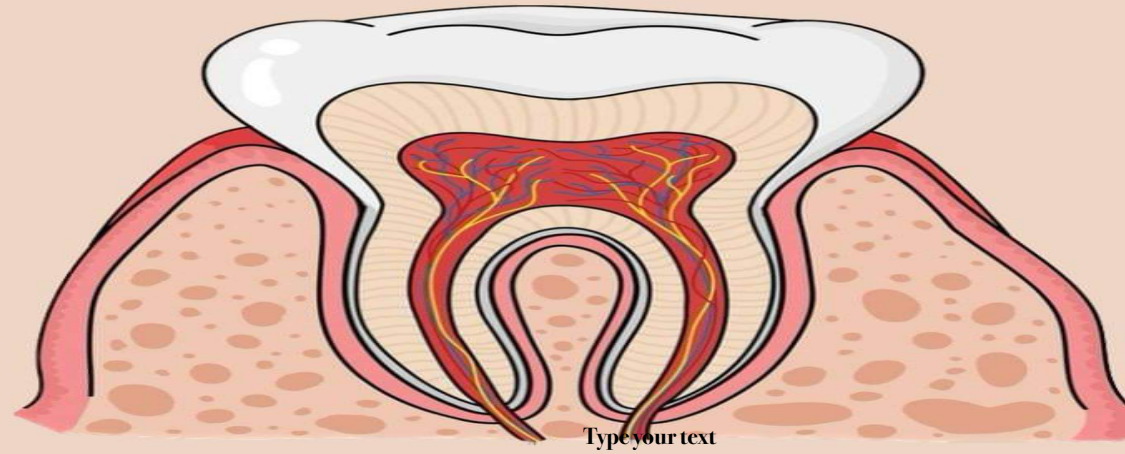




# ANATOMY



LEC NO. : 5  
DONE BY : Nour Al-amoush.

وَقُلْ رَبِّ زِدْنِي عِلْمًا



# Appendicular system part 2

General Anatomy lecture # 4

**Bones of lower limb**

By Heba Ali  
DDS, MSc, PhD (UK)

BONE MARKING	EXAMPLE
<b>Linear elevation</b>	
Line	Superior nuchal line of the occipital bone
Ridge	The medial and lateral supracondylar ridges of the humerus
Crest	The iliac crest of the hip bone
<b>Rounded elevation</b>	
Tubercle	Pubic tubercle
Protuberance	External occipital protuberance
Tuberosity	Greater and lesser tuberosities of the humerus
Malleolus	Medial malleolus of the tibia, lateral malleolus of the fibula
Trochanter	Greater and lesser tuberosities of the humerus
<b>Sharp elevation</b>	
Spine or spinous process	Ischial spine, spine of the vertebra
Styloid process	Styloid process of temporal bone

### Expanded ends for articulation

Head	Head of humerus, head of femur
Condyle	Medial and lateral condyles of femur (knuckle-like process)
Epicondyle (a prominence situated just above condyle)	Medial and lateral epicondyles of femur

### Small flat area for articulation

Facet	Facet on head of rib for articulation with vertebral body
-------	-----------------------------------------------------------

### Depressions

Notch	Greater sciatic notch of hip bone
Groove or sulcus	Bicipital groove of humerus
Fossa	Olecranon fossa of humerus, acetabular fossa of hip bone

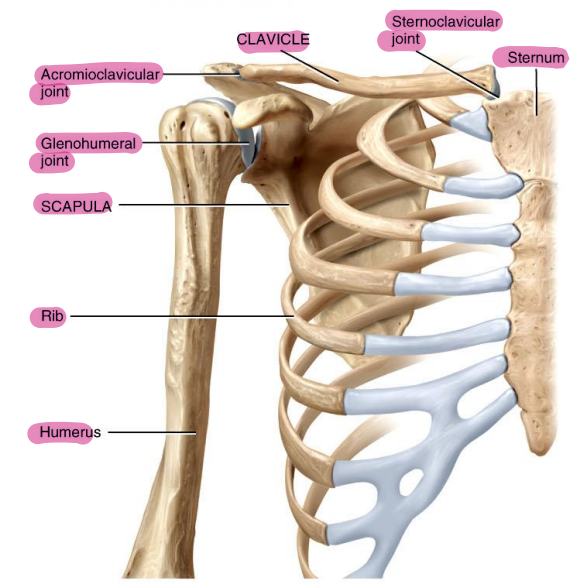
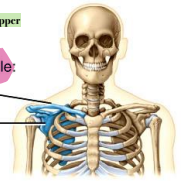
### Openings

