

-Vertebral column

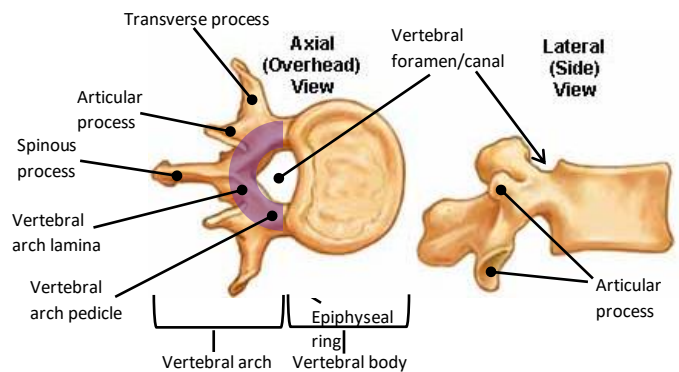
Consists of the axial skeleton, vertebrae, intervertebral joints and disc, vertebral canal and foramen.

> Foetal curvature

- **Primary:** Foetus has a 'C' shaped
- **Secondary:** Lordotic curves develop in cervical and lumbar regions after a few months.
- **Abnormalities:** Occurs when the spine is not in typical form.
 - **Abnormal lordosis:** Sway back, lumbar region bends more dramatically.
 - **Kyphosis:** Hunch back, thoracic region bends more dramatically.
 - **Scoliosis:** Vertebral column not straight.

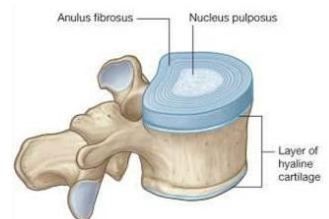
> Vertebrae structure: Vertebrae are regionally distinct.

- **Vertebral body:** Weight bearing, articular cartilage above and below.
- **Vertebral arch:** Form vertebral foramen – protects spinal cord
- **Spinous and transverse processes:** Levers for muscle attachment.
- **Articular process:** 4 – 2 above and below. For facet joints.
- **Intervertebral foramen:** Created by the hole formed from upper and lower vertebral notches.



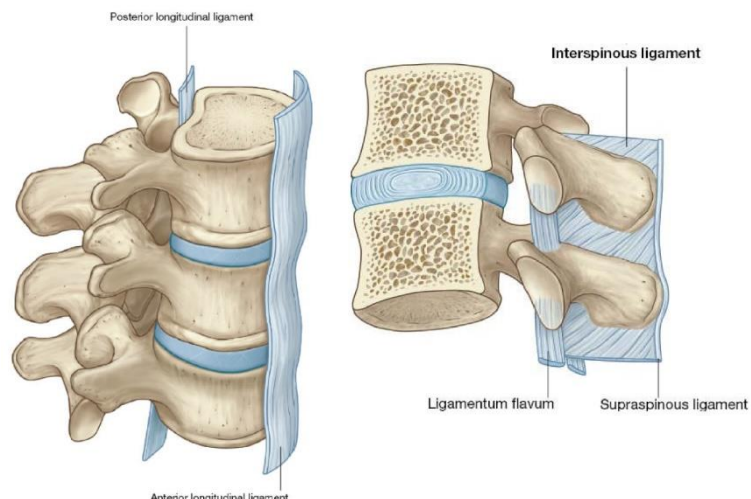
> Vertebral joints

- **Intervertebral joints/discs:** Secondary cartilaginous joints.
 - **Anulus fibrosis:**
 - Attaches to the epiphyseal ring above and below.
 - Consists of concentric lamellae and functions to keep vertebrae together.
 - Concentric fibrous rings orientated at right angles enables multi-directional movement (resists excessive movement)
 - **Nucleus pulposus:**
 - Encapsulated within the anulus fibrosis, very water-rich and functions to keep vertebrae together.
 - Deformable but not compressible – shock absorber.
- **Zygapophyseal (facet) joints:** Plane synovial joints.
 - **Articular processes:** Plane synovial joints permit gliding along only one axis.
 - Movement determined by shape and depth of articular surfaces.
 - Orientation of processes differ regionally.



> Vertebral ligaments

- Anterior and posterior longitudinal ligaments
- Interspinous and supraspinous ligaments
- **Ligamenta flava:** Connects from caudal articular process of 1 vertebrae to the cranial articular process of the neighbouring vertebrae. Highly elastic to allow stretching during forward flexion (but not too much) and compression during extension.



