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.*

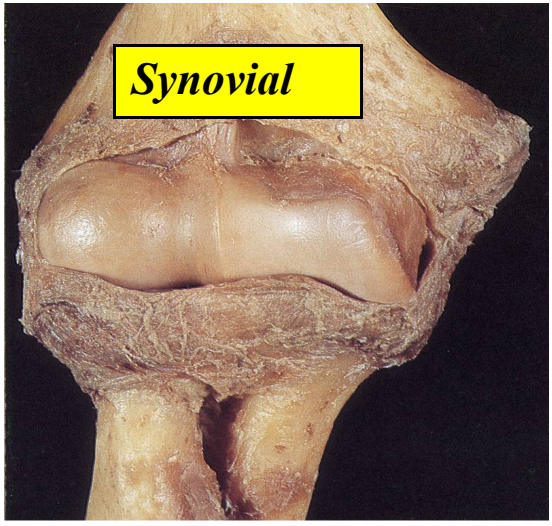
DEFINITION

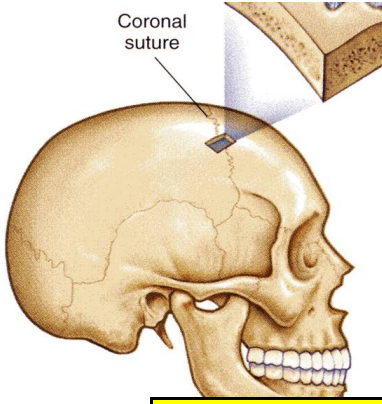
- **What is a joint?**
- **It is the site where two or more bones meet together.**

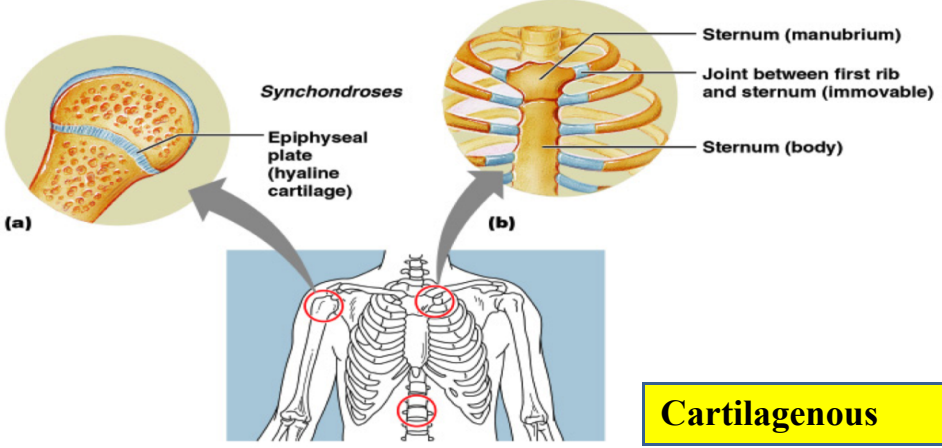
CLASSIFICATION

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

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







FIBROUS JOINTS

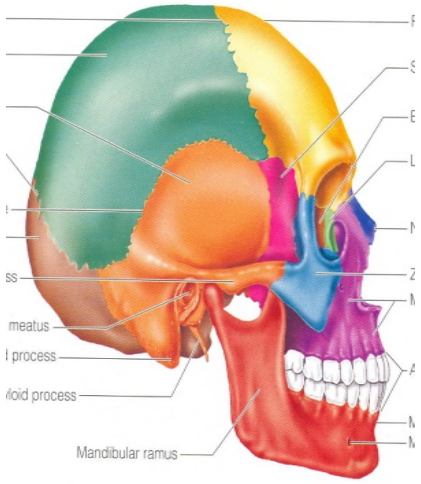
The articulating surfaces are joined by fibrous connective tissue, where No or very mild movement

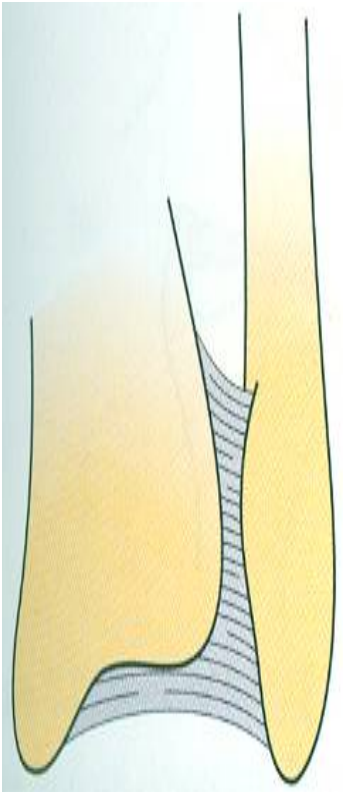
1. Skull sutures:

   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 (synchondrosis):

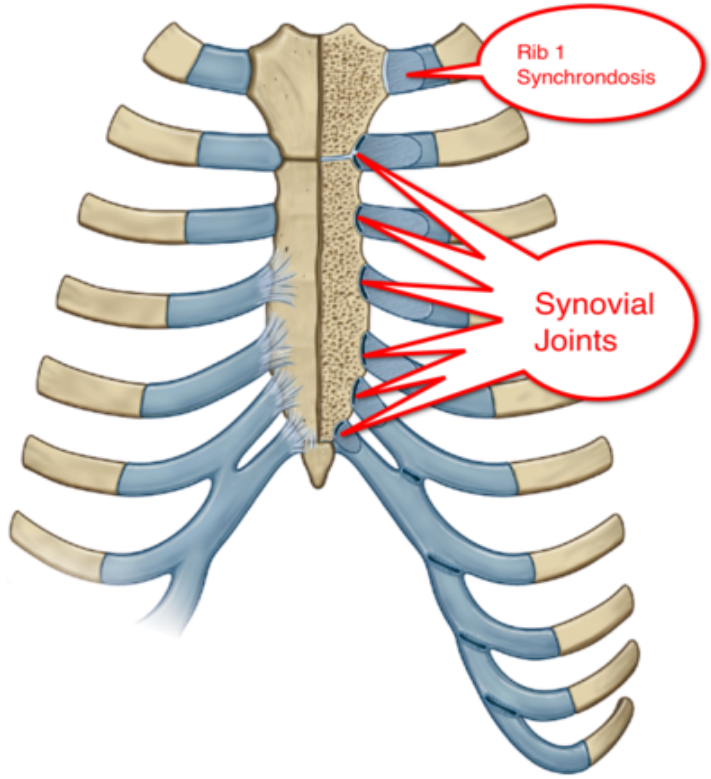
The bones are united by a plate or a bar of hyaline cartilage.

No movement, temporary joints (ossify later), example:

Between the Epiphysis and the Diaphysis of a growing bone.

Between the First Rib and the Sternum (1st sternocostal joint).

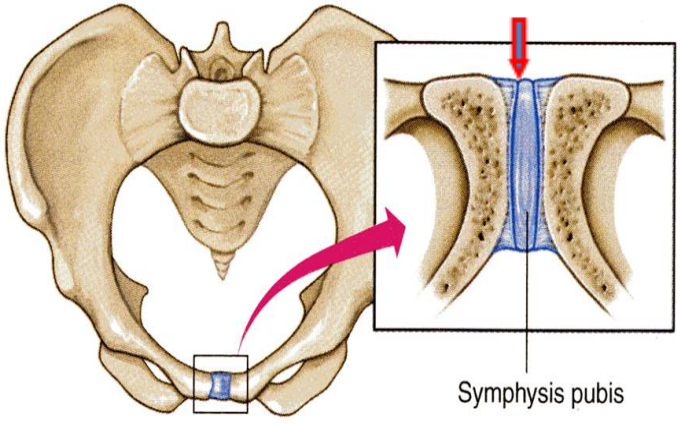
(The rest of the sternocostal joints are synovial plane joints.)

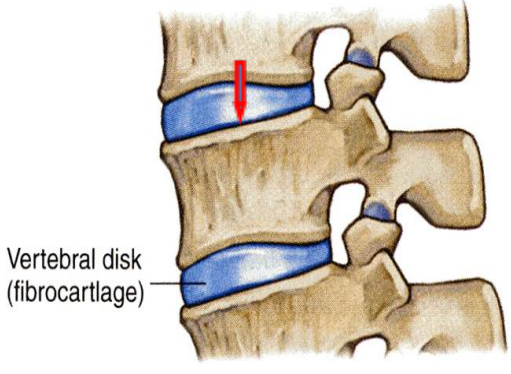


Primary Cartilaginous

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.**
- **The are called Midline joints.**
  1. **Joints between the *Vertebral Bodies* (intervertebral discs).**
  2. ***Symphysis Pubis*.**





