

JOINTS



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OBJECTIVES

By the end of the lecture, students should be able to:

- *Define the term “Joint”.*
- *Describe the classification of the 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

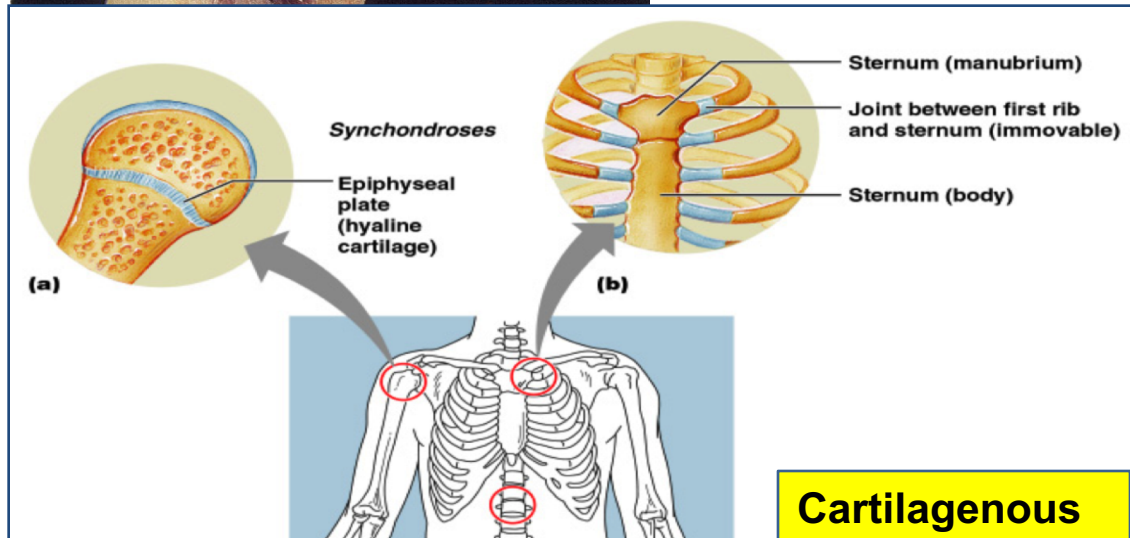
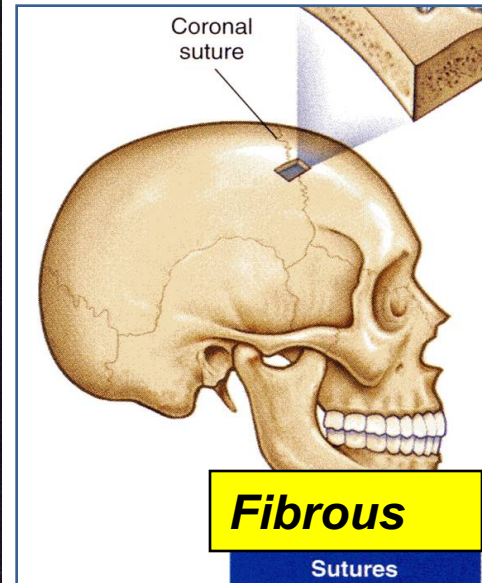
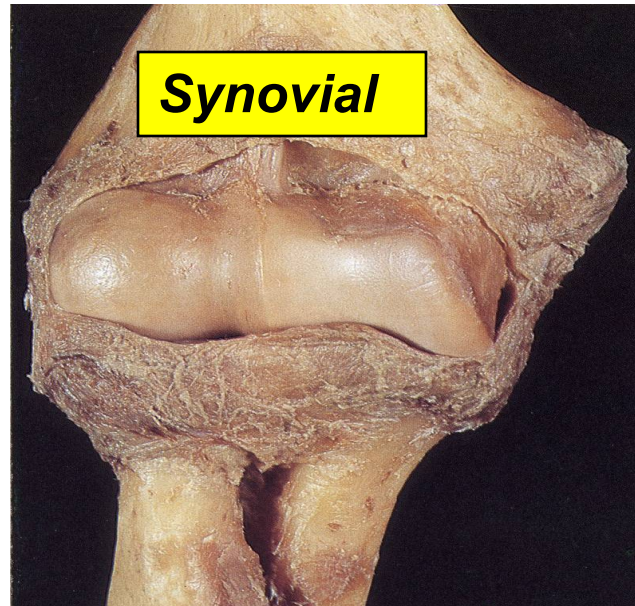
- **What is a joint?**
- It is the **site** where two or more **bones** meet together.



CLASSIFICATION

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

1. Fibrous.
2. Cartilaginous.
3. Synovial.



FIBROUS JOINTS

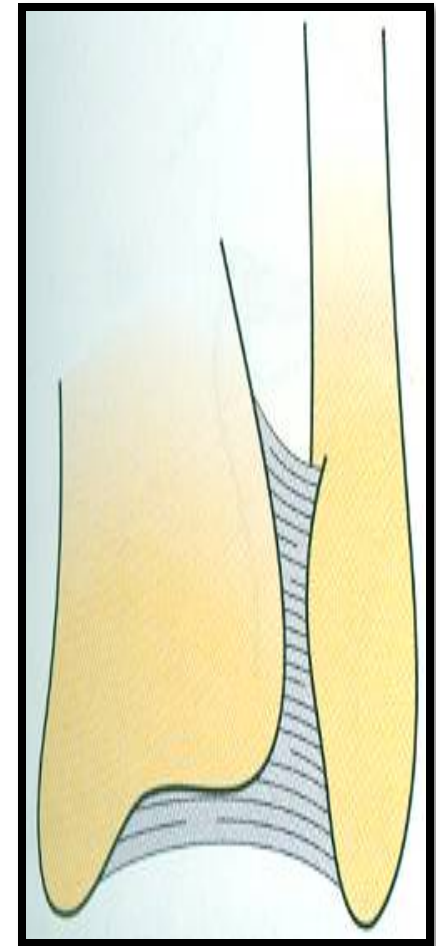
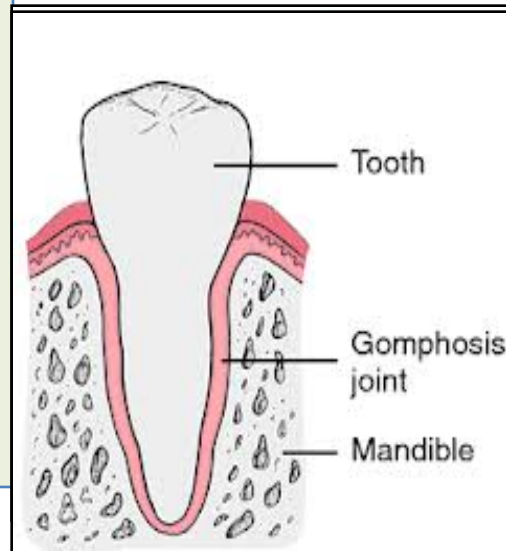
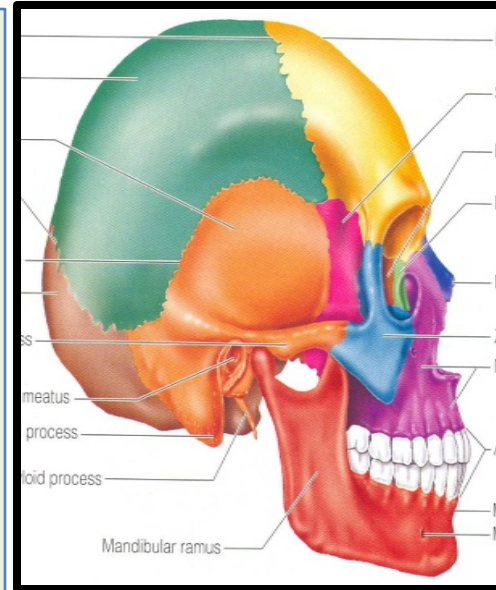
- The articulating surfaces are joined by **fibrous connective tissue**, where **No or very mild movement**

