



*Anatomy  
Passion*



Lecture: Upper Limb

Done By: Leen Alashram



# General Anatomy

## Lecture 4: Appendicular Skeleton (1): Bones of Upper Limb

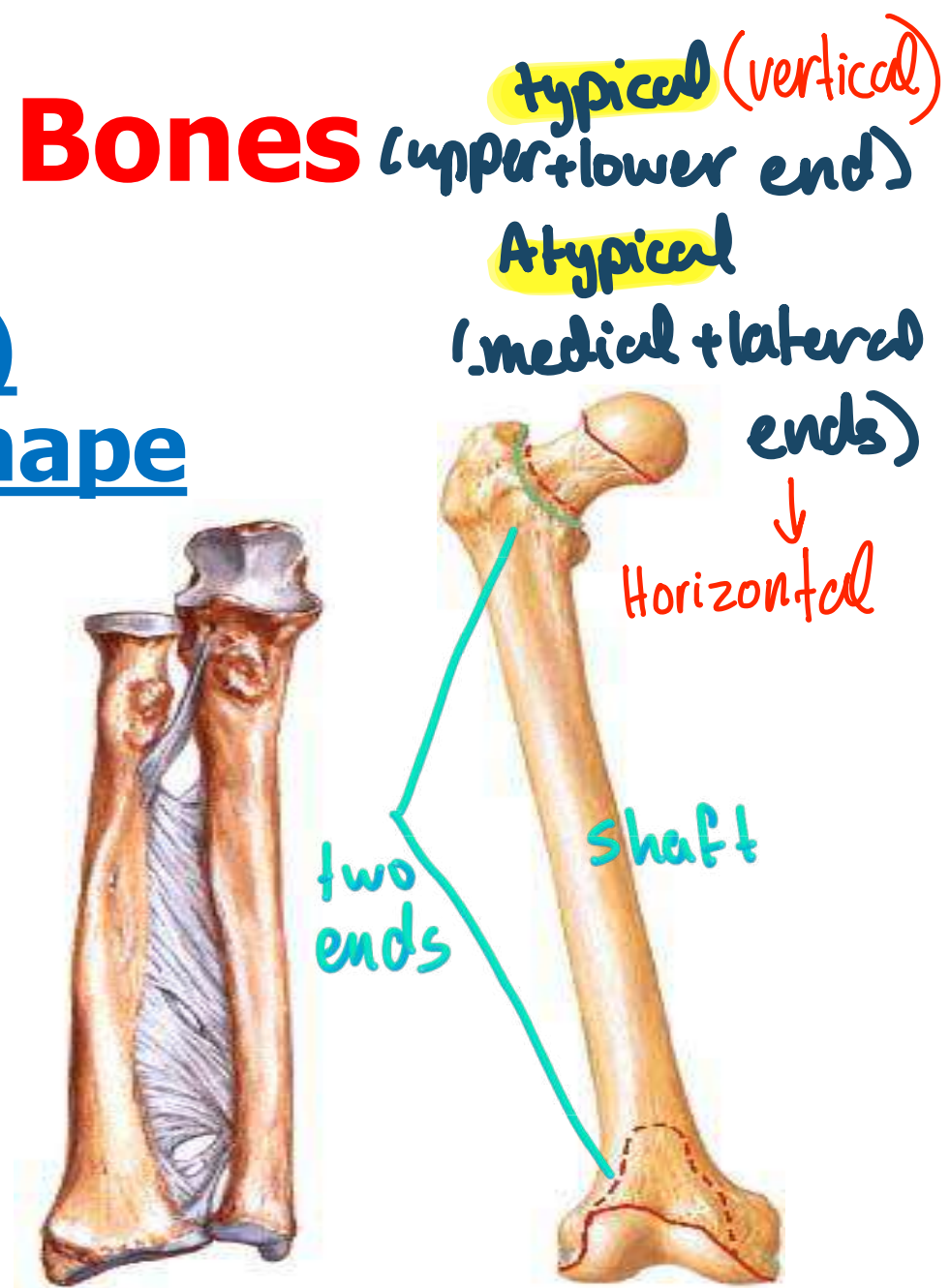
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# Classification of Bones

## (A) Morphological (Anatomical) classification according to shape of bone:

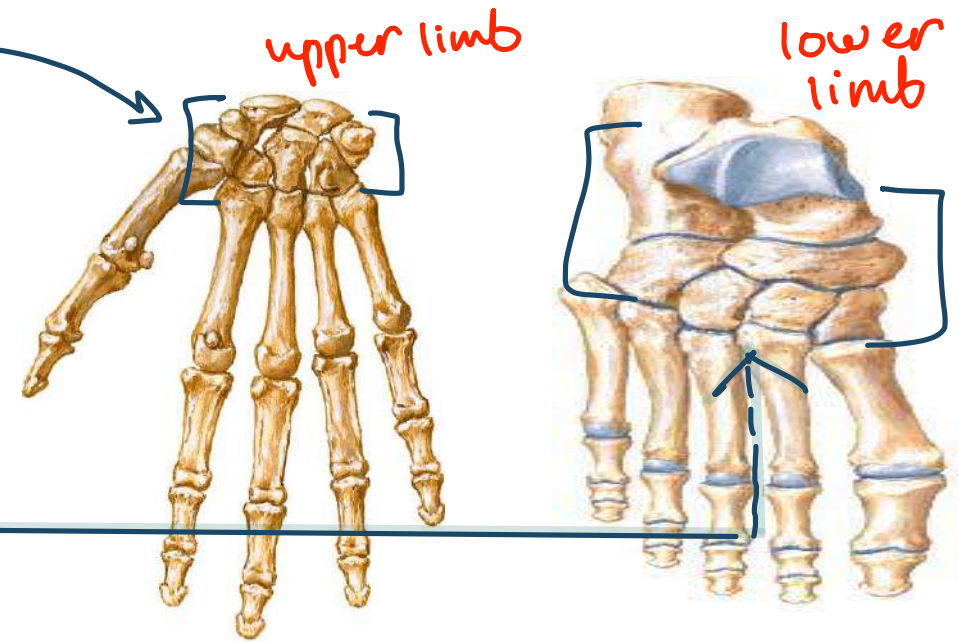
**1. Long bones:** have 2 ends & a shaft as bones of proximal & intermediate segments of the limbs (humerus, radius, ulna, femur, tibia & fibula).



# Classification of Bones (contd)

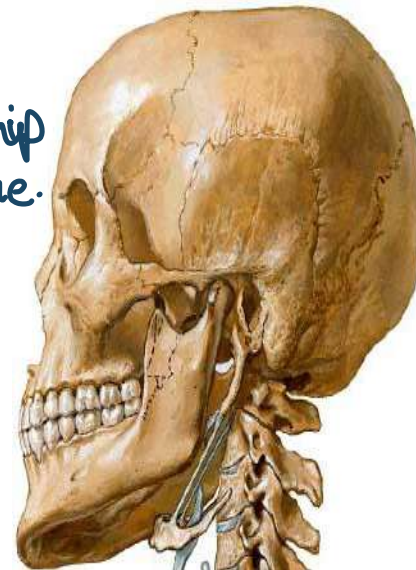
no ends, no shaft

2. **Short bones:** as carpal & tarsal bones. These bones are strong & help in limited movements.



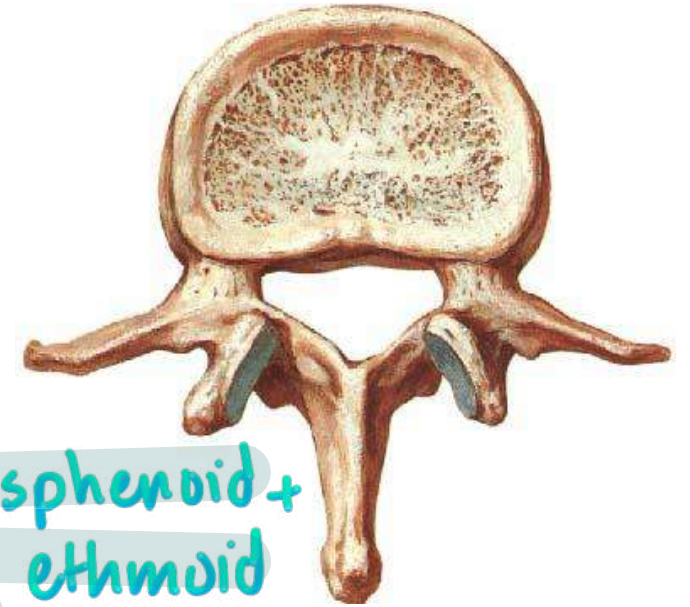
3. **Flat bones:** as scapula, sternum & skull cap. These have wide surface for muscle attachment or protection.

ilium of hip bone.



4. Irregular bones: as vertebrae & hip bones. *+sphenoid*

5. Pneumatic bones: contain **air-filled** spaces lined with mucous membrane (paranasal sinuses) in skull bones (maxilla & frontal bones) to reduce the weight of skull, help in resonance of voice & warm air.



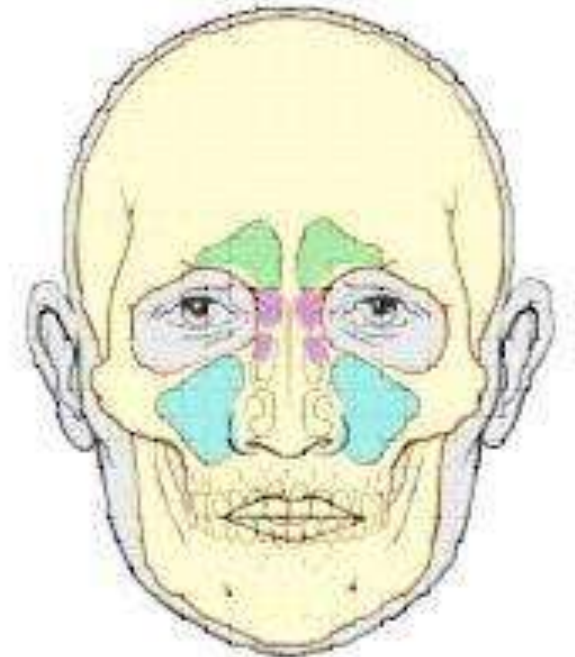
*+sphenoid + ethmoid bones*

6. Sesamoid bone: are small nodules of bone found in the tendons of certain muscles to reduce friction over bony surfaces. e.g. patella & pisiform bones.

*صابونة الركبة*



*عند الكف باليد*

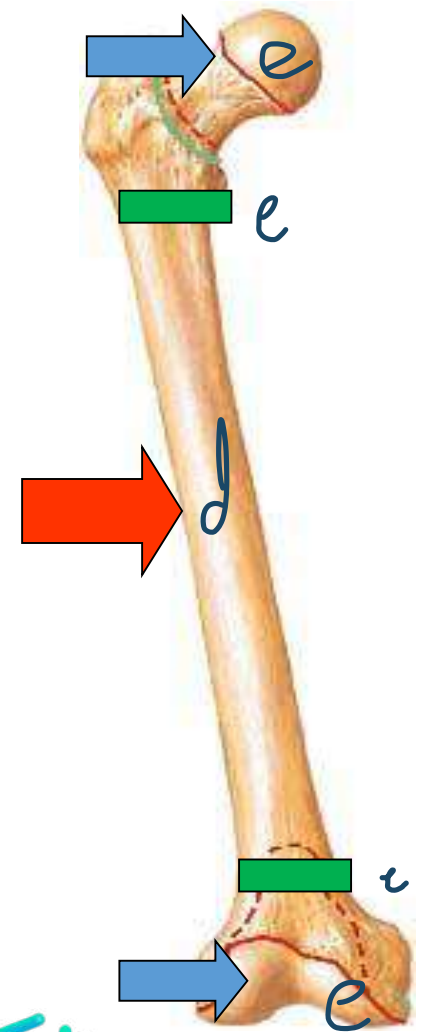


# @ Parts of a growing long bone:

1. 2 ends called **epiphysis**.
2. A shaft called **diaphysis**.
3. **Epiphyseal plate of cartilage** between the diaphysis & epiphysis. This is the most important factor for the growth of bone in length.
4. The part of the shaft close to the plate is called **metaphysis**.