SYNOVIAL JOINTS

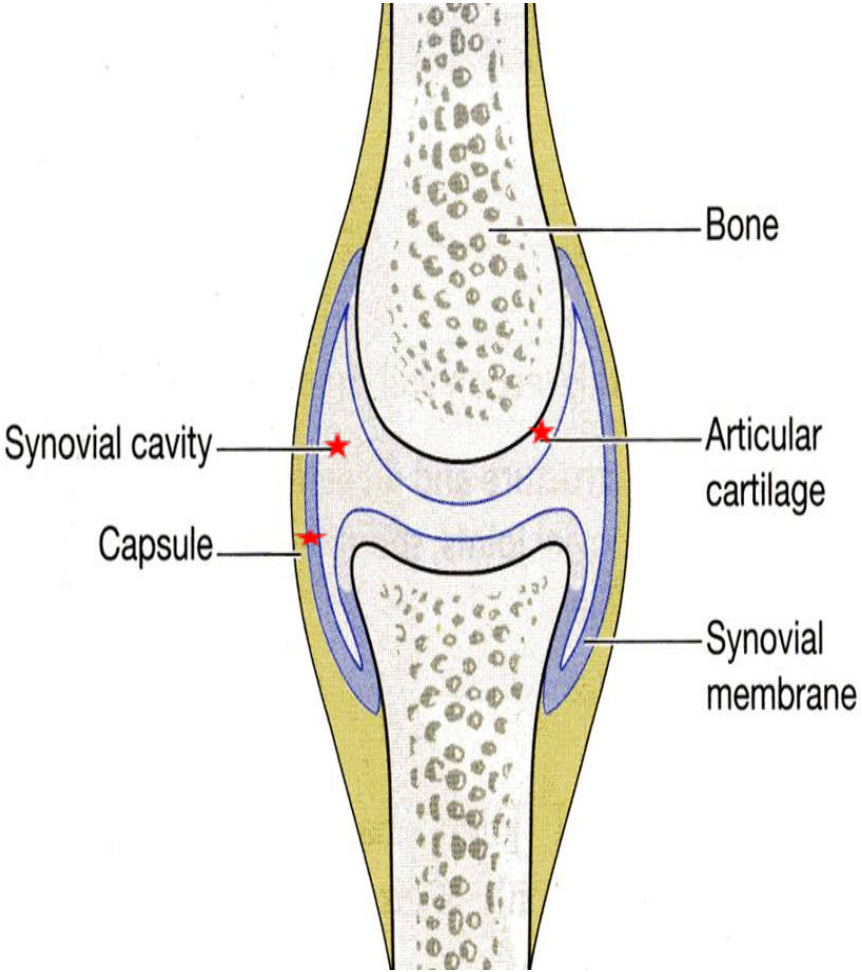
Characteristic features:

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.

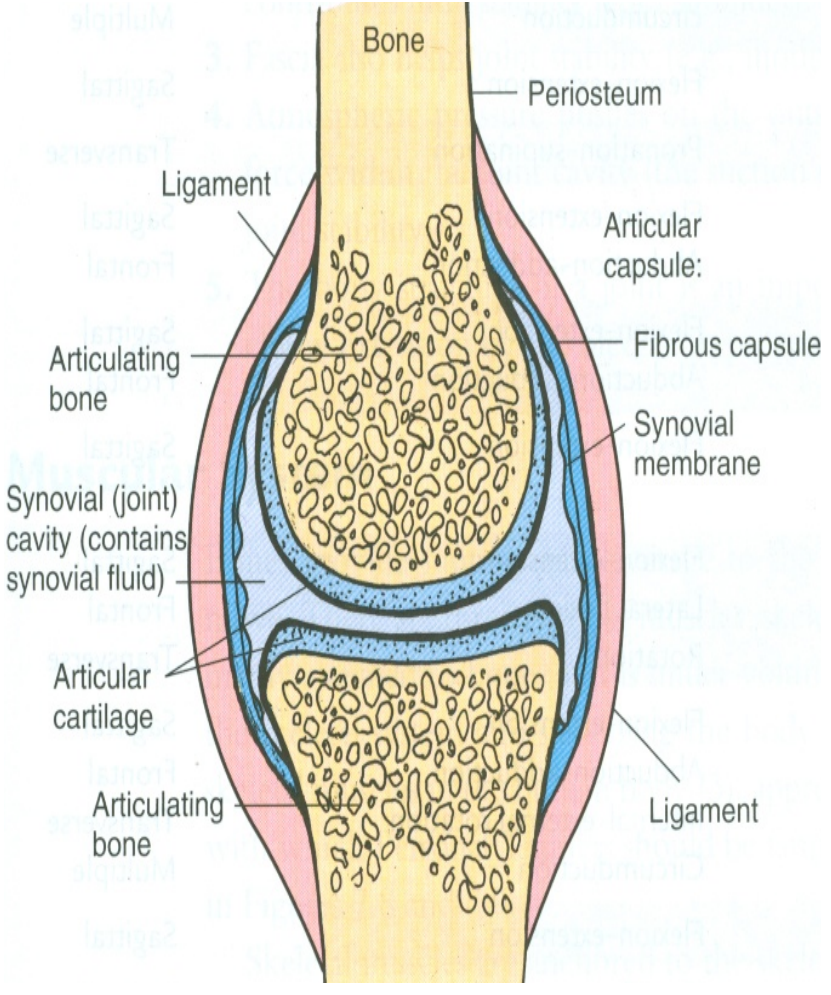


SYNOVIAL JOINTS

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.