1. Skull sutures:

Temporary (as it ossify later).

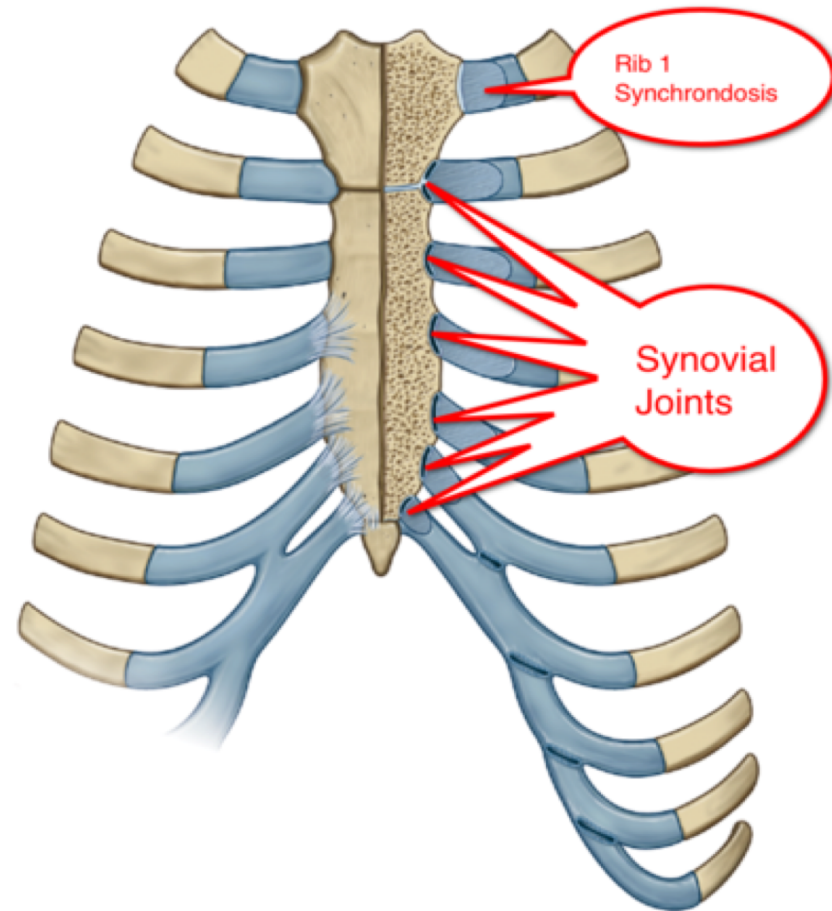
2. Inferior tibiofibular joints (syndesmosis):
minimal movement, permanent joints.

3. Gomphosis: dental alveolar joints.



CARTILAGINOUS JOINTS

- The Two bones are joined by **cartilage**.
- It is of 2 types:
 - ❑ **Primary Cartilaginous (symphysis):**
 - 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 the **Diaphysis** of a growing bone.
 2. Between the **First Rib** and the **Sternum (1st sternocostal joint)**.
(The rest of the sternocostal joints are synovial **plane joints**.)

