ابدأ طموحك | واصنعه من العدم !

لا تنتظر لحظةً يأتيك مستقبلك بها على طبقٍ من ذهبْ

الحياة سلفًا قاسيه ؛ تحتاج أن تسقطك مرة لتعود بشكلٍ أقوى

Musculoskeletal Block

ANATOMY

team 435

COLOR CODES

- IMPORTANT NOTES
- EXTRA NOTES
- DEFINITION

Objectives :

At the end of the lecture, you should be able to :

- List the different bones of the UL.
- List the characteristic features of each bone.
- Differentiate between the bones of the right and left sides.
- List the articulations between the different bones.

Bones

Bones

Store minerals

Come in a variety of shapes and sizes

Different shapes of bone in next slide

From the bone marrow

Produce red and white blood cells

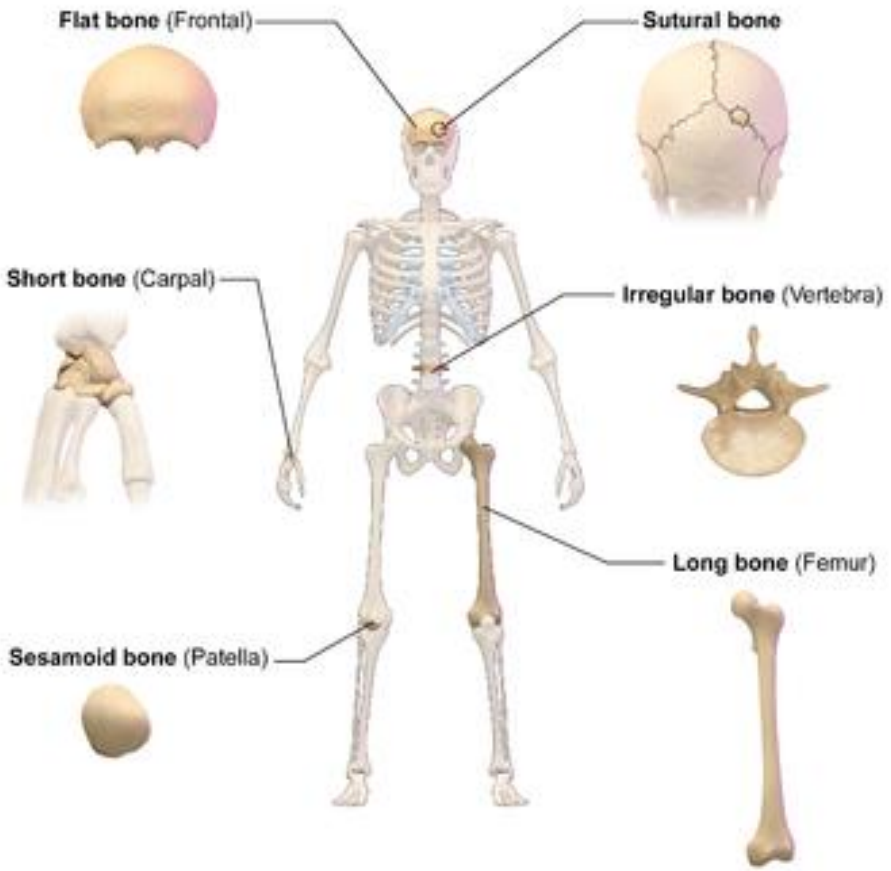
Provides attachment for muscles

support and protect the various organs of the body

Enable movement

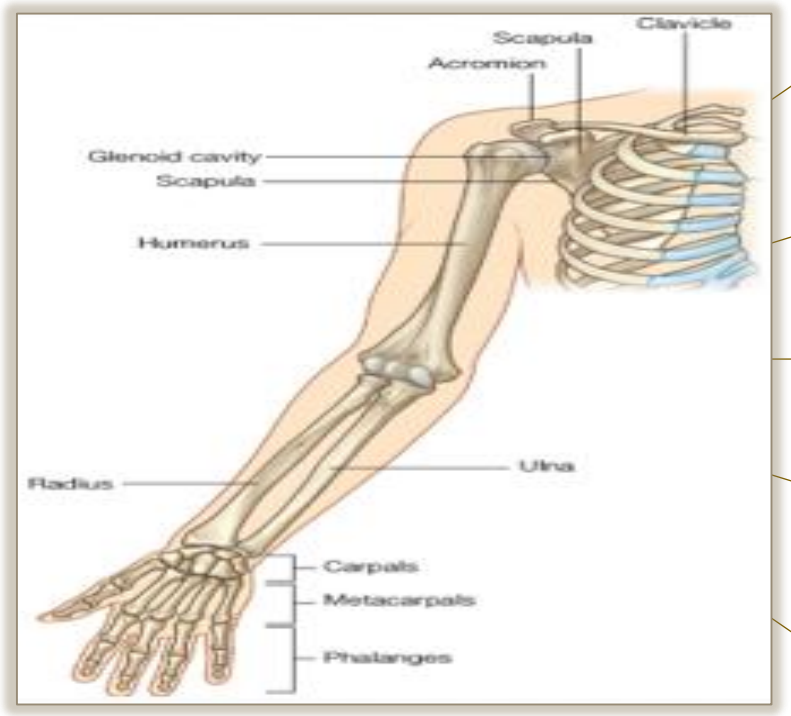
Example:
Thoracic cage
Protect:
Heart and lungs

Classification of bones by shape



1. Long bones ⟹ Limbs and fingers
2. Short bones ⟹ Wrist and ankles
3. Flat bones ⟹ Skull and sternum
4. Irregular bones ⟹ Spine and pelvis
5. Sesamoid bones ⟹ Patella

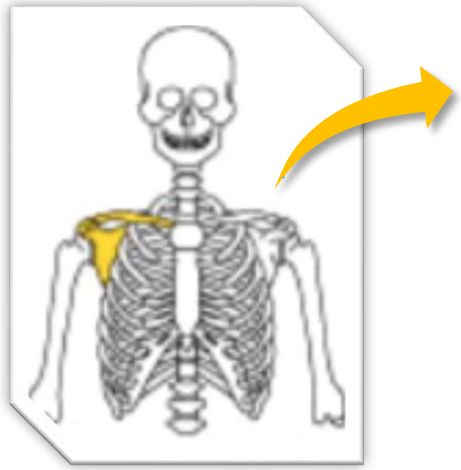
Bones of upper limb



- Pectoral girdle
  - Clavicle
  - Scapula
- Arm
  - Humerus
- Forearm
  - Ulna
  - Radius
- Wrist
  - Carpal bones
- Hand
  - Metacarpals
  - Phalanges

Bones of upper limb

- Pectoral girdle
- Arm
- Forearm
- Wrist
- Hand



- It is very light
- allows the upper limb to have exceptionally free movement

On the other hand, the pelvic girdle " in lower limb " has limited movement compare to pectoral girdle

Formed of two bones

- **Scapula** "posterior"

- **Clavicle** "Anterior"

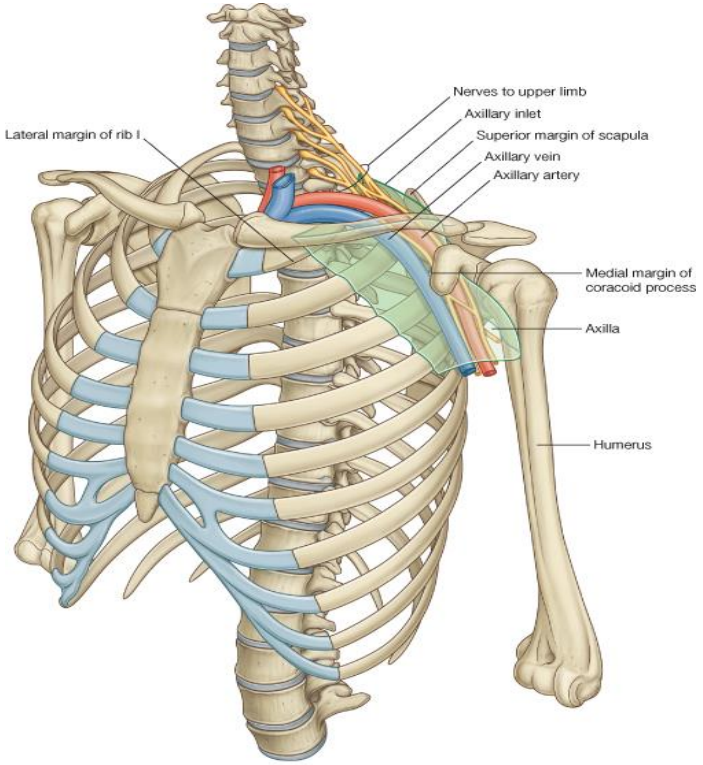
Clavicle

General information

- long bone lying horizontally across the root of the neck.
- doubly curved.
- It is subcutaneous "under the skin" throughout its length.
- There is NO medullary cavity.
- It has the appearance of an elongated letter Capital (S) lying on one side

Functions

- It serves as a rigid support from which the scapula and free upper limb are suspended
- keep them away from the trunk so that the arm has maximum freedom of movement
- Transmits forces from the UL to the axial skeleton
- Provides attachment for muscles
- It forms a boundary of the Cervicoaxillary canal for protection of the neurovascular bundle of the UL

