

Joints

A joint is the junction of two or more bones which allow flexibility and movement of the body. The most basic premise here is that all joints move; hence movement is the function of any joint.

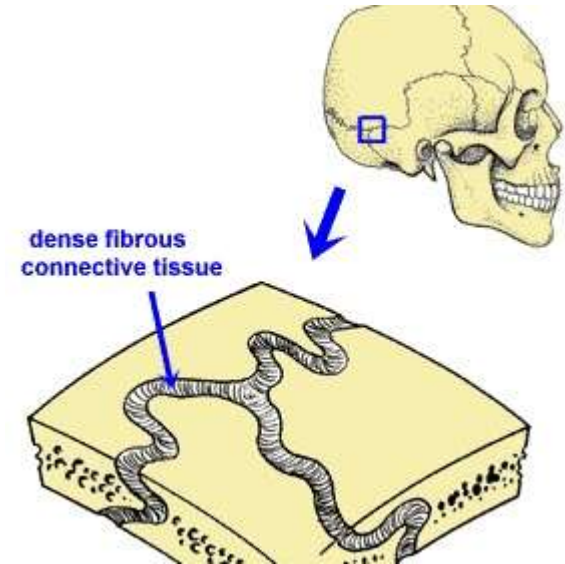
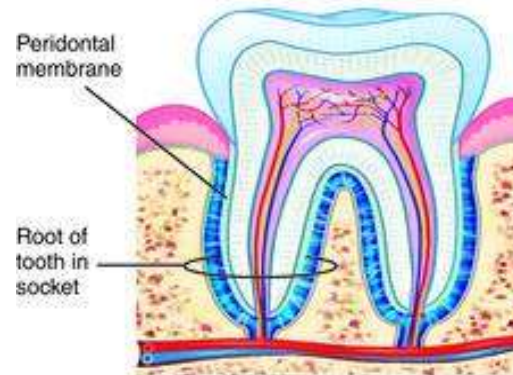
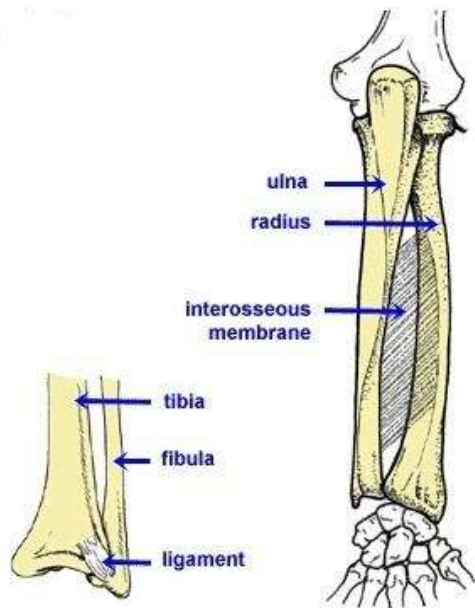
Bones are connected to one another by ligaments. These are strong inelastic fibrous bands of tissue. These pass from bone to bone stabilise joints; limiting their movement.

Types of Joints

Fibrous Joints

Indiscernible (not obvious) movement e.g. the skull sutures and the joints between the teeth and jaw, lower ends of tibia and fibula (slight movement possible).

Figure 1 - Different Types of Fibrous Joint



Cartilaginous Joints

Cartilaginous joints are defined as 'slightly movable' joints. They can be

- Primary (synchondrosis), or
- Secondary (symphysis)

They contain strong ligaments and fibrous cartilage e.g. the pelvis, vertebral discs (except atlas and axis), manubrium and gladiolus, manubrium and xiphoid (these 2 can become fixed in later life), as can the pubic symphysis.