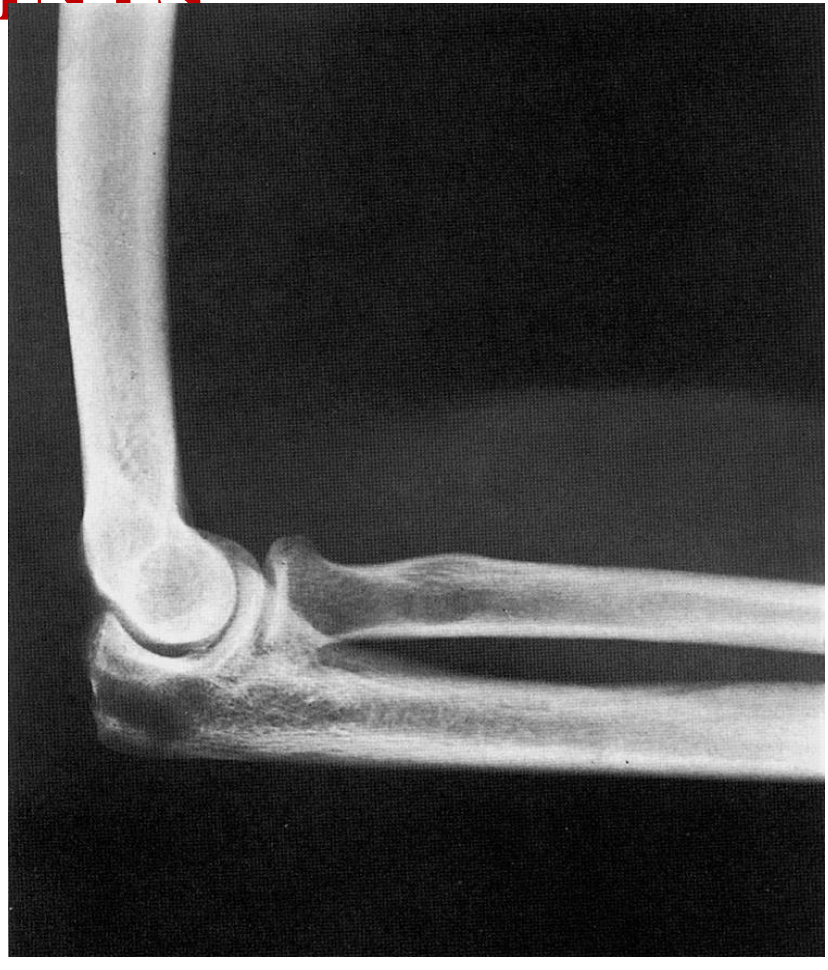
The fluid minimizes the friction between the articular surfaces.



CLASSIFICATION OF SYNOVIAL JOINTS

Synovial joints can be classified according to:

- The **arrangement** & **shape** of the **articular surfaces.**
- The **range of movement** that are possible
- **synovial joints are classified into:**
- **Plane synovial joints.**
- **Axial synovial joints.**