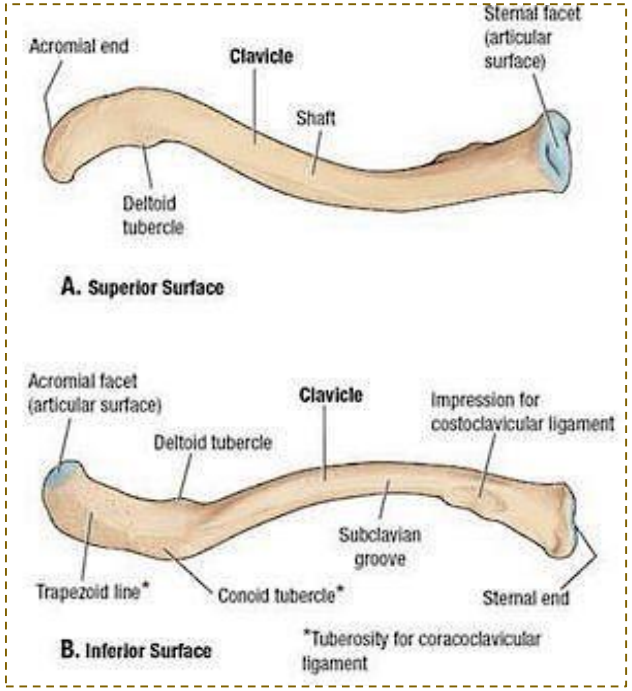


All long bones are vertical except for the clavicle is horizontal

- Clavicle is clear seen in thin people and disappear in obese one.
- medullary cavity = marrow cavity
- clavicles are one of the Cervicoaxillary components
- Cervicoaxillary canal : contain the nerves that come from the neck and supply to the upper limb

Clavicle

The clavicle has :
- 2 ends
- 2 surface
- Body (shaft) doubly curved
- 3 articulations → Next slide



Two Ends

- Sternal (medial): enlarged & triangular
- Acromial (lateral) : flattened

Body (shaft)

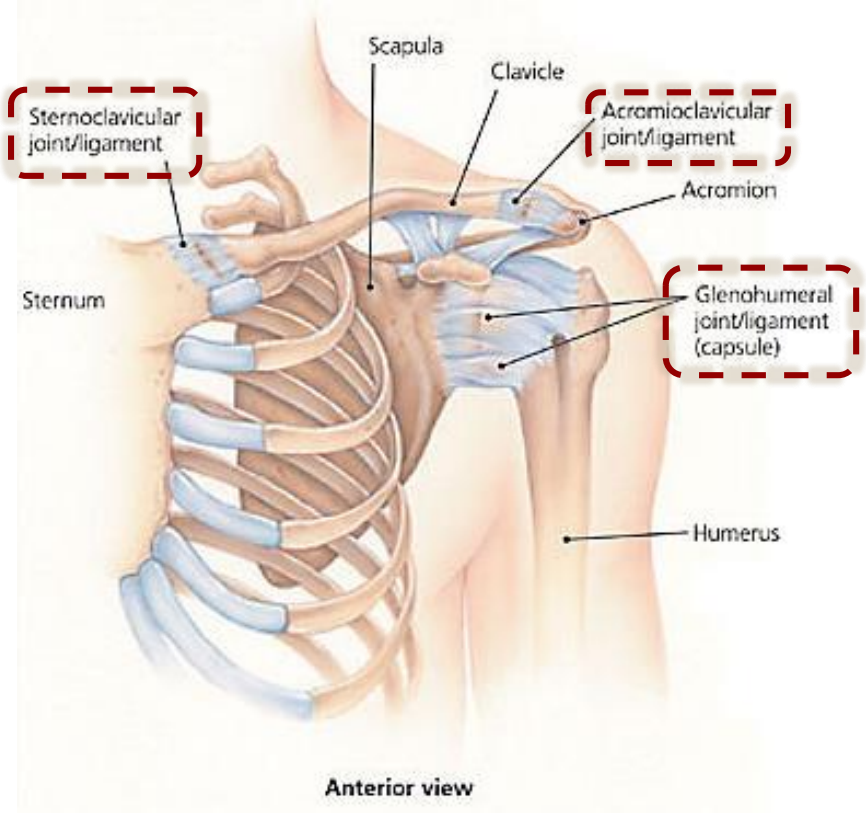
- Convex forward: **2\3** its medial
- Concave forward: **1\3** its lateral

Two Surface

- Superior: smooth as it lies just deep to the skin
- Inferior: rough because strong ligaments bind it to **the 1st rib**

- the clavicle has 2 ends MEDIAL & LATERAL, but all the other long bones have PROXIMAL & DISTAL ends
- We said sternal end because it is near to sternum and acromial because it is near to acromion

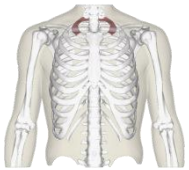
Articulations of Clavicle



Medially — Sternoclavicular joint → Clavicle with manubrium of sternum

Laterally — Acromioclavicular joint → Clavicle with acromion of scapula

Inferiorly — Costoclavicular Joint → Clavicle with the 1st rib

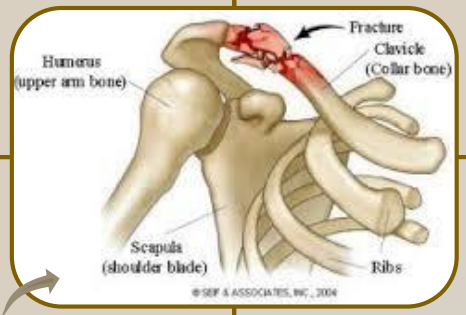


COSTAE mean rib in Latin

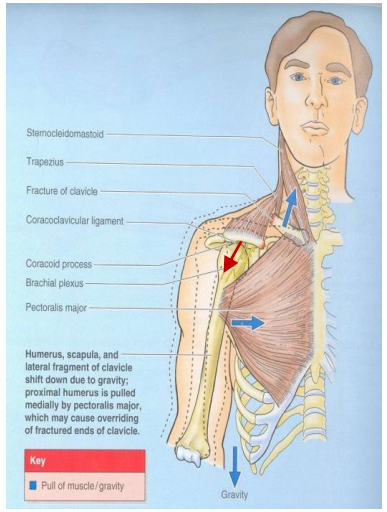
- Any bone that form a joint is “smooth” because it is covered by a cartilage

Fractures of the Clavicle

- The clavicle is commonly fractured especially in children
- as forces are impacted to the outstretched hand during falling



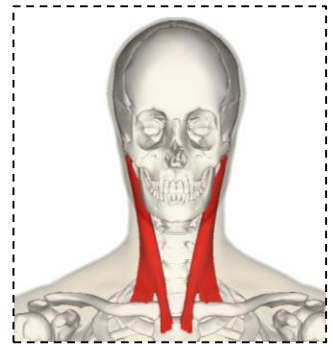
- It may be pulled medially by the adductors of the arm
- The sagging limb is supported by the other



The weakest part of the clavicle is : the junction of the middle and lateral thirds

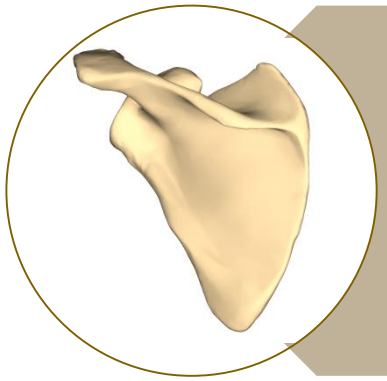
After fracture:

- the medial fragment → **elevated** by the sternomastoid muscle
- lateral fragment → drops → because of the weight of the UL



sternomastoid muscle

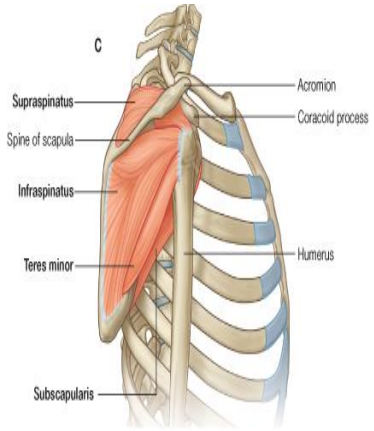
Scapula



Scapula (shoulder blade):

-it is a triangular flat bone.

-extends between the **2nd** rib till the **7th** rib.



Two surface :

- convex posterior : divided by the **spine** of the scapula into the :
  1. supraspinous fossa (the small part above the spine of the scapula)
  2. infraspinous fossa (the largest part below the spine of the scapula)
- concave anterior (costal) : it forms the large subscapula fossa

Function of scapula:

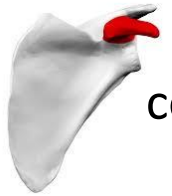
- Gives attachment to muscles
- Has a considerable degree of movement on the thoracic wall to enable the arm to move freely
- The glenoid cavity forms the socket of the shoulder joint

the scapula gives some muscles the origin point or the insertion point

Scapula

Processes

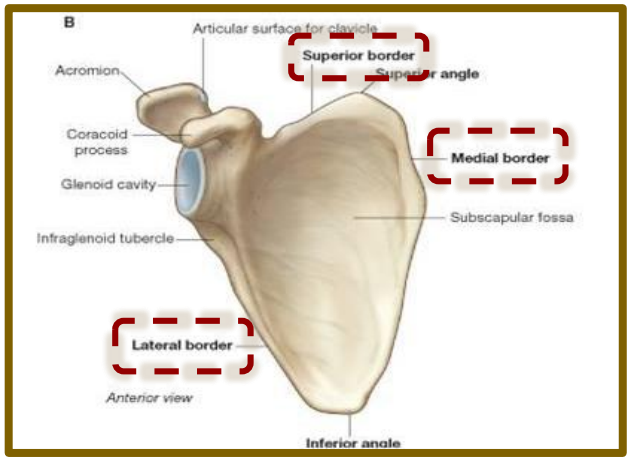
spine



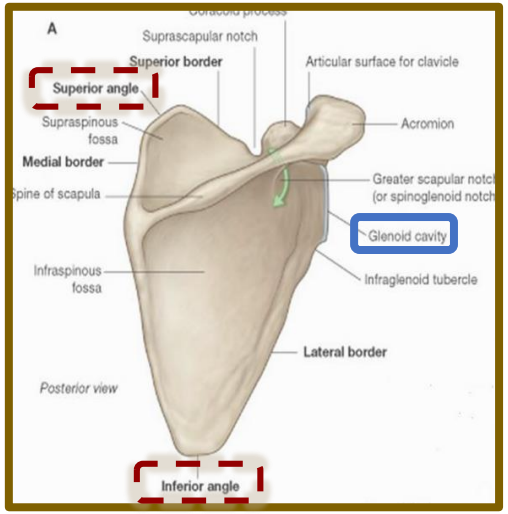
coracoid

acromion

Borders



Angels



Three processes :

- Spine : a thick projecting ridge of bone that continues laterally
- Coracoid : a beaklike process, it has a finger like shape pointed to the shoulder. it resembles is size shape and direction
- Acromion : forms the subcutaneous point of the shoulder.