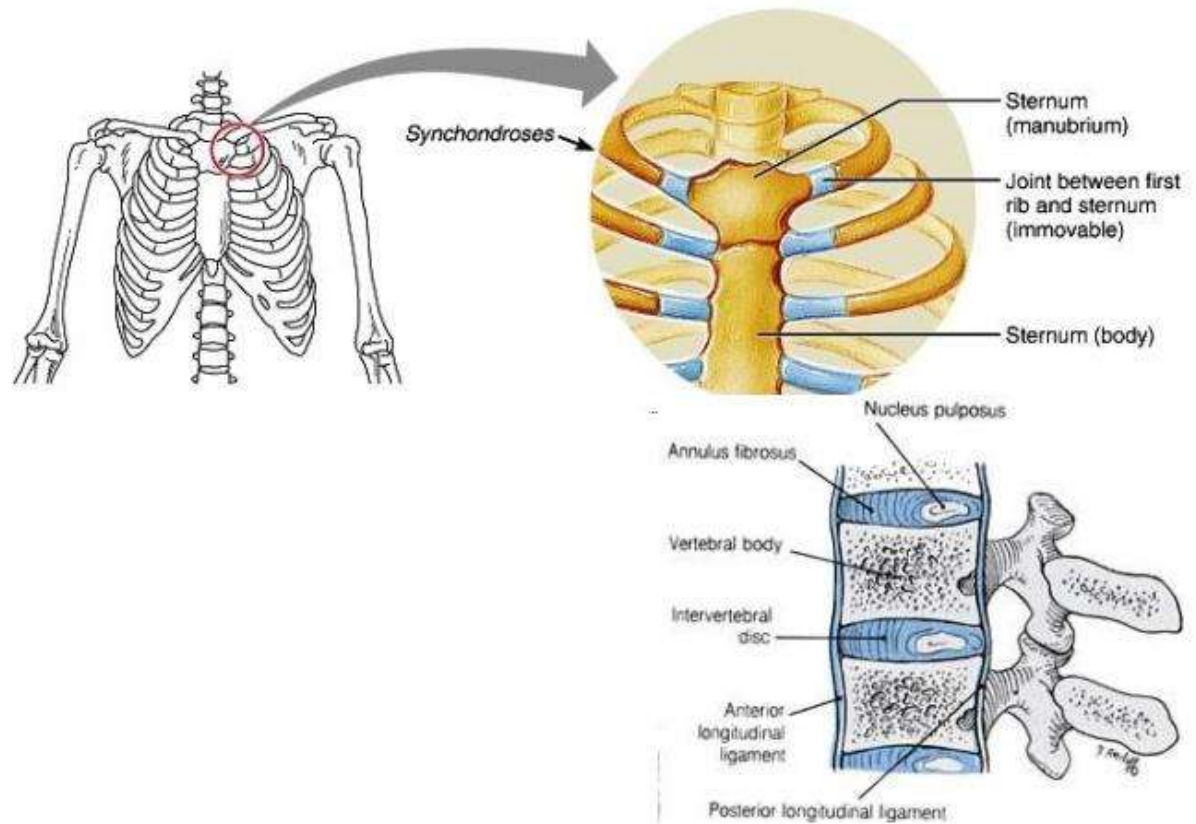
Figure 2 - Cartilaginous joint: Primary and Secondary

Synovial Joints

Synovial joints are freely movable joints. There are several types of these, which allow different types and ranges of movement according to their structure (See below)

All synovial joints have factors in common:

1. Bony ends covered in articular, hyaline cartilage. Its function is to cushion the impact between the two ends of bone, with movement, and to reduce obvious wear and tear occurring therein. This cartilage is avascular. Its structure is like a firm sponge; joint movement compresses the sponge, squeezing out the synovial fluid (see below), and on release it is sucked back in again – creating an effective circulation within the cartilage.
2. Capsule of the joint. This is a fibrous structure that literally encapsulates the joint, defining its limits.
3. Synovial membrane. This is made up of epithelial cells, lining the inside of the capsule, secreting a sticky fluid, similar to egg white. This lubricates and nourishes the joint and holds the bones in contact, in the same way that a water film holds two pieces of glass together.
4. Ligaments. These occur outside and inside joints, connecting bone to bone limiting its range of movement (i.e. preventing dislocation) and stabilising the joint.
5. Bursae (singular – bursa). These are small fluid filled sacs with a synovial membrane outer lining occurring only in some joints; they act as cushions and are positioned between tendons and bones and between tendons to reduce friction
6. Muscles. These attach to bones via tendons and move, and stabilise, the joint when they contract
7. A blood and nerve supply [motor to the muscles; sensory from the muscle spindles, tendons (Golgi tendon organ), capsule and ligaments].



Classification of Synovial joints

Types of Synovial Joints

1. **Gliding** – allows limited movement usually in one plane; e.g. acromioclavicular joint, intercarpals, intermetacarpals, intermetatarsals, sacroiliac joints, proximal tibiofibular, facet joints of vertebrae.
2. **Pivot** – allows rotation movement; e.g. between atlas and axis at top of neck, proximal and distal ends of radius and ulna.
3. **Ball and socket** – hemispherical convex surface sitting in concave surface, allowing flexion/extension, adduction/abduction, rotation and circumduction; e.g. hip, glenohumeral and talocalcaneonavicular joint.
4. **Ellipsoidal/condyloid** – oval shaped with convex sitting in concave surface, allowing two planes of movement excluding rotation; e.g. radio-carpal, metacarpal and phalanges, metatarsal and phalanges. (structurally, also the tibio-femoral, TMJ and occipito-atlantal joints, though functionally these are hinge joints)
5. **Saddle** – Two reciprocally concave surfaces, allowing two planes of movement, excluding rotation; e.g. sternoclavicular, base of first metacarpal and trapezium in wrist.
6. **Hinge** – allows only flexion/extension; e.g. knee, elbow, TMJ, O/A.