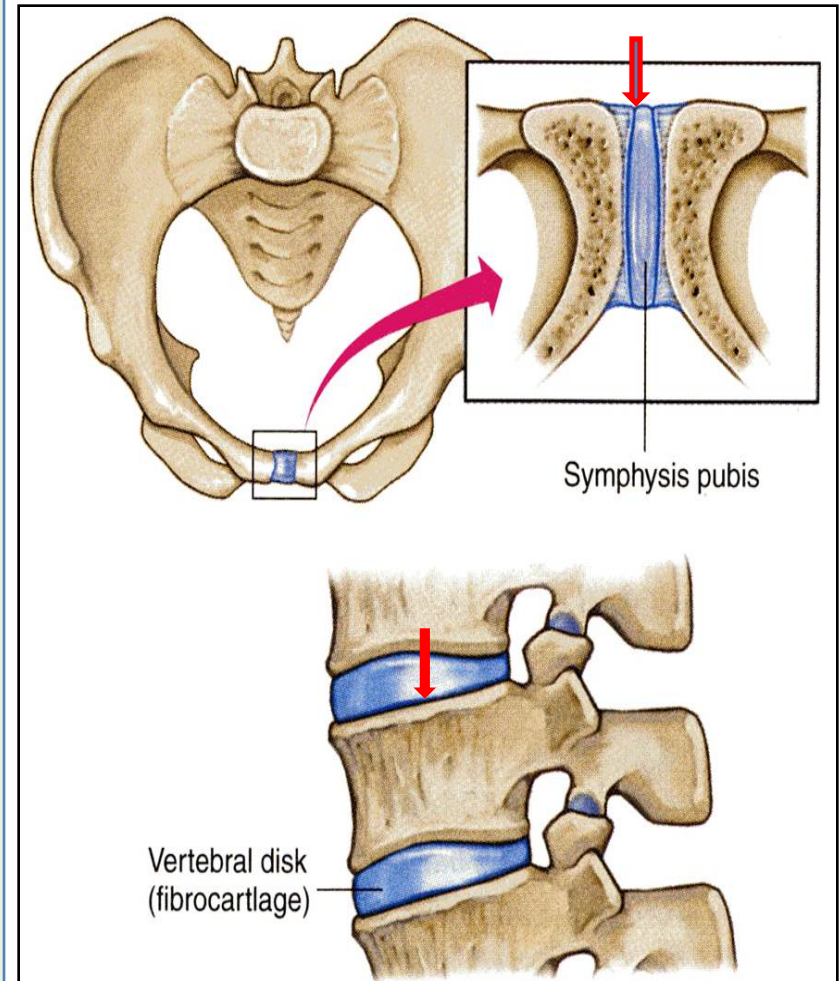


Primary Cartilaginous

CARTILAGINOUS JOINTS

❑ *Secondary Cartilaginous*

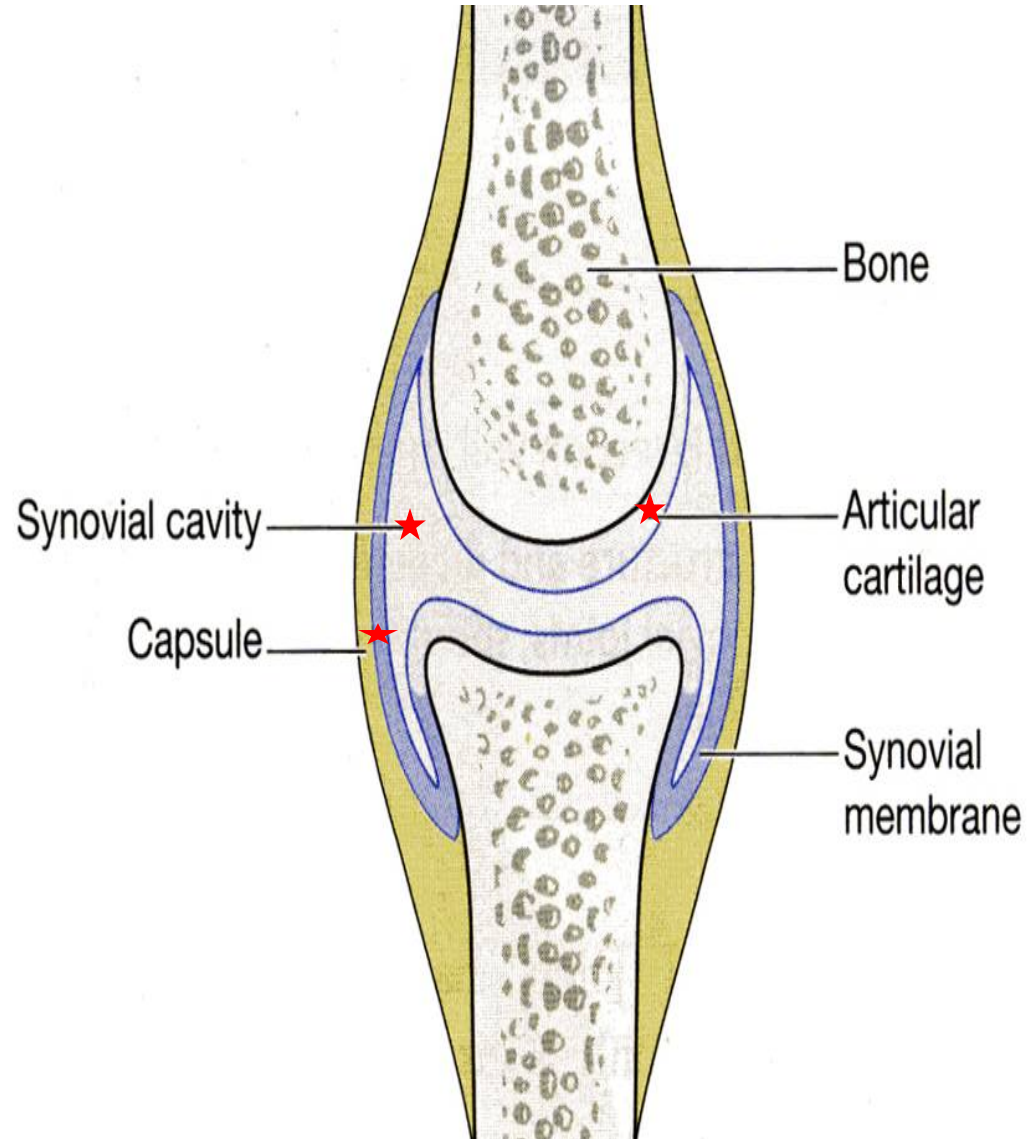
- The bones are united by a plate of fibrocartilage.
 - Their articulating surfaces are covered by a thin plate of hyaline cartilage.
 - Little movement, permanent joints.
 - They are called Midline joints.
1. Joints between the *Vertebral Bodies* (intervertebral discs).
 2. *Symphysis Pubis*.



SYNOVIAL JOINTS

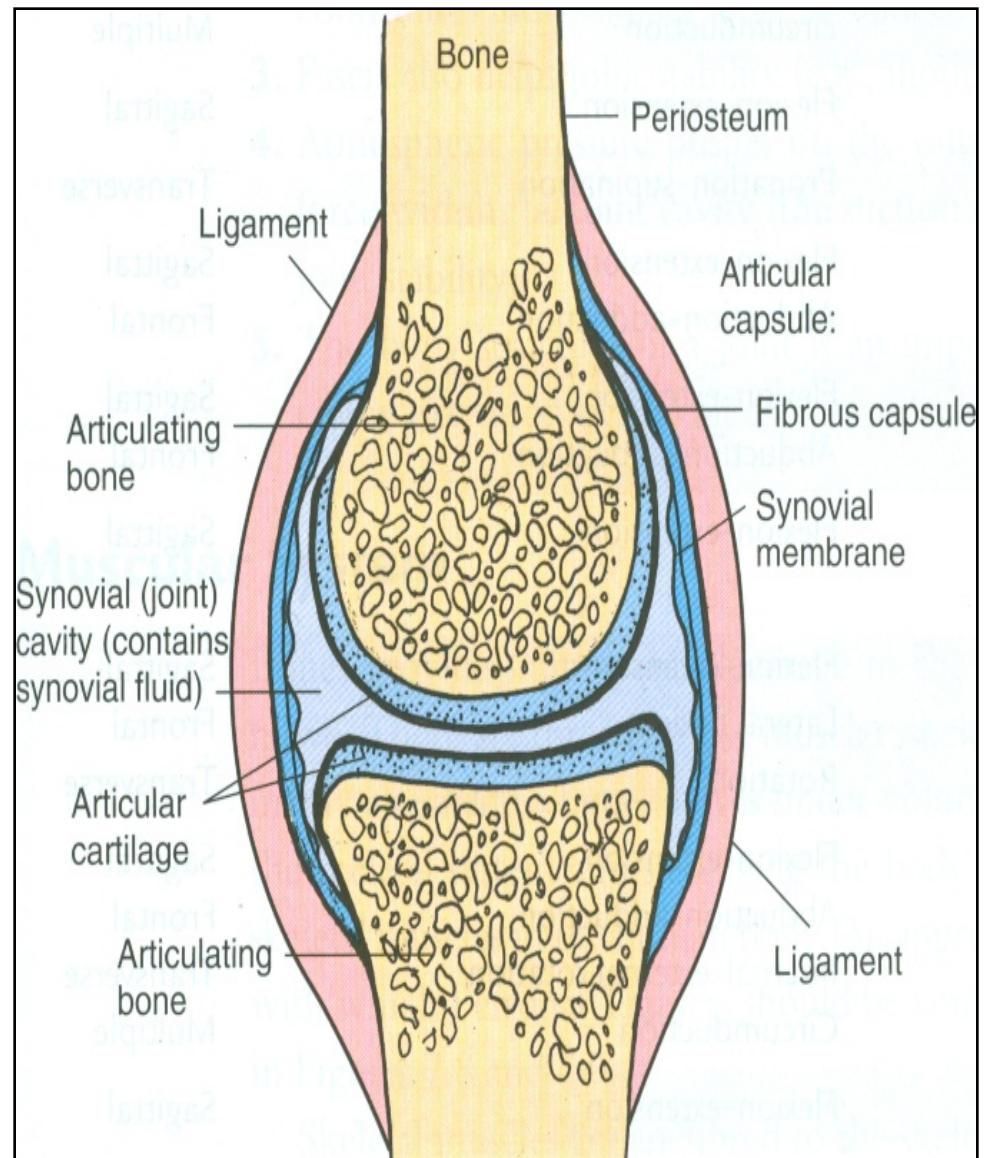
❑ Characteristic features:

- **Freely movable** joints.
- The 2 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

- **Synovial membrane** : a **thin vascular membrane** lining the inner surface of the capsule.
- **Synovial fluid** : a **lubricating fluid** produced by the **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 arrangement of the articular surfaces.
- The range of movement that are possible

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

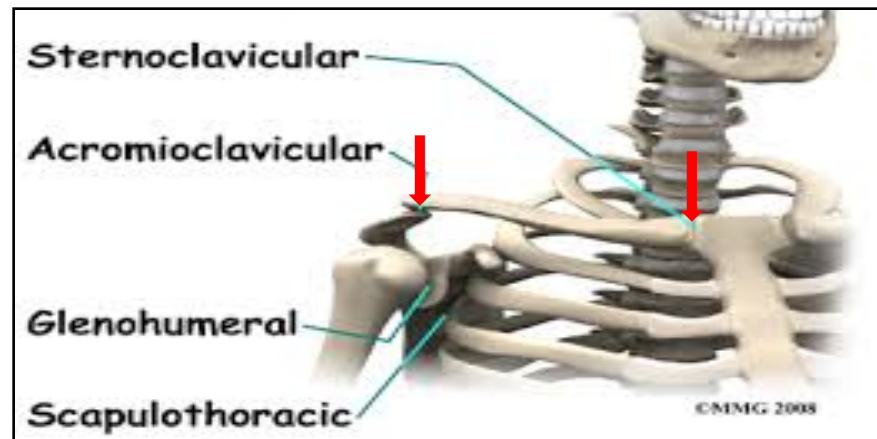
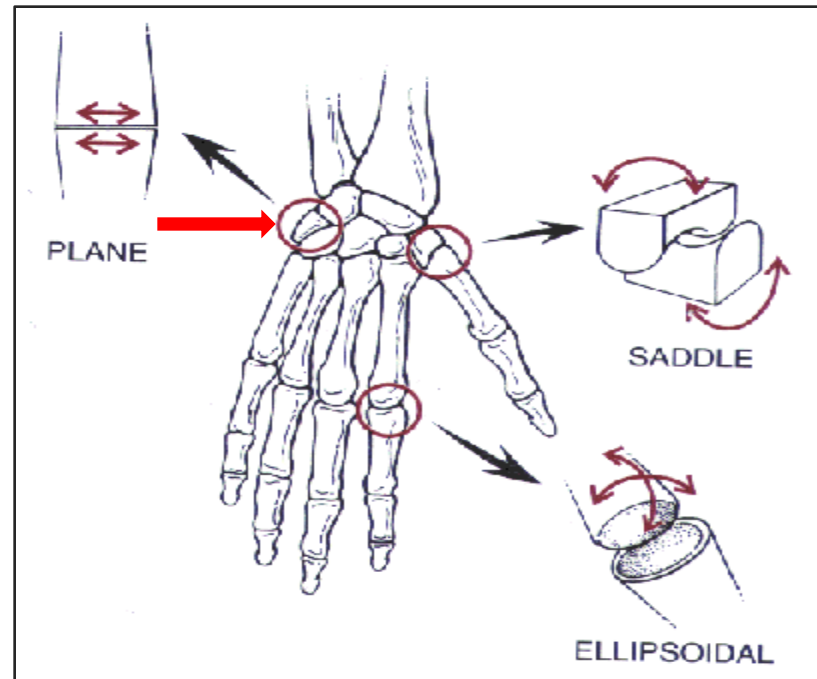
- **Plane synovial joints.**
- **Axial synovial joints.**



PLANE SYNOVIAL JOINTS

- The articulating surfaces are flat and the bones slide on one another, producing a **gliding movement**.
example;

1. Intercarpal Joints.
2. Sternoclavicular
3. Acromioclavicular joints.
4. Between the 2nd - 7th sternocostals



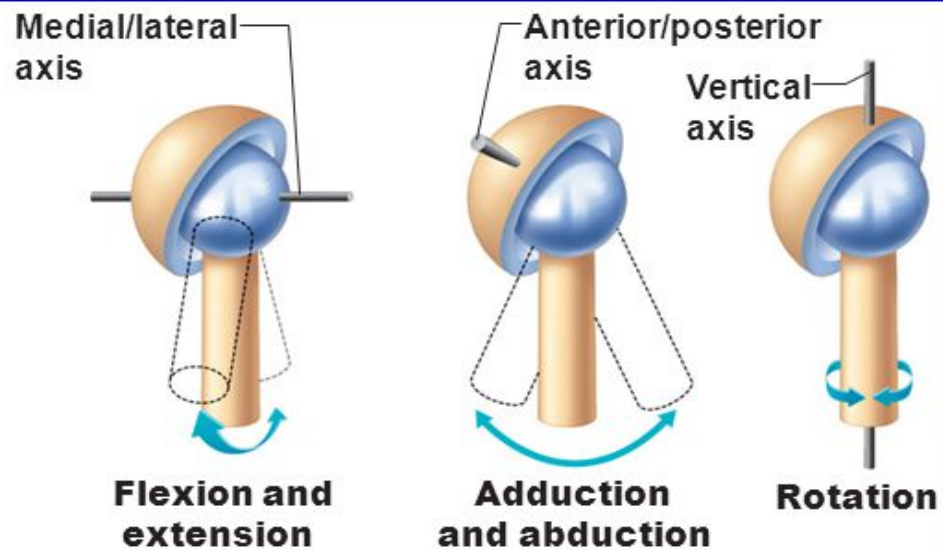
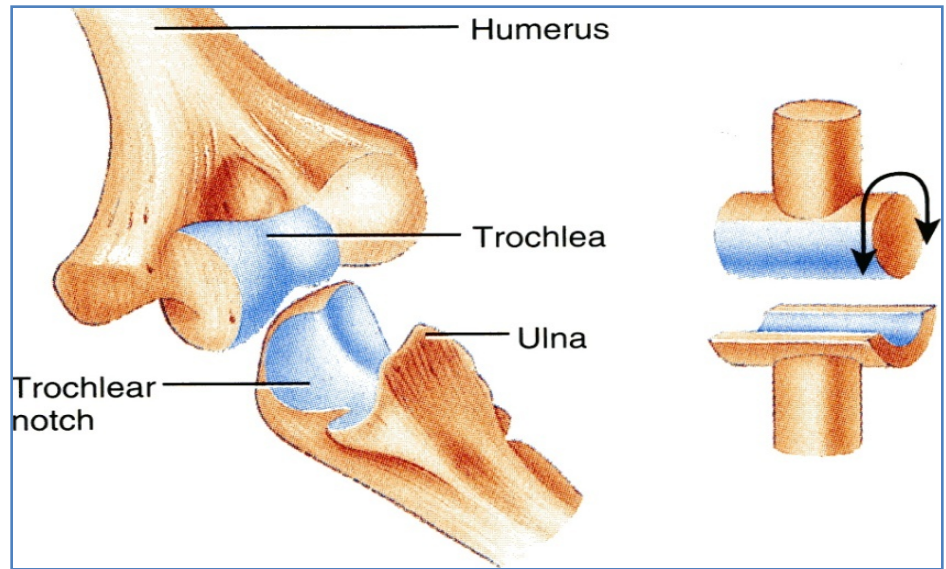
AXIAL SYNOVIAL JOINTS