الأسفنجي

btw ends + shaft



الأسفنجي

epiphysis - epiphysial plate of cartilage - metaphysis - diaphysis - metaphysis - epiphysial - epiphysis  
plate of cartilage

	The 2 ends	The shaft
<b>1. Name:</b>	epiphysis	diaphysis
<b>2. Develops from:</b>	2ry center of ossification	1ry <u>center of ossification</u>
<b>3. Covered by:</b>	Articular hyaline cartilage	<u>Periosteum</u>
<b>4. Medullary (bone marrow) cavity:</b>	Absent	<u>Present</u>
<b>5. Formed of:</b>	Spongy bone contains spaces	Compact bone

تتكون أول

نقاط يخرج منها العظام أثناء تكون العظام

غشاء عظمي

عظم كثيف

غشاء العظم

\* دانتے بے درسا ، سکہ عظمہ سقّے لکالک ھوول ال 4  
\* [name-type-general features - joints] : شفلایب

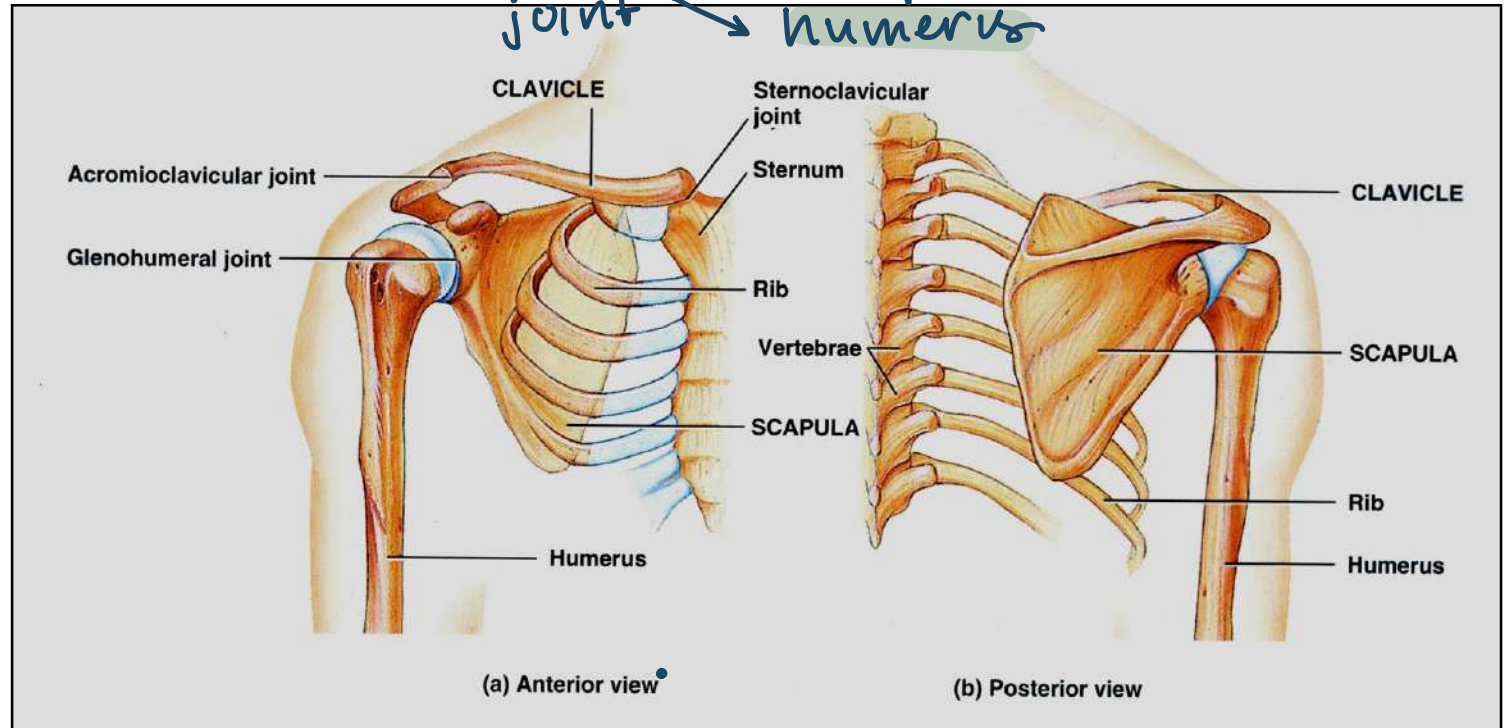
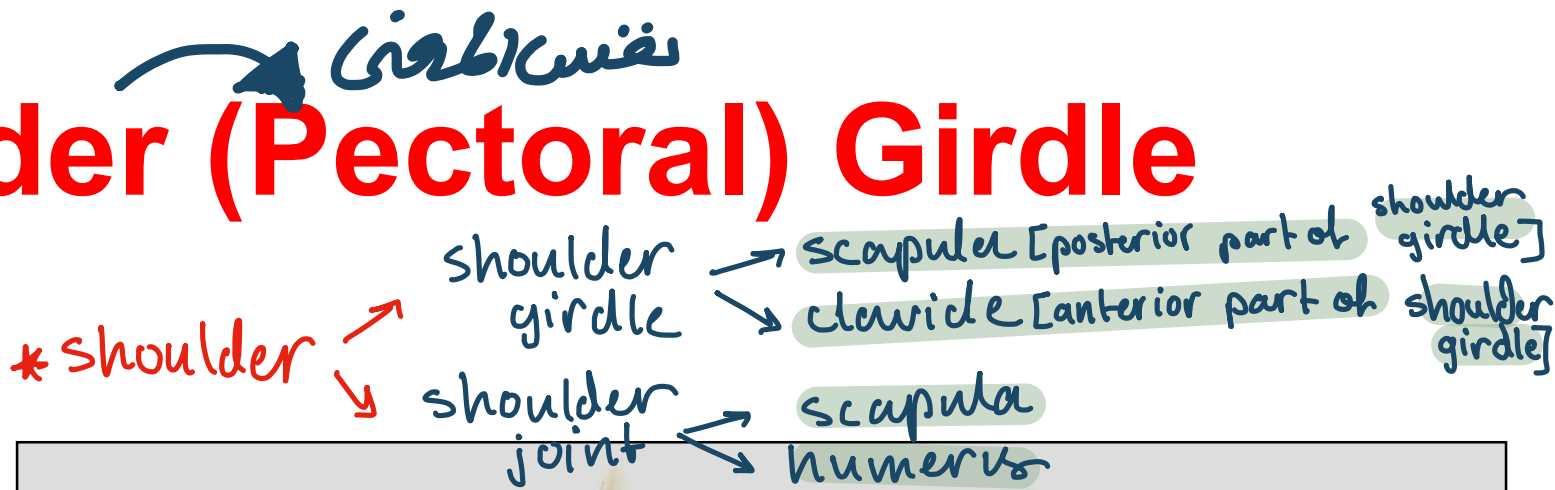
## Bones of Upper Limb



# \* The Shoulder (Pectoral) Girdle

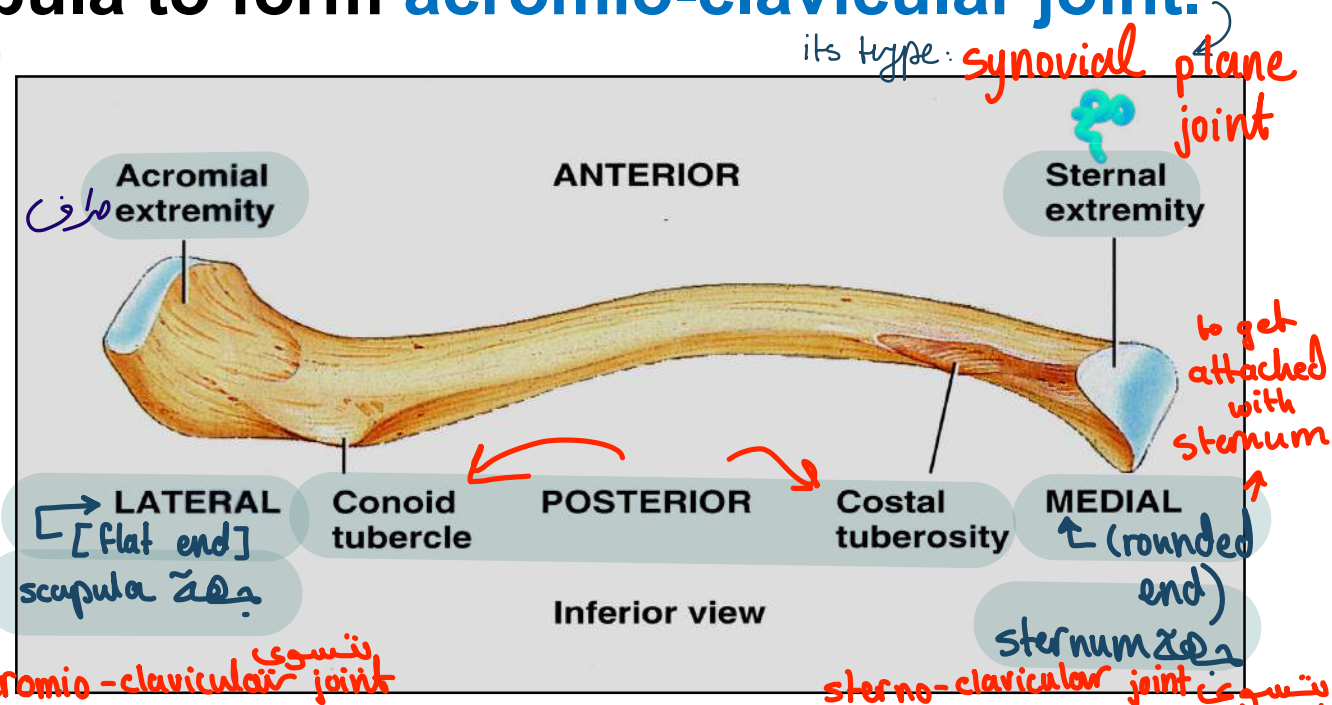
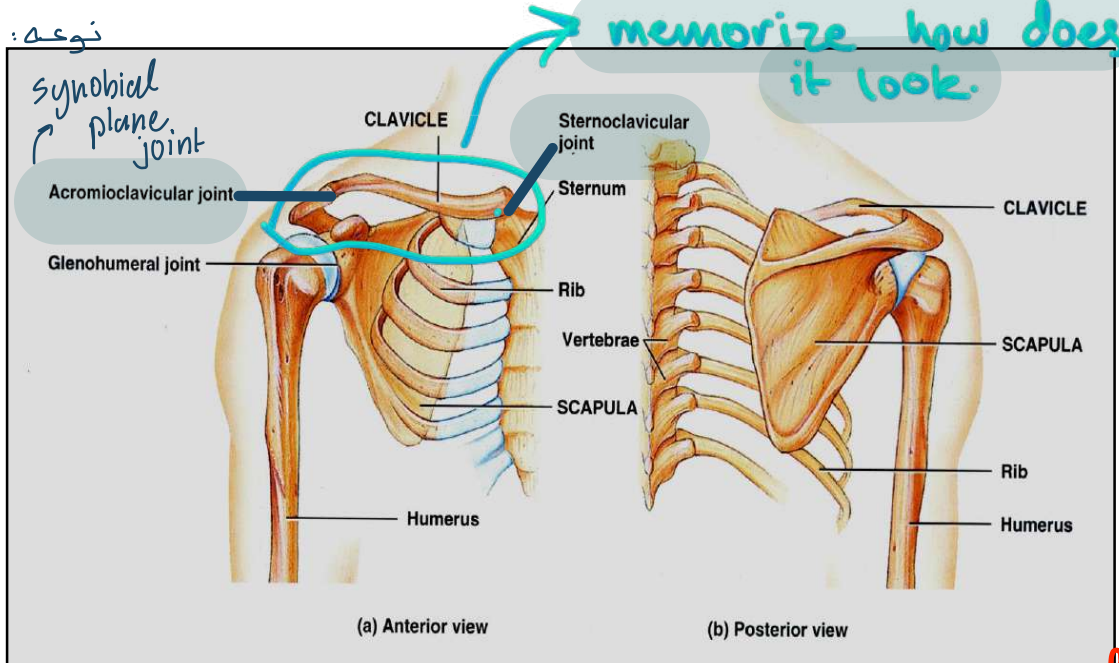
\* It is formed by the bones that connect the axial skeleton (i.e. sternum) with the appendicular skeleton (i.e. Humerus or bone of arm).

\* It is formed of 2 bones: clavicle & scapula.



# 1. The Clavicle → Atypical

- \* The clavicle is the anterior bone of <sup>shoulder</sup> pectoral girdle. "Horizontal"
- \* It has two ends → medial and lateral. long bone
- \* The medial end: is called the sternal end, it is rounded & articulates with manubrium part of sternum to form sterno-clavicular joint. Between sternum & clavicle, its type is: saddle synovial joint
- \* The lateral end: is called acromial end, is broad and flat & articulates with the acromion process of scapula to form acromio-clavicular joint.



↑ costal  
↑ cost 1/2 2/3  
↑ medical  
↓ ↓  
بيلست منة قدام، والضعف

\* The medial <sup>2/3</sup> two-thirds of the clavicle is convex anteriorly, whereas the lateral <sup>1/3</sup> one-third is concave anteriorly / or convex posteriorly → concave posteriorly

\* The <sup>upper</sup> superior surface of the clavicle is smooth, whereas the <sub>lower</sub> inferior surface is rough.

\* medial end = sternal end

\* lateral end = acromial end



upper (smooth) surface

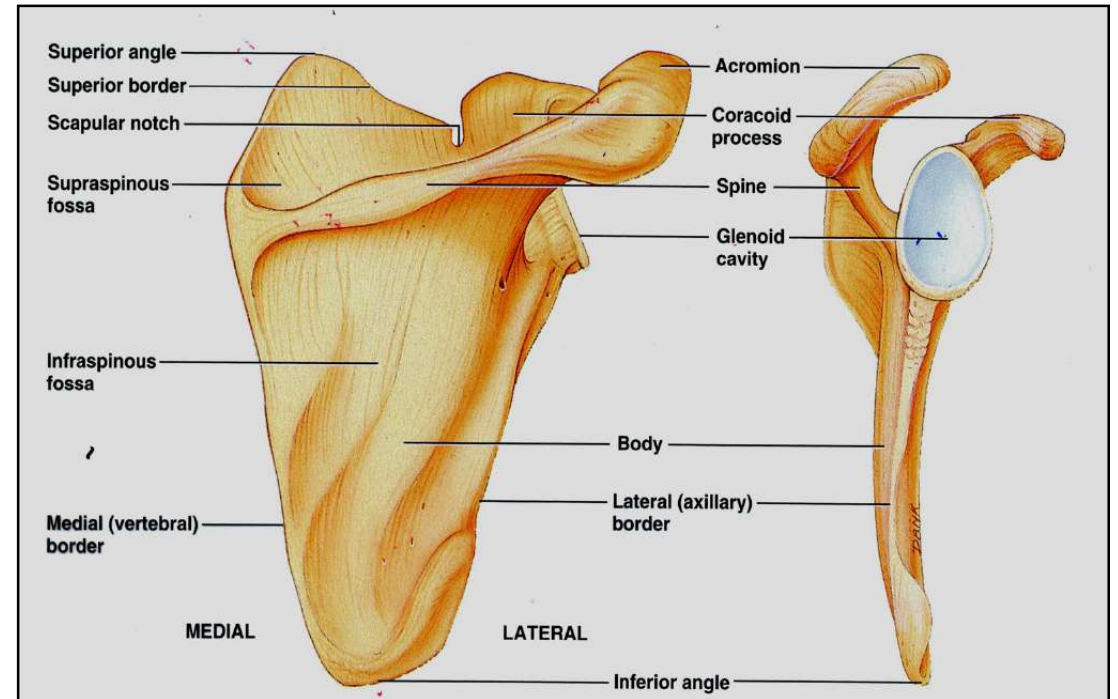
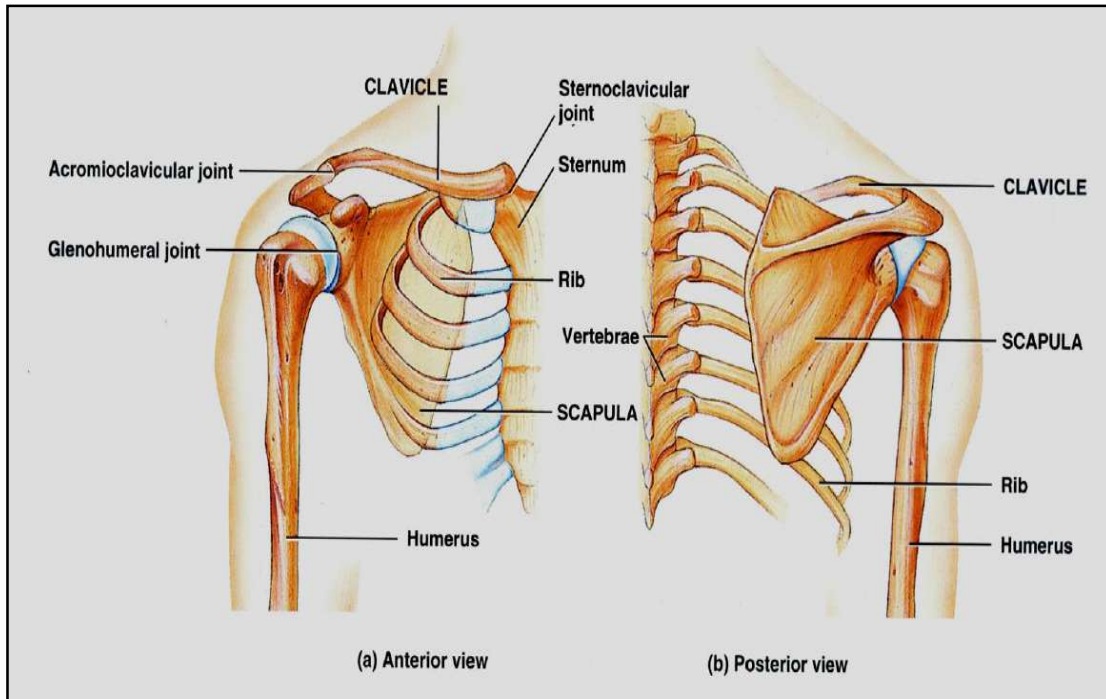