Fissure	Superior orbital fissure
Foramen	Infraorbital foramen of the maxilla
Canal	Carotid canal of temporal bone
Meatus	External acoustic meatus of temporal bone

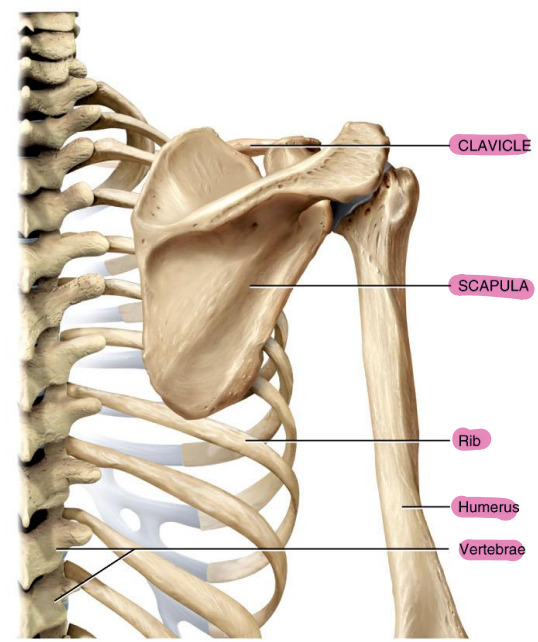
• A quick recap of the previous lecture. *☆ اگہا جہتہ وجہ من قبلہ ...*

Structure which connect upper limb with axial skeleton

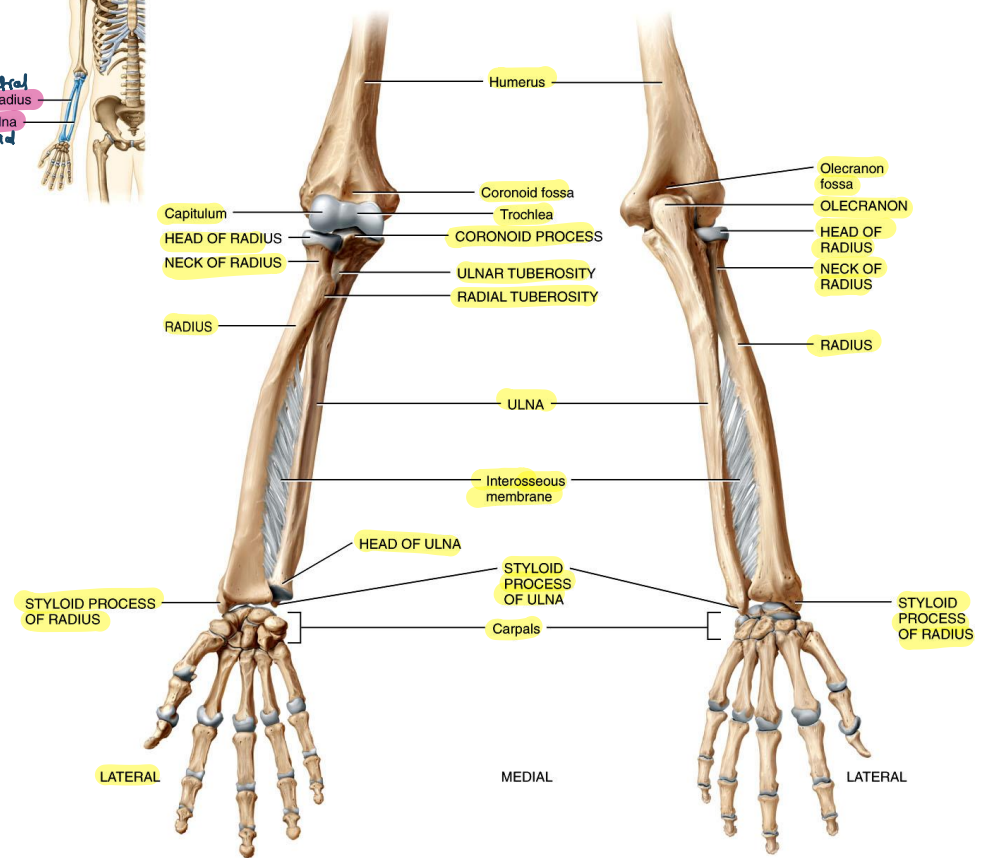
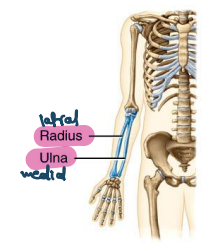
Pectoral girdle:  
Clavicle  
Scapula