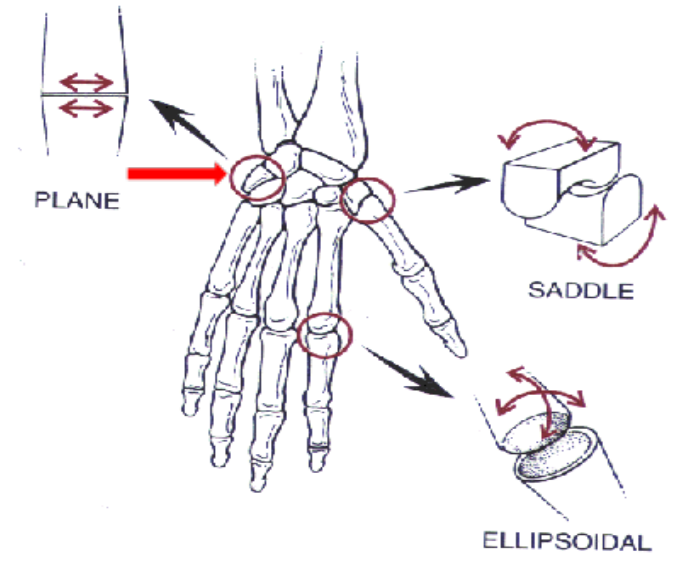


PLANE SYNOVIAL JOINTS

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



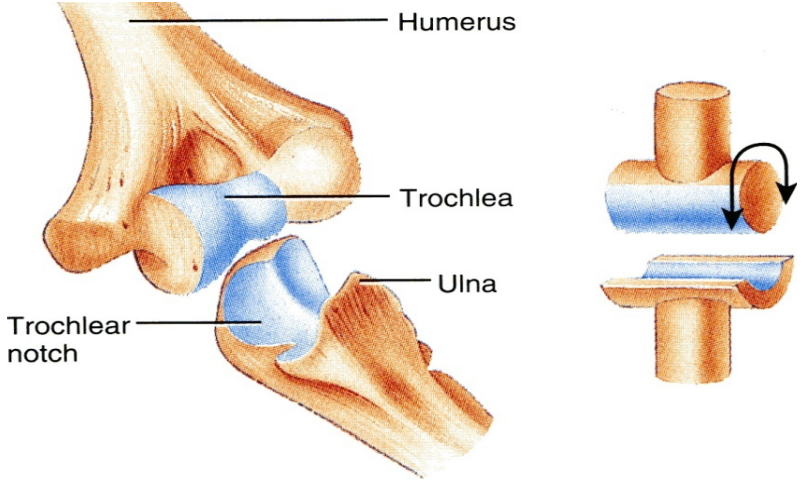
AXIAL SYNOVIAL JOINTS

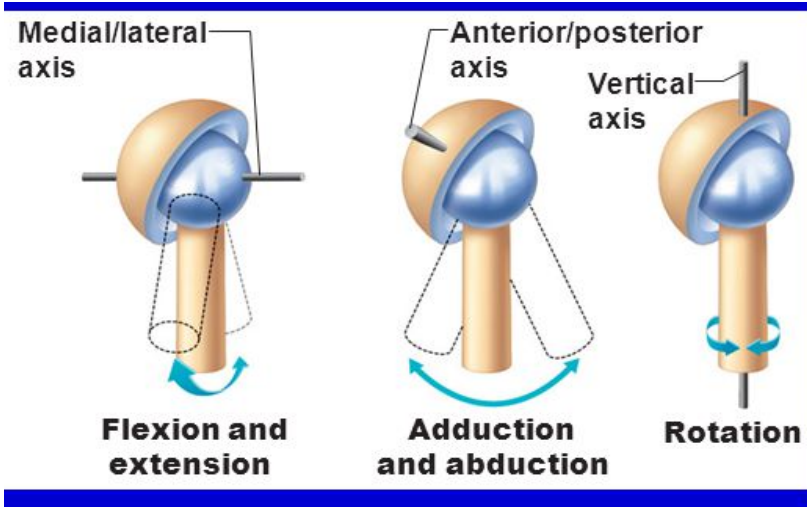
- **Movements occur along axes:**

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

- **Axial joints are divided into:**

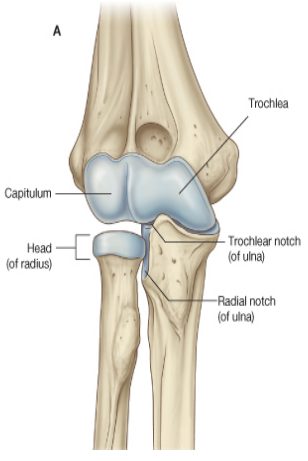
4. **Uniaxial.**
5. **Biaxial.**
6. **Multi-axial (polyaxial).**