lower (rough) surface

# 2. The Scapula

3x3x3x3  
angle, borders, fossa, process  
2 joint → clavicle  
→

- \* The scapula is the posterior bone of pectoral girdle.
- \* It is a large, flattened, triangular bone.
- \* It lies on the posterior wall of thorax, overlapping the **2<sup>nd</sup> – 7<sup>th</sup> ribs**.
- \* It has two surfaces: anterior (costal) and posterior.



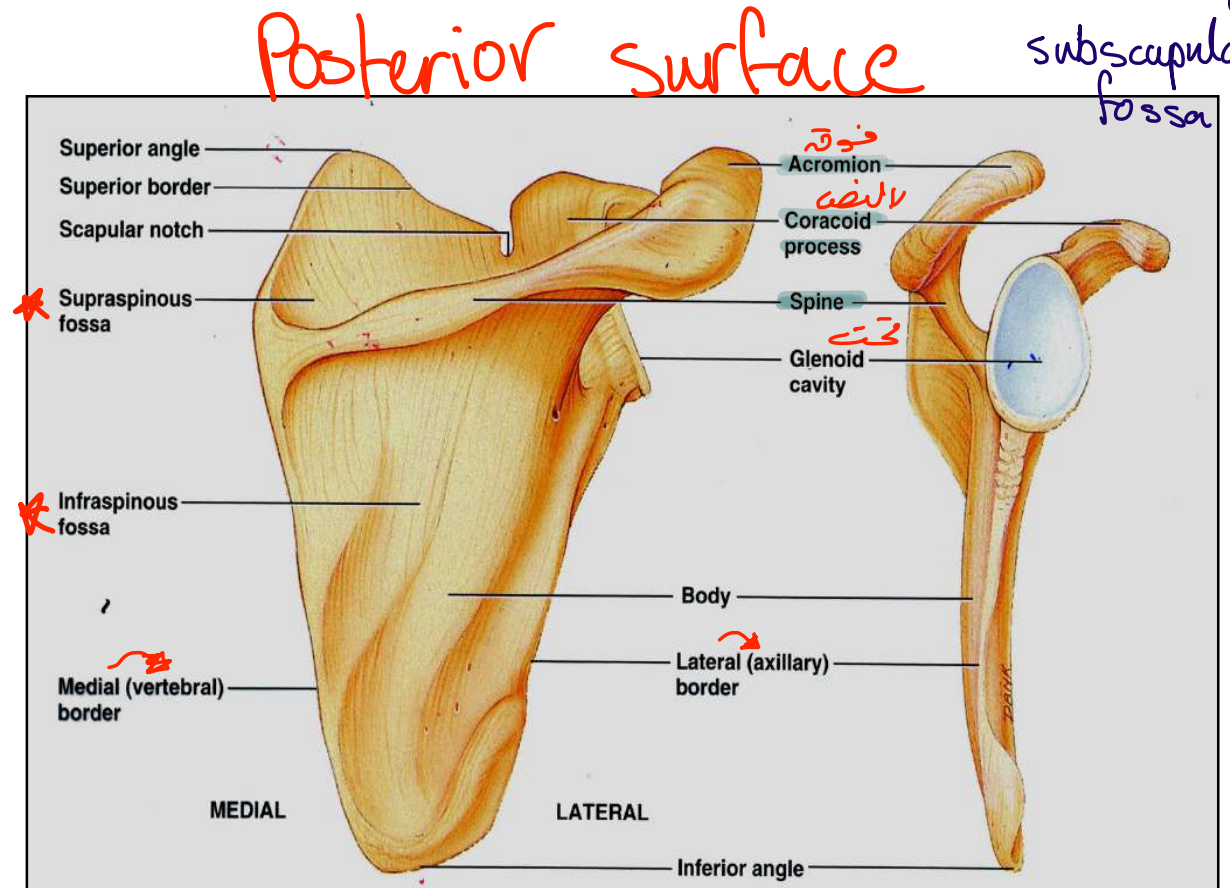
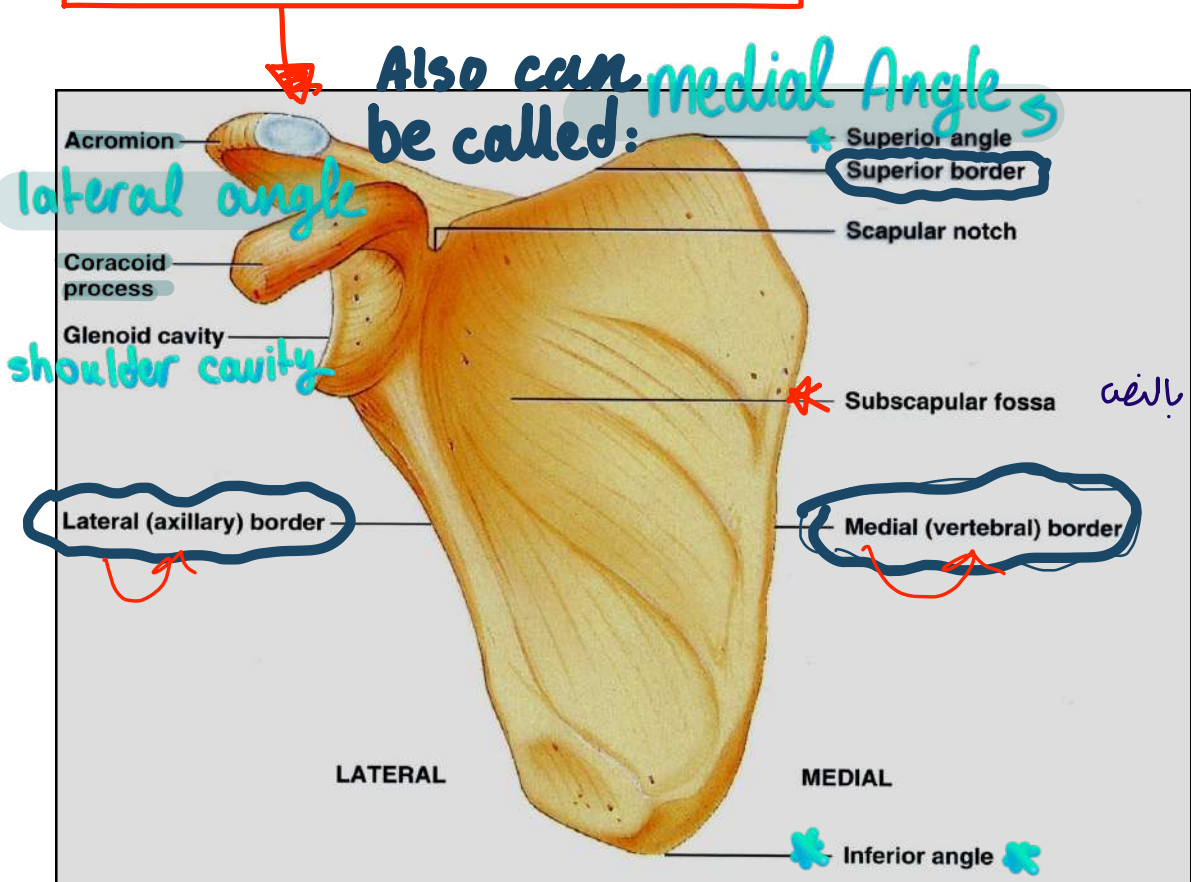
\* It has three angles: superior, inferior & lateral.

\* It has three processes: spine, acromion process & coracoid process.

هو الجزء من ال scapula التي تتصل بال clavicle وتسمى acromio-clavicular joint

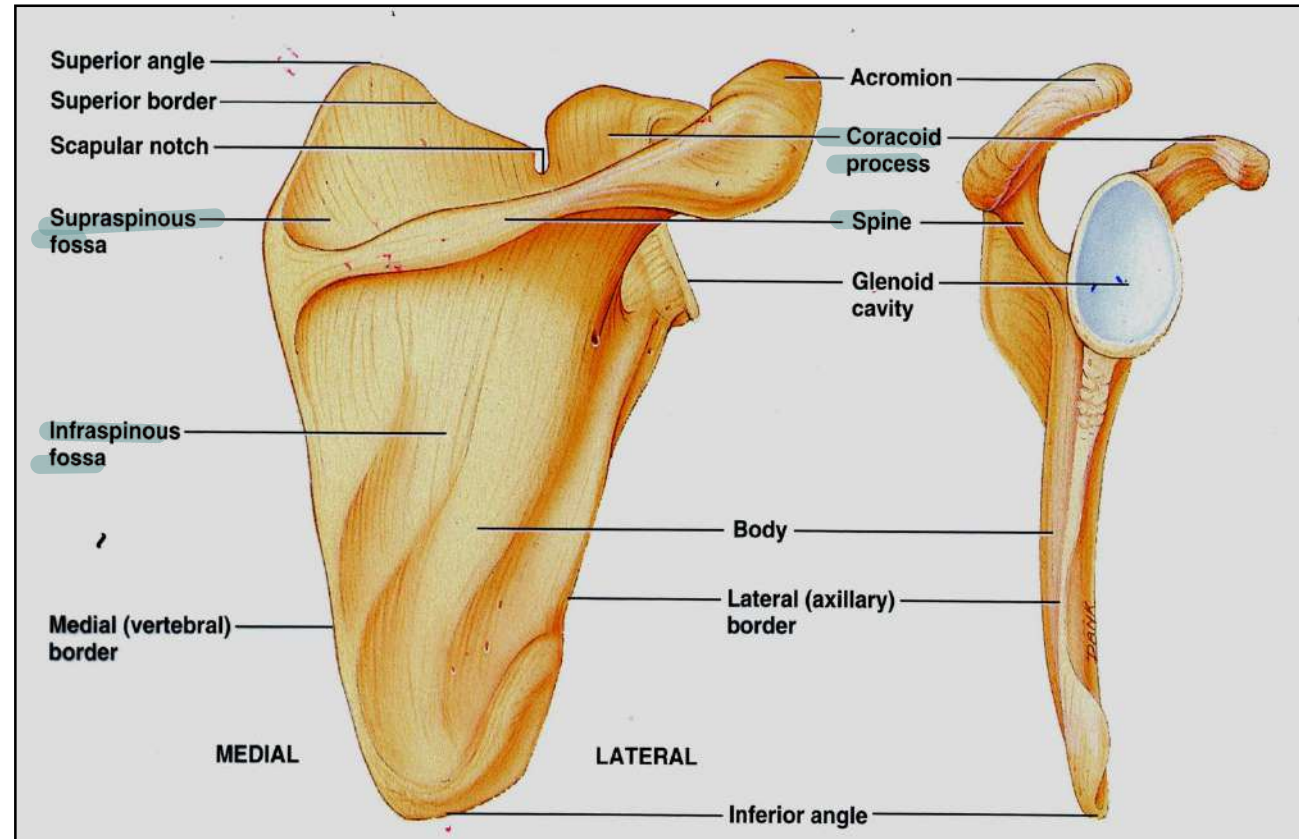
\* The costal (anterior) surface forms the subscapular fossa.

