

# JOINTS



**Prof. Saeed Abuel Makarem**

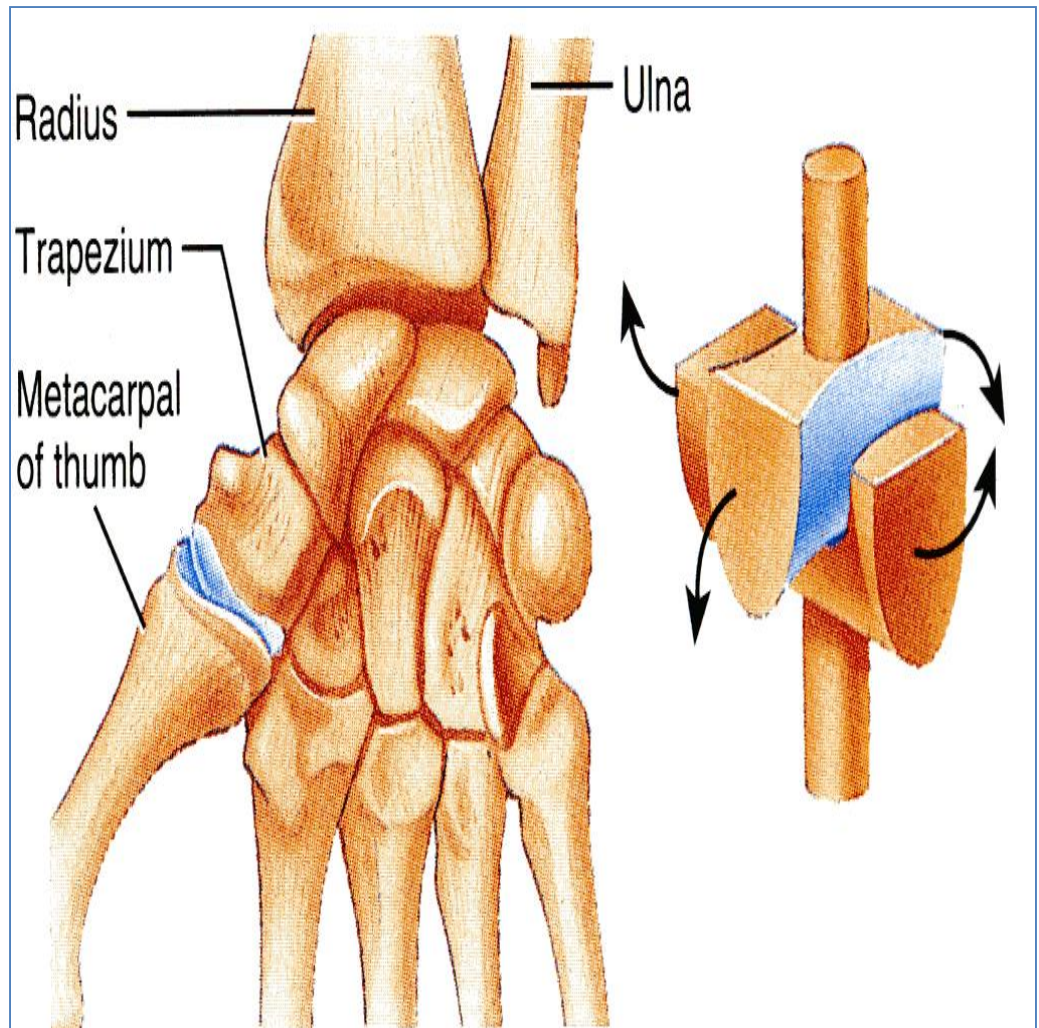
# OBJECTIVES

**By the end of the lecture, you should be able to:**

- Define the term **“Joint”**.
- Describe the **classification of 3 types of joints & give an example of each.**
- Describe the **characteristics of synovial joints.**
- Describe the **classification of synovial joints & give an example of each.**
- List factors maintaining **stability of joints.**
- Recite **“Hilton’s law”** for nerve supply of joints.

# DEFINITION

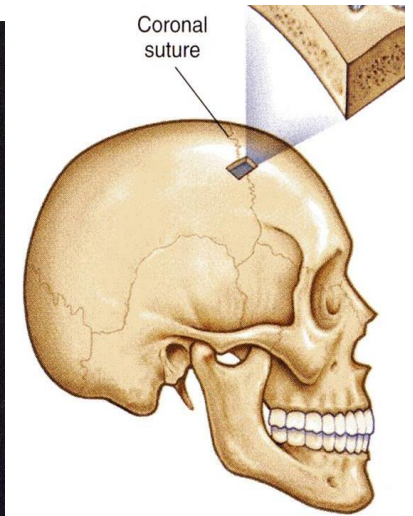
- **What is a joint?**
- **It is the site where two or more bones meet together.**



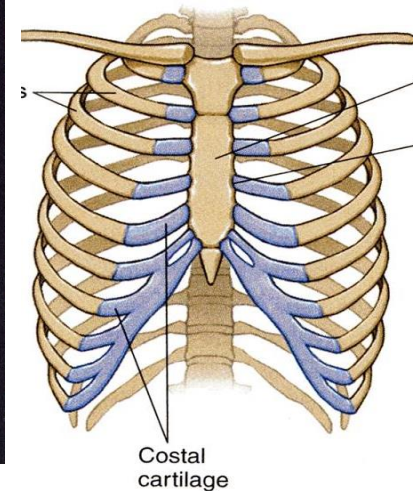
# CLASSIFICATION

☐ Joints are classified according to the tissues that lie between the bones into:

- Fibrous.
- Cartilaginous.
- Synovial.