(a) Anterior view of pectoral girdle



(b) Posterior view of pectoral girdle



(a) Anterior view

(b) Posterior view



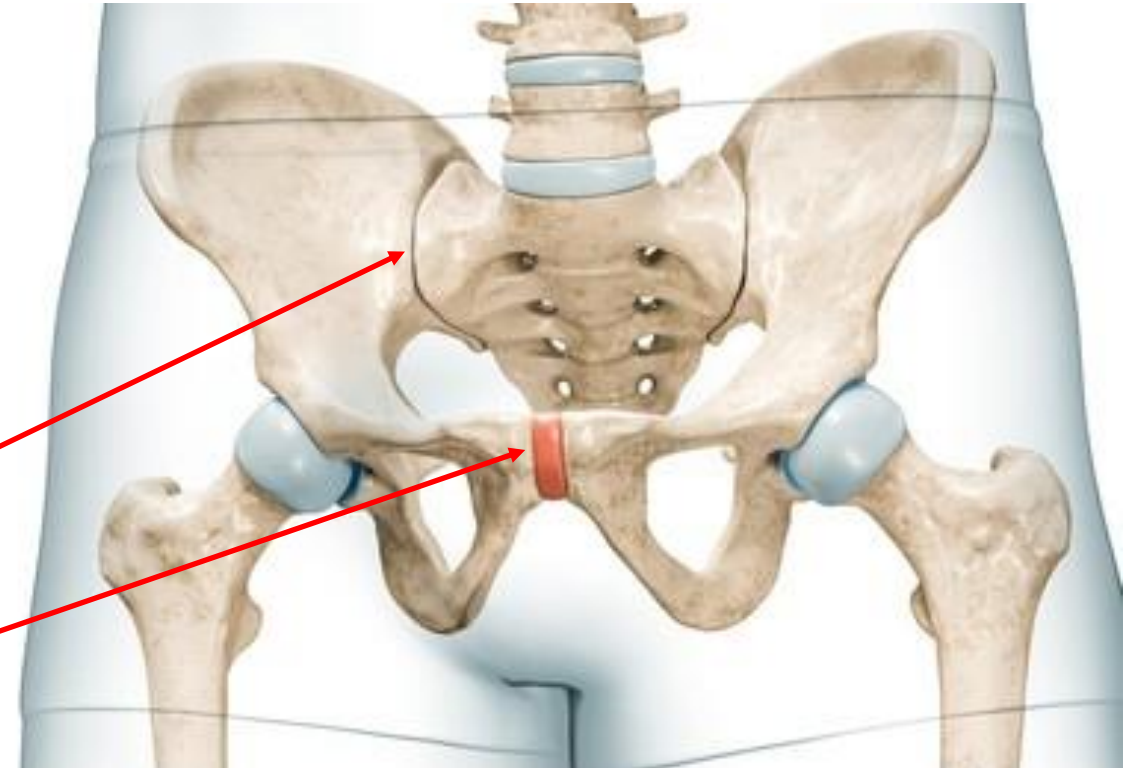
هو عبارة عن connection between lowerlimb (appendicular skeleton)

