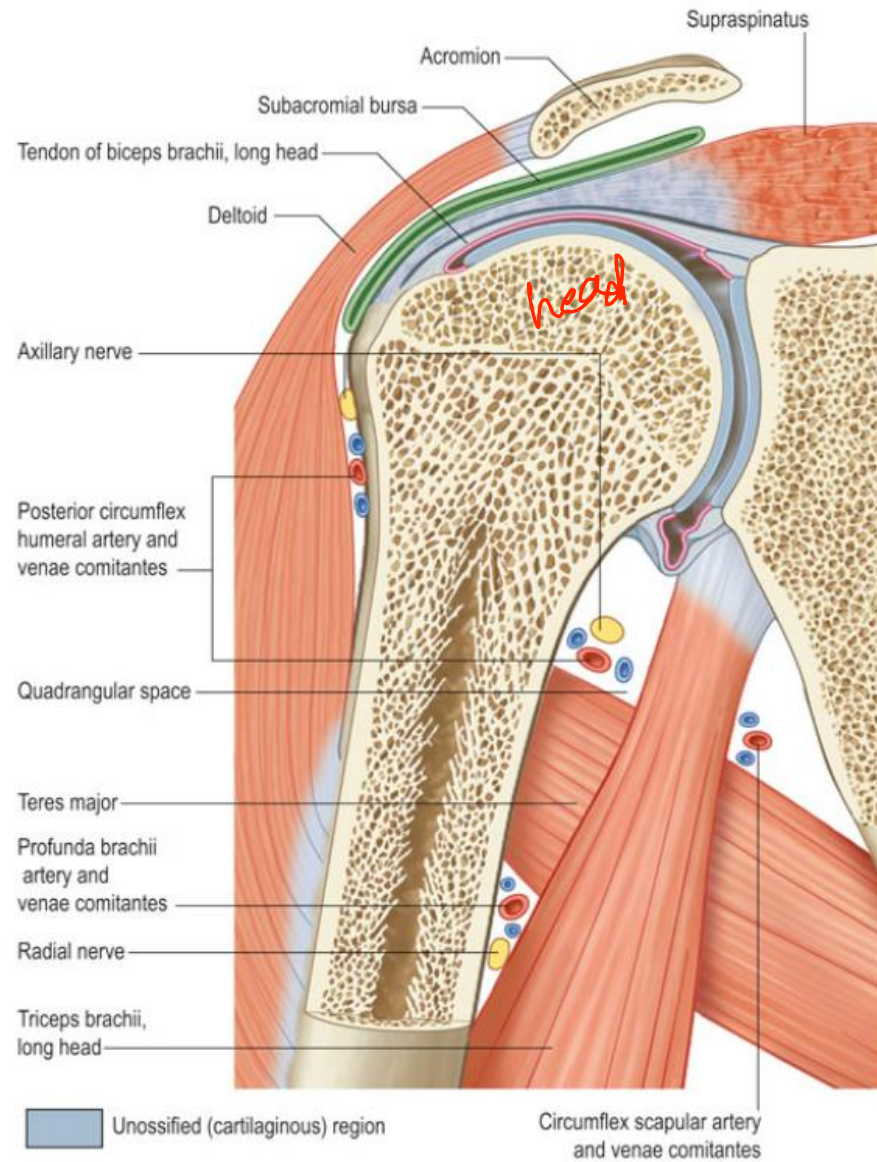
Ball and socket joints Shoulder & Hip joints

Glenoid cavity with head of humerus

Glenohumeral joint (shoulder joint)