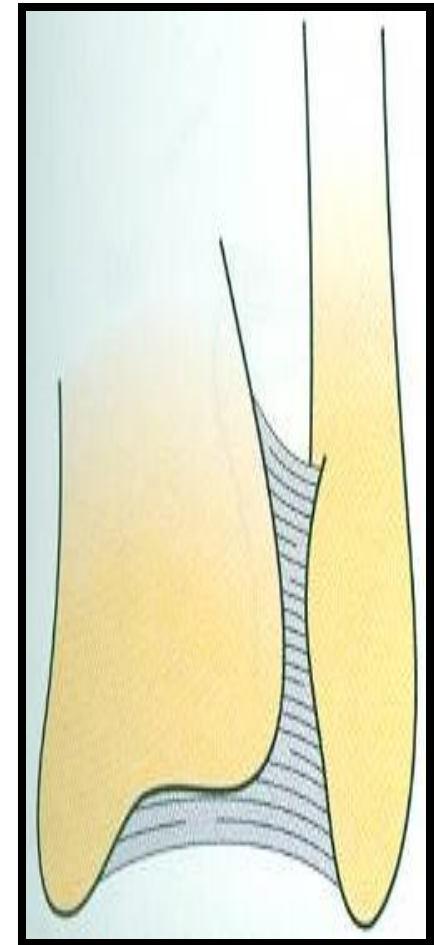
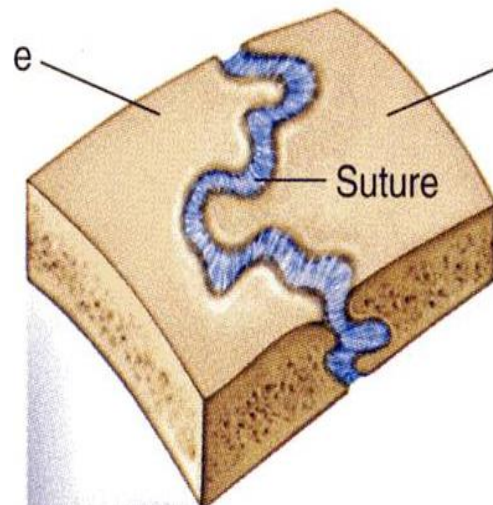
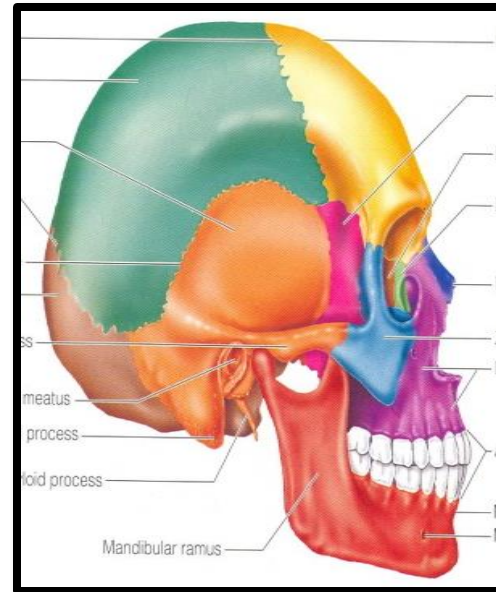
Sutures



# FIBROUS JOINTS

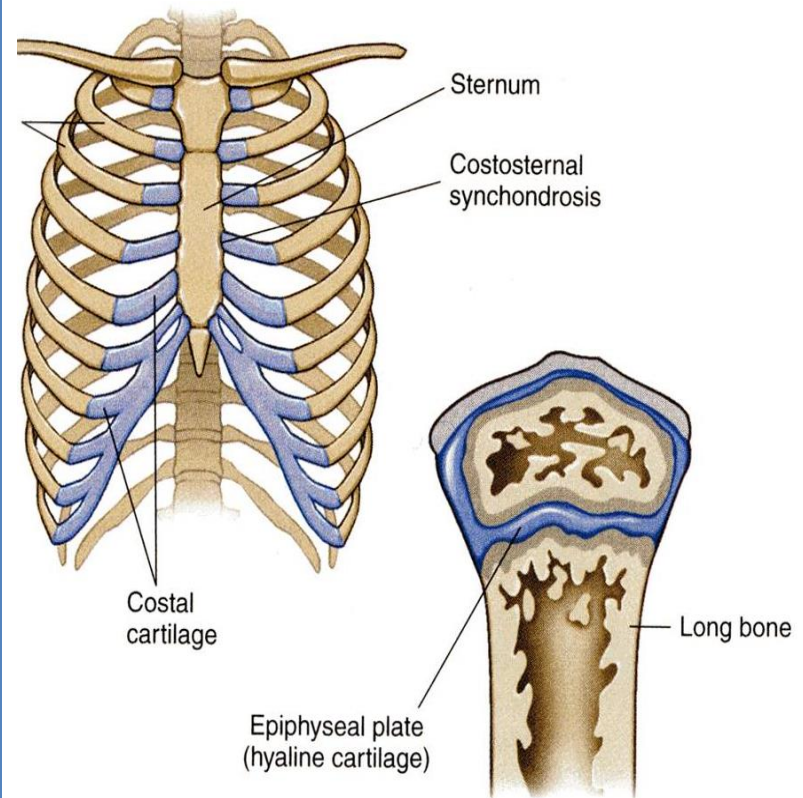
- The articulating surfaces are joined by **fibrous** tissue, example:

1. Skull sutures: **No movement**, temporary as it ossify later).
2. Inferior tibiofibular joints (syndesmosis): very **Little** movement, permanent joints.
3. Gomphoses: Between teeth and there socket.



# CARTILAGINOUS JOINTS

- The Two bone are joined by cartilage.
- It is of 2 types:
  - ❑ **Primary Cartilaginous**
    - The bones are united by a plate or a bar of hyaline cartilage.
    - No movement, **temporary** joints (ossify later), example:
      1. Between the Epiphysis and Diaphysis of a growing bone.
      2. Between the First Rib and the Sternum (1<sup>st</sup> sternocostal joint).

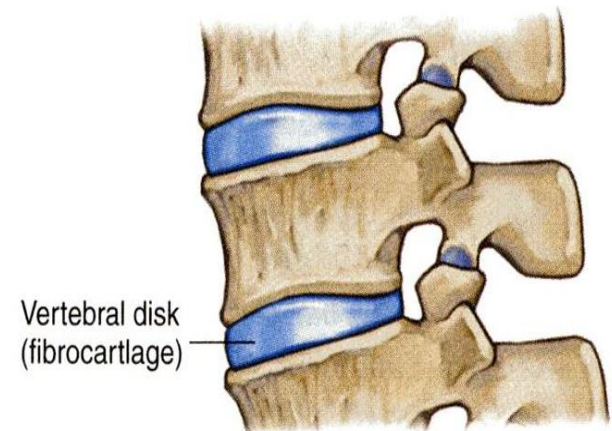
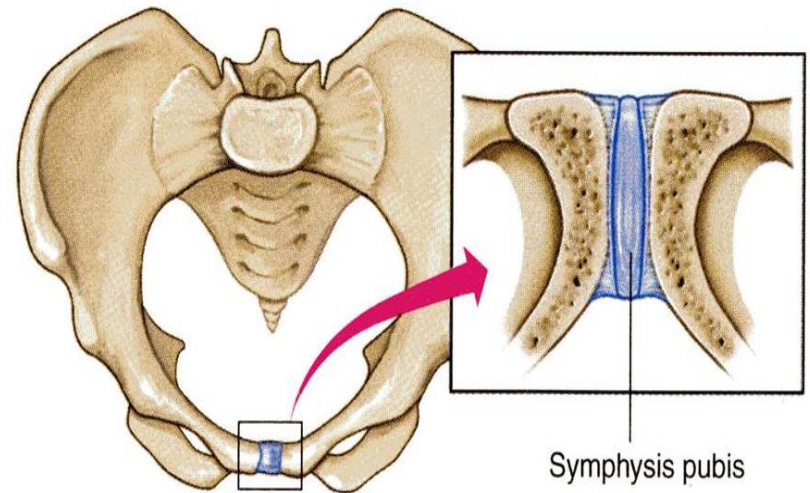