شئ بشبه اجزاء (لعمل الخ نشاء و يحيط بها)

# Pelvic girdle (os coxae)

related to bones ↑

- **Equivalent of the upper limb clavicle and scapula.** <sup>بمماثلته</sup>
- **The pelvic girdle connects bones of lower limb to axial skeleton.** (sacrum)
- **The pelvic girdle consists of the two hip bones.** <sup>عظام الوركين</sup>
- **The hip bones articulate posteriorly with the sacrum to form sacroiliac joints,** and <sup>\* Between sacrum and hip bones</sup>
- **anteriorly with each other to form symphysis pubis.** <sup>\* axis of body, موجود بين</sup>



Between two hip bones. (توفر support داخلية) <sup>movements و اذا كان في زوايا مختلفة</sup>

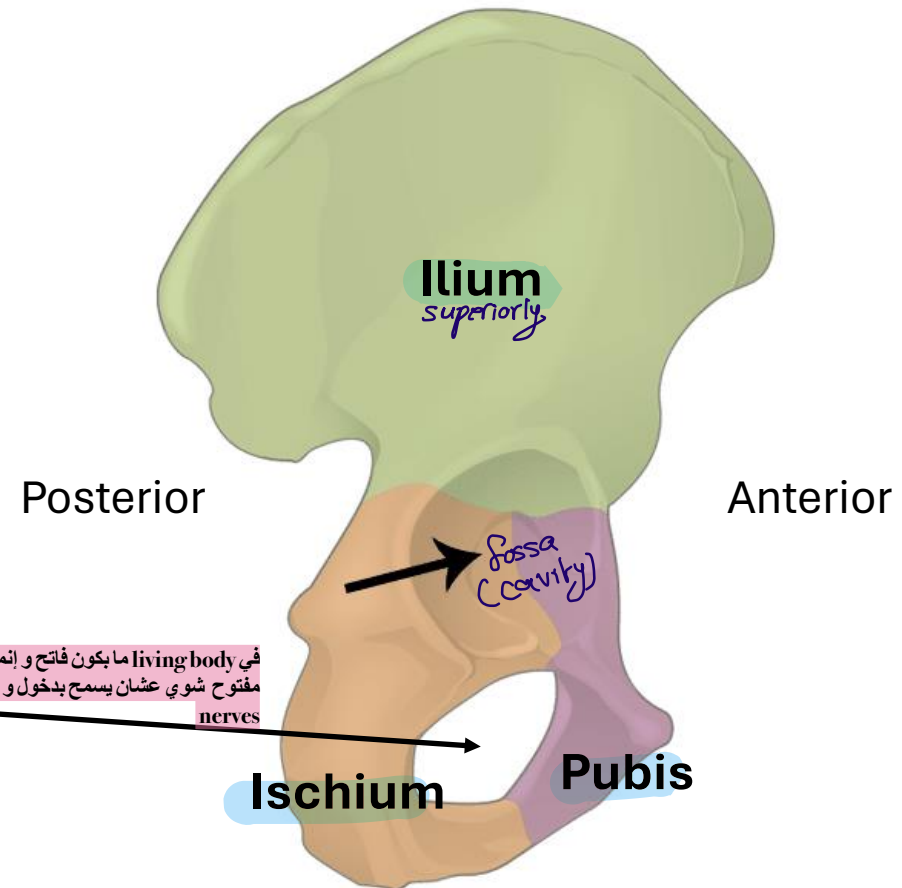
Symphysis joints → very strong joints  
vertebral column في منعم موجودين

# Hip Bone

Fusion of 3 bones (ilium, ischium, pubis)