Mostly dislocated joint because of its movement

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



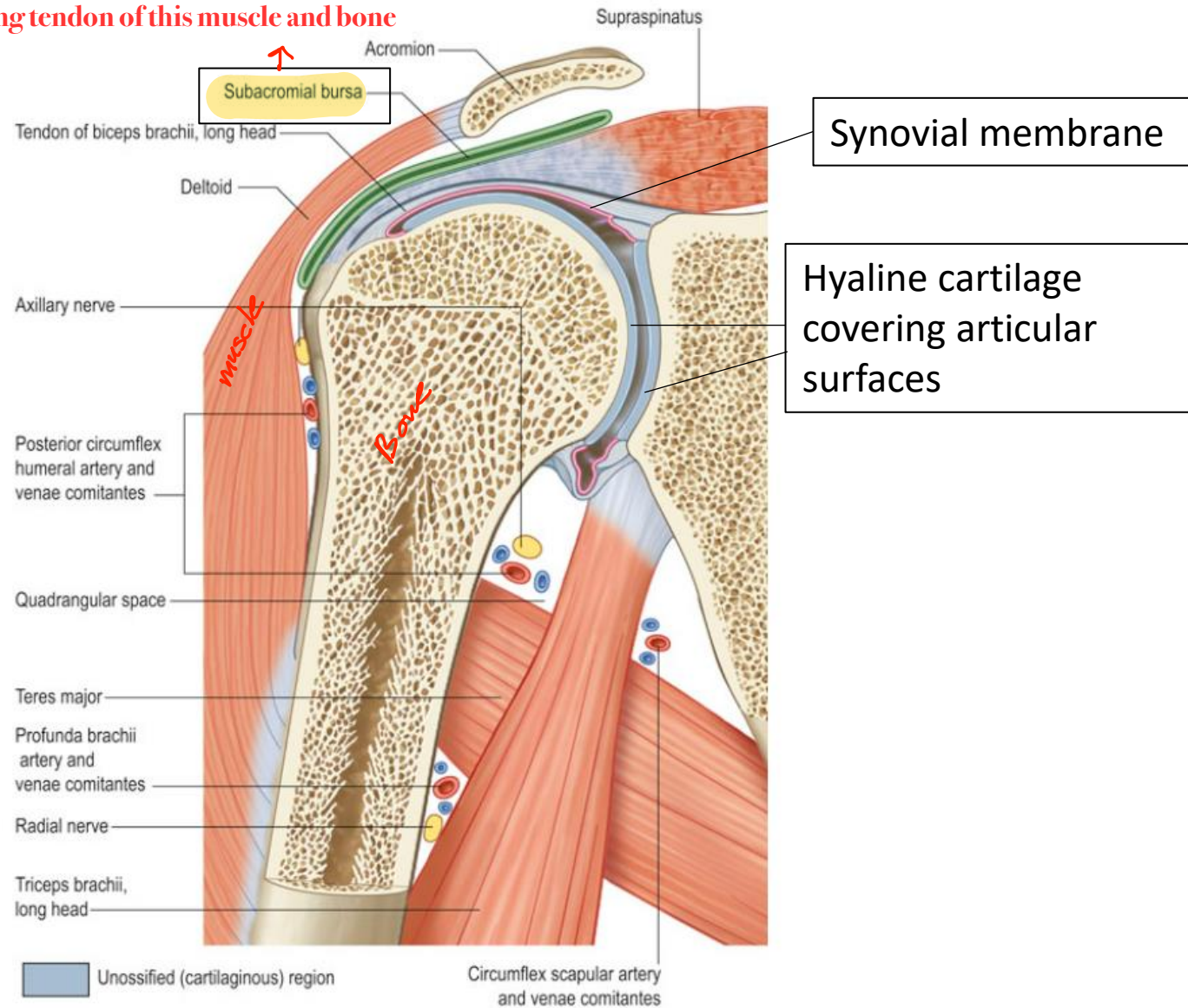
Ball and socket joints

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

Separating tendon of this muscle and bone



Ball and socket joints

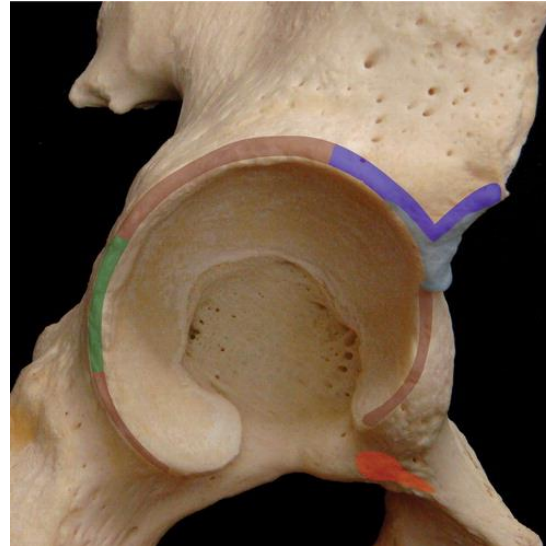
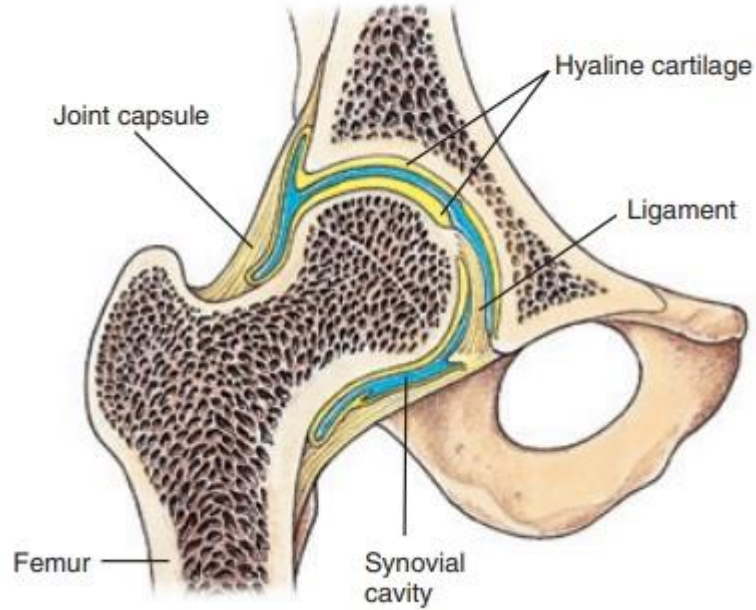
Acetabulo-femoral joint (Hip joint)

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

head of the femur → داخل ألتشر
No wide movement.