## **Primary Cartilaginous**

# CARTILAGINOUS JOINTS

## ❑ *Secondary Cartilaginous*

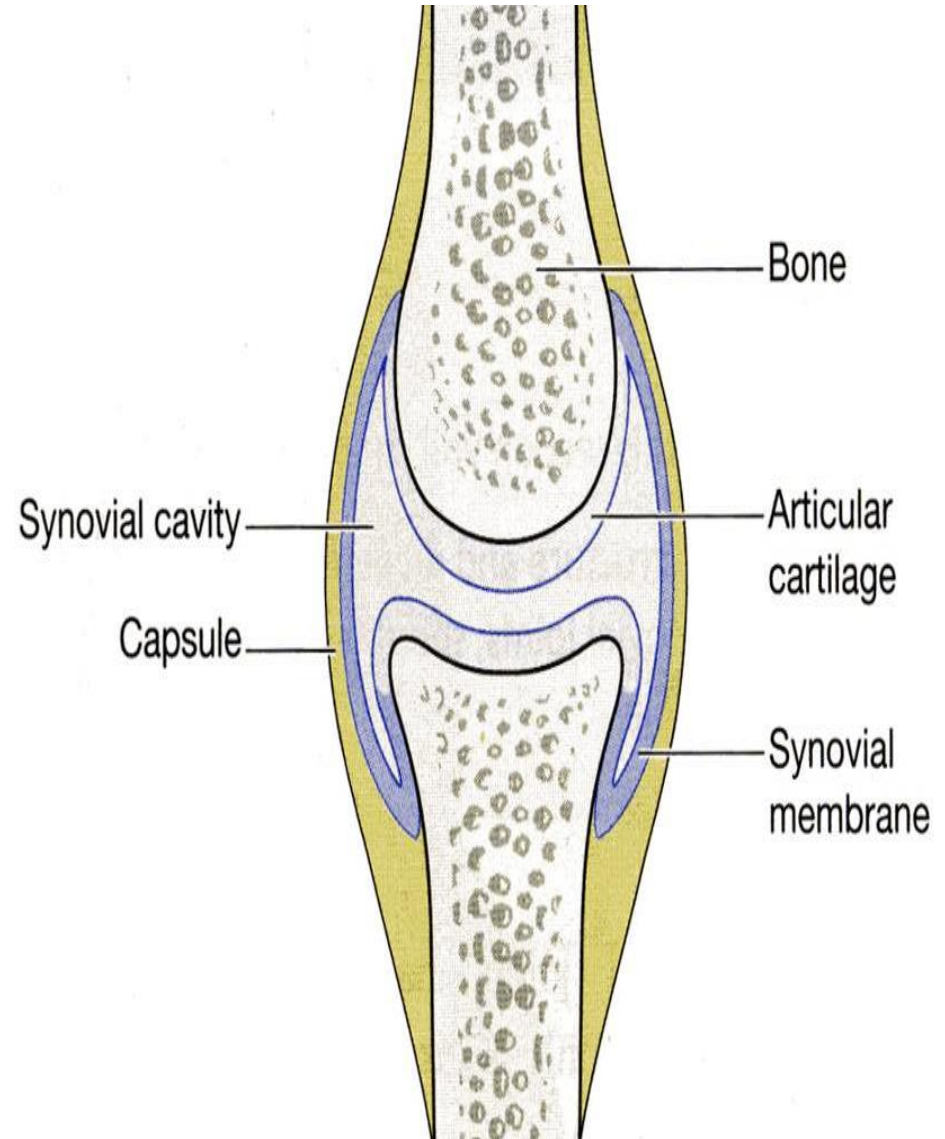
- The bones are united by a plate of *fibrocartilage*.
- Their articulating surfaces are covered by a thin plate of *hyaline cartilage*.
- **Little movement, permanent joints.**
- They are called **Midline joints**.
  1. Joints between the *Vertebral Bodies* (intervertebral discs).
  2. *Symphysis Pubis*.



# SYNOVIAL JOINTS

## ❑ Characteristic features:

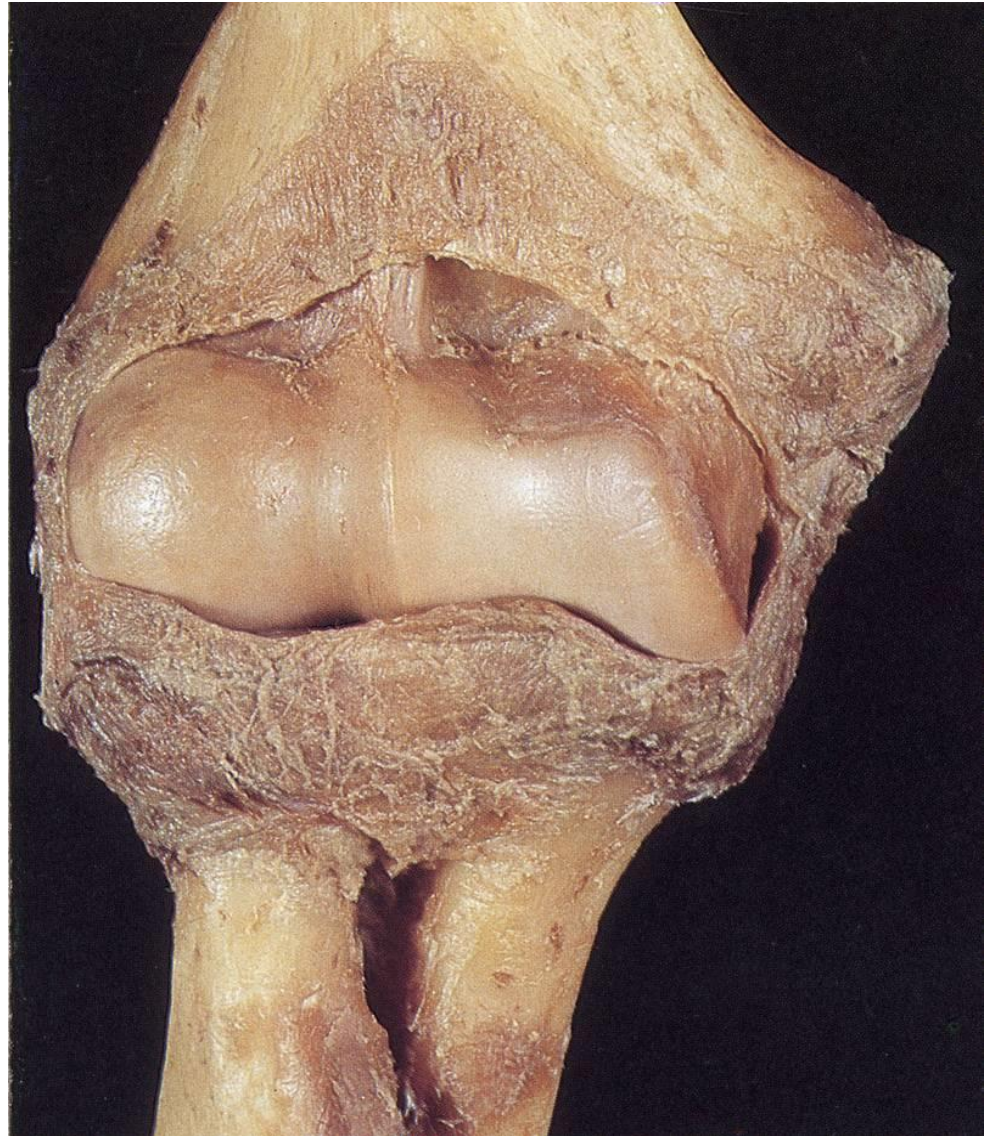
- Freely movable joints.
- The bones are joined by a fibrous capsule, which is attached to the margins of articular surfaces & enclosing the joint.
- The articular surfaces are covered by a thin layer of hyaline cartilage (articular cartilage).
- A joint cavity enclosed within the capsule.