☐ **Movements occur along axes:**

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

☐ **Axial joints are divided into:**

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



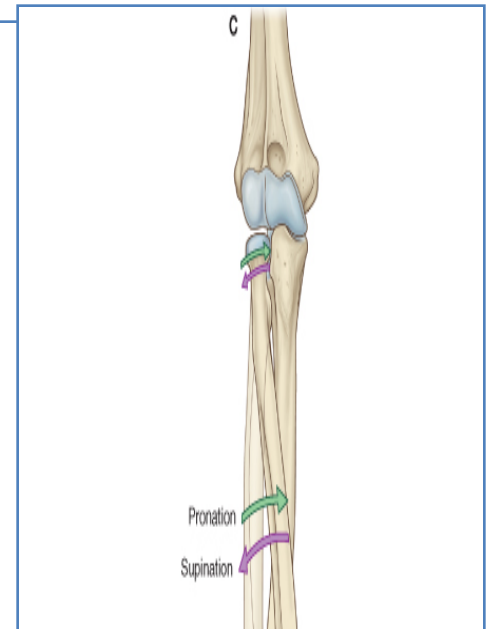
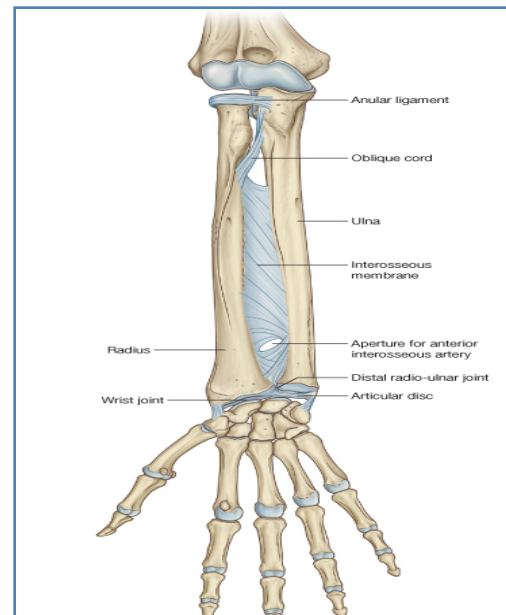
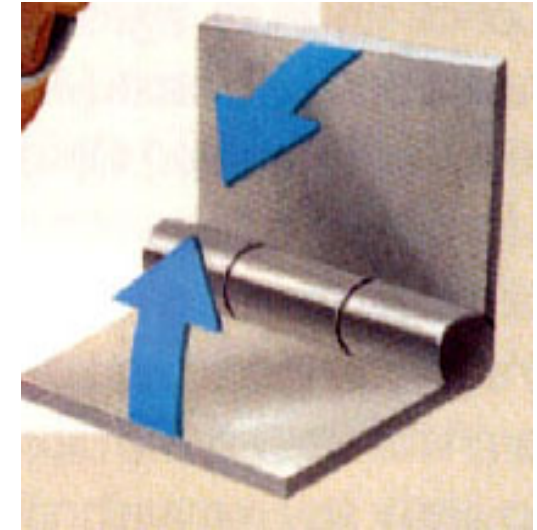
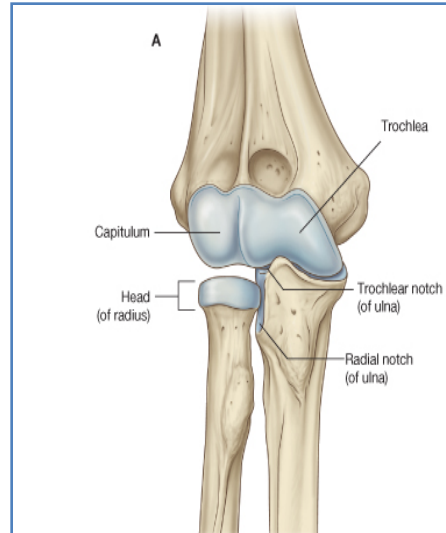
UNIAXIAL SYNOVIAL JOINTS

□ Hinge joints:

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

□ Pivot:

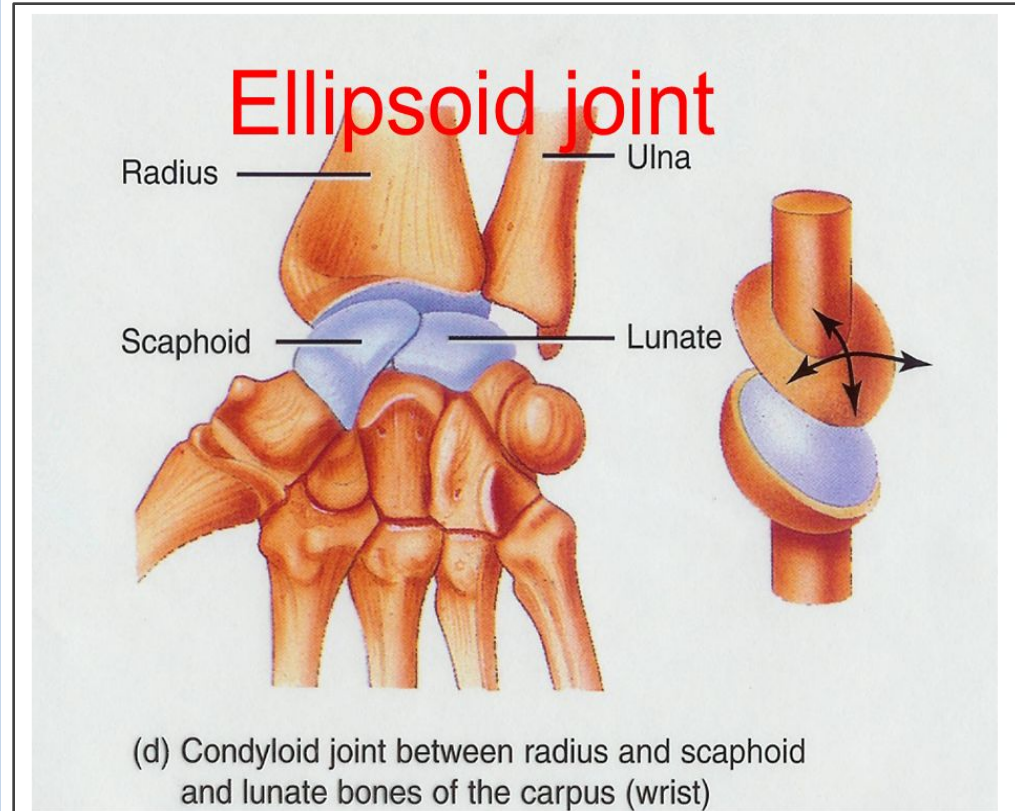
- Axis: longitudinal.
- Movements: rotation.
- Example: **radio-ulnar** joints