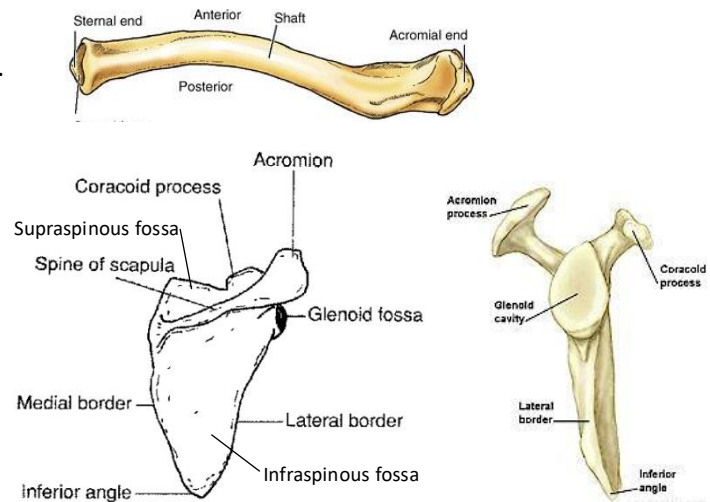
Disc prolapse: Occurs when bulge in intervertebral disc occurs leading to herniation and extrusion.

Joint degradation: Caused by thinning of articular cartilage and narrowing of joint space. Bony outgrowths form and encroach on adjacent structures – severe pain.

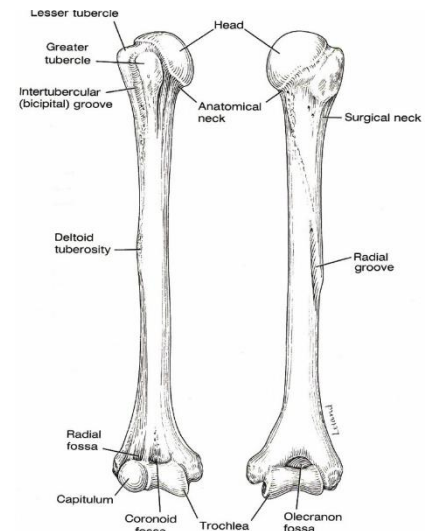
-Bones of the upper back

> Shoulder girdle

- **Clavicle:** Long bone which supports upper limb.
 - Acromial and sternal ends for joints.
 - Muscle and ligament attachments.
- **Scapula:** Flat bone
 - Spine
 - Fossae (depressions) for muscle attachments
 - **Acromion process:** Where acromial end of clavicle attaches.
 - Coracoid process
 - **Glenoid fossa:** Shallow, flat depression for head of humerus.
- **Humerus:** Long bone – head



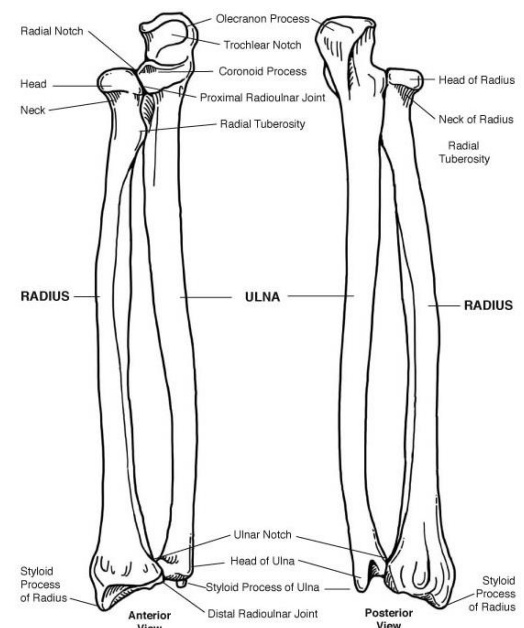
- **Neck:**
 - **Anatomical:** At margin of articular surface. Where shoulder joint capsule attaches
 - **Surgical:** Common site of fracture – operated on.
- **Tuberosities:** Greater and lesser for muscle attachment.
- **Bicipital groove:** For biceps tendon
- **Epicondyles:** Medial and lateral for muscle attachment.
- **Condyles/articular surfaces:** Capitulum and trochlea.



> Forearm

- **Ulna and radius:** Long bones that are articular with each other (for pronation and supination) and the humerus. Linked by interosseous membrane (deep fascia for muscle attachment points)

- **Ulna:** Medial
 - Articular surfaces**
 - **Trochlea notch:** Deep, trochlea of humerus fits in here.
 - **Radial notch:** Attachment site for radius.
 - Tuberosities**
 - **Olecranon process:** Bony prominence at elbow.
 - **Styloid process:** Prominent bony point at wrist.
- **Radius:** Lateral
 - Articular surfaces**
 - **Head and fovea:** Depression at top of head.
 - **Ulnar notch:** Prominence in shaft
 - **Carpal articulation:** Surface for the carpal bones of the wrist.

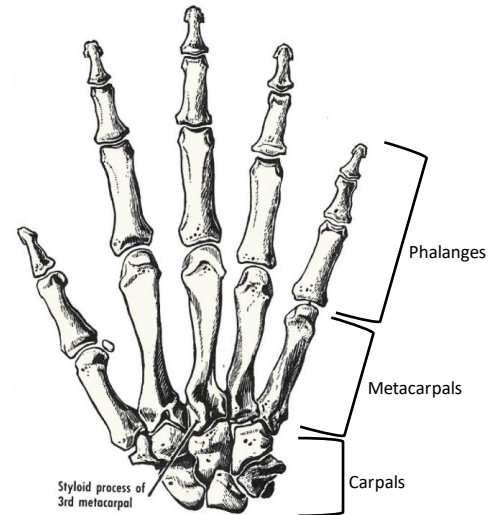


Tuberosities

- Radial tuberosity
- **Styloid process:** Bony prominence at the wrist.