# SYNOVIAL JOINTS

- A thin **vascular synovial membrane** lining the inner surface of the capsule.
- A lubricating **synovial fluid** produced by synovial membrane in the joint cavity.
- The fluid minimizes the friction between the articular surfaces.



# CLASSIFICATION OF SYNOVIAL JOINTS

Synovial joints can be classified according to:

- The types of movement that are possible.

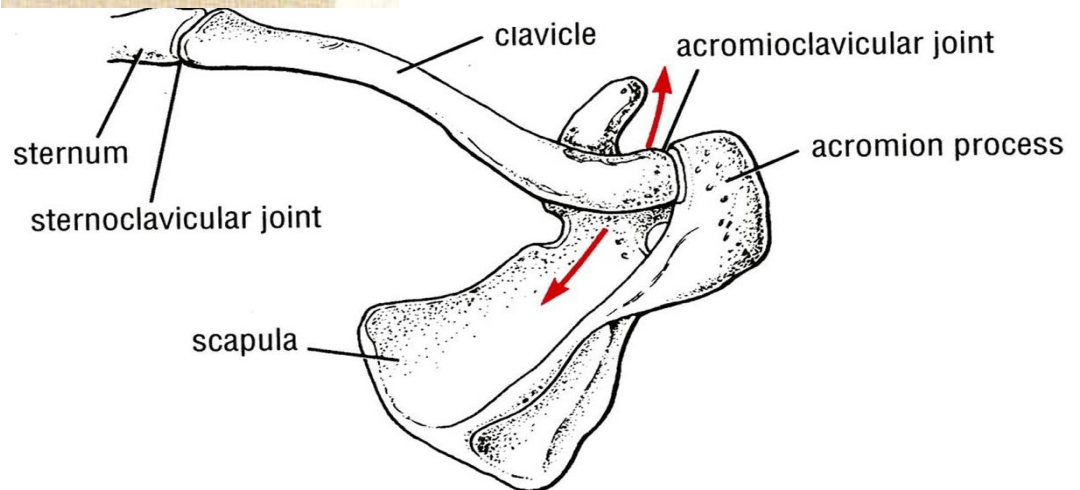
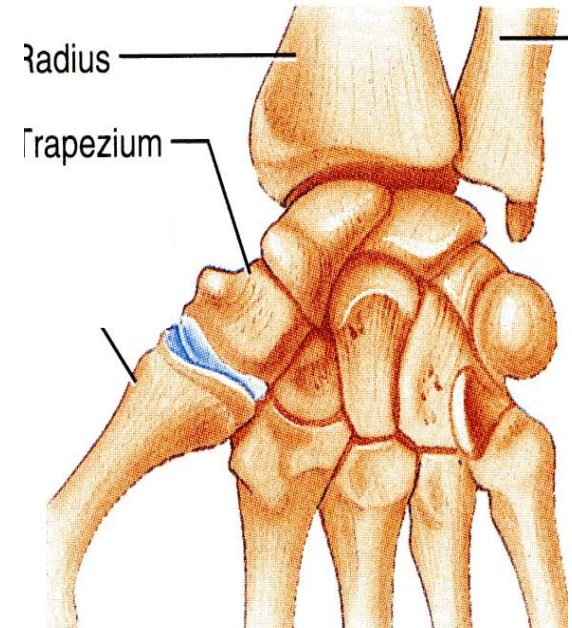
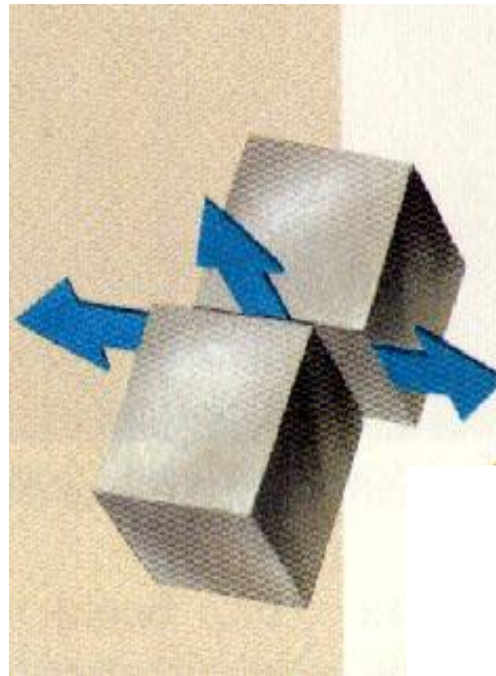
□ According to the **range of movement** synovial joints are classified into:

- **Plane synovial joints.**
- **Axial synovial joints.**



# PLANE SYNOVIAL JOINTS

- The articulating surfaces are flat.
- The bones slide on one another, producing a gliding movement.
- Examples:
  1. Intercarpal Joints.
  2. Sternoclavicular joint.
  3. **Acromioclavicular joint.**