في بينهم cartilage عند infant لكن عند adult بصير له تصلب و بصيروا one bone

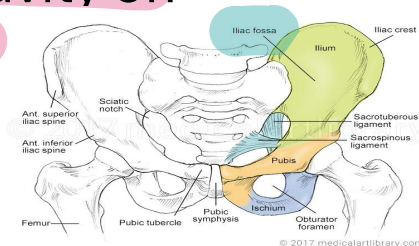
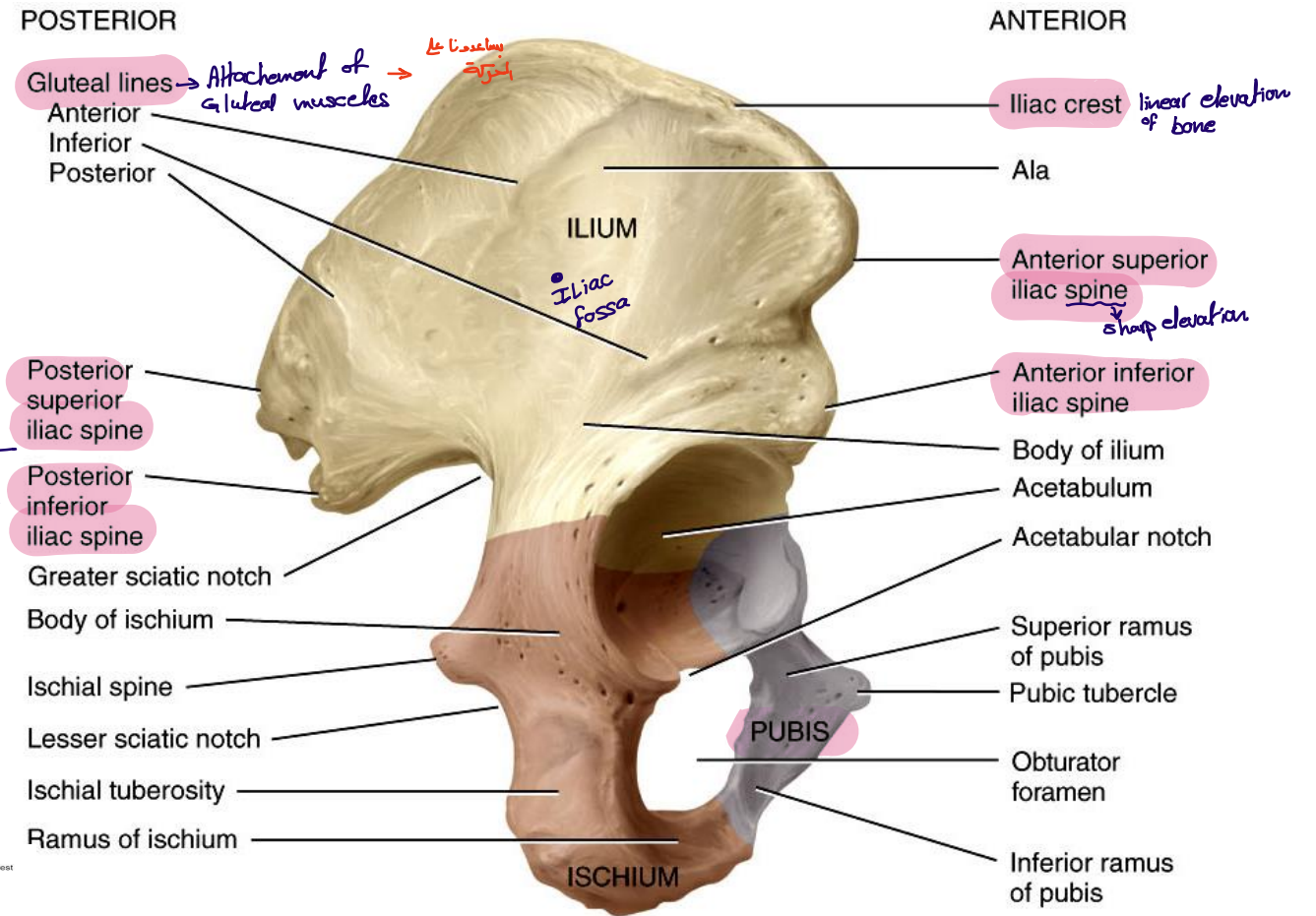
- Each hip bone is large & irregularly-shaped.
- Its lateral surface has near its centre a deep cup-shaped cavity named the **acetabulum**, which articulates with head of femur to form hip joint. **Acetabulum : 3 مكوّن من bones (Ilium, pubis, ischium)**
- Below the acetabulum the bone presents a large oval or triangular gap, the **obturator foramen**. **large foramen**
- The hip bone has three parts: **ilium, pubis** and **ischium**