Articulation between head of the femur and acetabulum of the hip bone

(uniaxial)
↓
flexion, extension



Transverse
ligament

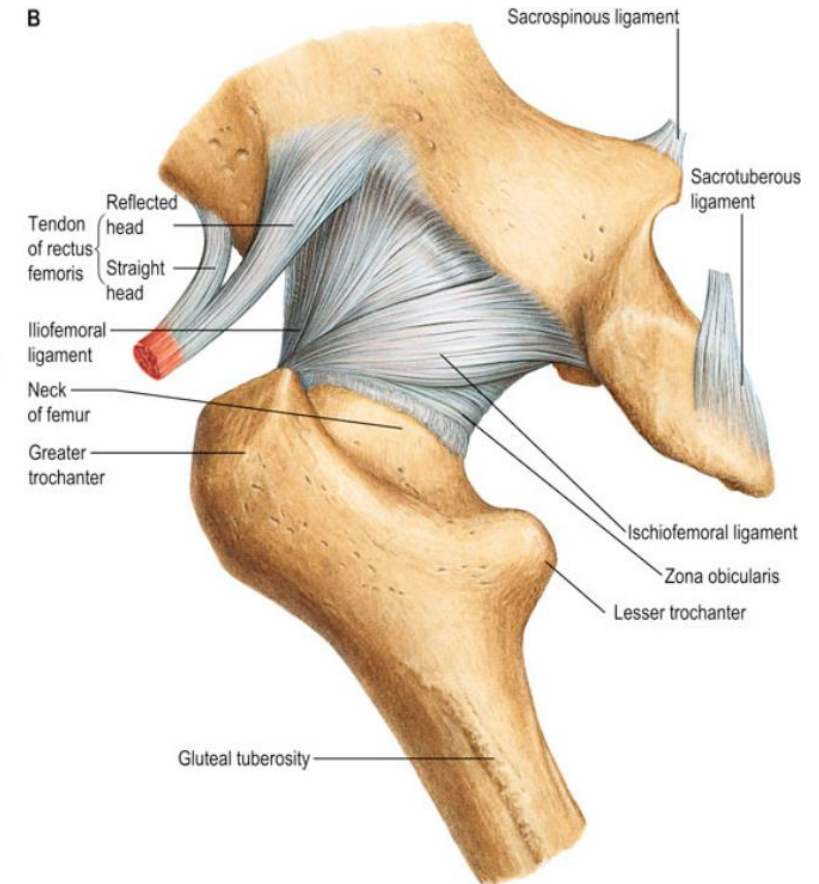
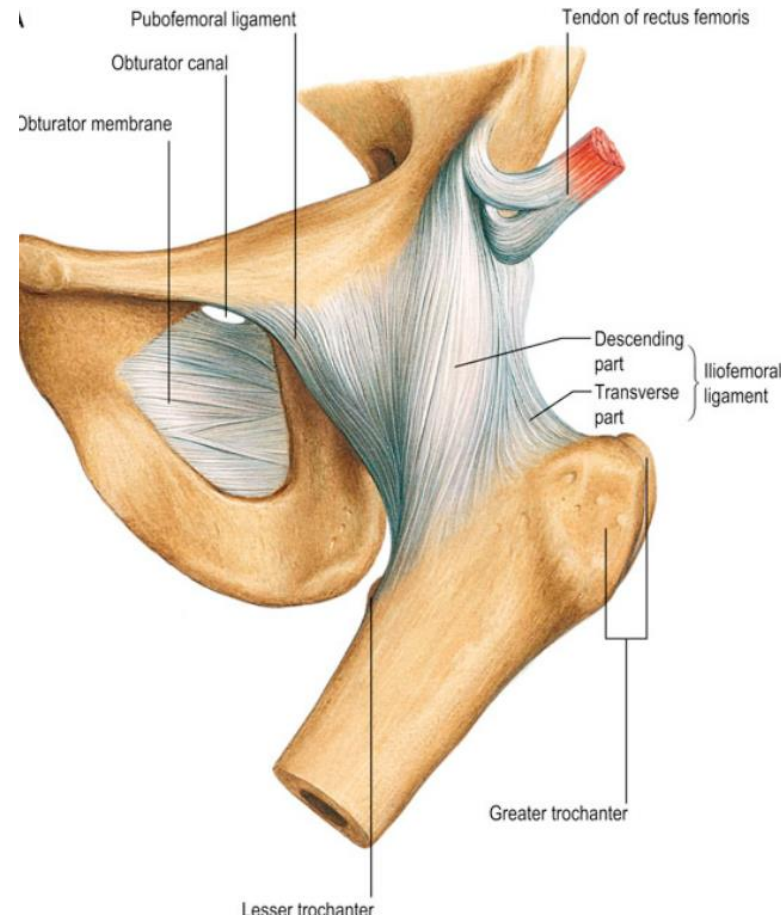
Ball and socket joints

Acetabulo-femoral joint (Hip joint)

Ligaments of hip joint:

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

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



Hinge joints

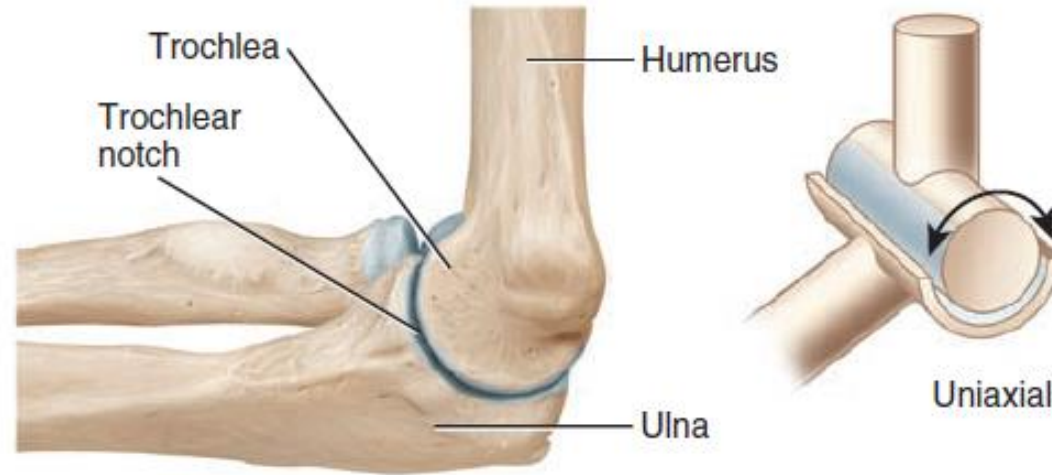
Elbow joint

mainly between them

Humerus, radius and ulna.