BIAXIAL SYNOVIAL JOINTS

□ Ellipsoid joints:

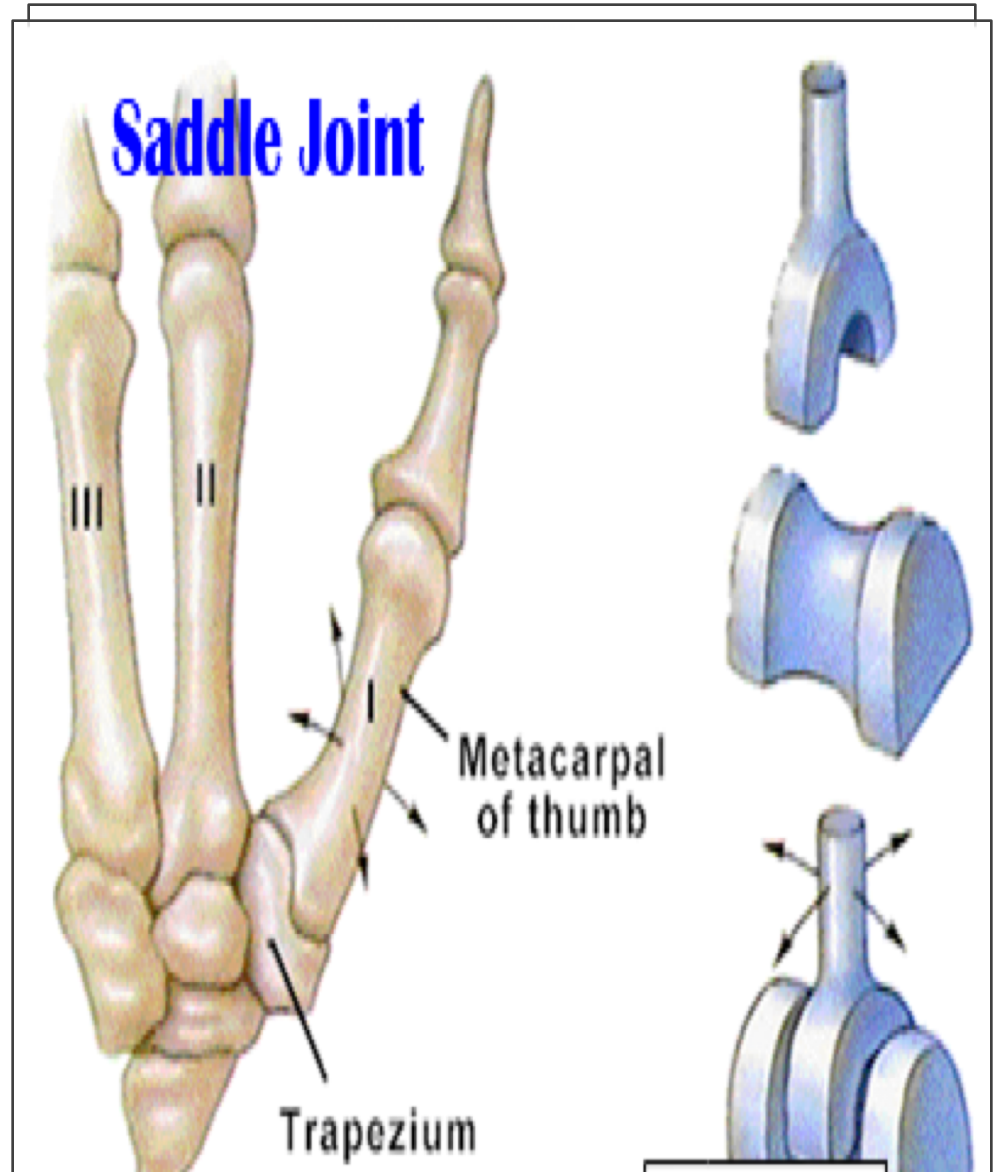
- An elliptical **convex** fits into an elliptical **concave** articular surface.
- **Axes:** Transverse & antero-posterior.
- **Movements:** Flexion & extension + abduction & adduction **but rotation is impossible.**
- **Example:** Wrist joint.



BIAXIAL SYNOVIAL JOINTS

□ Saddle joints:

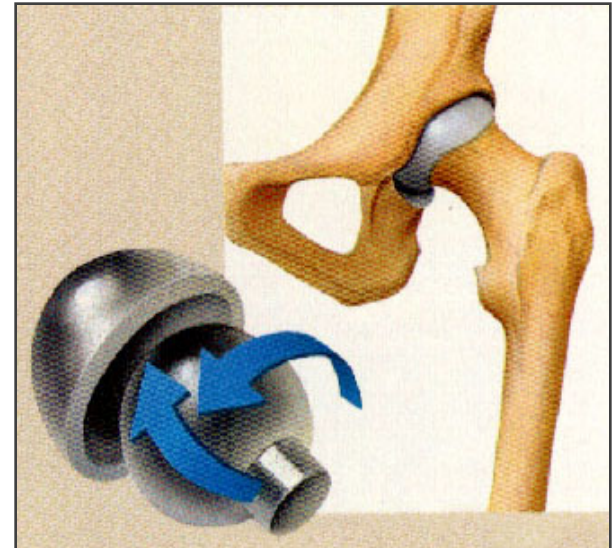
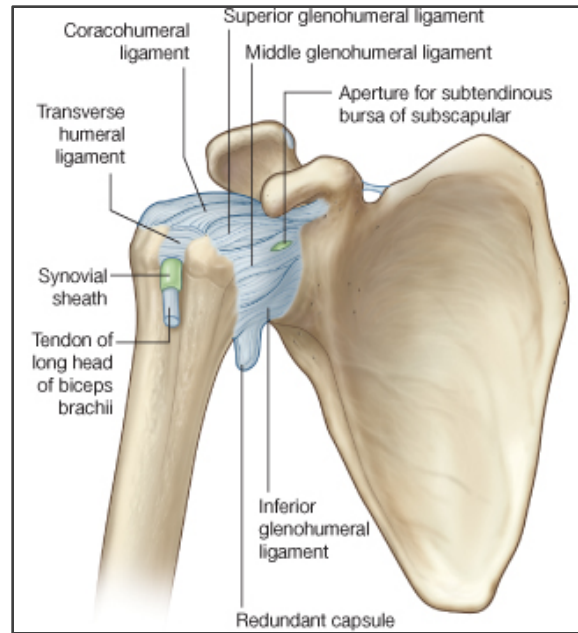
- The articular surfaces are reciprocally **concavoconvex**.
- They **resemble a saddle** on a horse's back.
- **Movement:** As ellipsoid joints (Flexion & extension + abduction & adduction) + *a small range of rotation*.
- **Example:**
Carpometacarpal joint of the thumb.