Lateral view

# The Ilium *superiorly*

- Includes the upper part of acetabulum & the expanded, flattened area of bone above it.
- Its upper margin is curved and is termed **iliac crest**. *→ elevation*
- Its anterior border presents **anterior superior iliac spine (ASIS)** & **anterior inferior iliac spine (AIIS)**.
- Its posterior border presents **posterior superior iliac spine (PSIS)** & **posterior inferior iliac spine (PIIS)**. The lateral surface of the ilium is called the **gluteal surface**.
- Iliac fossa** is a concavity on anteromedial surface



# The Pubis

→ Anterior, inferior of hip bone

- Forms the anterior portion of the lower expanded part of the hip, and the **lower anterior** part of the acetabulum.

- It consists of a **body**, a **superior ramus**, and an **inferior ramus**.

↓  
إحدى ذراعي

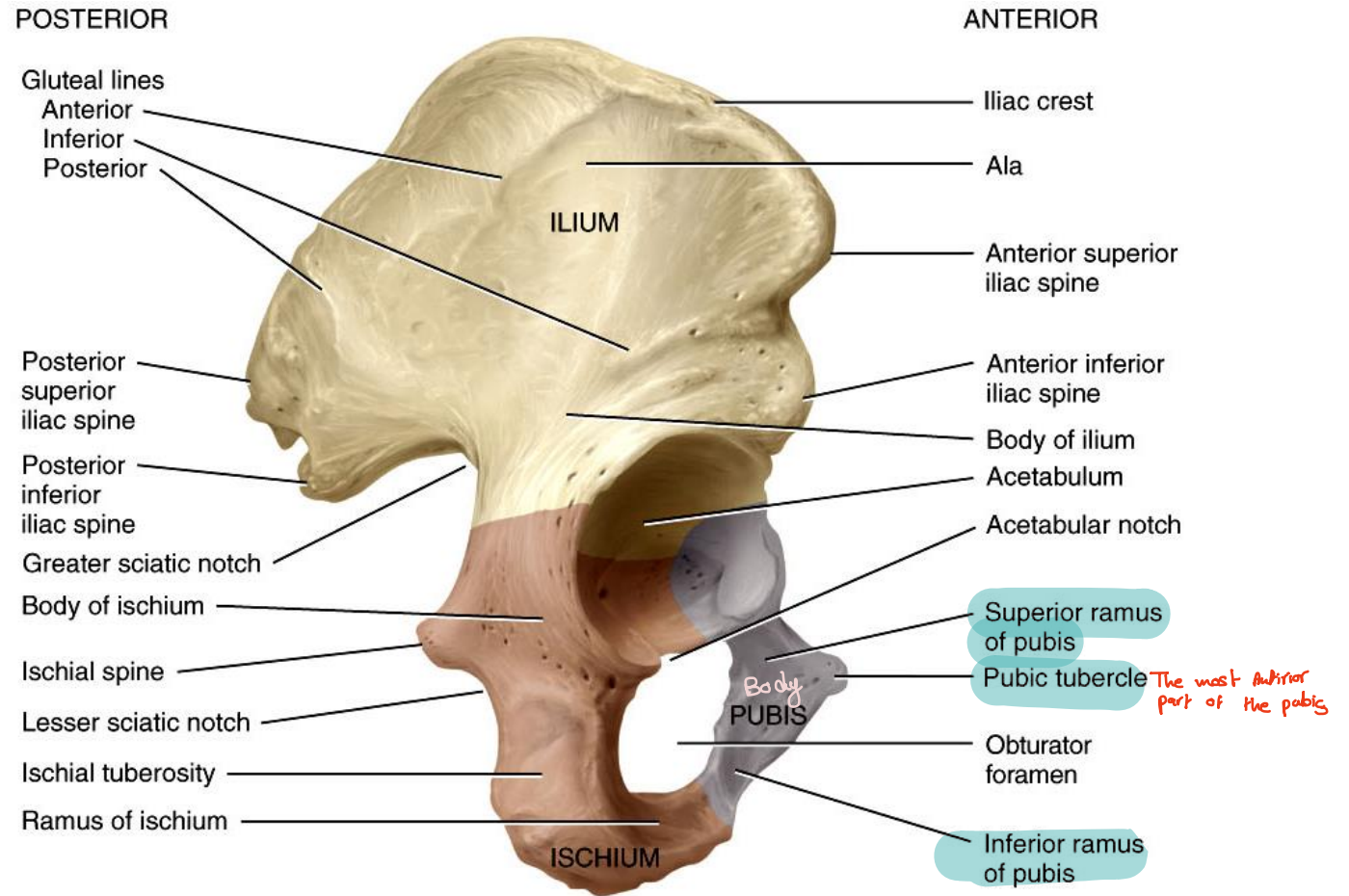
- Pubic tubercle**

↓  
part of the body

→ elevation  
وهو جزء بارز جدا

- The body articulates with the body of the opposite pubis → from other hip bone forming the **symphysis pubis**.