Uniaxial joint → *one axis*

Movement: flexion-extension



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

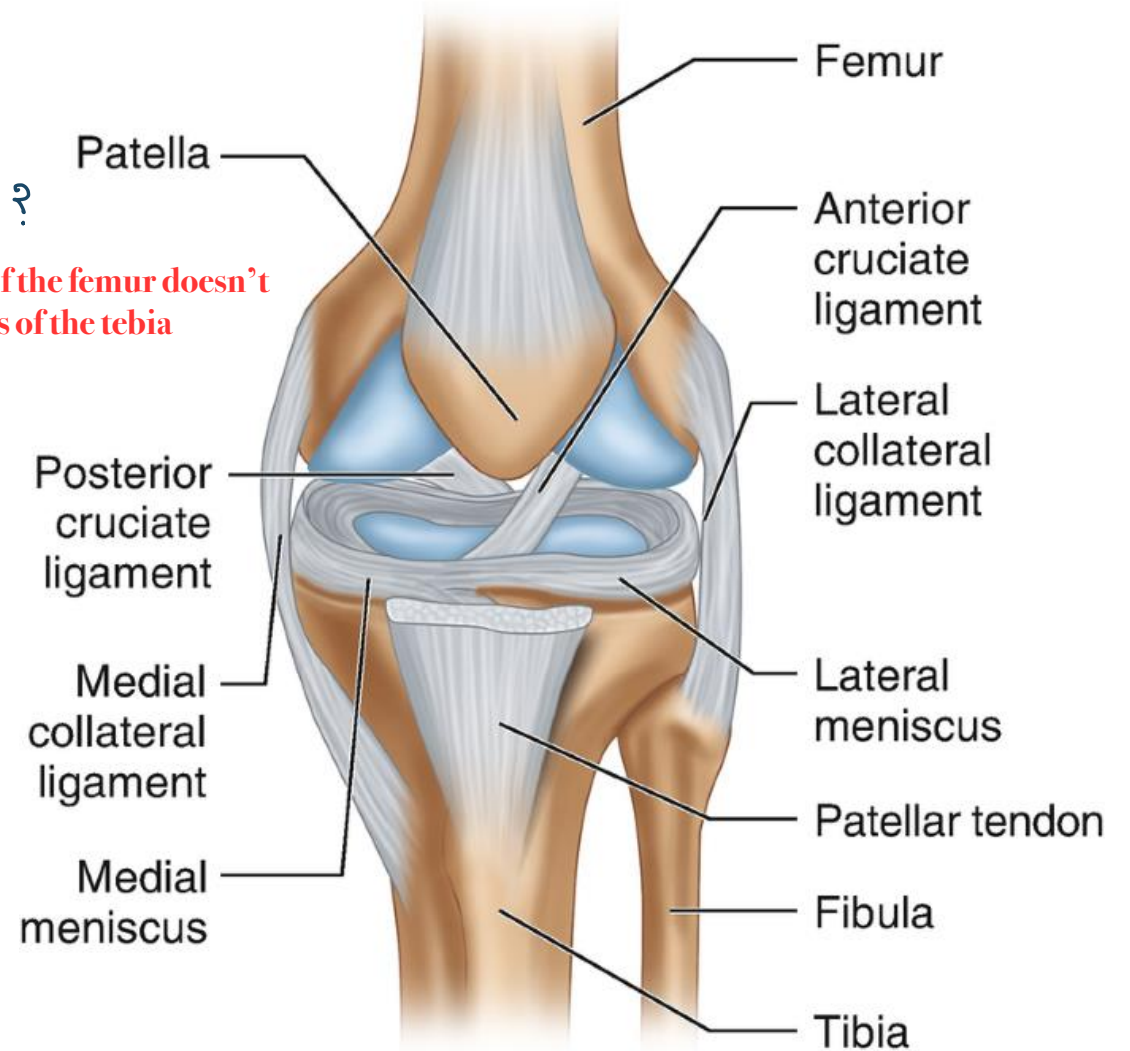
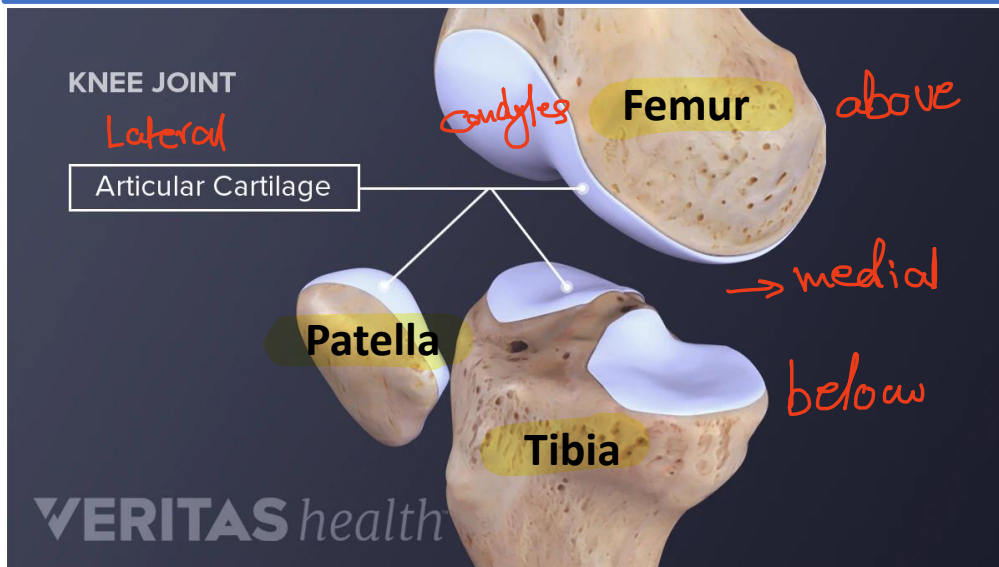
Hinge joints

Knee joint مش موجودة Fibula

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

why modified ?