Three angels :

- Inferior
- lateral : a shallow concave oval fossa that receives the head of the humerus (forms the glenoid cavity)
- Superior

Three borders :

- Superior
- Lateral : axillary: the thickest part of the bone, it terminates at the lateral angle
- Medial : vertebral

Winged Scapula

*** Clinical appearance :**

it will protrude **posteriorly**

*** Etiology :**

it's due to injury of thoracic long nerve as in radial mastectomy which causes paralysis of serratus anterior muscle

*** Symptoms :**

the patient has difficulty in raising the arm above the head

(difficult in rotation of the scapula).

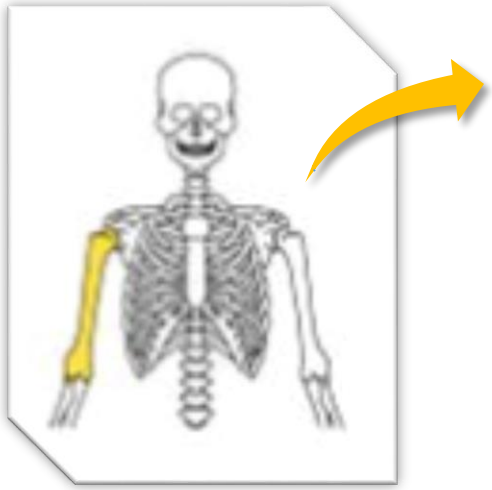
The medial border and inferior angle of the scapula will no longer be kept closely applied to the chest wall

because most of the scapula is well protected by muscles and by it's association with the thoracic wall, most of it's fractures involve the protruding subcutaneous Acromion.

المكان الأكثر عرضة للكسر هنا هو الـ acromion

Bones of upper limb

- Pectoral girdle
- Arm
- Forearm
- Wrist
- Hand



- The arm formed of one bone called : Humerus

Humerus is :

- Typical Long bone.
- It is the largest bone in the upper limb

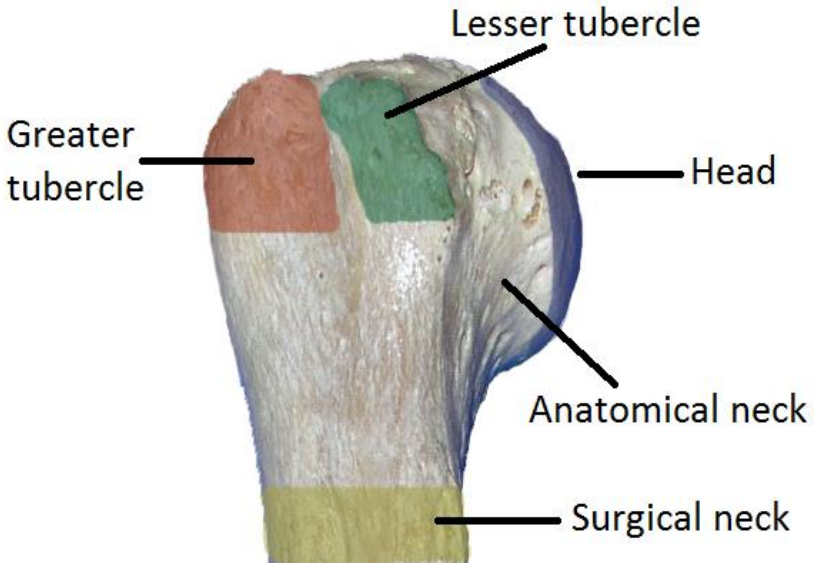
Video

Humerus has

- Proximal end
- Body (shaft)
- Distal end

Proximal end of Humerus

Proximal end consist of :
Head, Neck, Greater and Lesser Tubercles



Head: Smooth
it forms 1/3 of a sphere, it articulates with the glenoid cavity of the scapula.

Greater tubercle:
at the lateral margin of the Humerus

Lesser tubercle: projects anteriorly.

The two tubercles are separated by Intertubercular Groove

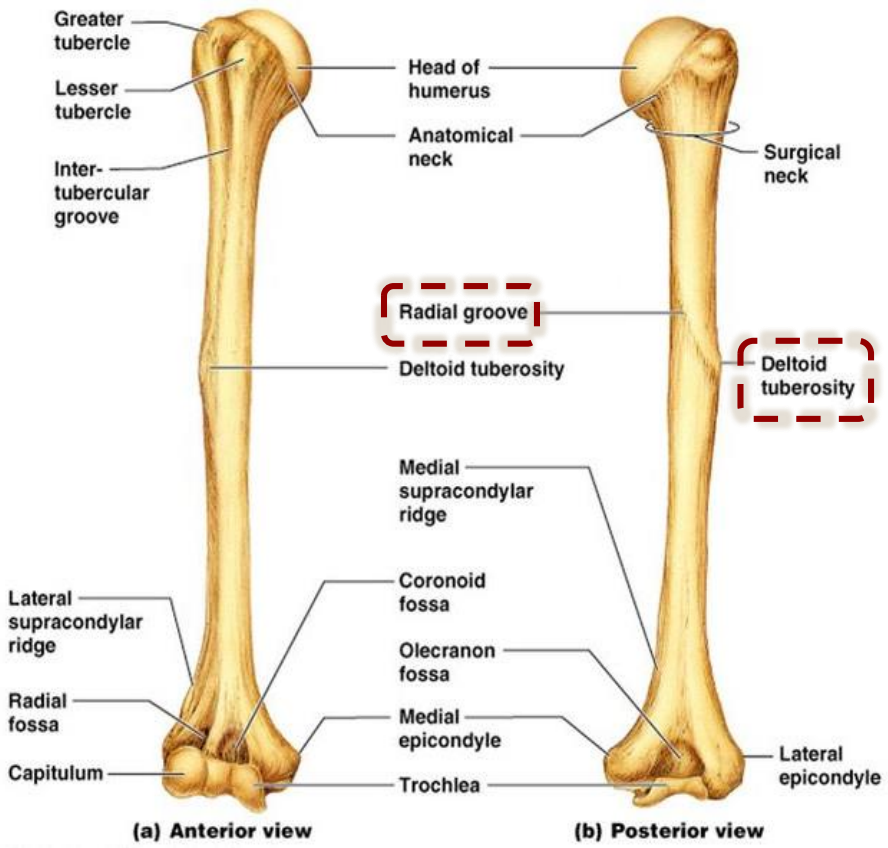
Anatomical neck: formed by a groove separating the head from the tubercles

Surgical Neck: a narrow part distal to the tubercles.

Greater tubercle: up and lateral
Lesser tubercle: up and forward

Shaft of Humerus

has two prominent features :



Deltoid tuberosity

A rough elevation laterally for the attachment of deltoid muscle

Spiral (Radial) groove

Runs obliquely down the posterior aspect of the shaft

It lodges the important radial nerve and vessels

Distal end of Humerus

- Widens as the sharp medial and lateral Supracondylar Ridges and end in the Medial (can be felt) and Lateral Epicondyles

- They provide muscular attachment

Here we have 3 fossa : 2 anterior and 1 posterior

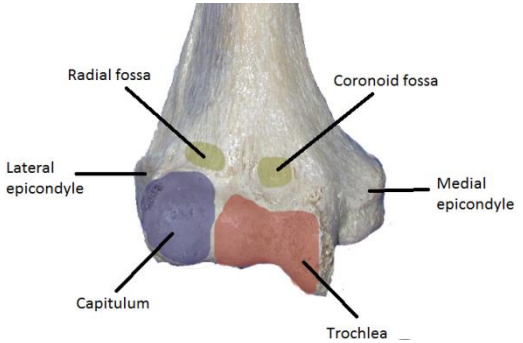
Structure of distal end

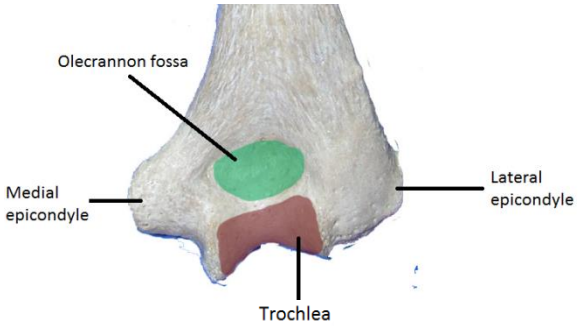
Anteriorly

- **Trochlea:** (medial) for articulation with the ulna
- **Capitulum:** (lateral) for articulation with the radius.
- **Coronoid fossa:** above the trochlea
- **Radial fossa:** above the capitulum.