Hand

- **Carpal:** 8 carpal bones (short) make up the carpal arch – proximal 4 and distal 4.
- **Metacarpals:** Long bones. All have 1 metacarpal each
- **Phalanges:** Long bones.
 - **Thumb:** 2 phalanges
 - **Digits II-V:** Each have 3 phalanges
- **Joints:**
 - **Radius:** Articular joint.
 - **Ulna:** Not articular joint.



-Joints of the upper limb

Stable joints:

Congruent (often deep) articular surfaces.

Tight capsule with strong ligaments.

Limited range of movement.

Mobile joints:

Ball and socket joints most stable.

Stability often depend of fixator muscles

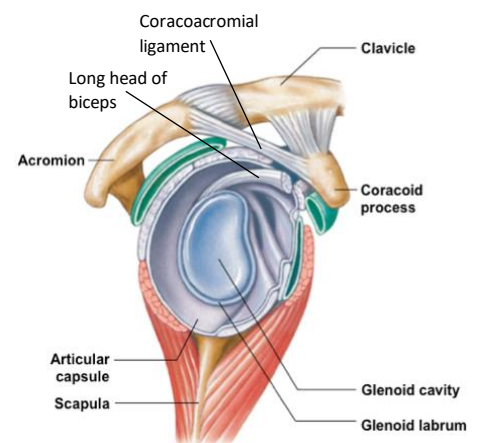
Susceptible to subluxation or dislocation

Clavicle joints

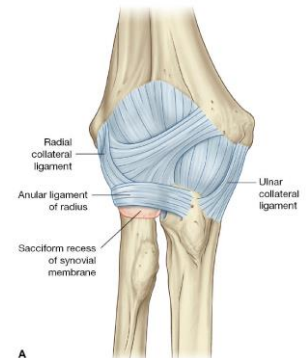
- **Sternoclavicular joint:** Joint of the sternum and clavicle.
 - Saddle type synovial joint for elevation/depression and forward/backwards movement.
 - Intra-articular disc
 - Very strong capsule
 - Stabilised by costoclavicular ligament
- **Acromioclavicular joint:** Joint of the acromion and the clavicle
 - Plane synovial joint
 - Weak capsule
 - Stabilised by coracoclavicular ligament.

Shoulder joints

- **Glenohumeral joint:** Joint of the glenoid cavity and the humerus.
 - Synovial ball and socket joint
 - Large humeral head to shallow glenoid fossa – unstable.
 - Socket deepened by glenoid labrum
 - Supported by coracoacromial ligament, long head of biceps and rotator cuff muscles.
 - **Rotator cuff:** Cuff around humerus and keep it right to glenoid cavity.
 - **Supraspinatus:** Resides in supraspinous fossa
 - **Infraspinatus:** Resides in Infraspinous fossa
 - Teres minor
 - **Subscapularis:** Resides in front.
- **Dislocation:** Lead to risk of nerve injury.
 - Anterior (most common)
 - Posterior (less common)



- Humerus drops inferiorly
- > **Scapulo-thoracic joint:** Not a true joint – physiological joint.
 - Allows movement of the scapula across the thoracic cage.
 - Preserves length-tension relationships
 - Increase range of movement
 - Prevents muscular impingement
- > **Elbow joints**
 - **Elbow joint:** Hinge type synovial joint with strong collateral ligaments to reinforce capsule.
 - Radius is not articular with the capitulum throughout the full range of the elbow joint.
 - **Proximal radioulnar joint:** Pivot type synovial joint between head of radius and radial notch of ulna.
 - **Anular ligament:** Encircles head of radius to keep radius close.
 - **Radial collateral ligament:** Attaches to anular ligament
 - **Supination:** Lateral rotation
 - **Pronation:** Medial rotation
- > **Wrist joints**
 - **Distal radioulnar joint:** Pivot type synovial joint between the head of the ulna and the ulnar notch on the distal radius.
 - Proximal and distal radioulnar joints linked by interosseous membrane – function as 1 joint.
 - **Wrist joint:** Radiocarpal joint, condyloid type synovial joint between the distal radius and carpal bones.
 - Articular disc is present on the ulnar side.
- > **Hand joints**
 - **Intercarpal joints:** Between the bones of each row
 - **Midcarpal joint:** Between the proximal and distal rows of carpal bones
 - **Carpometacarpal joints:**
 - **Thumb:** Saddle type synovial joint.
 - **Digits (II-V):** Plane type synovial joints.
- > **Finger joints**
 - **Metacarpophalangeal joints:**
 - **Thumb:** Hinge joint
 - **Digits (II-V):** Condyloid joint.
 - **Interphalangeal joints:** Hinge joints.



-Muscles and movement of the upper limb

- > **Movement types**
 - **Shoulder movements:**
 - Retraction/protraction
 - Flexion/extension
 - Abduction/adduction
 - Medial rotation/lateral rotation
 - Circumduction