Shape of the condyles of the femur doesn't fit the shape of condyles of the tibia



But not Fibula!!

Hinge joints

Knee joint

Intra-capsular structures:

داخل

• Ligaments:

الرباط المحيطة به

1. Anterior cruciate ligament (ACL)

2. Posterior cruciate ligament (PCL)

• Menisci (crescent-shaped fibrocartilage),

increase fit and act as cushion: → To condyles of the femur.

→ To prevent lateral move

1. Medial meniscus

2. Lateral meniscus

Extracapsular ligaments

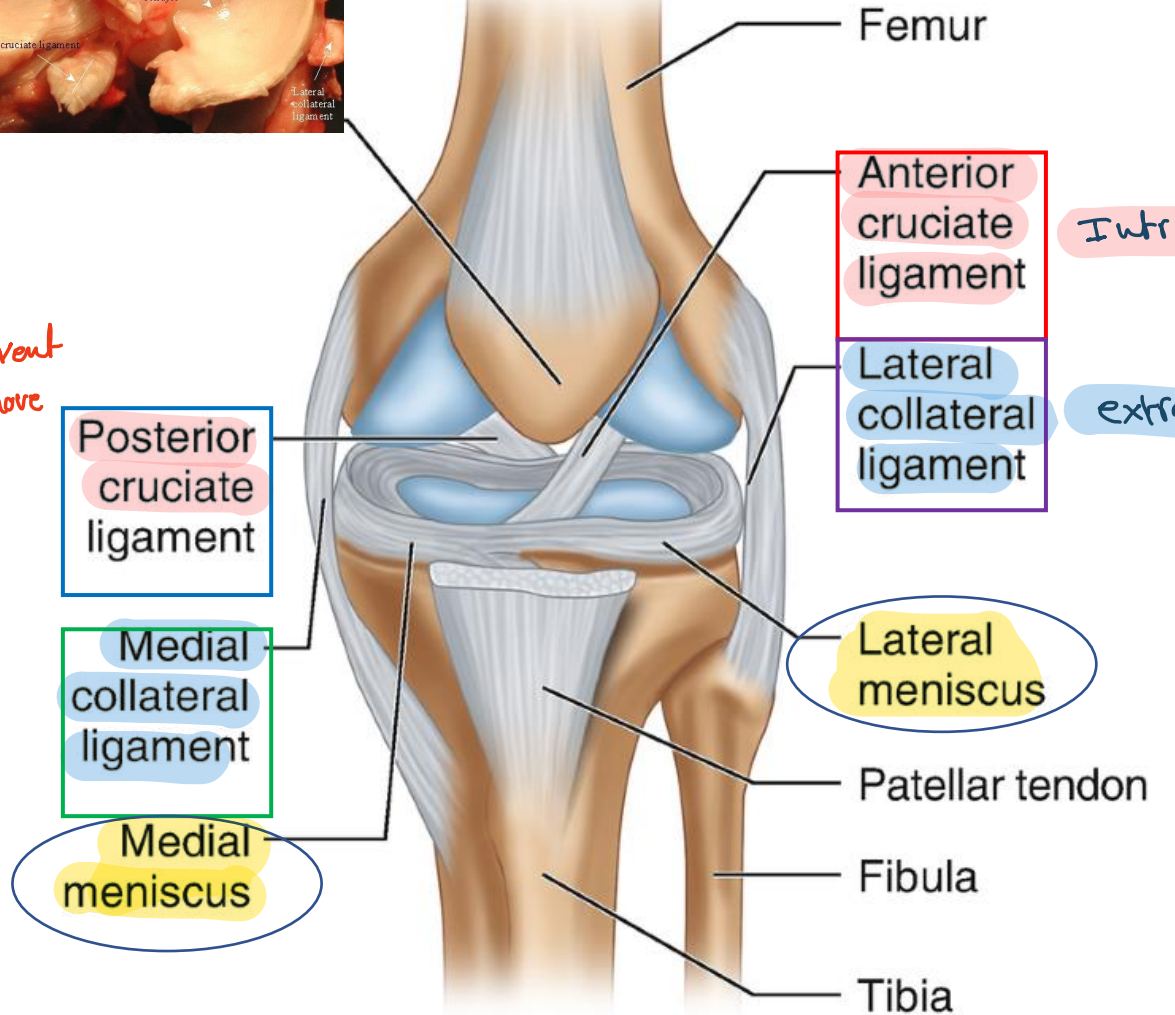
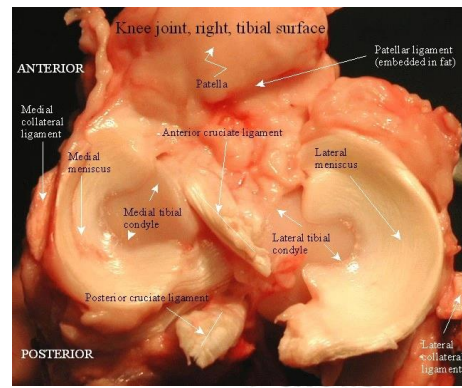
1. Medial collateral ligament