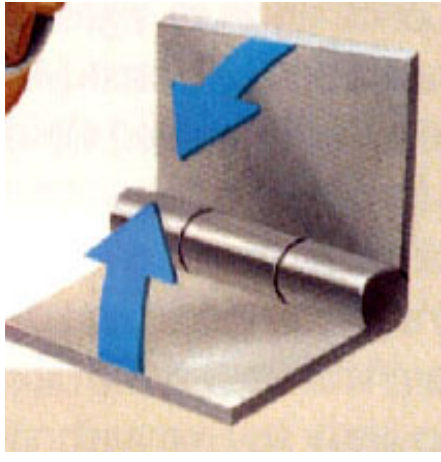


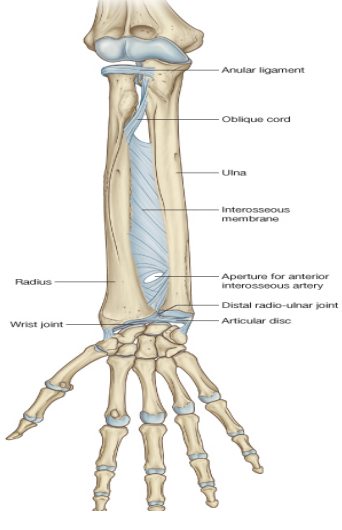


UNIAXIAL SYNOVIAL JOINTS

- **Hinge joints:**
- Axis: transverse.
- Movements: flexion & extension.
- Example: elbow and ankle joints.
- **Pivot:**
- Axis: longitudinal.
- Movements: rotation.
- Example: radio-ulnar joints

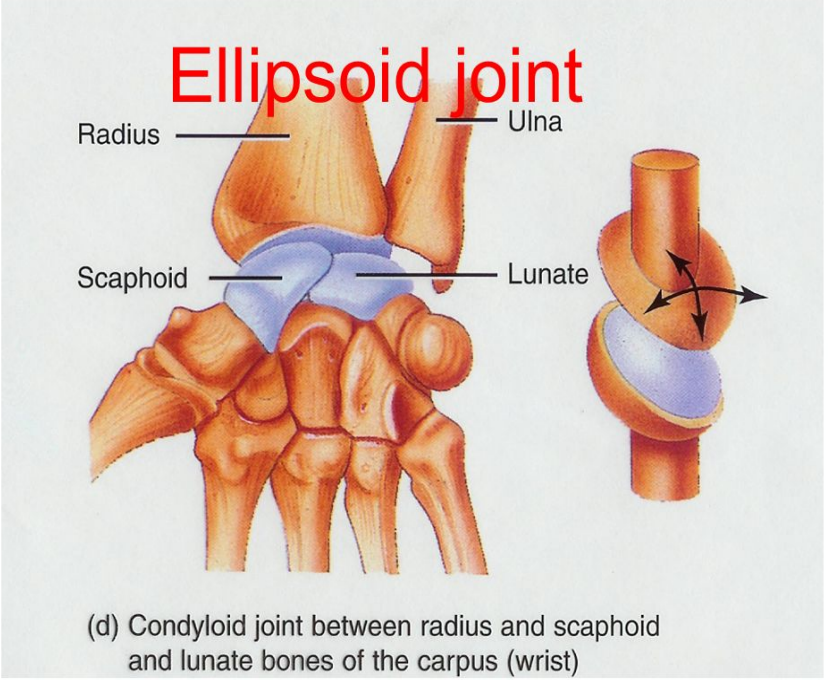






BIAXIAL SYNOVIAL JOINTS

- **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.**



(d) Condyloid joint between radius and scaphoid and lunate bones of the carpus (wrist)

BIAXIAL SYNOVIAL JOINTS

Saddle joints:

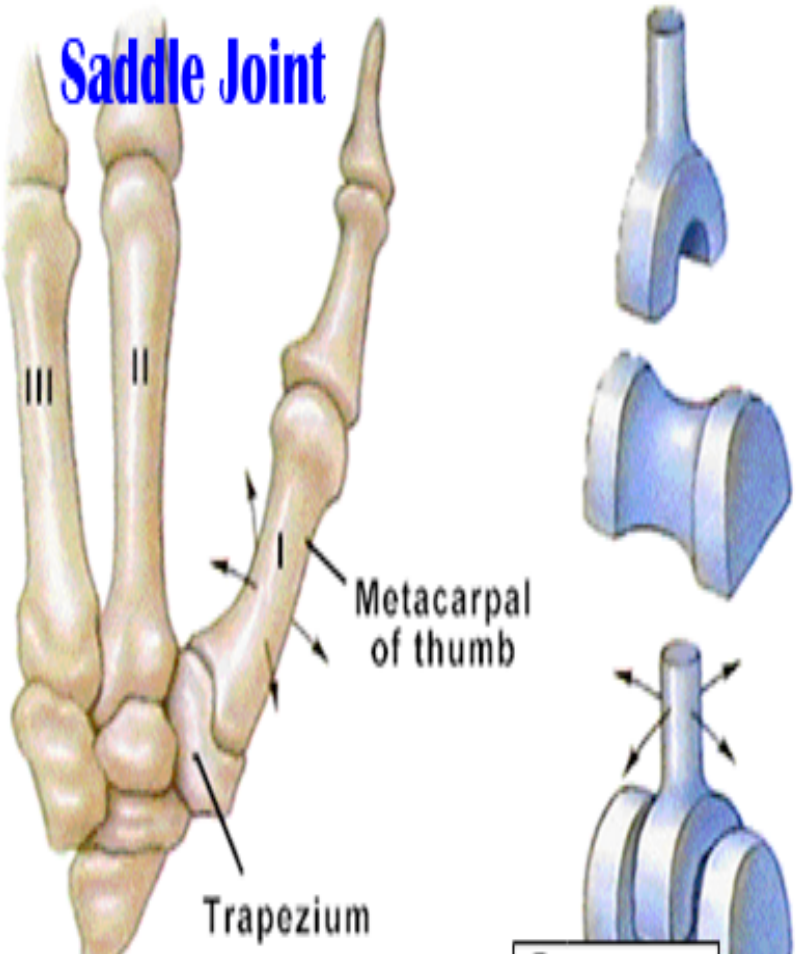
The articular surfaces are reciprocally **concavoconvex.**