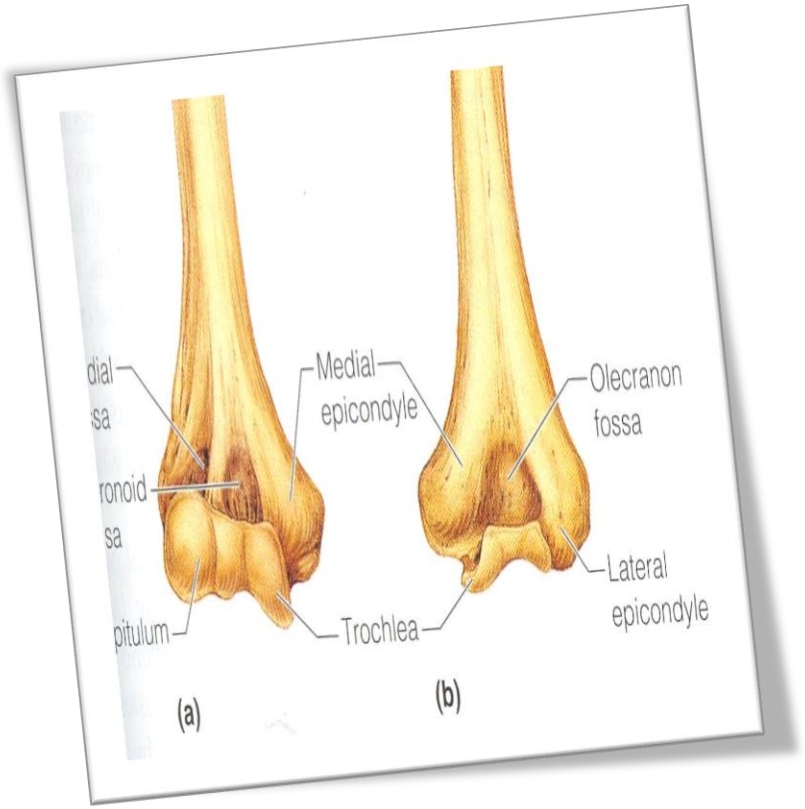
Posteriorly

- **Olecranon fossa:** above the trochlea.





Explanation



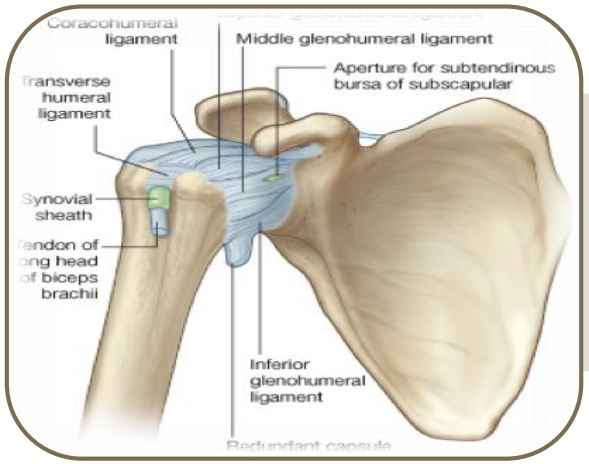
Process : a V-shaped indentation (act as the key joint)

Fossa: a hollow place (the notch is not complete but the fossa is complete and both of them act as the lock of the joint)

Spine: thick projecting ridge of bone

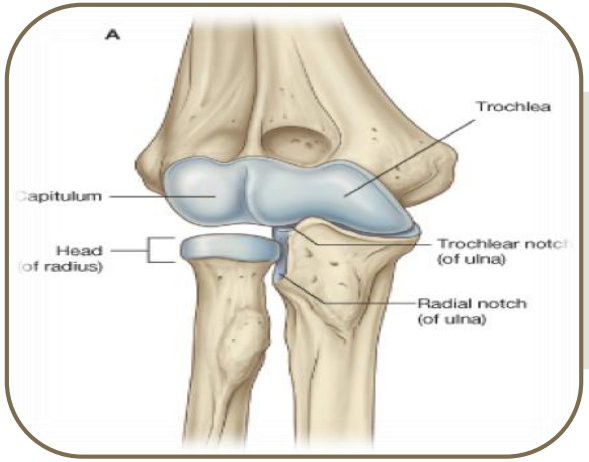
كلfossa يقابلهاprocess
يقابل النتوءات أجزاء غائرة
- Trochlea → coronoid fossa & Olecranon Fossa
- Capitulum → Radial Fossa

Articulations of humerus



- Shoulder joint

Head of the humerus + glenoid cavity of the scapula



- Elbow joint

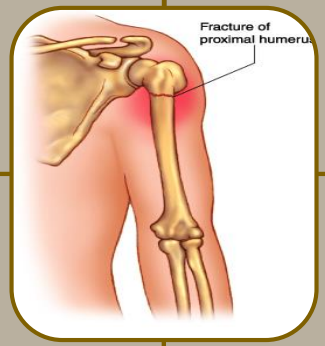
Lower end of humerus (Trochlea & Capitulum) + upper ends of the radius and ulna

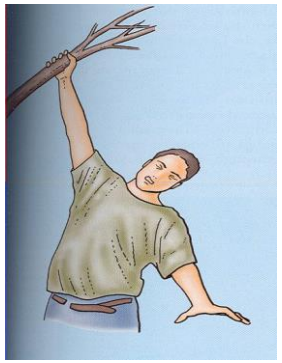
Fracture of Humerus

Most common fractures are of the Surgical neck especially in elder people with osteoporosis

The fracture results from falling on the hand

(transition of force through the bones of forearm of the extended limb)

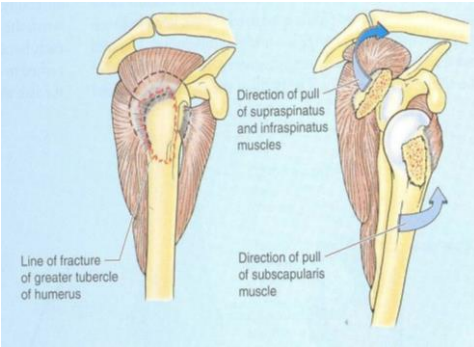




Surgical neck

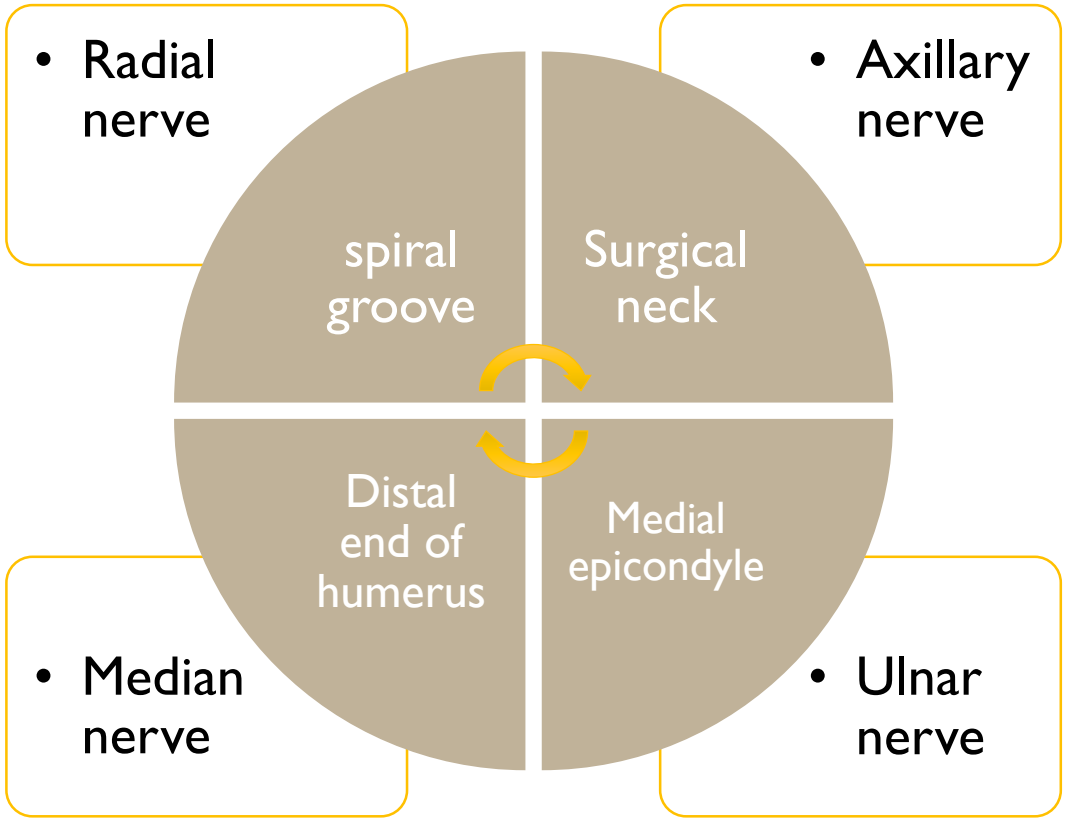
The body of the humerus can be fractured by a direct blow to the arm or by indirect injury as falling on the outstretched hand