خارج من جهة tibia

2. Lateral collateral ligaments

من جهة fibula

There are a number of bursae that protect the knee joint. No names



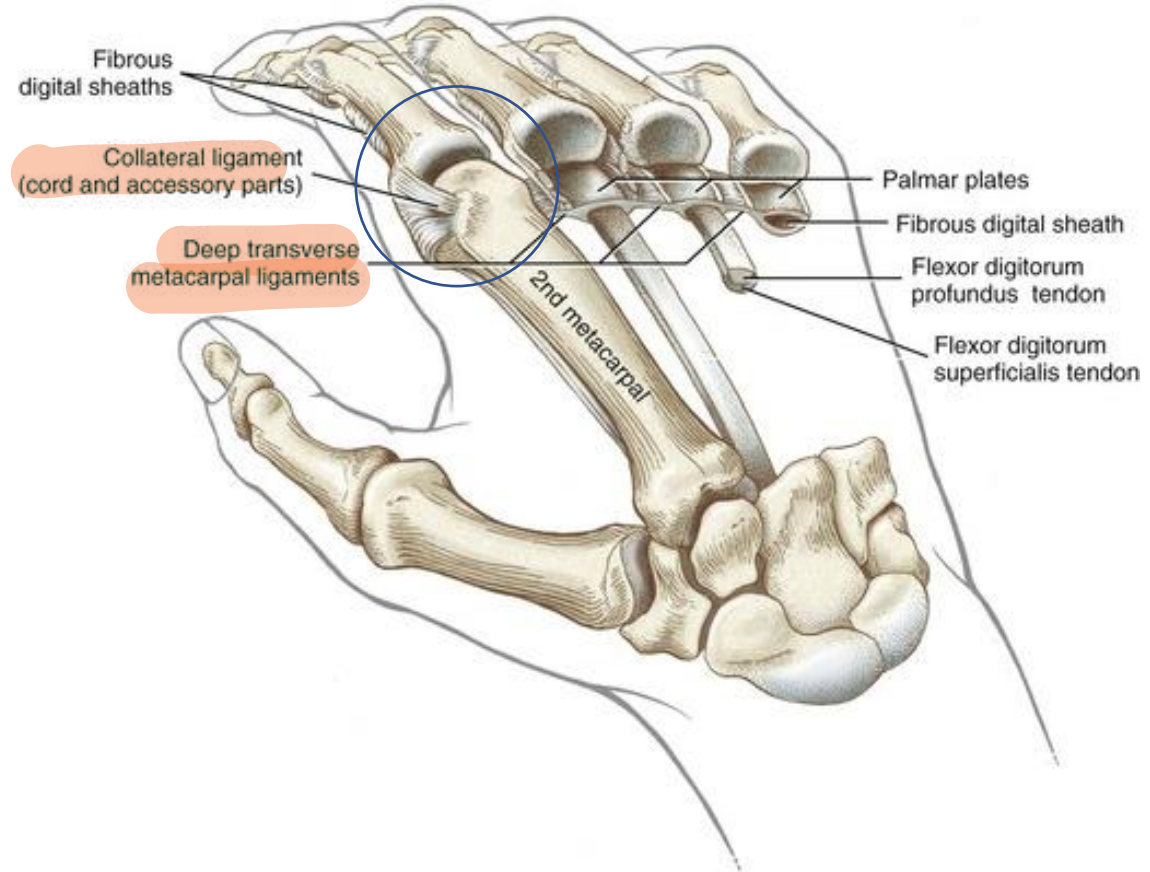
Condyloid and ellipsoid joints

Condyloid : joint has 2 articuler surfaces one of them condyle and the other concave

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

Scaphoid and lunate

عاملين شكل بيضوي



Movement:

Flexion-Extension

Adduction-Abduction

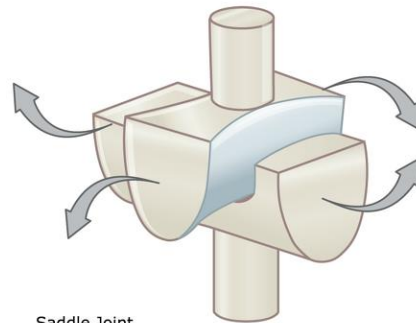
Saddle joints بيسمح انه thumb يصير anterior to other fingers

- **Biaxial joints** Articulation between trapezium & first metacarpal bone
1st carpometacarpal joint (thumb) and sternoclavicular joint.

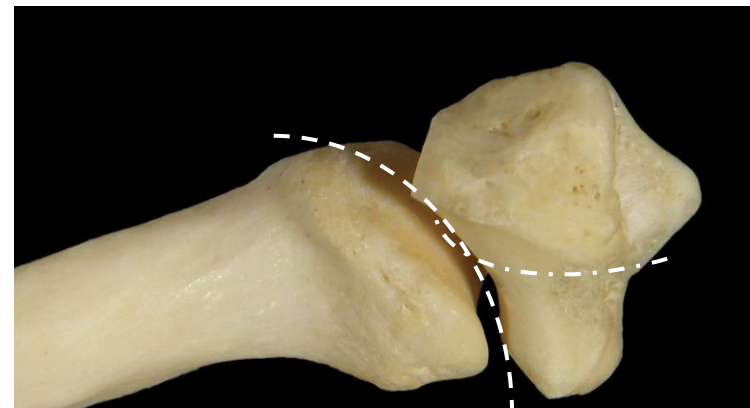
Bones have concave-convex articular surfaces and resemble a saddle on a horse back