↓  
Joint



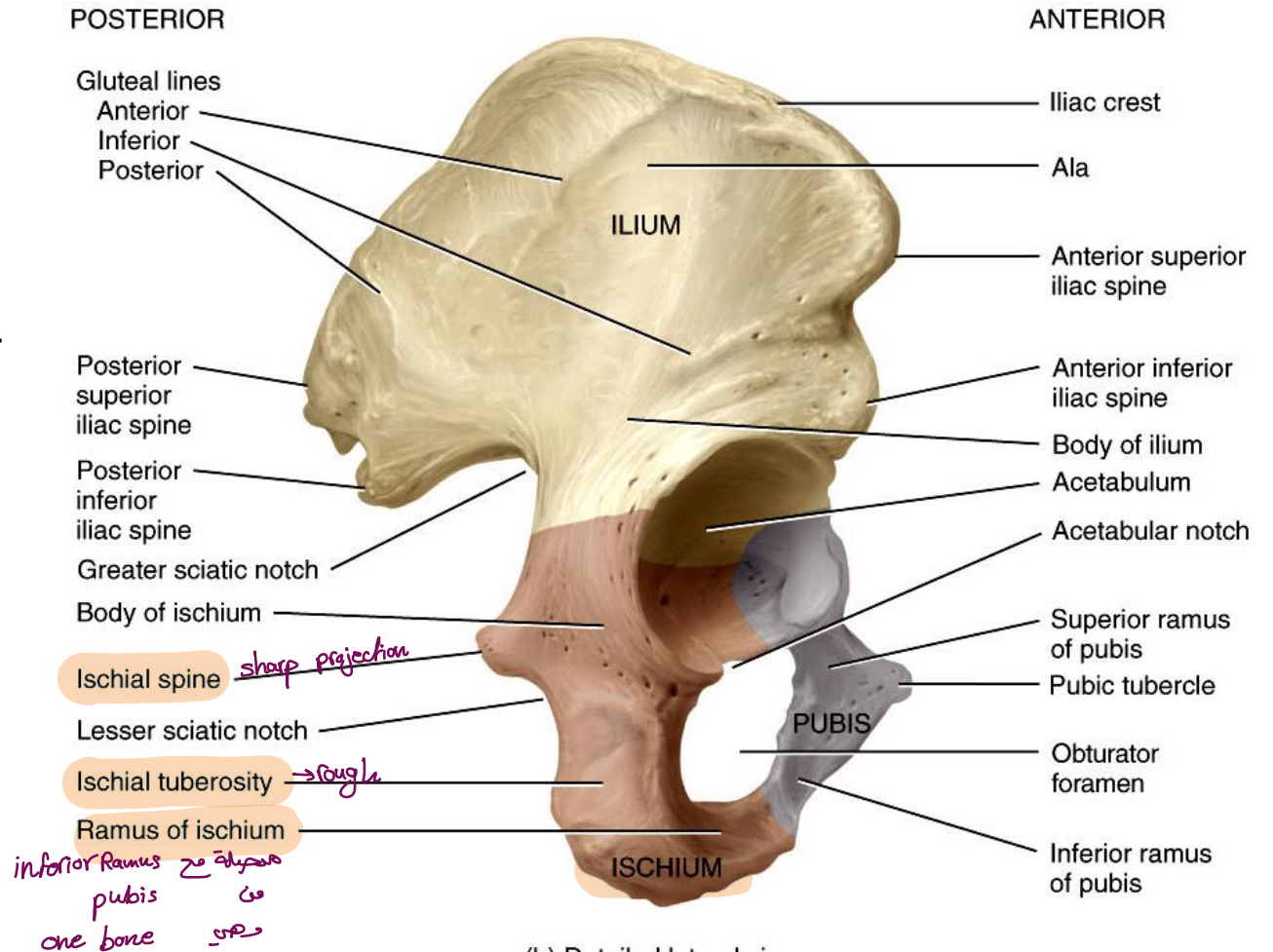
(b) Detailed lateral view

→ The most anterior part of the pubis



# The Ischium

- Forms the posterior portion of the lower expanded part of hip and the **lower posterior** part of acetabulum.
- It consists of: a **body** and a **ramus**, which is continuous with the inferior ramus of the pubis.
- The **ischial tuberosity** is a large rough area situated on the lower part of the body. *هو عتاء خشونة، وهي مهمة جداً لأنها متصلة مع muscles*