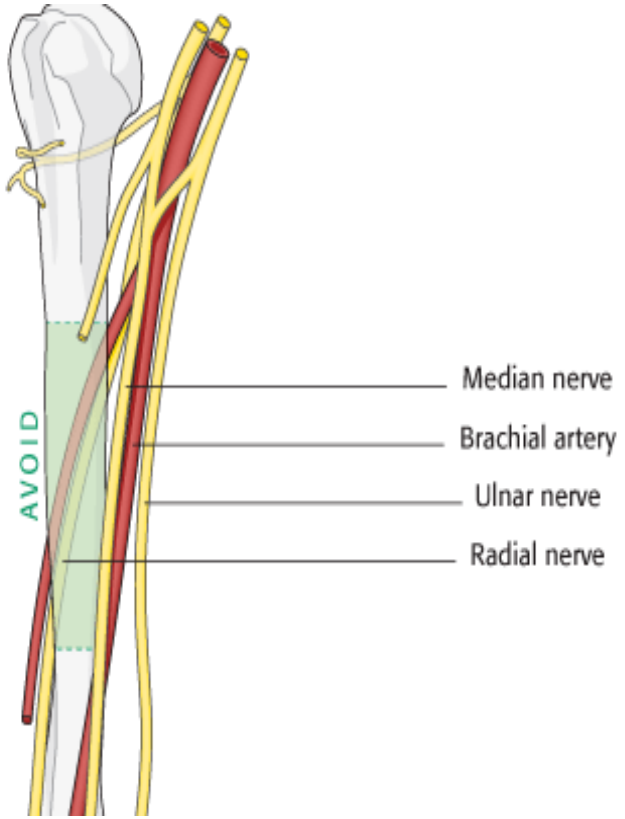
In younger people, fractures of the greater tubercle results from falling on the hand when the arm is abducted



Body of the humerus .. the fracture by a DIRECT blow
نادر حصول الكسر فيها إلا من خلال تلقي كدمة مباشرةً

Nerves affected in fractures of humerus





*medial epicondyle : ulnar nerve (عند ارتطام المرفق بطاولة, الألم الناشئ في هذه المنطقة يكون بسبب هذا العصب)

Bones of upper limb

- Pectoral girdle
- Arm
- Forearm
- Wrist
- Hand

Formed of two bones

- Ulna
- Radius

The stabilizing bone of forearm

	ULNA	RADIUS
LOCATION	medial	lateral
SIZE	longer	shorter
DIAMETER	Diminishes in diameter as it moves distally.	Expand in diameter as it moves distally
	Video	Video

Ulna

Proximal end

- Olecranon process
  - \- Projects proximally (near to the trunk) from the posterior aspect.
  - \- Forms the pointed portion of the elbow
- Coronoid process
  - Projects anteriorly
- Tuberosity of ulna
  - Inferior to coronoid process
    - it is a long ridge on the anterior side of the coronoid process where the brachialis muscle attaches
- Trochlear notch
  - Articulates with trochlea of humerus
- Radial notch
  - -A smooth rounded concavity(تقعر)
  - -lateral to coronoid process.
    - Articulates with the head of the radius

Distal end

- Small and rounded
- head: lies distally at the wrist
- styloid process: medial distal projection

Body (shaft)

- Superiorly : thick and cylindrical
- Inferiorly : diminishes in diameter
- Has three surfaces
  1. Anterior
  2. Medial
  3. Posterior
- Has three borders
  - See slide 22
  - Anterior (rounded)
  - Lateral interosseous (sharp)
  - posterior (sharp)

ما سبب عدم تسميتنا للـ Radial Notch بـ Fossa ؟
لأنها ليست عميقة

Radius

Proximal end

- **Head**
  - Small & circular.
  - Has a concave upper surface to articulate with the capitulum of humerus.
- **Neck**
- **Radial (biciptal) tuberosity**
  - Directed medially.
  - Separate the proximal end from the body(shaft)

Insertion point of the biceps brachii muscle

Body (shaft)

- Convex at it's lateral surface
- Gradually enlarges as it passes distally

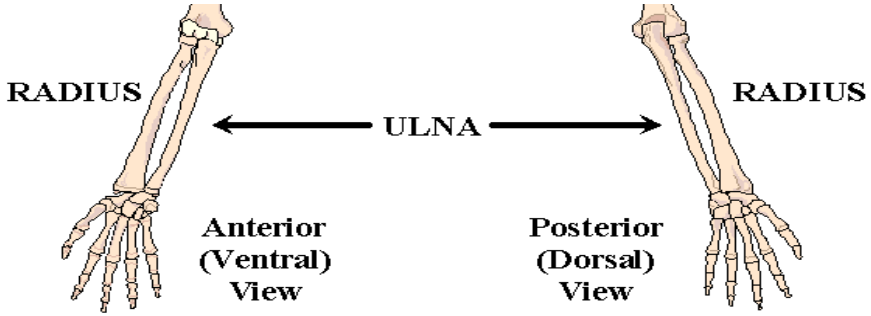
Distal end

It is rectangular

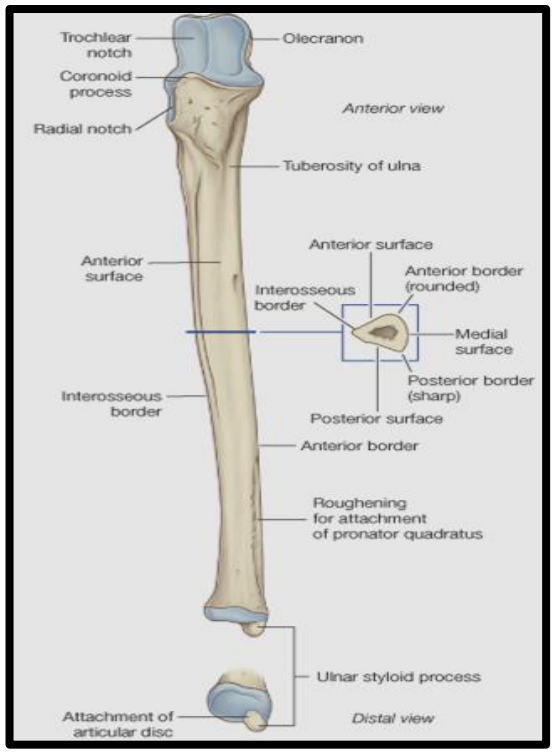
- **Dorsal tubercle**
  - Projects dorsally (away from the trunk)
- **Radial styloid process**
  - Projects from the lateral side.
- **Ulnar notch**
  - Concavity
  - Directed medially
  - Fit in with the ulna's head