بيظهر ال scapula في subscapular fossa



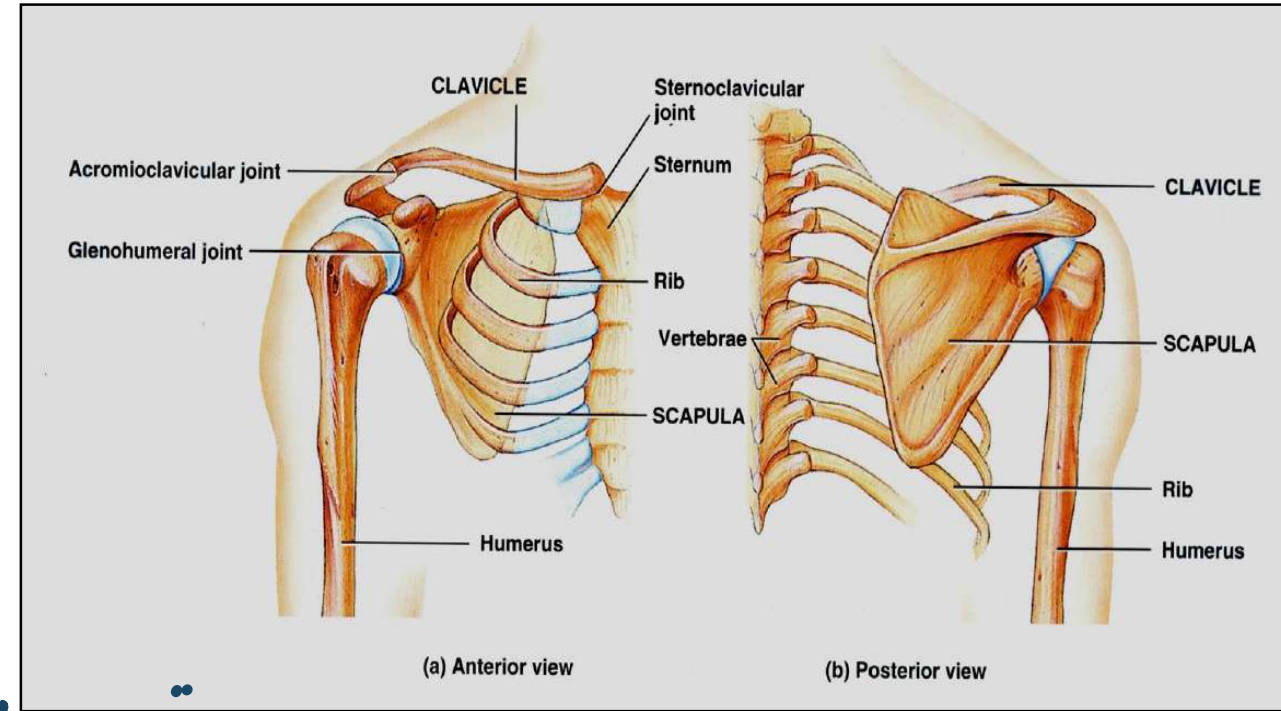
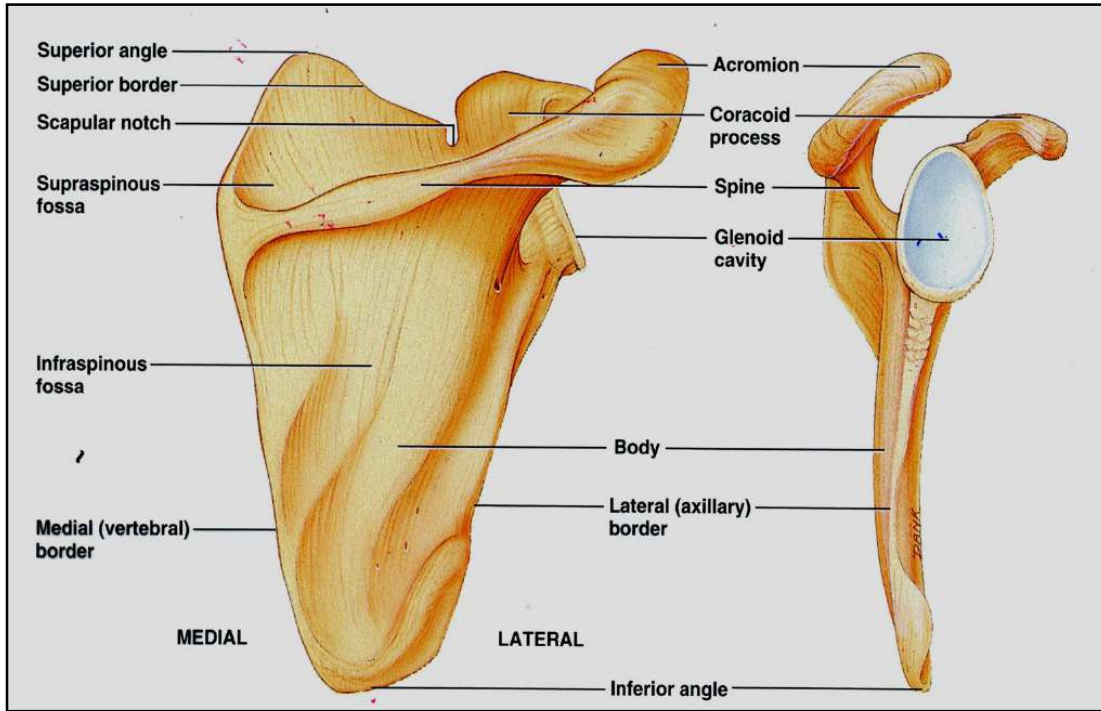
spine of scapula

↓  
posterior part  
of scapula



\* The posterior surface is divided into a smaller upper area → the **supraspinous fossa** & a **larger** **lower** area → the **infraspinous fossa**, by a shelf-like projection, called the **spine of the scapula**.

\* The **lateral end of the spine** projects as a **flattened, expanded process** called the **acromion process**.  
الجزء process جابین laterally



مذاكر العلوي، لكنه جاي تحت ال *anatomical process*

\* **The coracoid process** arises from lateral end of superior border.

\* The lateral angle of the scapula presents the glenoid cavity for articulation with head of the humerus (in shoulder joint).

Humerus → ① upper end  
→ ② middle end  
→ ③ lower end

- 1] upper end → head  
→ anatomical neck  
→ surgical neck  
→ greater tuberosity  
→ lesser tuberosity  
→ Bicipital groove

3] lower end

2] shaft → laterally: deltoid tuberosity



# 3. The Humerus *long, typical bone*

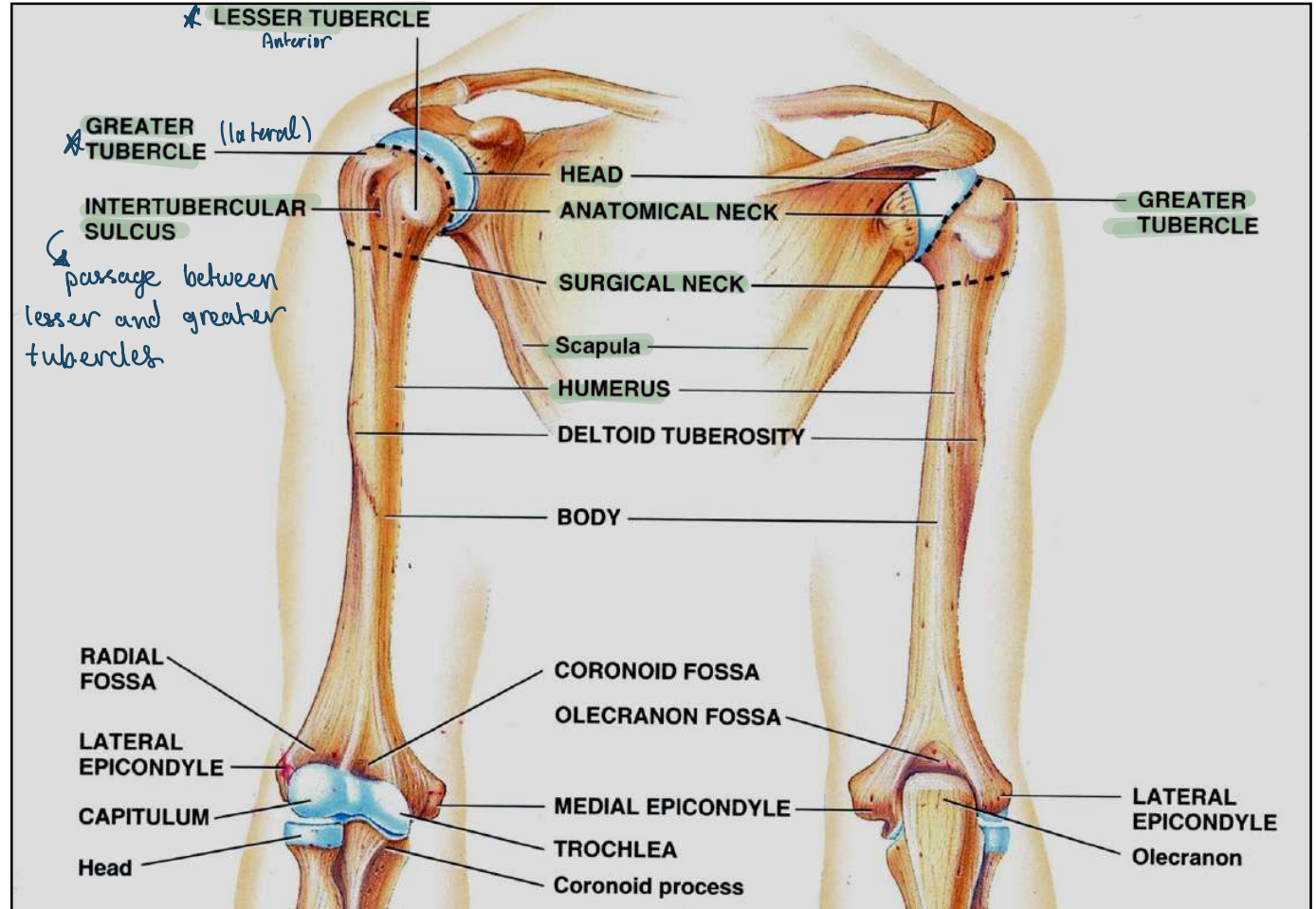
\* This is the bone of the arm.

\* It has an upper end, a shaft & a lower end.

**A. The upper end:** shows:

**1. The head:** <sup>→ *medial*</sup> which is less than half of a sphere. It articulates with the glenoid cavity of scapula to form shoulder (glenohumeral) joint.