POLYAXIAL SYNOVIAL JOINTS

❑ Ball-and-socket joints:

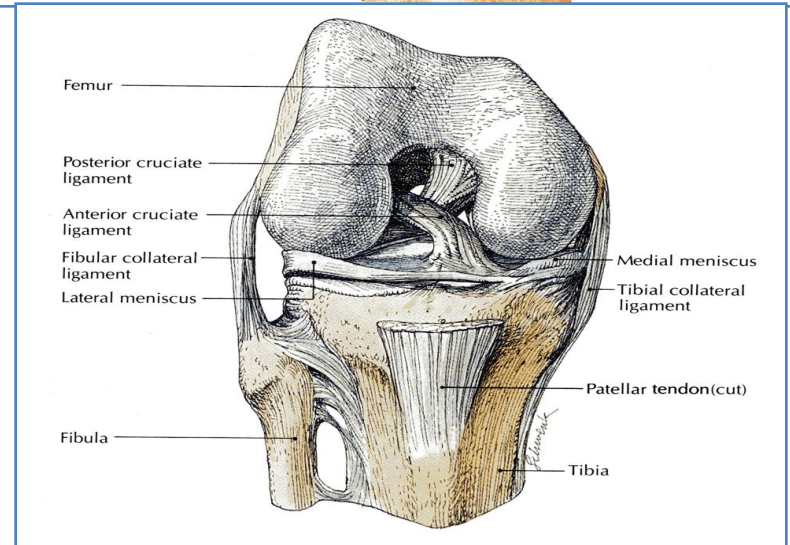
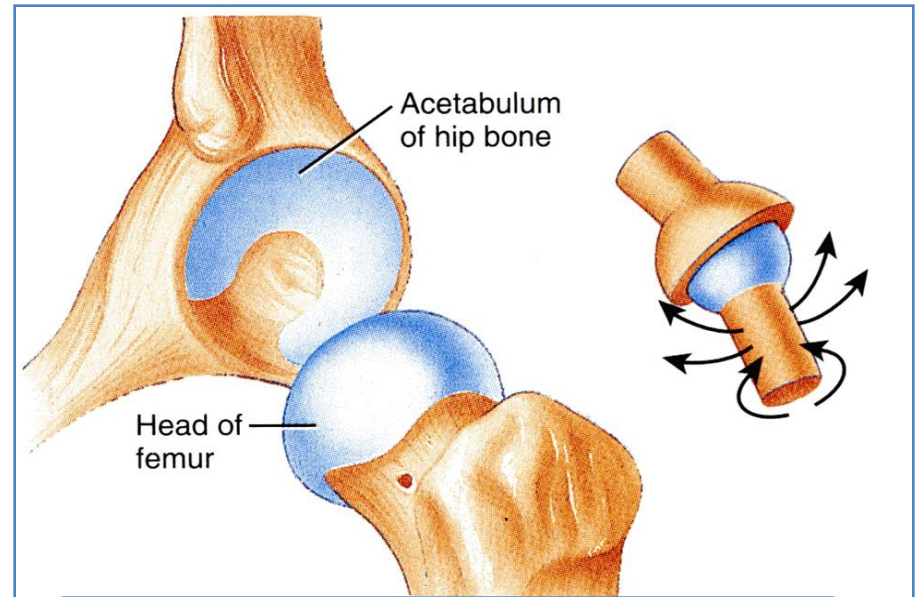
- A **ball** –shaped head of a bone fits into a **socket-like** concavity of another.
- **Movements:** Flexion & extension + abduction & adduction) + rotation along a separate axis.
- **Examples:**
 1. **Shoulder joint.**
 2. **Hip Joint.**



STABILITY OF SYNOVIAL JOINTS

1-The shape of articular surfaces:

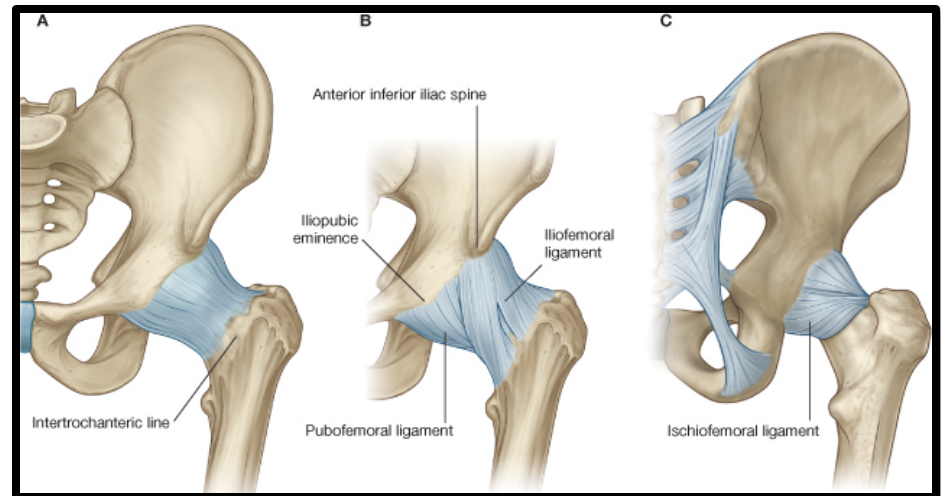
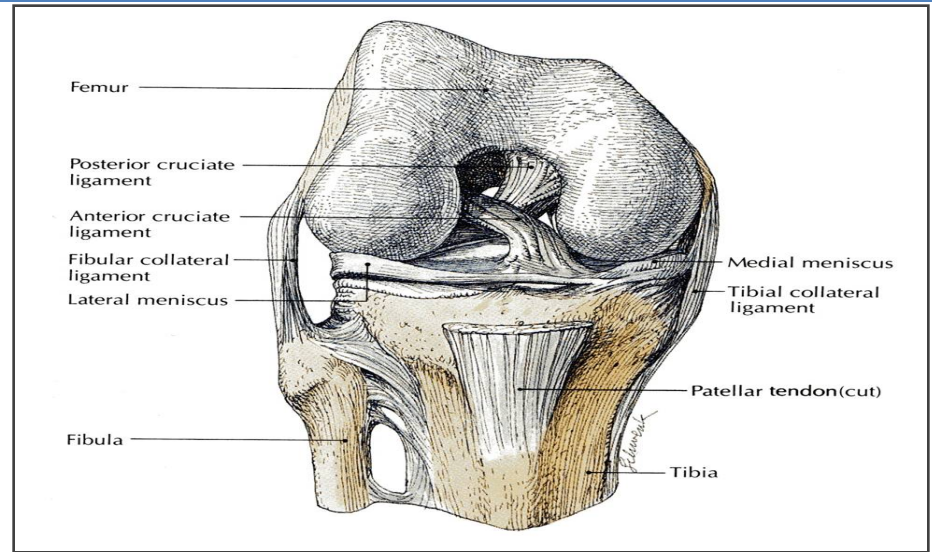
- The ball and socket shape of the Hip joint is a good examples of the importance of bone shape to maintain joint stability.
- The shape of the bones forming the Knee joint has nothing to do for stability.