Figure 3 - Synovial Joints



Disorders of synovial joints

Rheumatism – infers any painful condition affecting the supporting structures of the body-bones, joints, tendons, ligaments etc that is not caused by injury

Rheumatoid arthritis – an autoimmune disease affecting the joint cartilage and linings

Figure 4 - Deformity of hand with Rheumatoid Arthritis

Osteoarthritis – degenerative joints disease characterised by deterioration of the articular cartilage. It results from a combination of aging, irritation of the joints, and wear and tear. It is distinguished from RA in that it affects the larger joints (knees and hips) first, whereas RA affects the smaller ones first (the carpometacarpal joints in the hands)

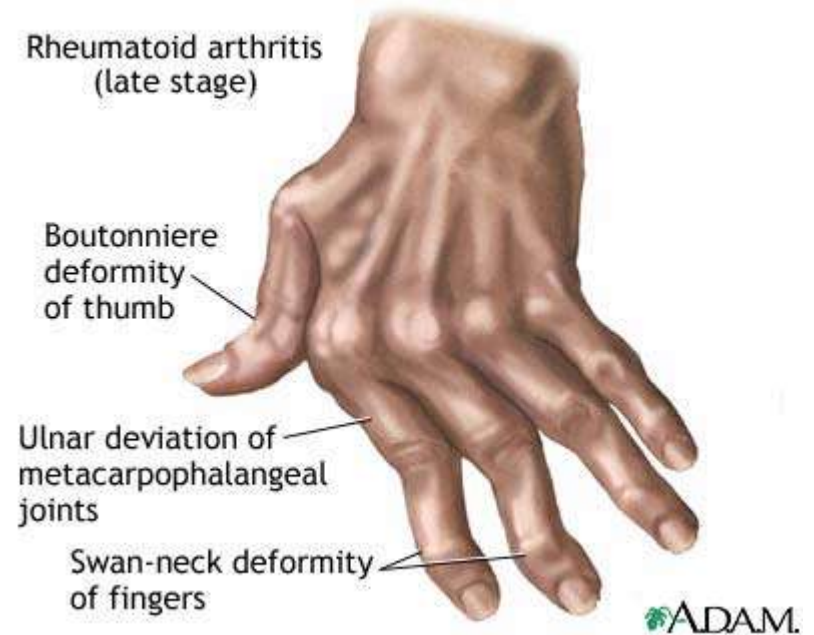


Figure 5 - X-Rays of Hip Joint Normal and with Osteoarthritis



Gout- caused by the deposition of sodium urate crystals. Phagocytes (macrophages) ingest the crystals but cannot break them down; this causes the macrophages cells to split and, consequently, inflammation then occurs. If uric acids levels are high due to overproduction, poor diet or under secretion by the kidneys this will occur. It can be repeated attacks can lead to permanent damage. Most commonly affects the base of the big toes, ankle, knee, wrist and elbow.

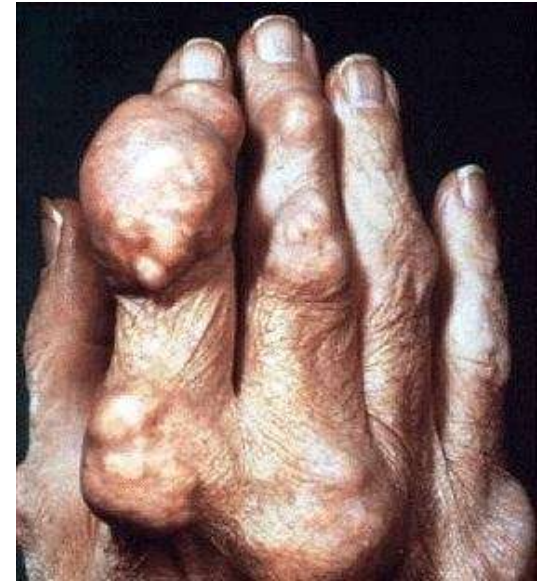


Figure 6 - Hand Showing Gout (Tophi)



Sprains –are forced twisting or wrenching of a joint (but not a dislocation) affecting the ligaments.

Strains –this are similar injuries, but affecting the muscles