→ well circumscribed دائرية  
glenohumeral joint = shoulder joint

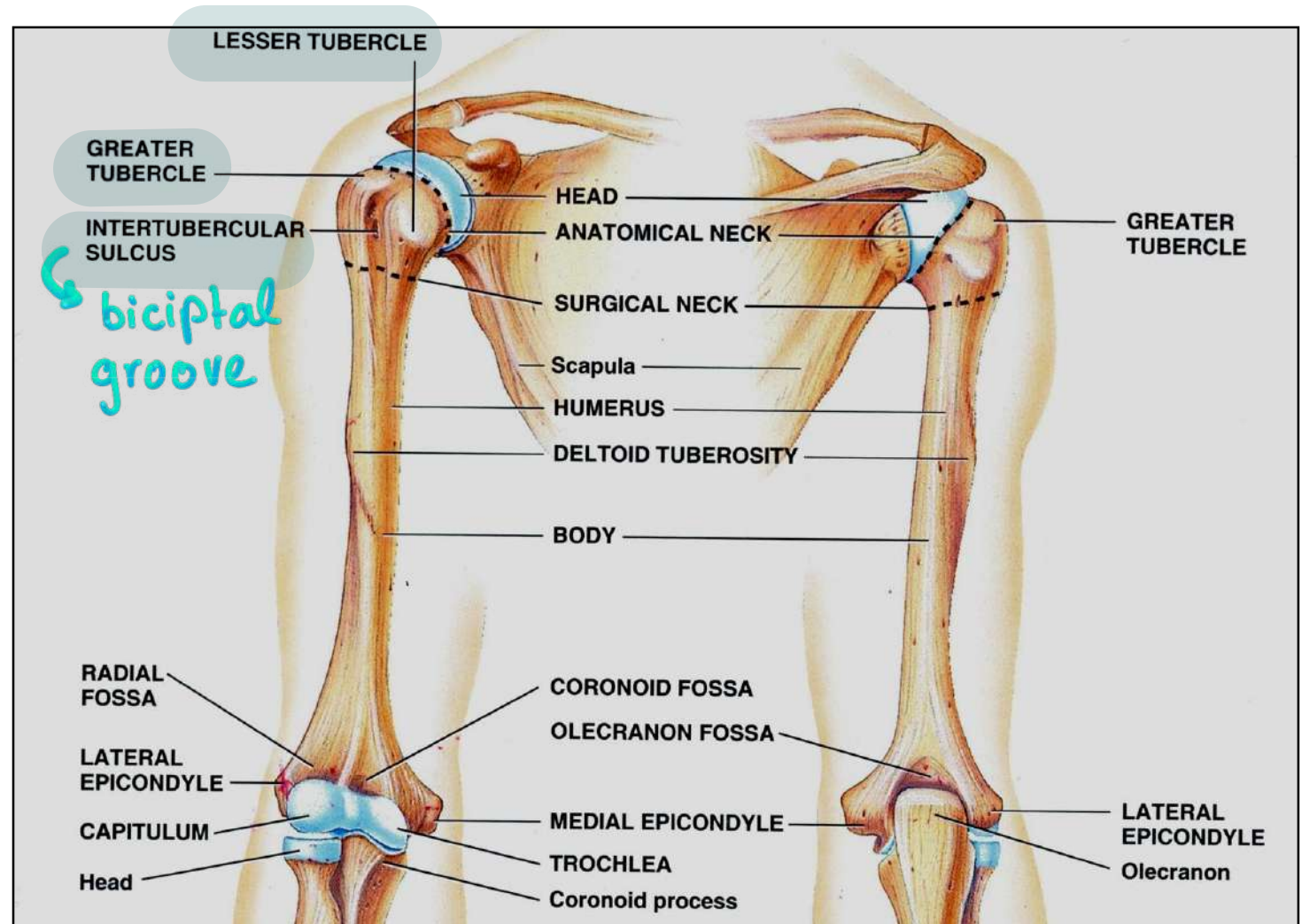


→ synovial ball & socket ← ∅

**2. The greater tuberosity (tubercle)**  
→ which is a lateral projection.

**3. The lesser tuberosity (tubercle)**  
→ which is an anterior projection.

**4. The bicipital groove (inter-tubercular sulcus)** → separates the 2 tuberosities.



\* has two necks

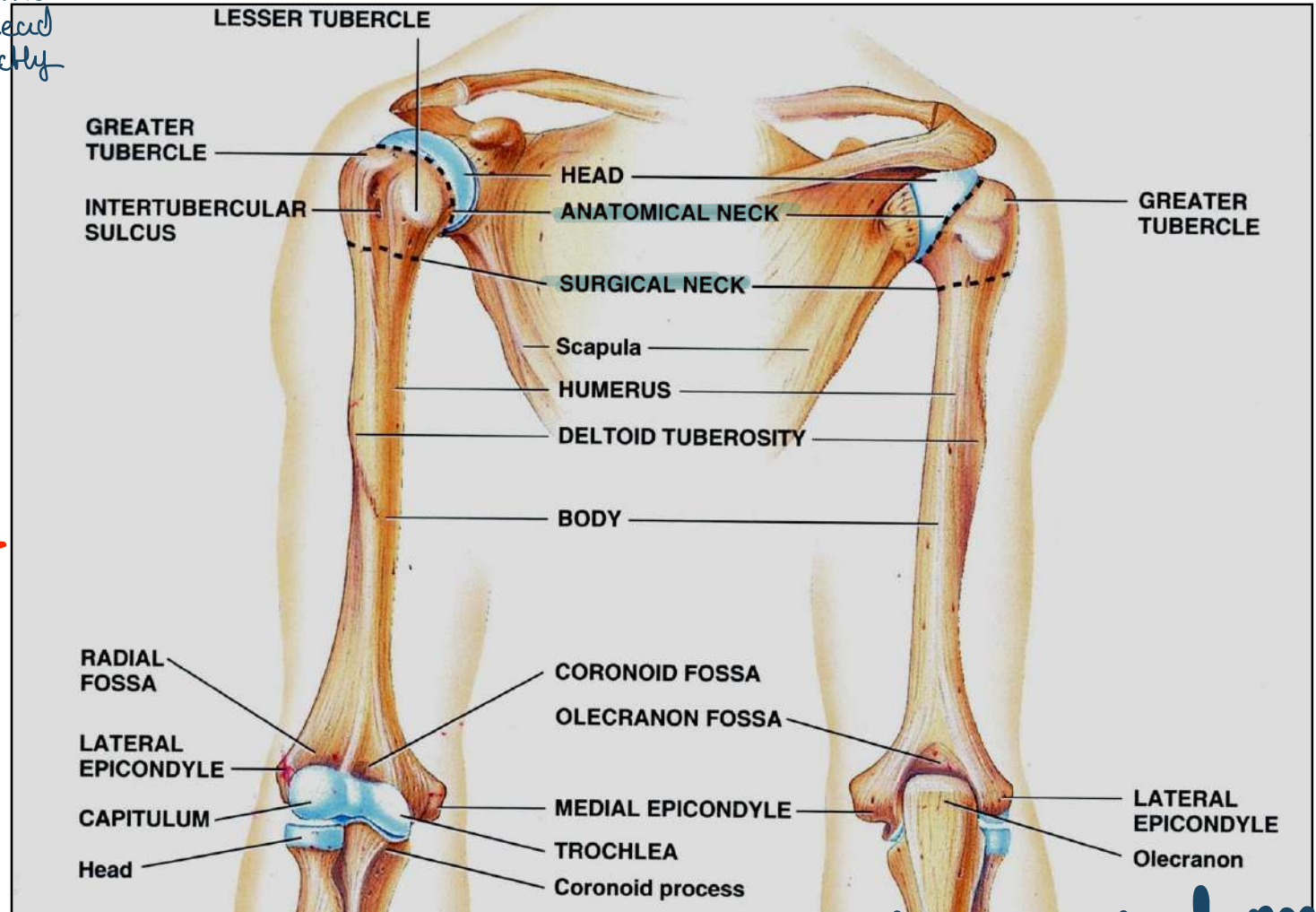
**5. The anatomical neck** → is the margin of the head that separates it from the tuberosities.

**6. The surgical neck** → is the constriction that separates the upper end from the shaft. [ يَفْرَدِي مِنْ عِزِّهَا حُلٌّ نِجْرًا ]

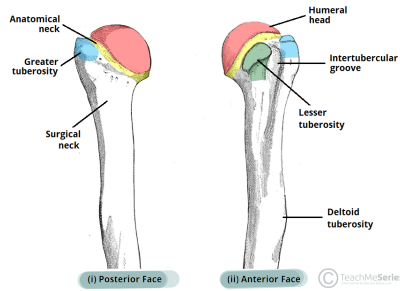
between upper end + shaft + surgical neck

→ under head directly

إما تبعا مع إصابة clavicle



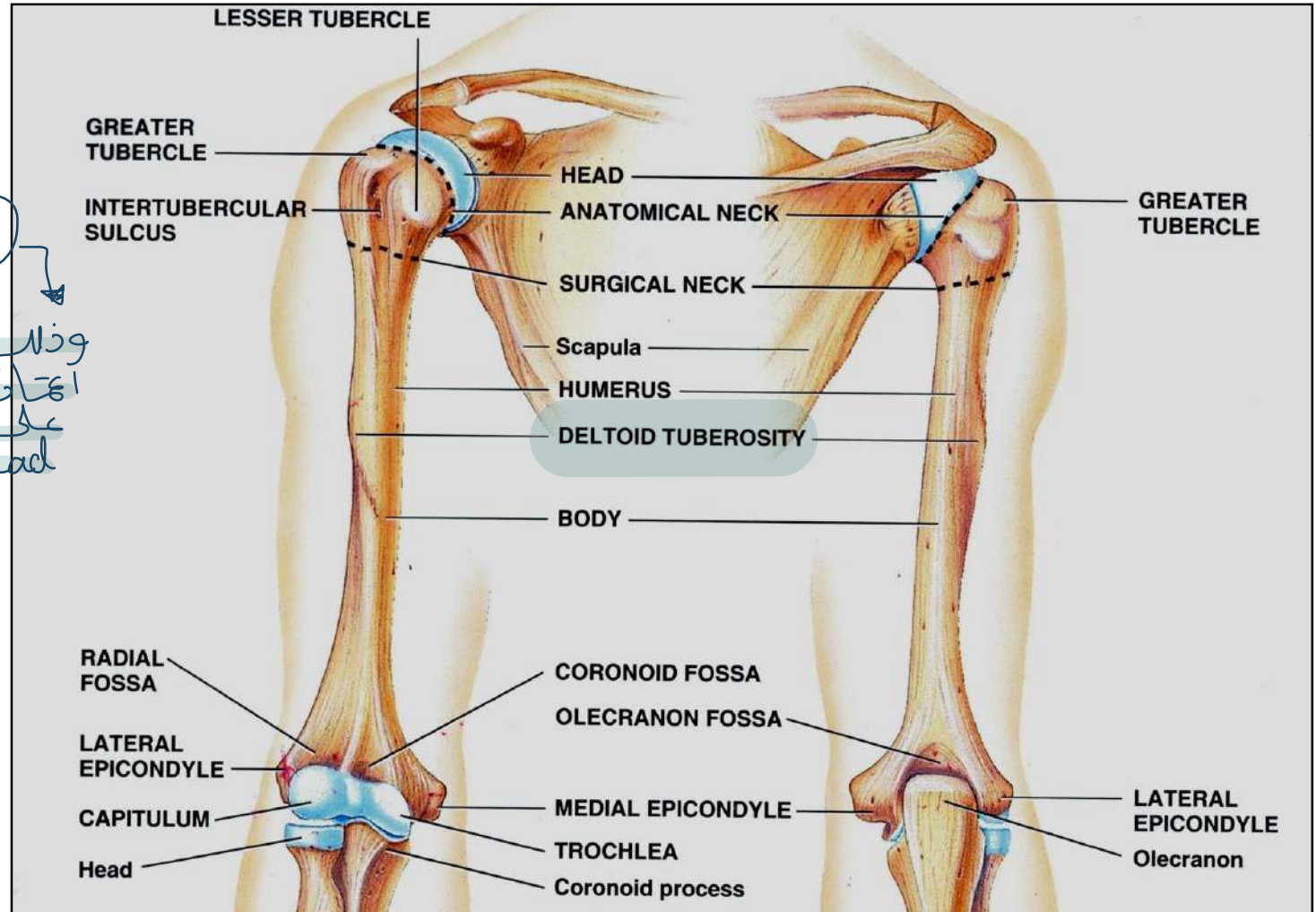
\* a man came with surgical neck friction  
 دكتور العظام مين الراكزة اللي  
 دكتور الأعصاب → axillary nerve  
 دكتور الأوعية الدموية → circumflex Humerus vessel



↗ lateral  
 ↘ medial  
 5  
 1 1/2  
 1  
 Head

**B. Shaft (body):**

**Laterally** → it presents about its middle a rough area called the **deltoid tuberosity**.



**C. The Lower end:** shows:

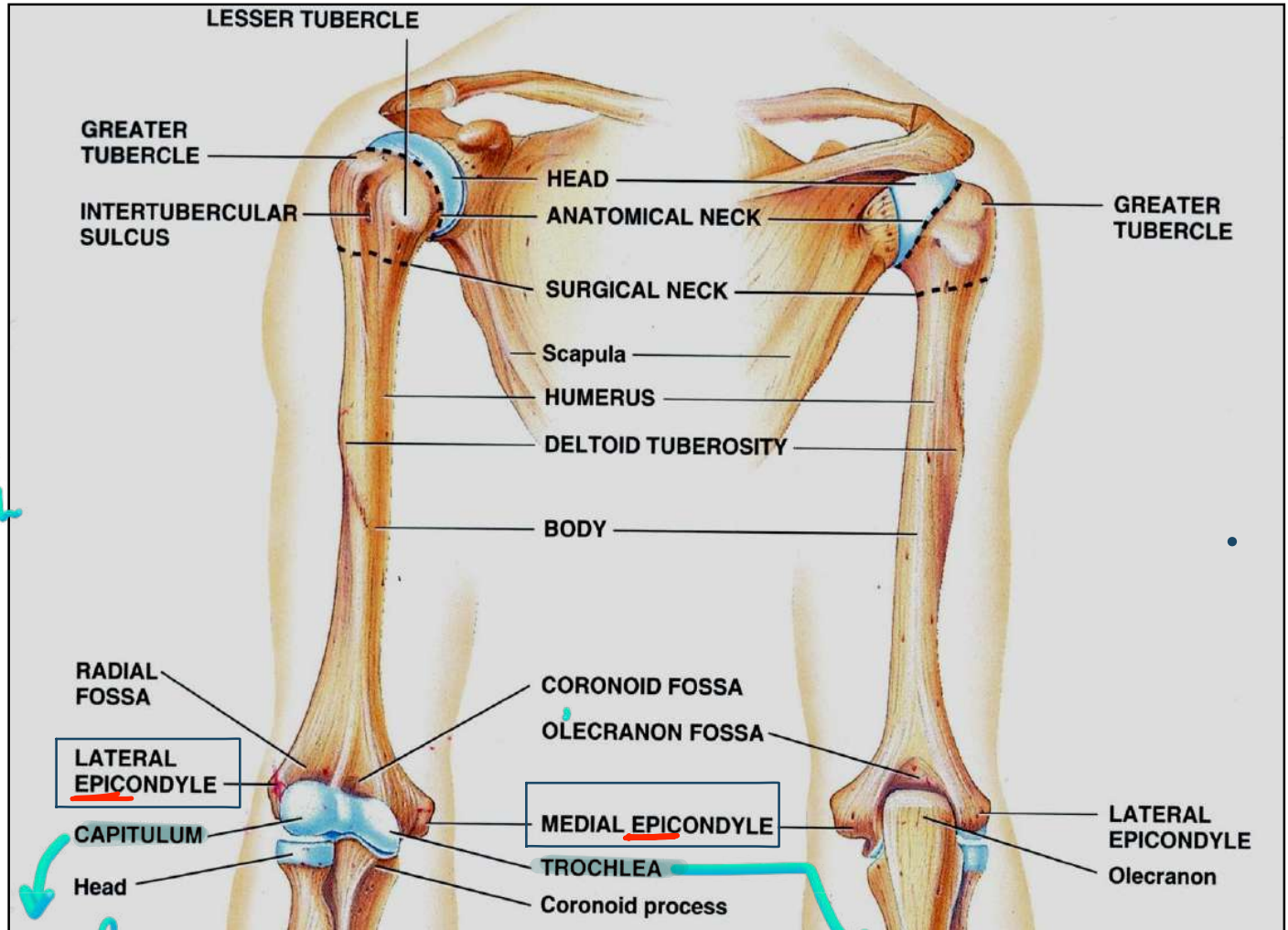
**1. Two articular surfaces:**

**a. The capitulum** → a **convex surface laterally**. It articulates with the **radius** in **humero-radial articulation**.

**b. The trochlea** → a pulley-shaped surface medially. It articulates with the **ulna** in **humero-ulnar articulation**.

\* Both the humero-radial & humero-ulnar articulations form **the elbow joint**.