STABILITY OF SYNOVIAL JOINTS

2-Strength of the ligaments:

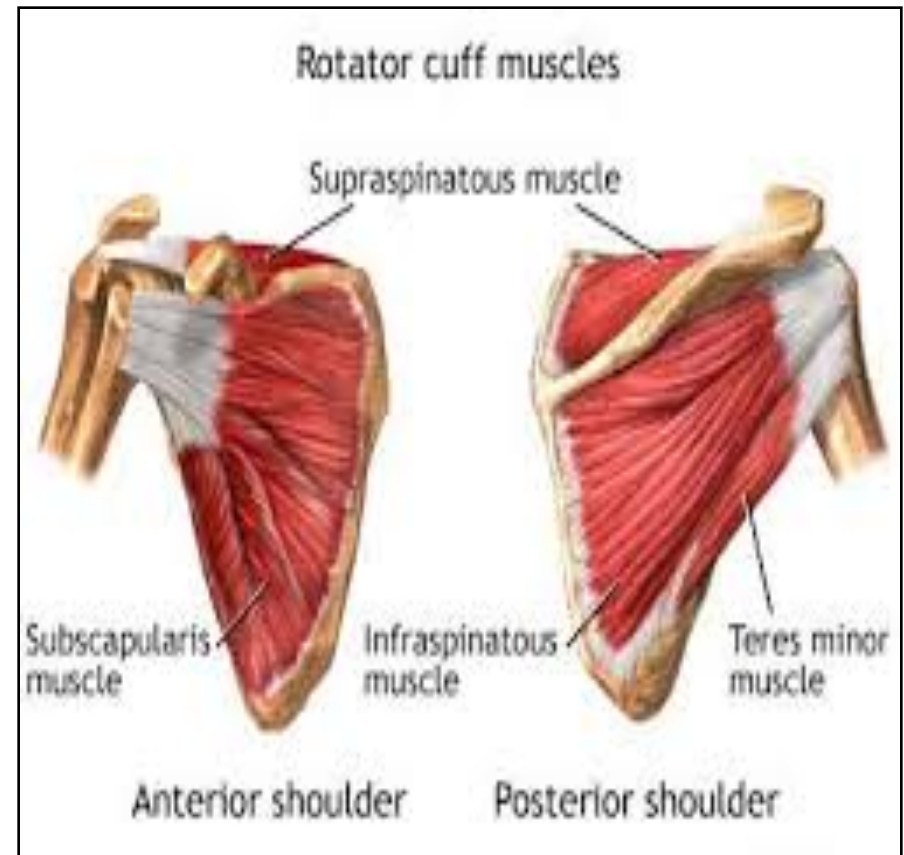
- They prevent excessive movement in a joint.
- **Example:** cruciate ligaments of the knee joint.



STABILITY OF SYNOVIAL JOINTS

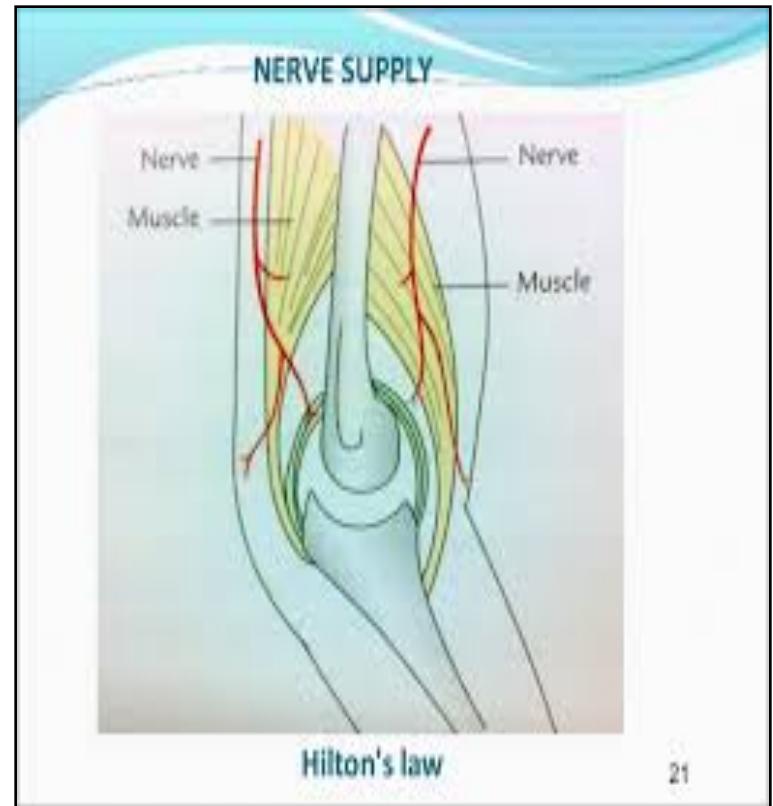
3- Tone of the surrounding muscles:

- In most joints, it is the major factor controlling stability.
- **The short muscles around the shoulder joint** 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 nerve supplying a joint also supplies the **muscles** moving that joint and the **skin** overlying the insertions of these muscles.”



GOOD LUCK

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 : fibrous capsule, articular cartilage, synovial membrane & 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.

FOR STUDENTS

- **Which one of the following joints related to Gomphosis ?**

Hinge.

Cartilaginous.

Fibrous

Pivot

- **Which one of the following contributes in synovial joints ?**

The articulating bones are covered by elastic cartilage.

Have fibrous tissue between the articulating bones.

Covered by synovial membrane externally.

Are freely movable.

- **Which one of the following joints is hinge synovial?**

Shoulder.

Elbow.

Wrist.

Knee.

- **Which one of the following joints is ball & socket synovial ?**

Wrist.

Elbow.

Hip.

Radio-ulnar.