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



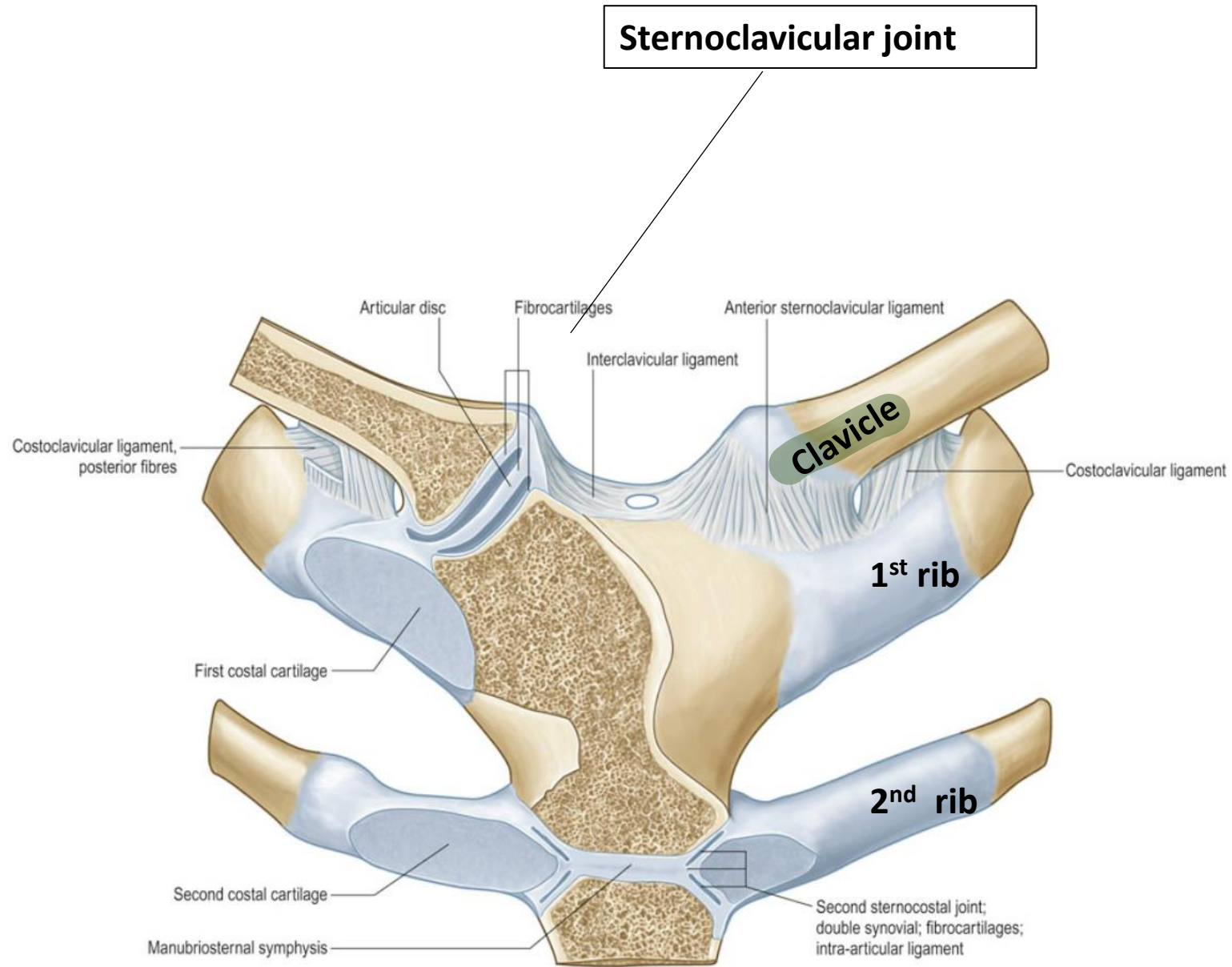
Saddle Joint
eg. CMC Joint of Thumb



Saddle joints

Sternoclavicular joint is synovial saddle-type joint

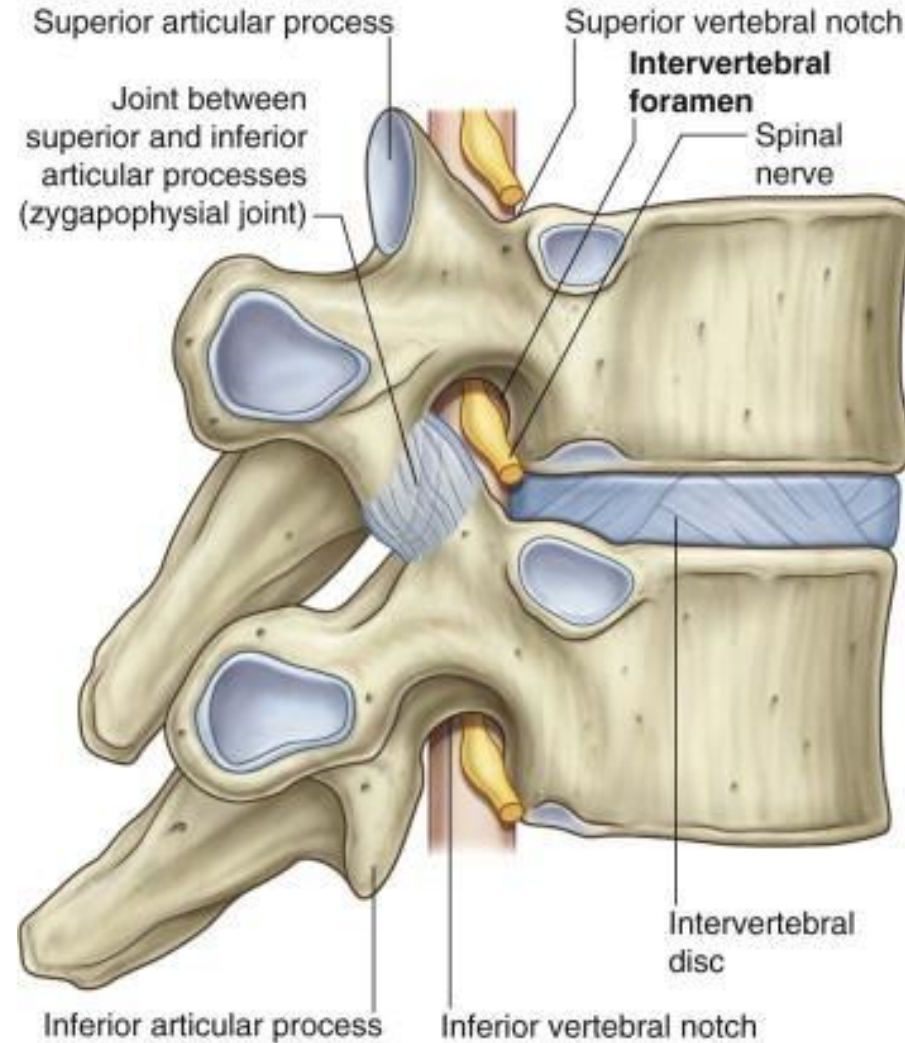
→ Between clavicle and sternum



Plane joints

Two surfaces articulating with each other

- **Gliding movement.**
All of them synovial joints.