\* medial → ulna  
 \* lateral → radius  
 } Flexion + extension



يشو العصب اللي بتأثر لو انك سرت  
 medial epicondyle?  
 → ULNAR NERVE

الفرق بينها وبينه  
 lateral condyle  
 medial condyle  
 بارزة أكثر، لأن  
 هذه خلفها يمر عصب ulnar nerve ← مساهم في الحركات

غير مفصلي

## 2. Two non-articular side projections → the medial & lateral epicondyles.

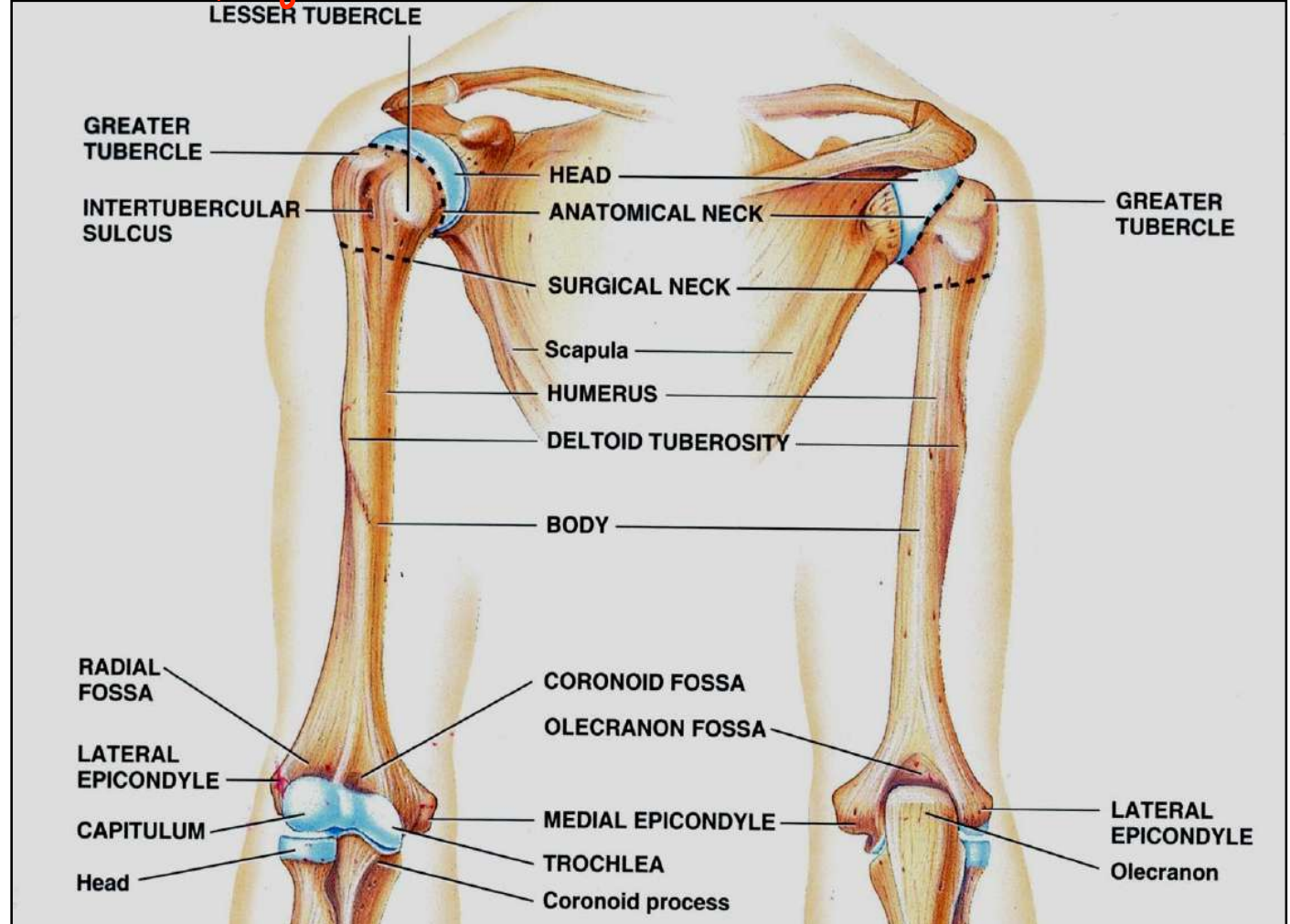
\* The medial epicondyle is more prominent and wider than the lateral, and is crossed on its posterior surface by ulnar nerve.

لأنه بارز .

synovial Hinge

upper + lower limbs

\* ملاحظة: كل ال joints 3



### 3. Three depressed fossae:

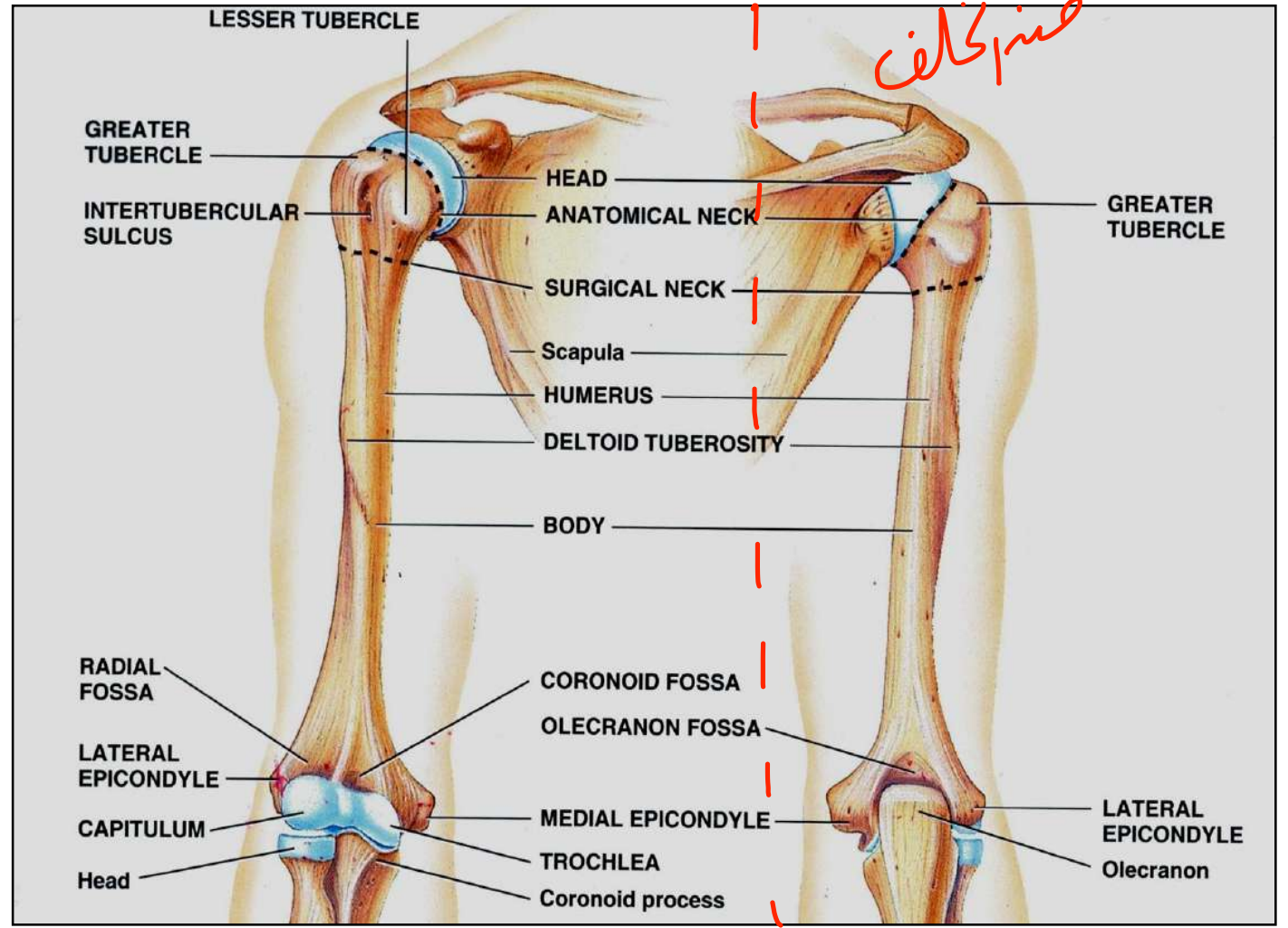
a. Radial fossa → above capitulum anteriorly.

b. Coronoid fossa → above trochlea anteriorly.

c. Olecranon fossa → above trochlea posteriorly.

R  
↑  
C  
↑  
t

scapula & coracoid process



# 4. The Radius

↳ lateral

\* This is the lateral bone of the forearm.

\* It has an upper end, a shaft & a lower end.

A. The upper end: shows:

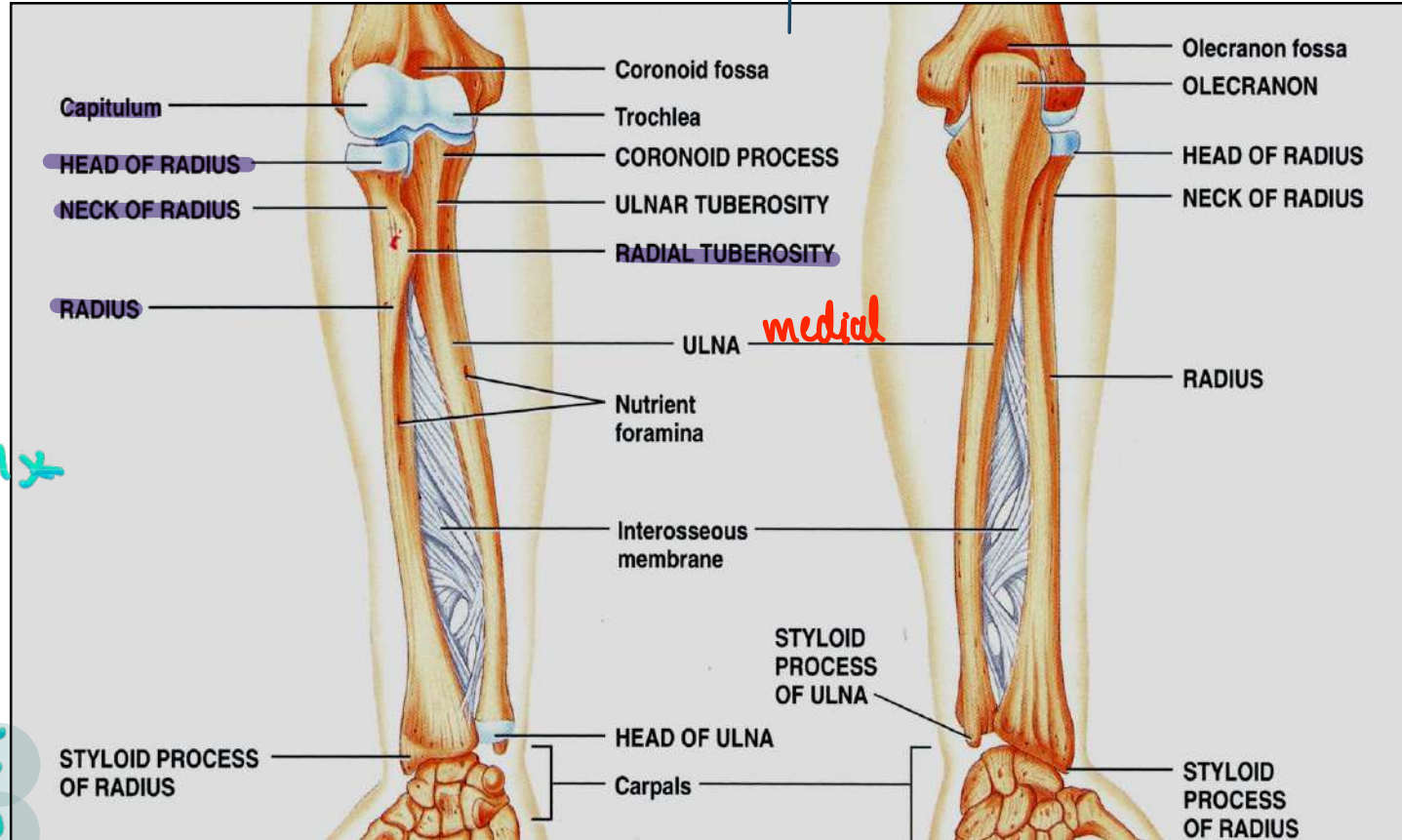
## 1. The head:

\* Disc-shaped. *+ humero-radial articulation*

\* It articulates superiorly with the capitulum of the humerus.

## 2. Neck.

② 3. **Radial tuberosity**: a *تحديد الموقع بالزبط* projection on ulnar side of shaft below the neck.





## B. Shaft (body):

\* Has a sharp medial border, **the interosseous border**, to which the interosseous membrane is attached.

## C. Lower end: shows:

1. The medial surface of lower end presents the **ulnar notch**, for articulation with head of ulna to form **inferior radio-ulnar joint**.