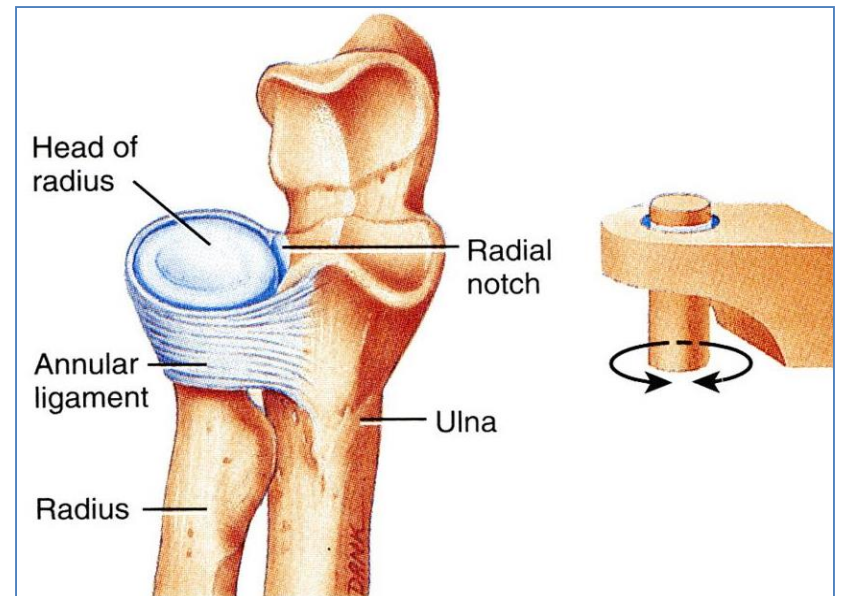
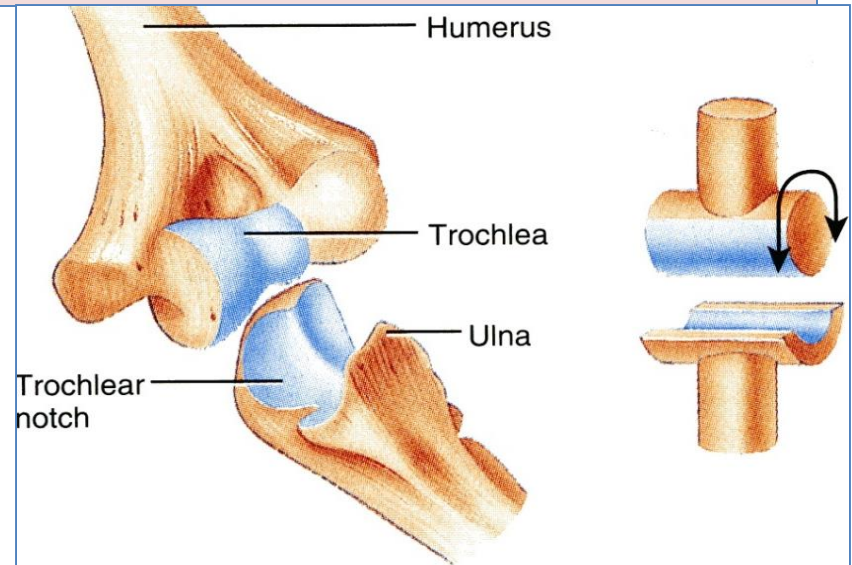
# AXIAL SYNOVIAL JOINTS

☐ Movements occur along an axes:

1. **Transverse axis:** flexion & extension occur.
2. **Longitudinal axis:** rotation occurs.
3. **Antero-posterior axis:** abduction & adduction occur.

☐ Axial joints are divided into:

1. Uniaxial.
2. Biaxial.
3. Multi-axial (polyaxial).



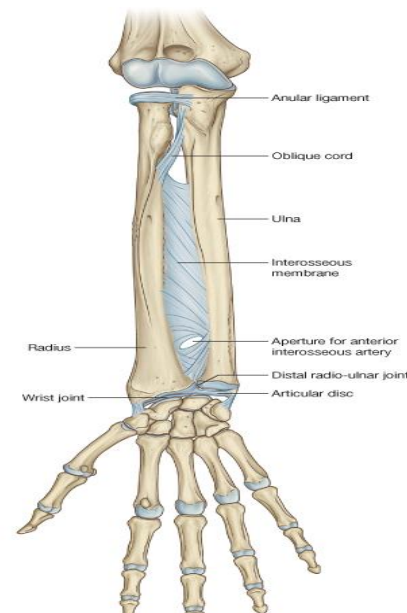
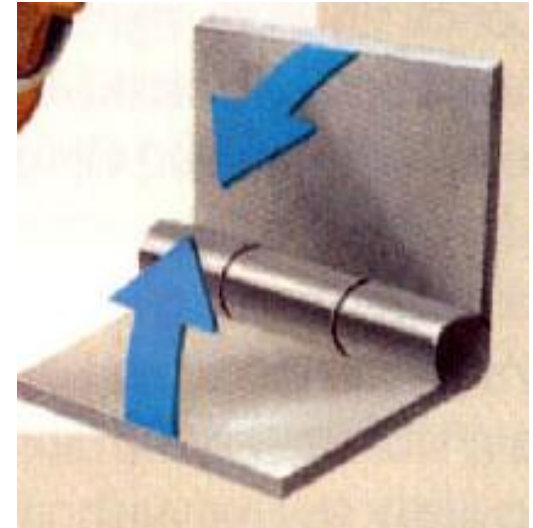
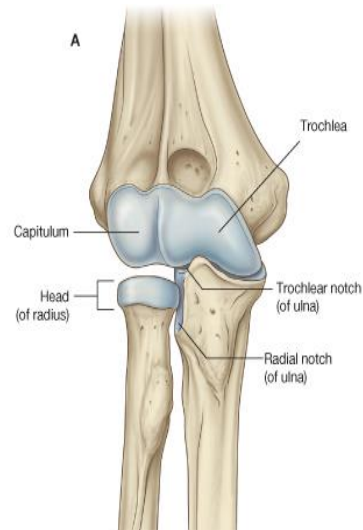
# UNIAXIAL SYNOVIAL JOINTS

## □ Hinge joints:

- Axis: transverse.
- Movements: flexion & extension.
- Example: **elbow joint**, and ankle joint.

## □ Pivot:

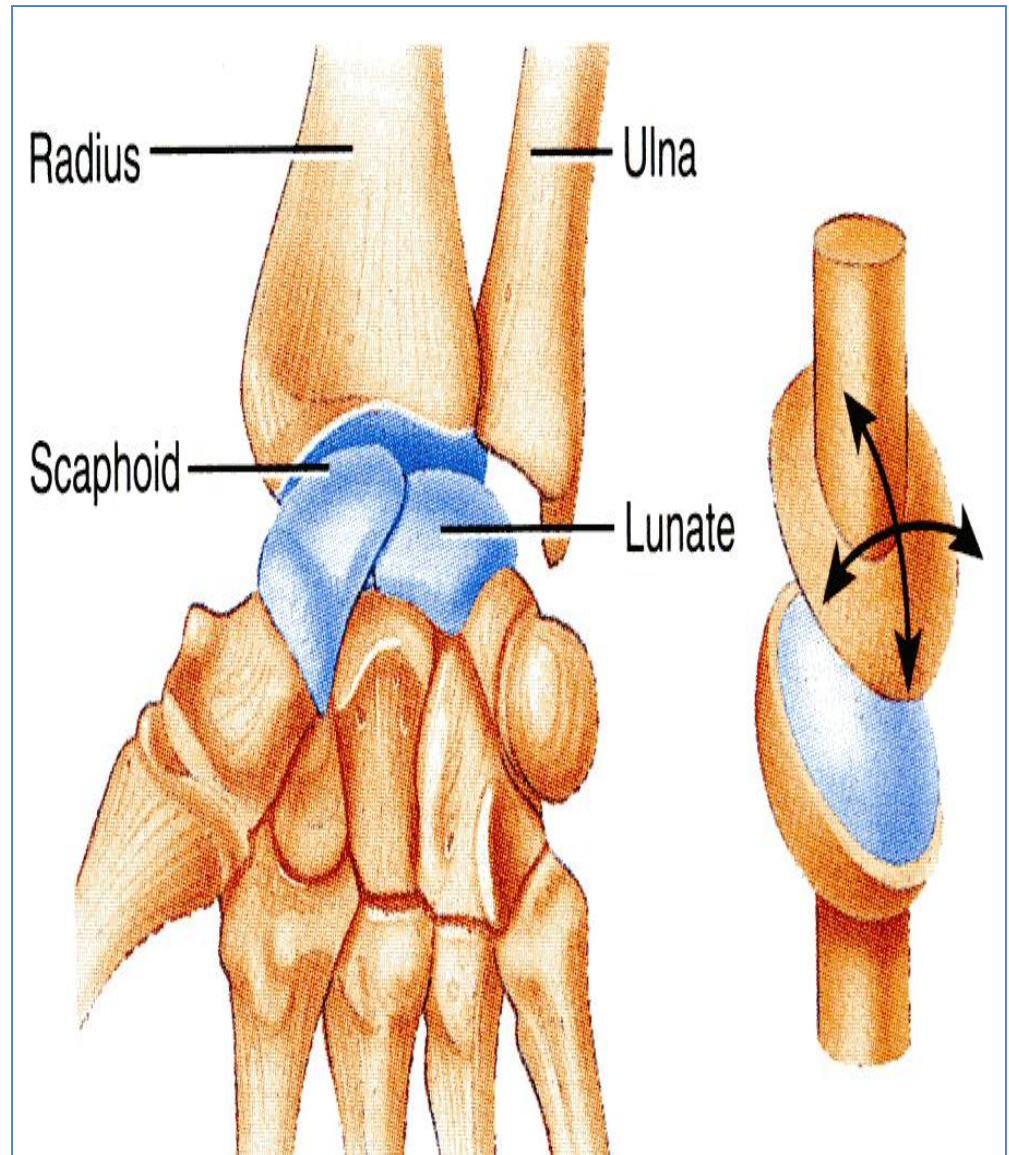
- Axis: longitudinal.
- Movements: rotation.
- Example: **radio-ulnar** and **atlantoaxial joint**.