forms the **radioulnar** joint

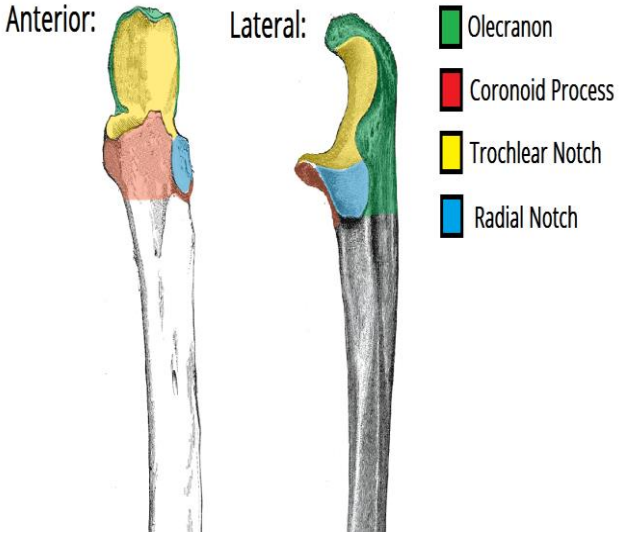
Ulna



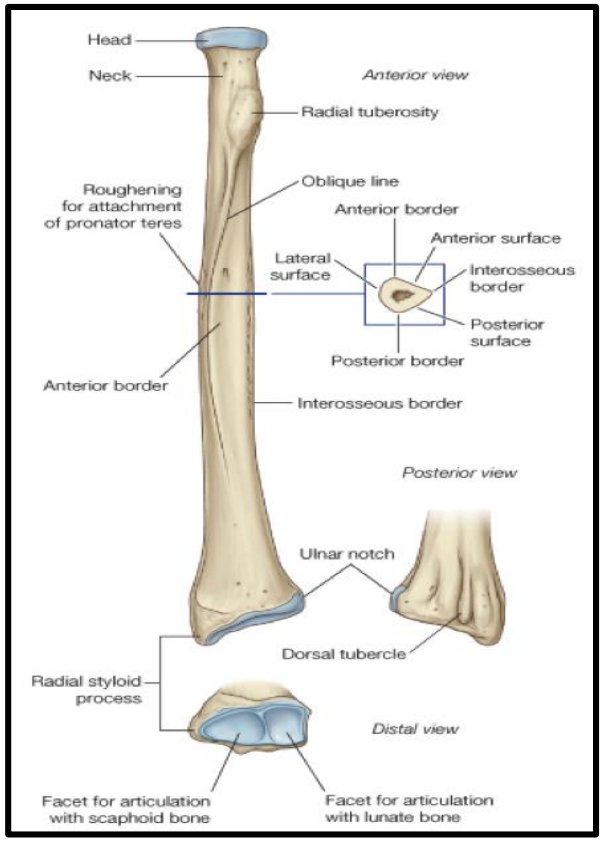
Radius



اكثر مكان بارز في الالنا هو الـ Tuberosity of Ulna



every fossa in ulna or radius has process in the humerus والعكس صحيح



Articulations of radius & ulna

- The two bones are connected by the flexible membrane

interosseous membrane

- Distal end of Humerus → with the proximal ends of radius and ulna

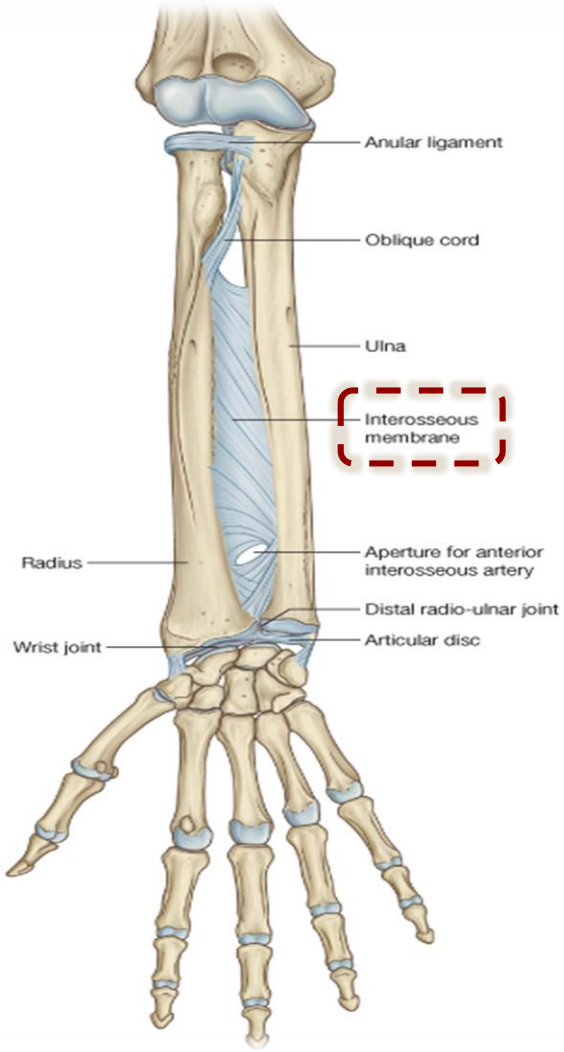
Elbow joint

Distal Radioulnar joint

- Head of ulna → with ulnar notch of radius

Proximal Radioulnar joint

- Head of radius → with radial notch of ulna



Fractures of the radius & ulna

Because the radius & ulna are firmly bound by the interosseous membrane, a fracture of one bone is commonly associated with dislocation of the nearest joint.

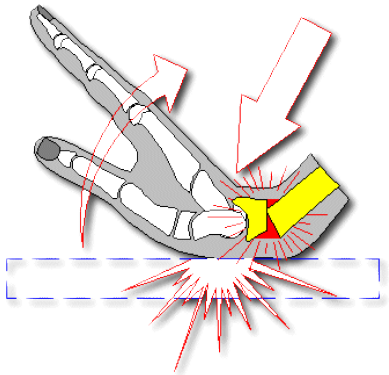
Example of the fracture of the radius is : **colle's fracture**

- It is fracture of the distal end of radius
- It is the most common fracture of the forearm.

The typical history of the fracture includes slipping

It is more common in women after middle age because of osteoporosis

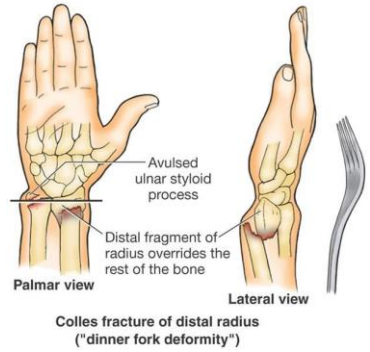
It results from forced dorsiflexion of the hand as a result to ease a fall by outstretching the upper limb



colle's fracture

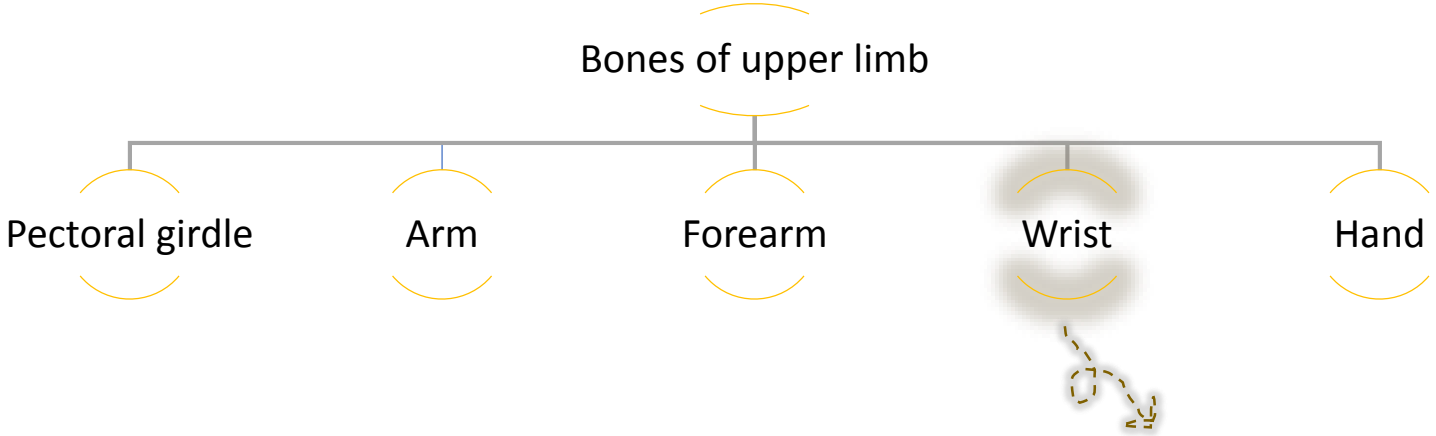
Because of the rich blood supply to the distal end of the radius, the healing is usually good

It causes dinner fork deformity



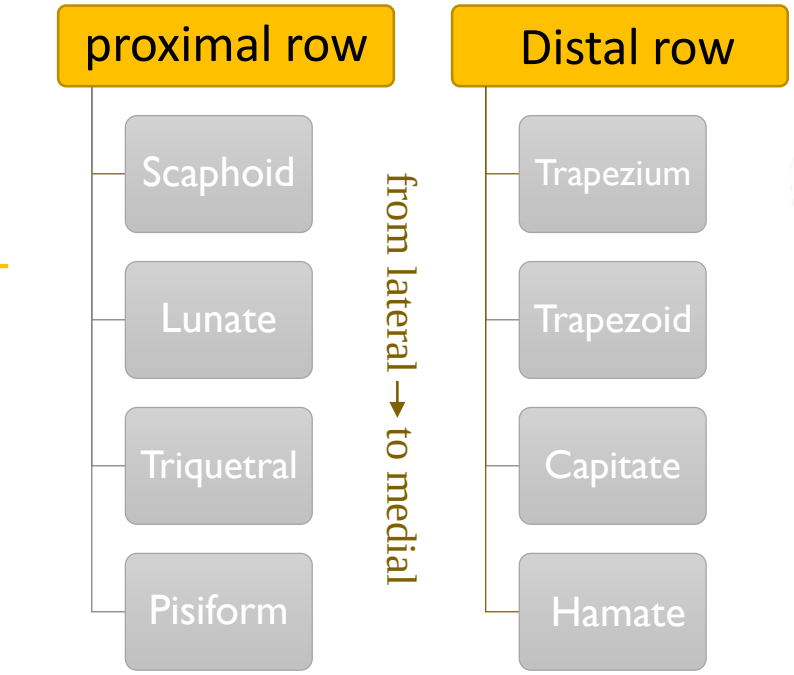
Colles fracture of distal radius ("dinner fork deformity")

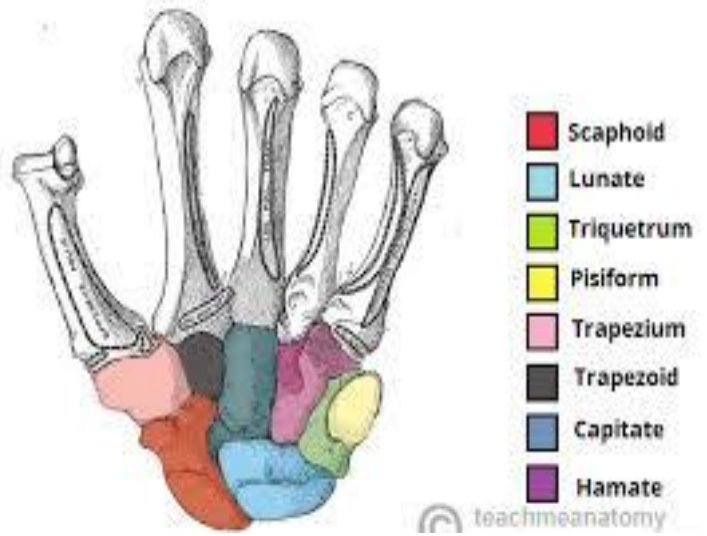
in colle's fracture the structures distal to the fracture (wrist and hand) are displaced posteriorly



Carpal bones :

- small bones make the wrist more flexible
- 8 short bones, arranged in 2 irregular rows "each row composed of 4 bones"
- Has two surface :
  1. The concave surface : anteriorly
  2. The convex surface : side to side posteriorly





To remember them :
Sally Left The Party To Take Cathy Home

Fractures of Scaphoid

It is the most commonly fractured carpal bone and it is the most common injury of the wrist

How it could be fractured ?

- The fracture result of a fall onto the palm when the hand is abducted

The pain !

- Pain occurs along the lateral side of the wrist especially during dorsiflexion and abduction of the hand

How it union ?