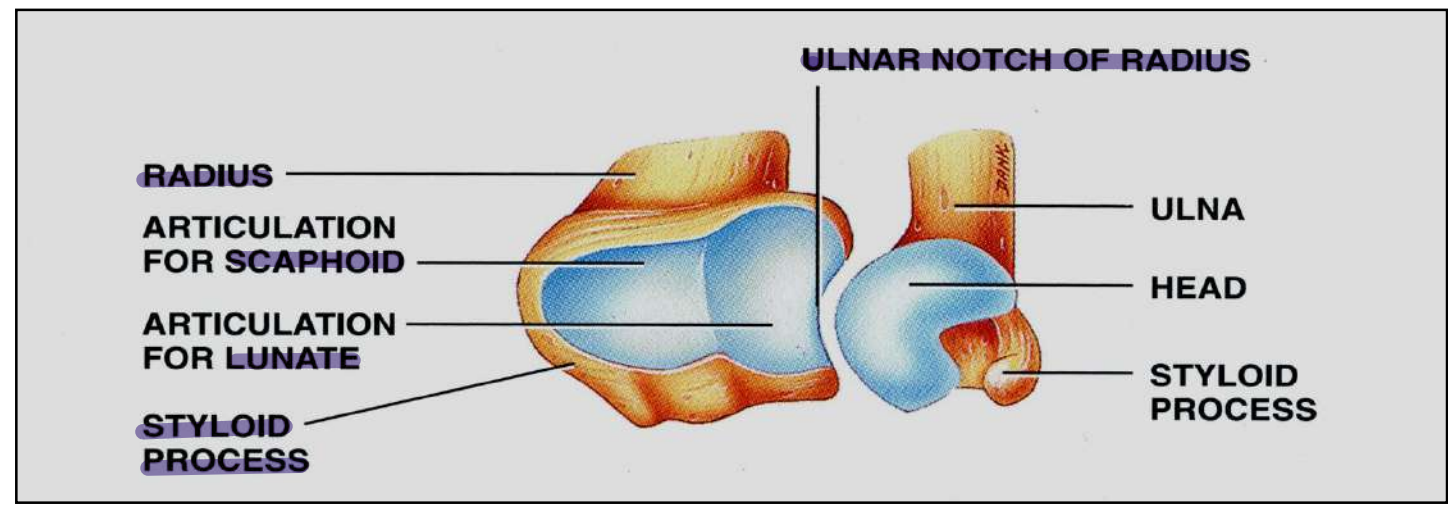
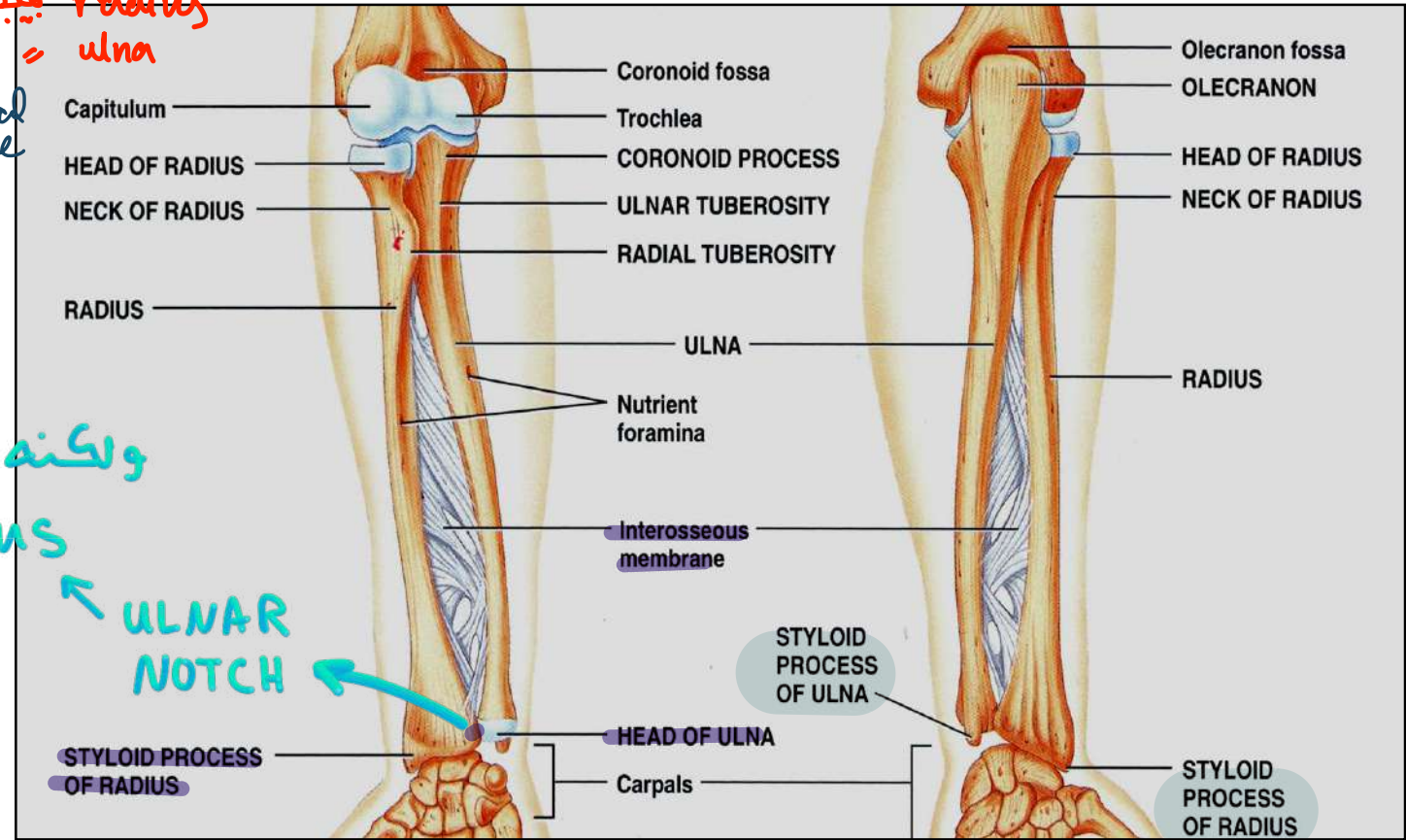
2. **Styloid process**.

3. The **inferior surface** of the lower end articulates with scaphoid bone (laterally) and the lunate bone (medially).


→ sharp bone of ulna ← radius  
" " " radius " " ulna  
→ medical in lateral bone

ولكن موجود في radius

← ULNAR NOTCH




ULNAR → 4 joints

elbow + 


\* RADIUS → 5 joints

elbow + 

trist

Radius, Alna  
notches ← 

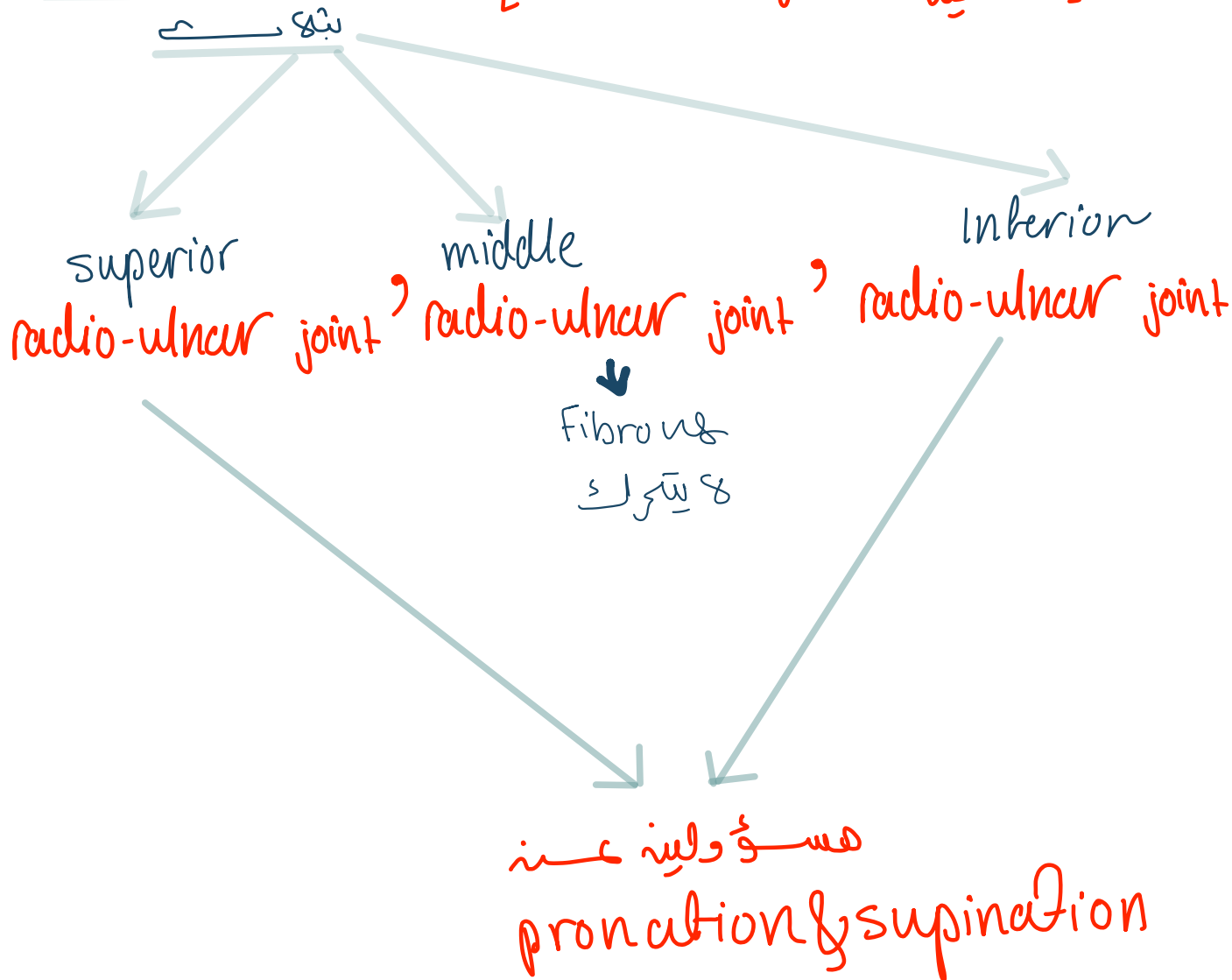
the notch in the Alna for the Radius  
is called Radial notch of Alna

there is also  
\* Alnar notch of Radius Radius Alna  
\* 

superior + inferior 

ULNA Radius مشترك

[radio-ulnar joint]: \* ما بين المفاصل



isn't involved  
in rest joint ←

# 5. The Ulna

no upper head in  
ULNA

O → olecranon process  
T → trochlear notch  
C → coronoid process

\* This is the medial bone of the forearm.

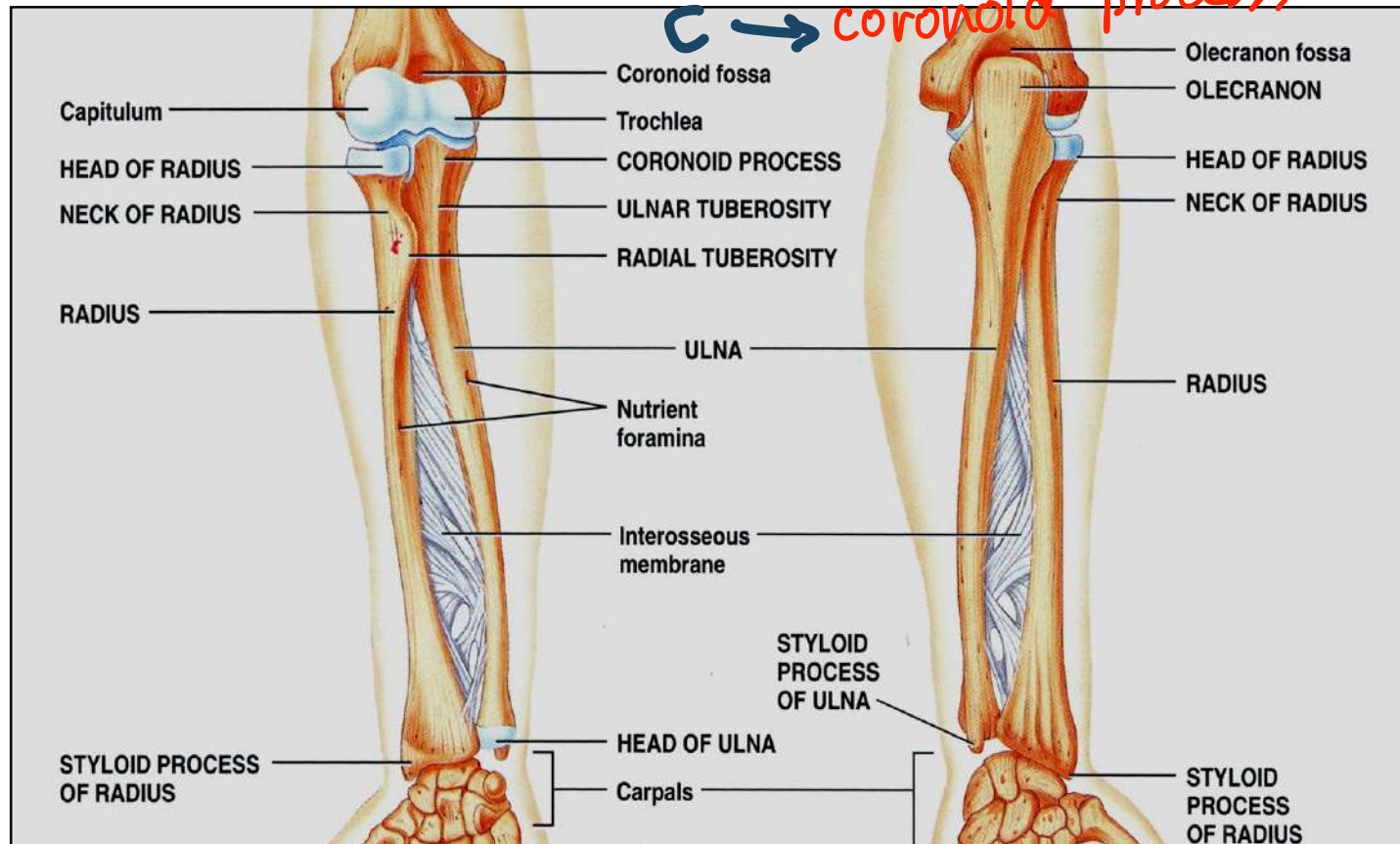
\* It has an upper end, a shaft & a lower end.

**A. The upper end: shows:**

**1. The trochlear notch:**

\* A semilunar concavity that lies in the anterior aspect of the upper end of the bone.

\* Articulates with the trochlea of the humerus.

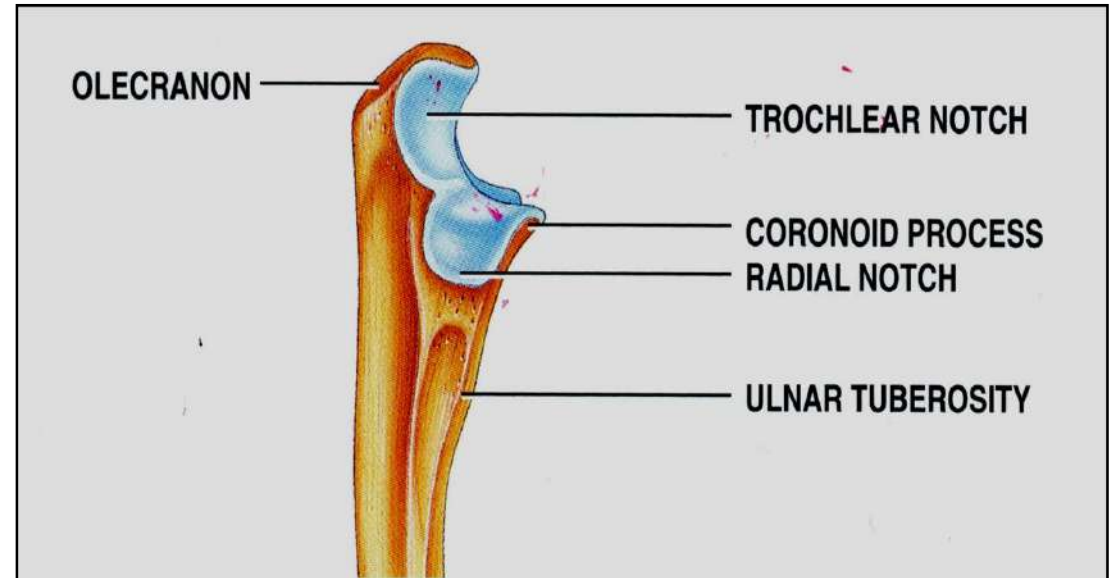


**2. The olecranon process**

→ which forms the prominence of elbow.