# BIAXIAL SYNOVIAL JOINTS

## □ Ellipsoid joints:

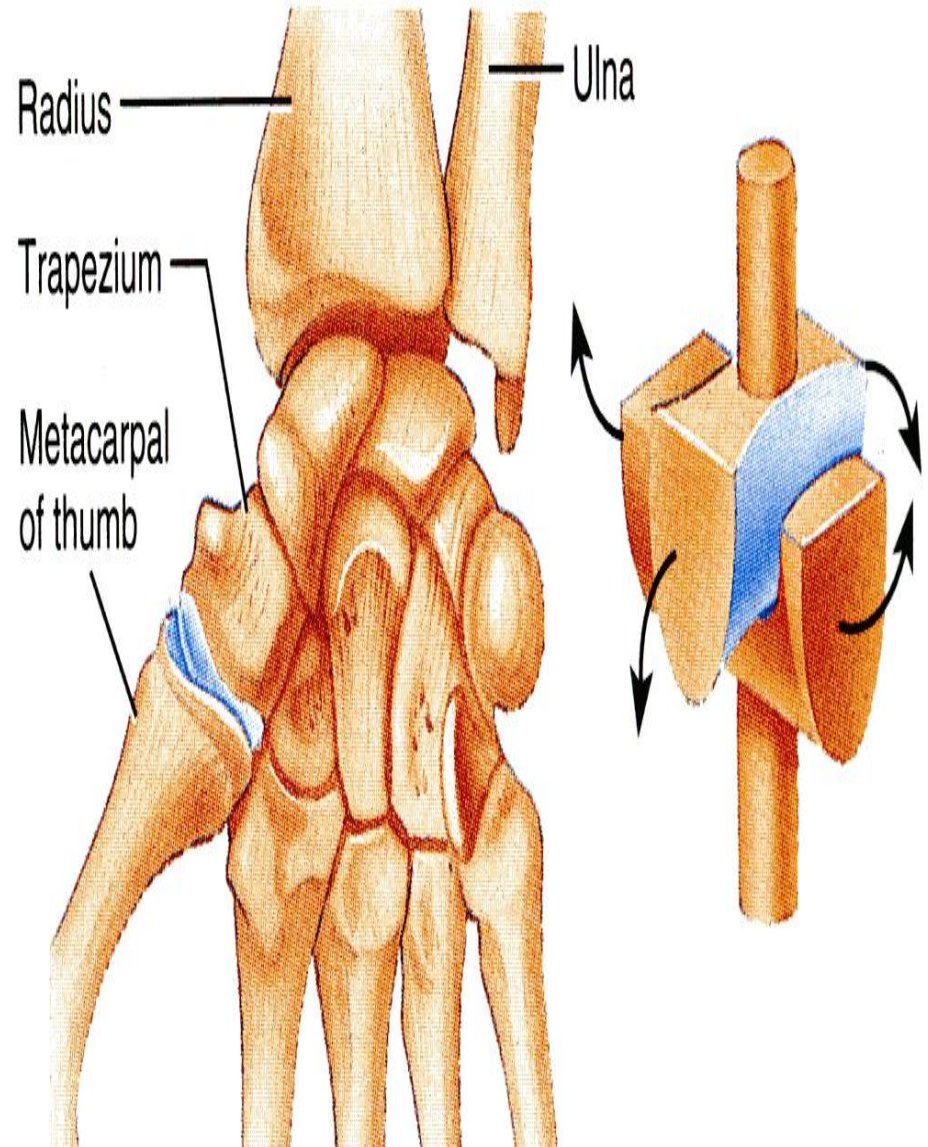
- An elliptical **convex** fits into an elliptical **concave** articular surfaces.
- Axes: Transverse & antero-posterior.
- Movements: Flexion & extension + abduction & adduction **but rotation is impossible.**
- **Example: Wrist joint.**



# BIAXIAL SYNOVIAL JOINTS

## □ Saddle joints:

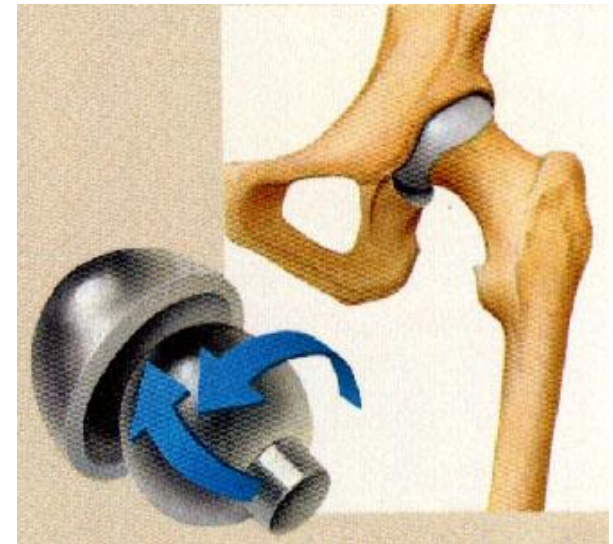
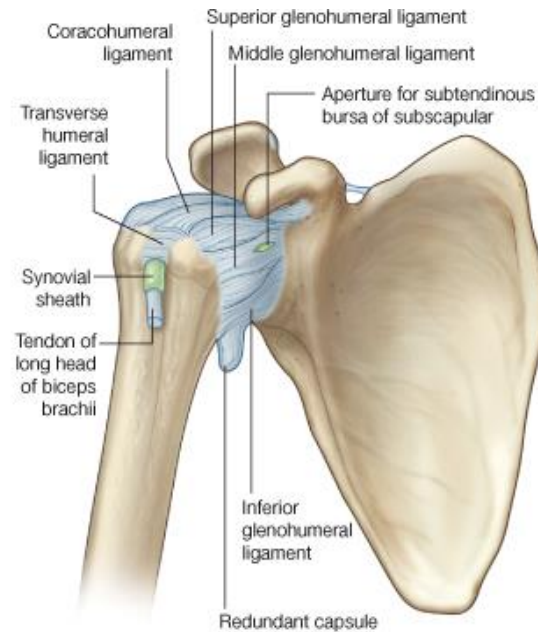
- The articular surfaces are reciprocally concavoconvex.
- They resemble a saddle on a horse's back.
- Movement: as ellipsoid joints (Flexion & extension + abduction & adduction) + a small range of rotation.
- **Example:**  
**Carpometacarpal joint of the thumb.**