- Union of the bone may take several months because of poor blood supply to the proximal part of the scaphoid

Bones of upper limb

- Pectoral girdle
- Arm
- Forearm
- Wrist
- Hand

The hand Formed of

- metacarpal
- Phalanges

metacarpal

Form the skeleton of the hand between the carpus and phalanges

Phalanges

Each digit has Three Phalanges. Except : the Thumb which has only Two

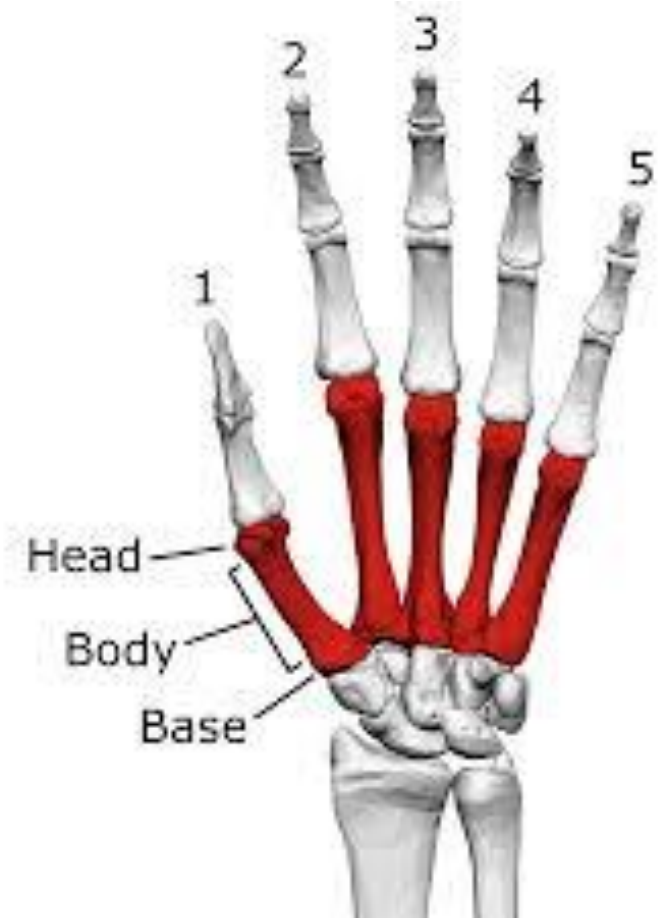
Metacarpal

we start counting from the THUMB

It is composed of Five Metacarpal bones, each has :
Base + Shaft + Head

The distal ends (Heads) articulate with the proximal phalanges to form the Knuckles of the fist

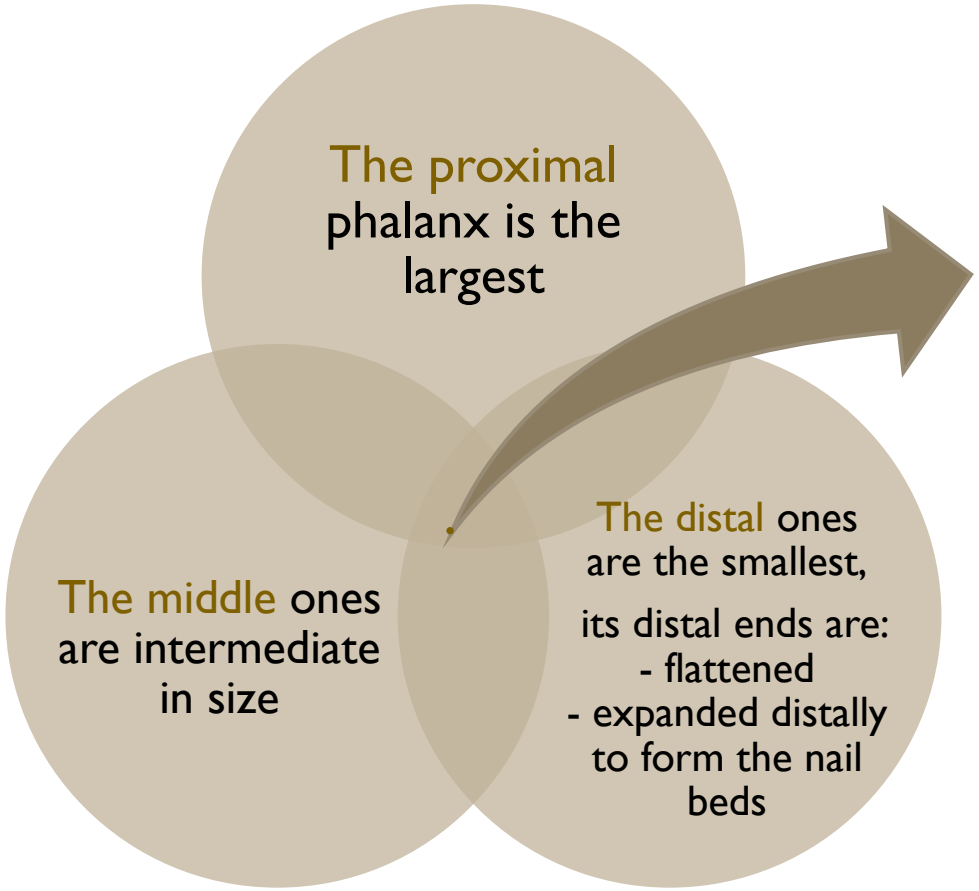
The Bases of the metacarpals articulate with the carpal bones

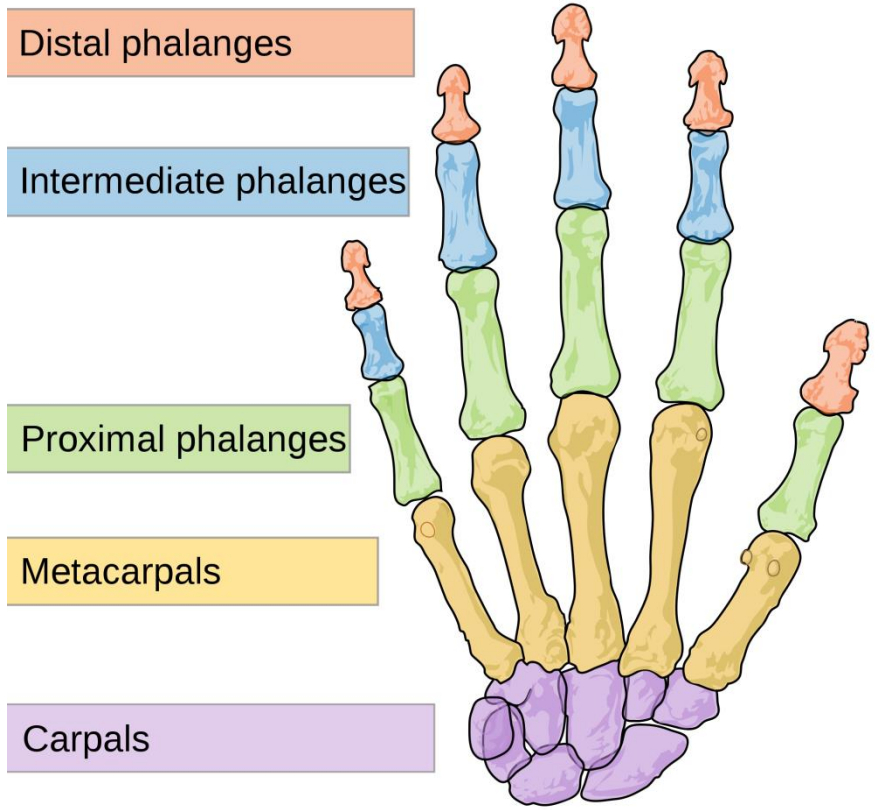


- They are numbered 1-5 from the thumb
- The first metacarpal is the shortest and most mobile

Phalanges

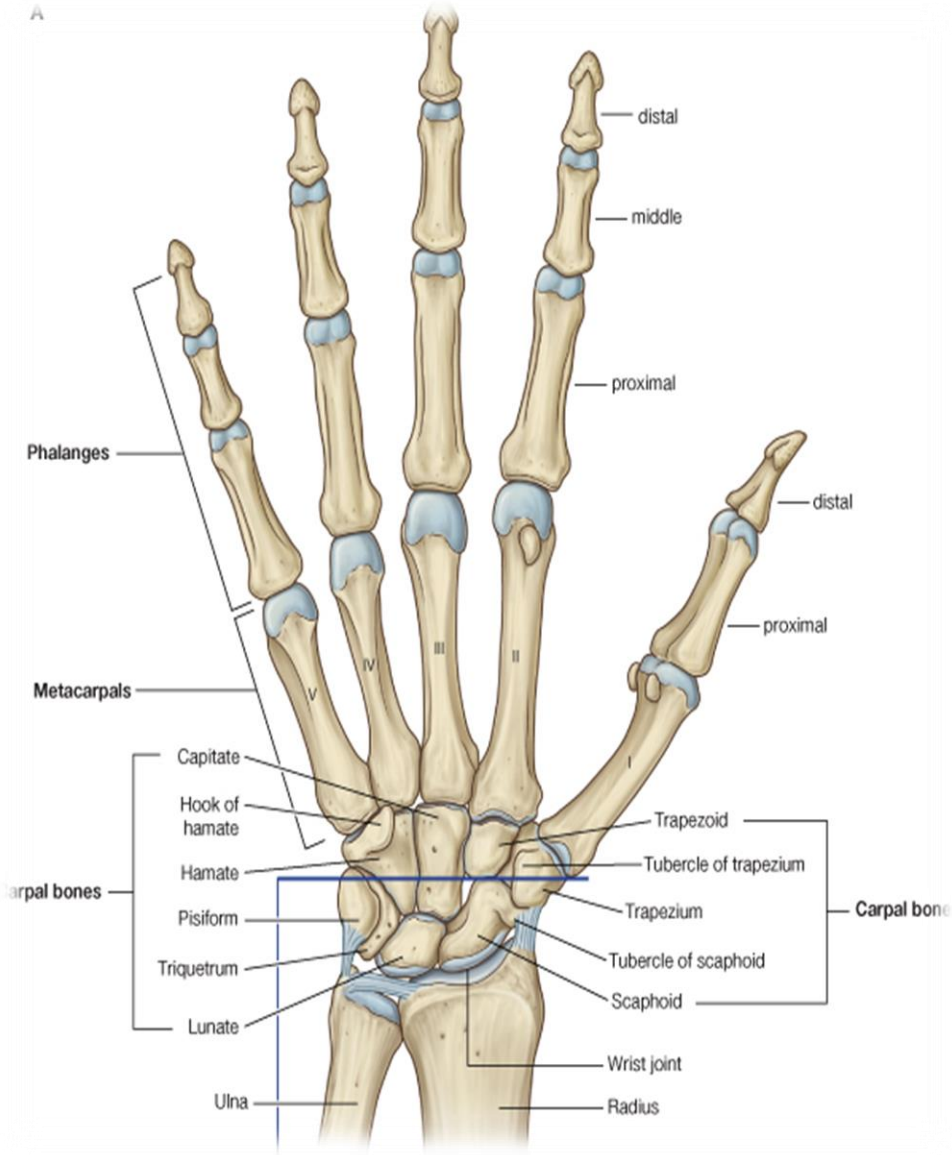
Each phalanx has : Base Proximally + Head distally + Body in between