They **resemble a saddle** on a horse's back.

Movement: As ellipsoid joints (Flexion & extension + abduction & adduction) + *a small range of rotation .*

Example:

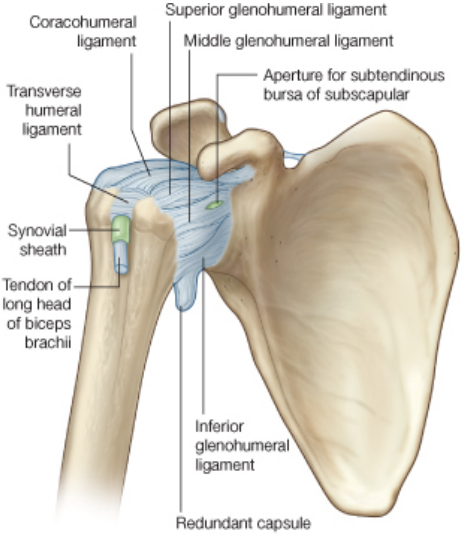
Carpometacarpal joint of the thumb.

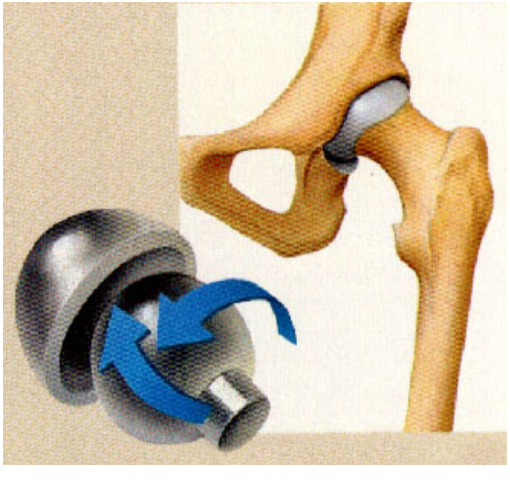


POLYAXIAL SYNOVIAL JOINTS

- **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.**

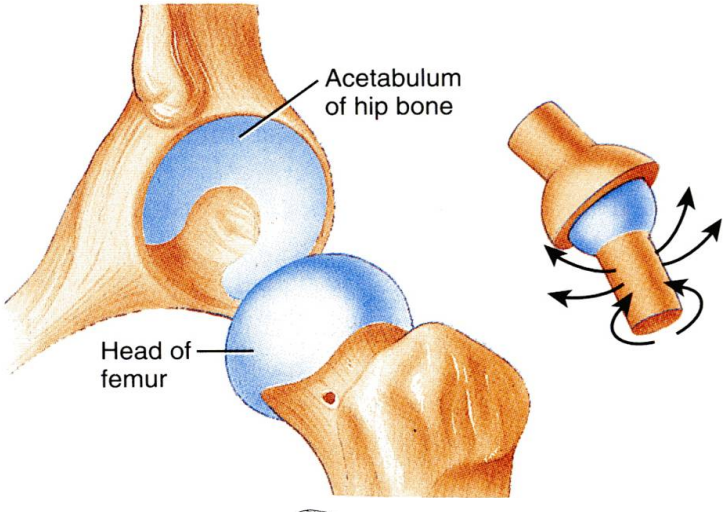


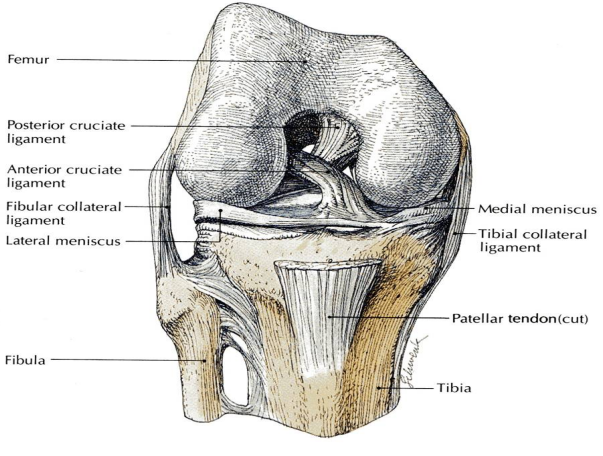