# POLYAXIAL SYNOVIAL JOINTS

## ❑ Ball-and-socket joints:

- A **ball** –shaped head of a bone fits into a **socket-like** concavity of another.
- Movements: Flexion & extension + abduction & adduction) + medial and lateral rotation.
- **Examples:**
  1. Shoulder joint.
  2. Hip Joint.

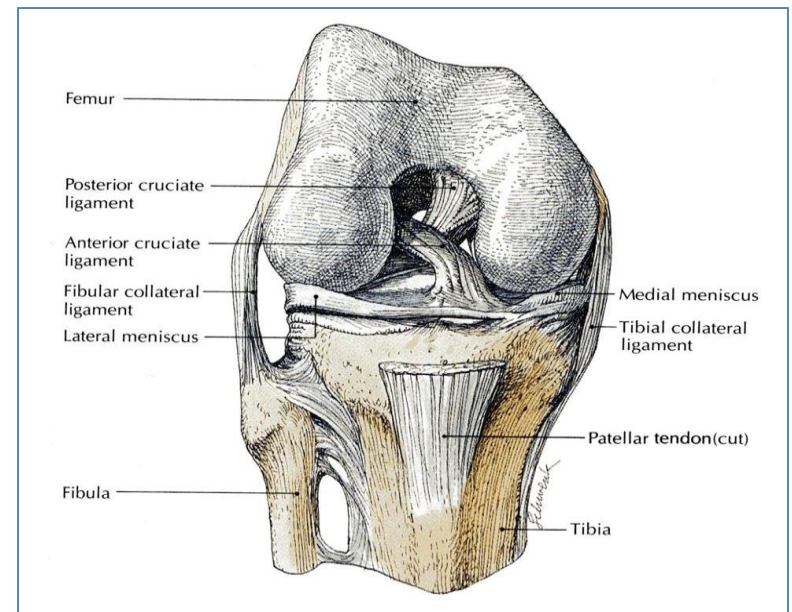
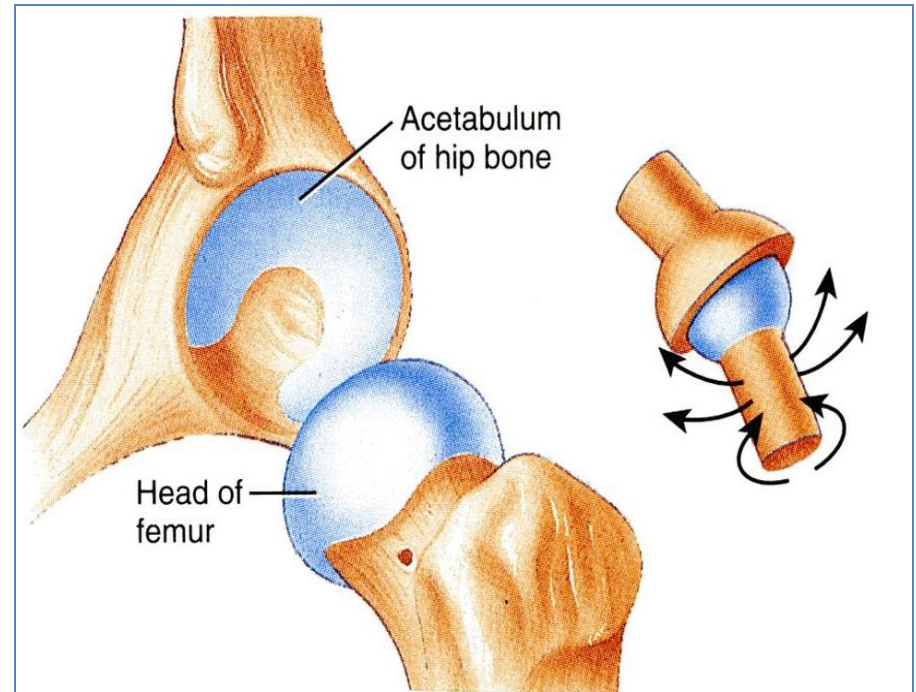