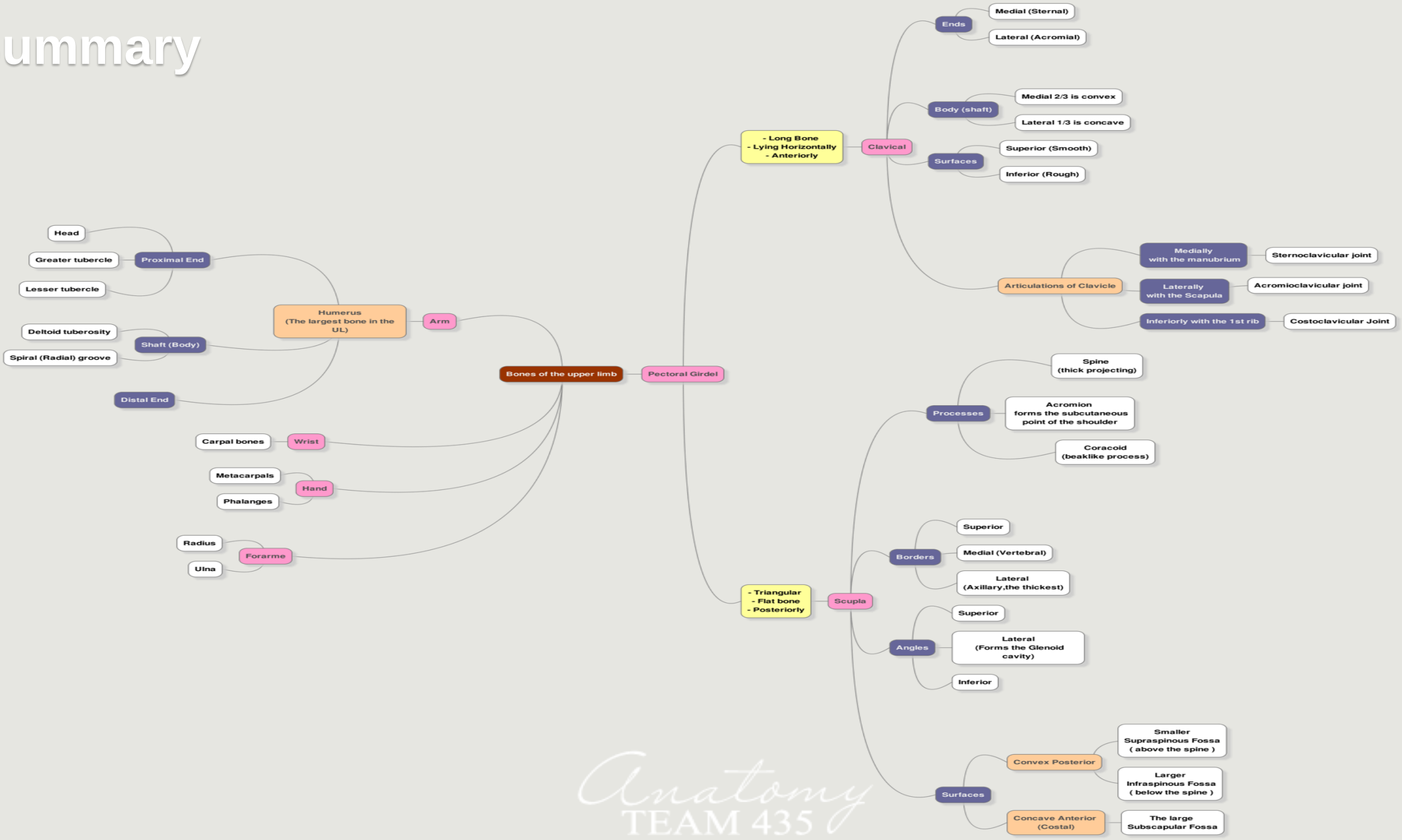


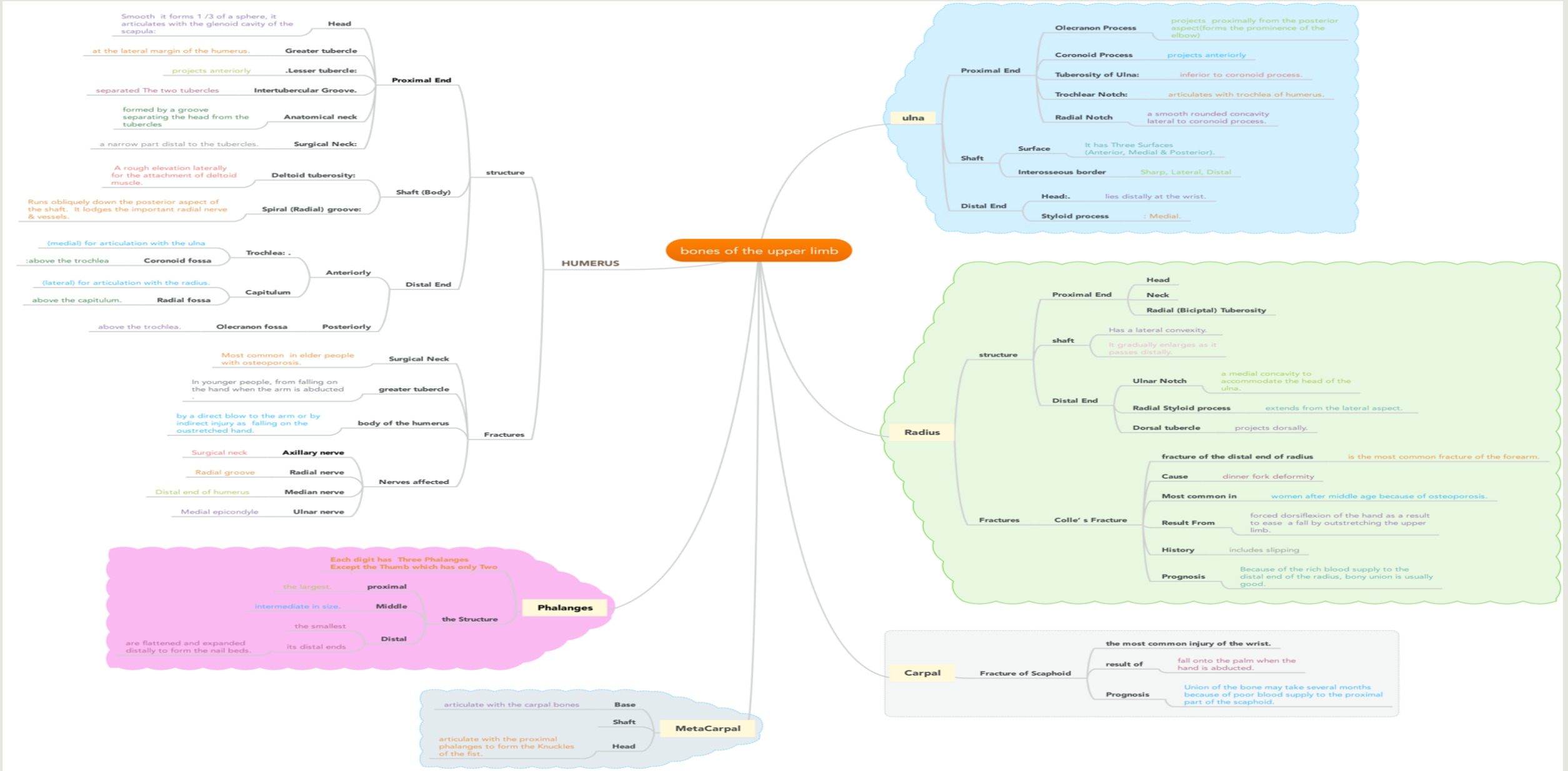
Articulations of wrist and hand

Carpometacarpal joints	• Bases of the Metacarpal bones → with the distal row of the carpal bones
Metacarpo phalangeal joints	• Heads of metacarpal (knuckles) → with the Proximal Phalanges
Interphalangeal joints	• The phalanges articulate with each other
Wrist joint	• Distal end of Radius → with the Proximal Raw of Carpal bones



Summary





Zoom it if it's not clear

Anatomy TEAM 435

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Video: arm and forearm
https://www.youtube.com/watch?v=2ufqUOpm8O0

Video: bones of upper limb
https://www.youtube.com/watch?v=715Z0XPtlDI

Application: Essential anatomy 5
you can have it for free, ask
https://twitter.com/Med_435

Quiz:

Upper Limb part.1 (15 questions)
https://www.onlineexambuilder.com/bones-of-the-upper-limb/exam-47458

Upper Limb part.2 (15 questions)
https://www.onlineexambuilder.com/upper-limb-part-ii/exam-52135

هذا العمل إجتهاد من طلاب و طالبات

إن أصبنا فمن الله و إن أخطأنا فمن أنفسنا و من الشيطان

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