STABILITY OF SYNOVIAL JOINTS

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.

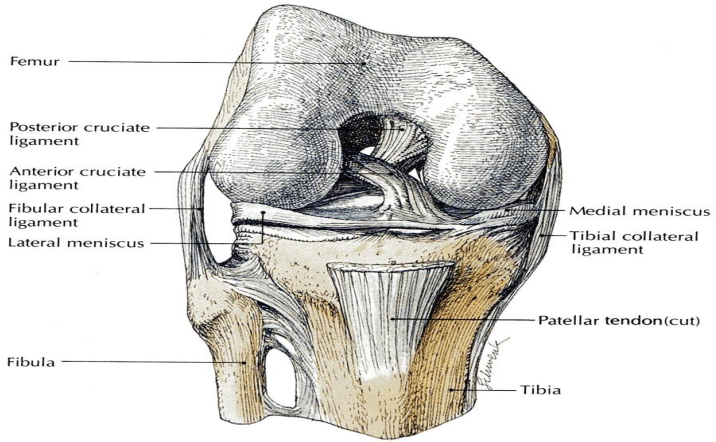


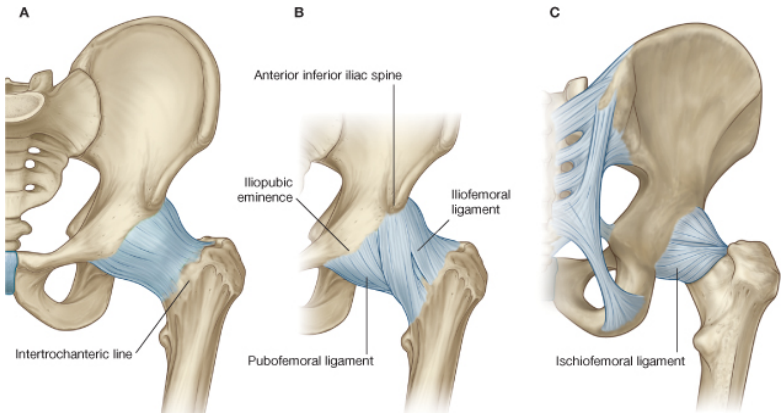


STABILITY OF SYNOVIAL JOINTS

2-Strength of the ligaments:

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





STABILITY OF SYNOVIAL JOINTS

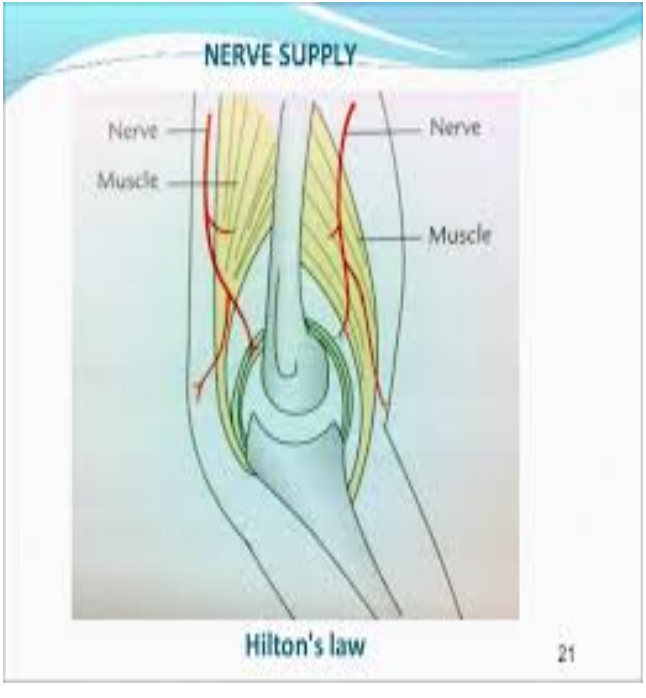
3- Tone of the surrounding muscles:

- 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.