- 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

Mandible + Temporal bone.

- 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.

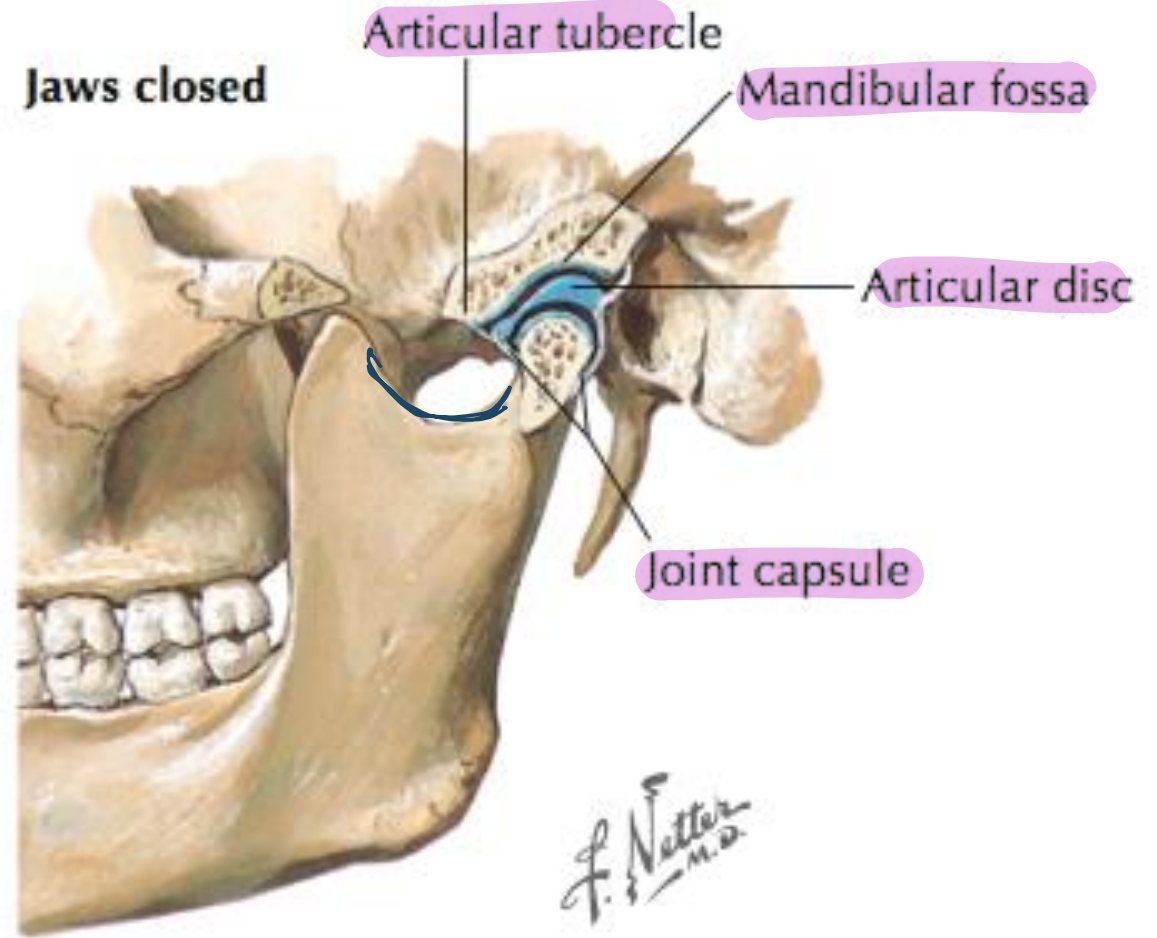
synovial joint is

- 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**

limitation of movement **بيعمل**

مهم نوعاً الحظام
التي تتفصل، و

spacial structures - الحركات - كالتحريك (أخذناهم قبل).



Thank you!