**3. The coronoid process.**

4. The lateral surface of coronoid process presents the shallow **radial notch**, for articulation with head of radius to form **superior radio-ulnar joint**.



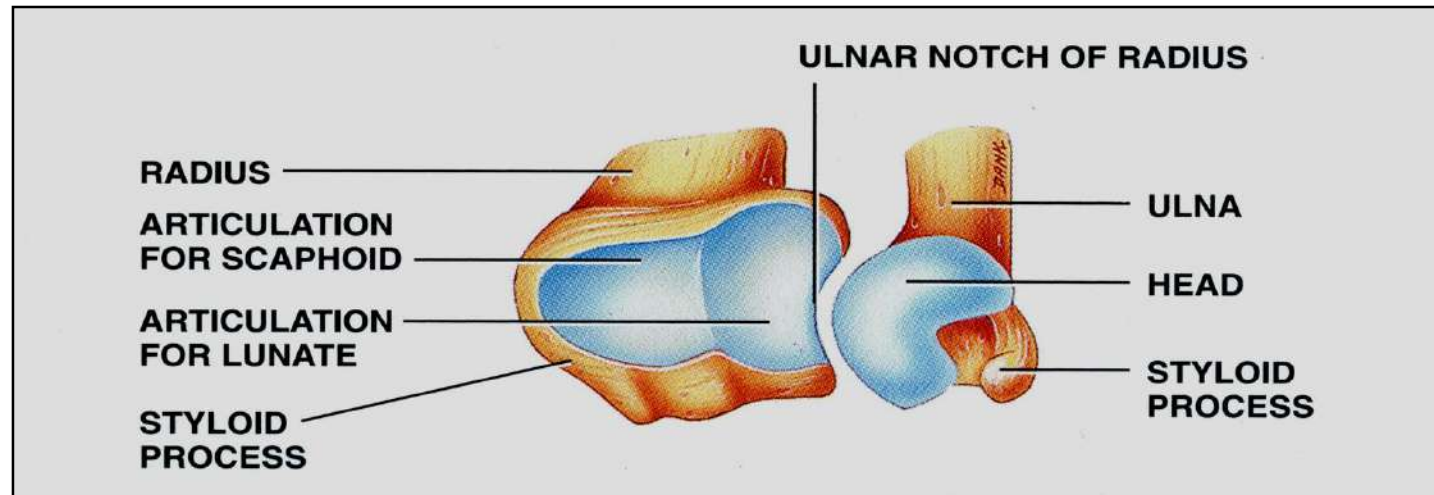
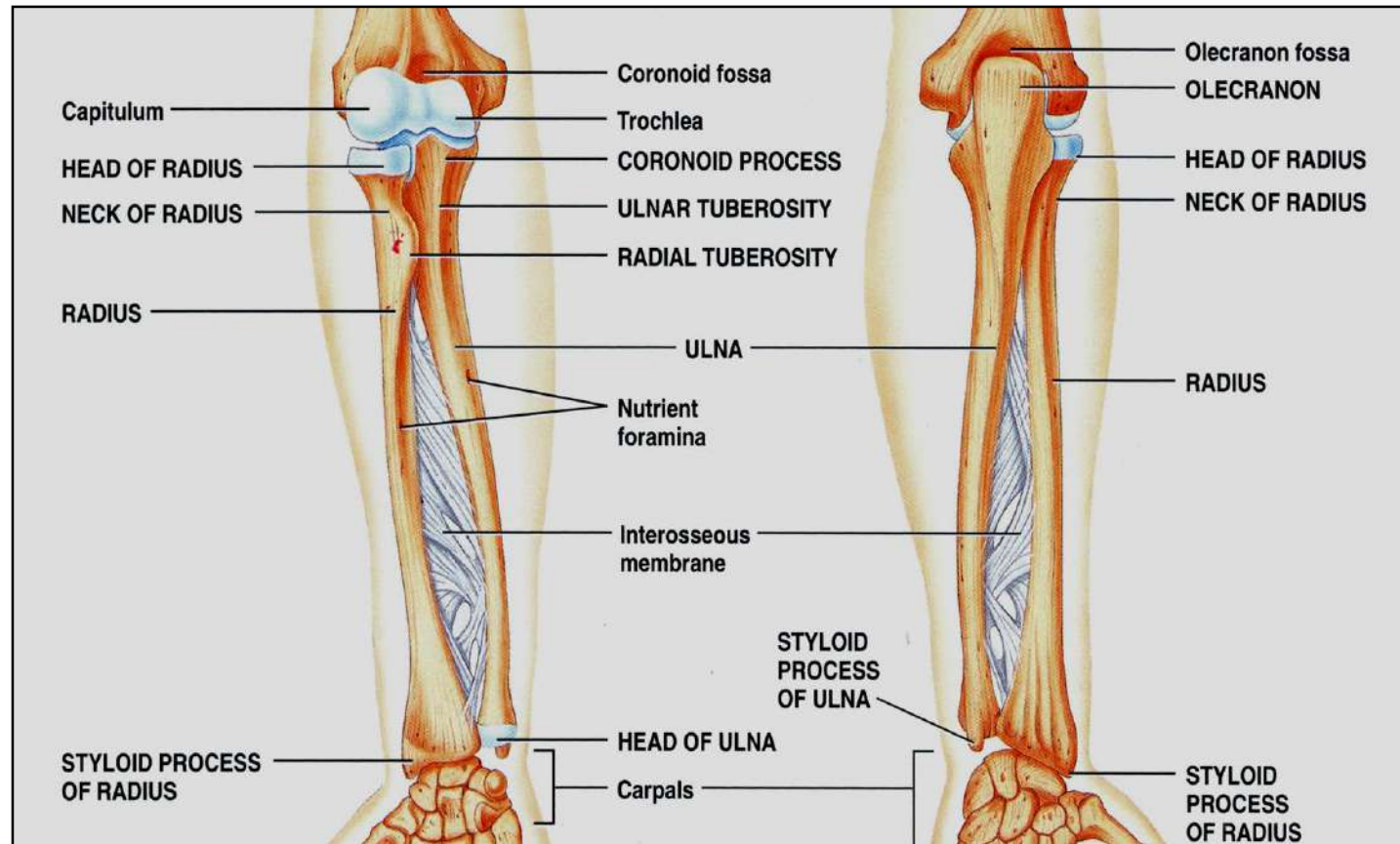
## B. Shaft (body):

\* Has a sharp lateral border, **the interosseous border**, to which the interosseous membrane is attached.

*→ lateral in the medial Bone*

## C. Lower end:

\* shows head and styloid process of ulna.



# 6. Bones of Hand

## A. The Carpal Bones (Carpus): <sup>Short Bones</sup> 8

\* The carpal bones are eight bones which are arranged in a proximal and a distal row, and are held firmly together by ligaments.

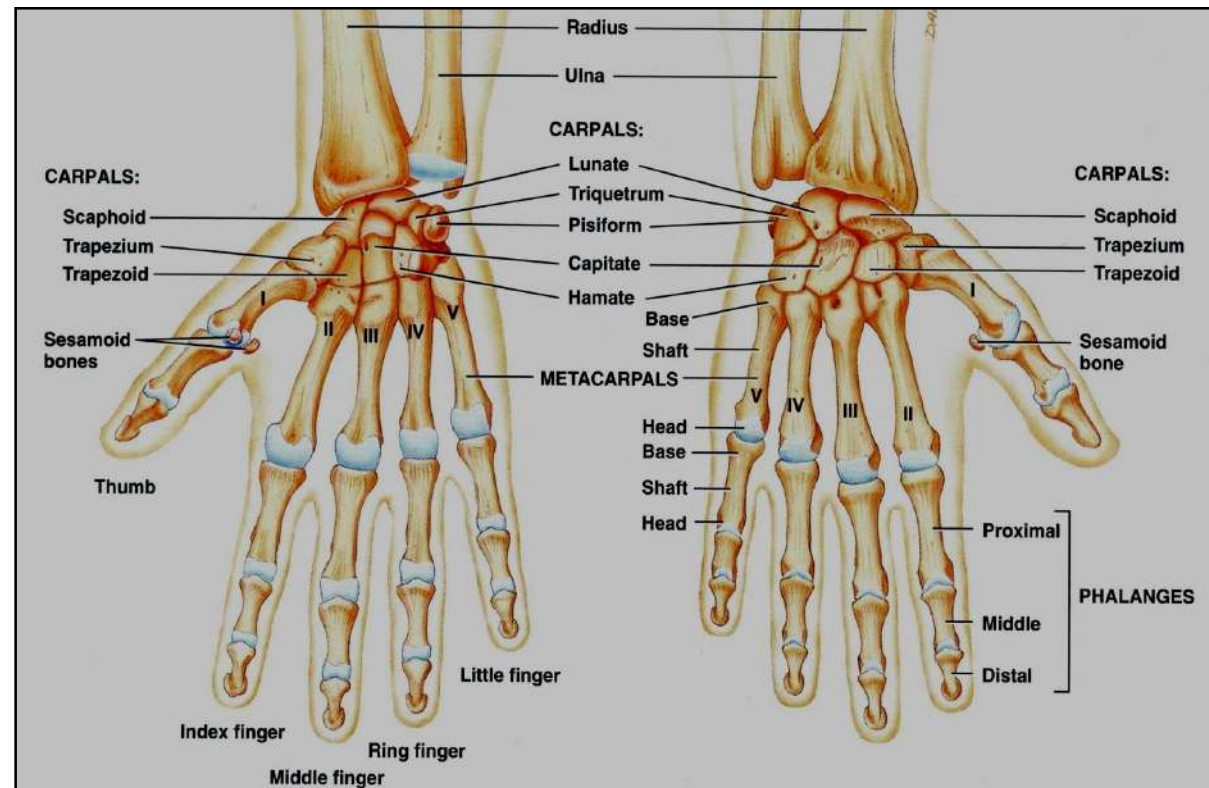
### A. Proximal row:

\* Is formed by the following bones (from lateral to medial): <sup>1</sup> scaphoid, <sup>2</sup> lunate, <sup>3</sup> triquetrum, and <sup>4</sup> pisiform.

### B. Distal row:

\* Is formed by the following bones (from lateral to medial): <sup>5</sup> trapezium, <sup>6</sup> trapezoid, <sup>7</sup> capitate, and <sup>8</sup> hamate.

↓  
Hook of Hamate  
مخرج صند



## B. The Metacarpal Bones:

short longy Bone

Bone: they are short, But have the criteria of long Bones [2 ends & shaft]

\* There are five metacarpal bones; the 1<sup>st</sup> one is that of the thumb.

\* Each metacarpal has: a proximal base, a body, and a distal head.

## C. The Phalanges:

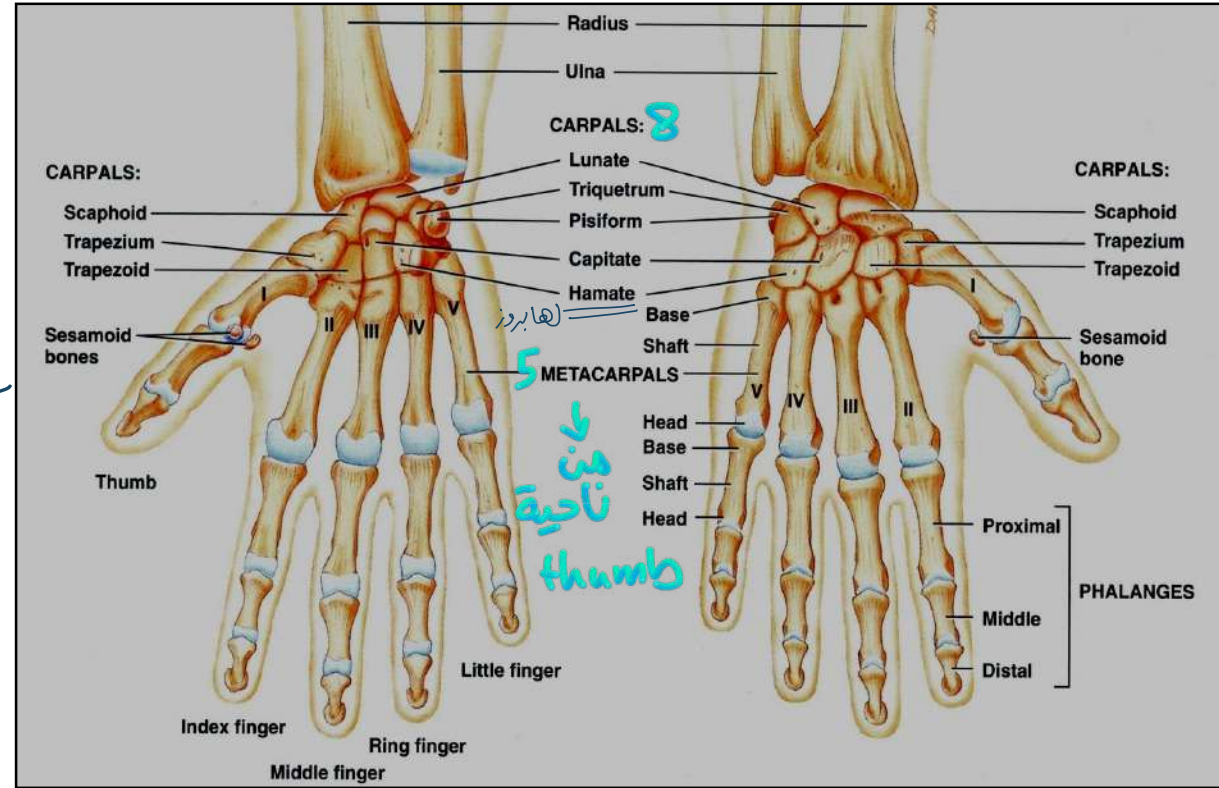
short longy Bone

\* There are two phalanges in the thumb and three in each of the medial four digits.

\* Each phalanx has: a proximal base, a body, and a distal head.

from lateral to medical  
→

نقطه  
thumb



except the thumb, only has proximal + distal [each finger has 3 phalanges except the thumb, it has only two]



Thank You  
Thank You  
Thank You!!!!