# FACTORS AFFECTING STABILITY OF SYNOVIAL JOINTS

## 1-The shape of articular surfaces:

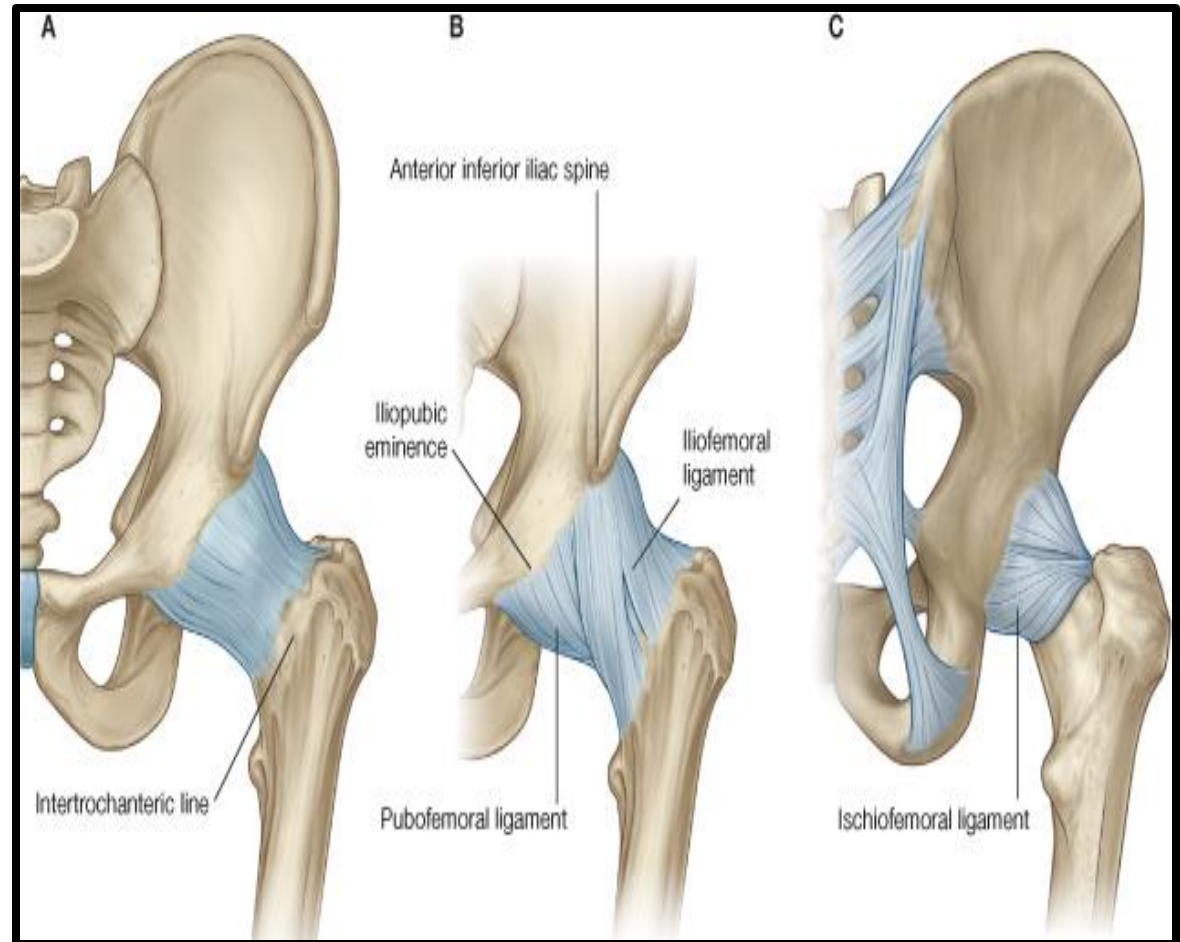
- The ball and socket shape of the **Hip joint** is a good example of the importance of the shape of the bone, to maintain joint stability.
- The shape of the bones forming the **Knee joint** has nothing to do for stability.



# STABILITY OF SYNOVIAL JOINTS

## 2-Strength of the ligaments:

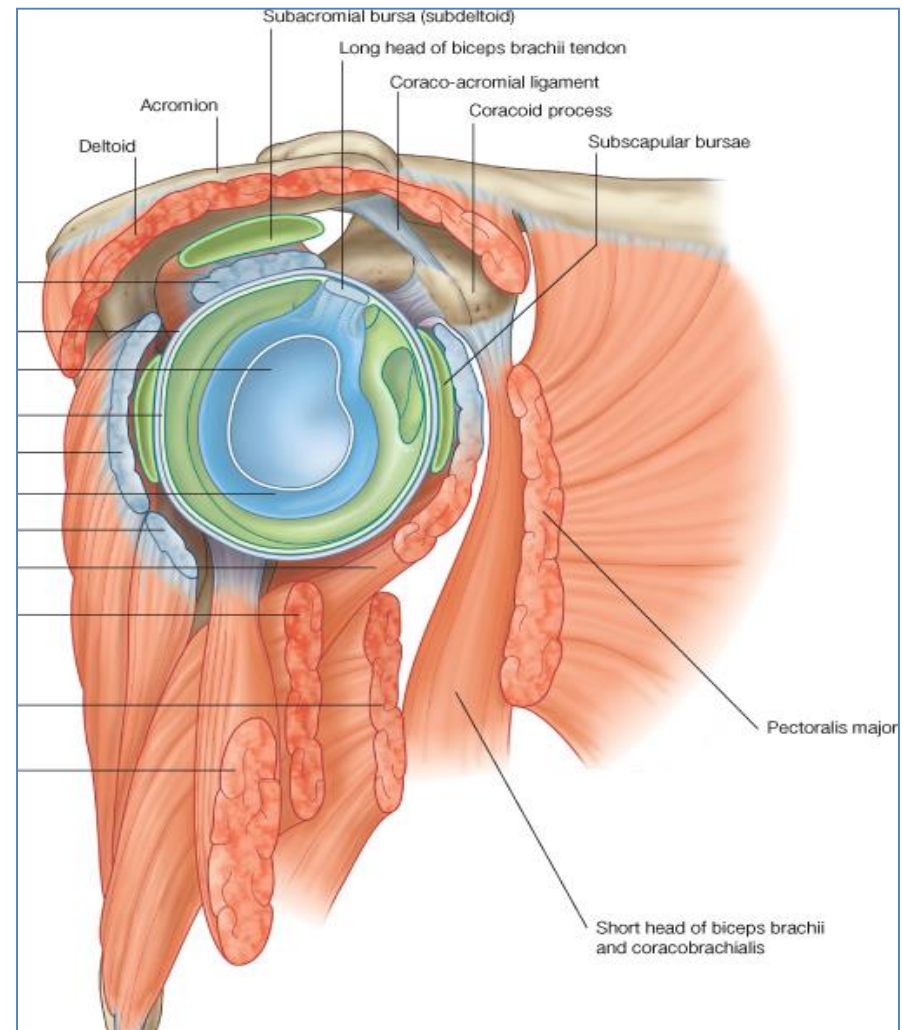
- They prevent excessive movement in a joint.



# STABILITY OF SYNOVIAL JOINTS

## 3- Tone of the surrounding muscles:

- In most joints, it is the major factor controlling stability.
- The short muscles around the shoulder joint (**rotator cuff**) keeps the head of the humerus in the shallow glenoid cavity.



# NERVE SUPPLY OF JOINTS

- The **capsule** and **ligaments** receive an abundant sensory nerve supply.
- ***HILTON'S LAW:***  
“A sensory nerve supplying a joint also supplies the muscles moving that joint and the skin overlying the insertions of these muscles.”

# SUMMARY

- ❑ **Joint** is the site where two or more bones come together, whether movement occurs (or not) between them.
- ❑ **Joints** are classified according to the tissues that lie between the bones into 3 types: fibrous, cartilaginous & synovial.
- ❑ Synovial joints are freely movable & characterized by the presence of:
  1. Fibrous capsule,
  2. Articular cartilage,
  3. Synovial membrane &
  4. Joint cavity containing synovial fluid.

# SUMMARY

- ❑ Synovial joints are classified according to the range of movement into: plane and axial.
- ❑ Axial are divided according to the number of axes of movements into: uniaxial, biaxial & polyaxial or multiaxial.
- ❑ Stability of synovial joints depends on: shape of articular surfaces, ligaments & muscle tone.
- ❑ Joints have same nerve supply as muscles moving them.

# TEST YOURSELF

## QUESTION "I"

Which of the following is a hinge synovial joint?

1. Shoulder.
2. Elbow.
3. Sternoclavicular.
4. Symphysis pubis.

# QUESTION "II"

Which of the following is a cartilaginous joint?

1. Hip.
2. Elbow.
3. Sternoclavicular.
4. Symphysis pubis.