- The posterior border of ischium is continuous with posterior border of ilium.



(b) Detailed lateral view

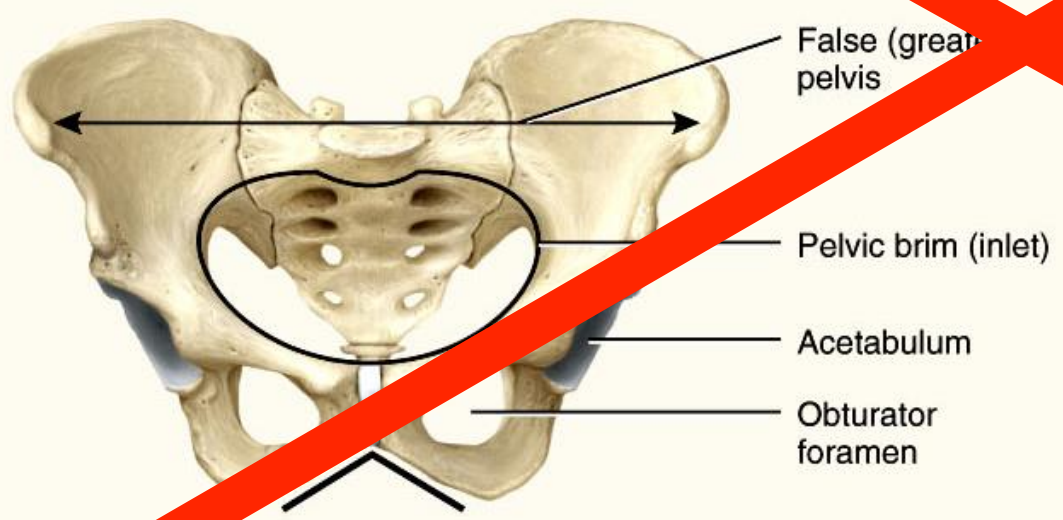
**Ischial spine** is a sharp projection, which intervenes between the **greater and lesser sciatic notches**.

*أهميته إنه يعمل 2 notches  
above → part of ilium  
below → part of ischium  
نسبة 1  
يلعب بتخزين  
lower limb  
منه تأخذ  
nerves  
muscles*

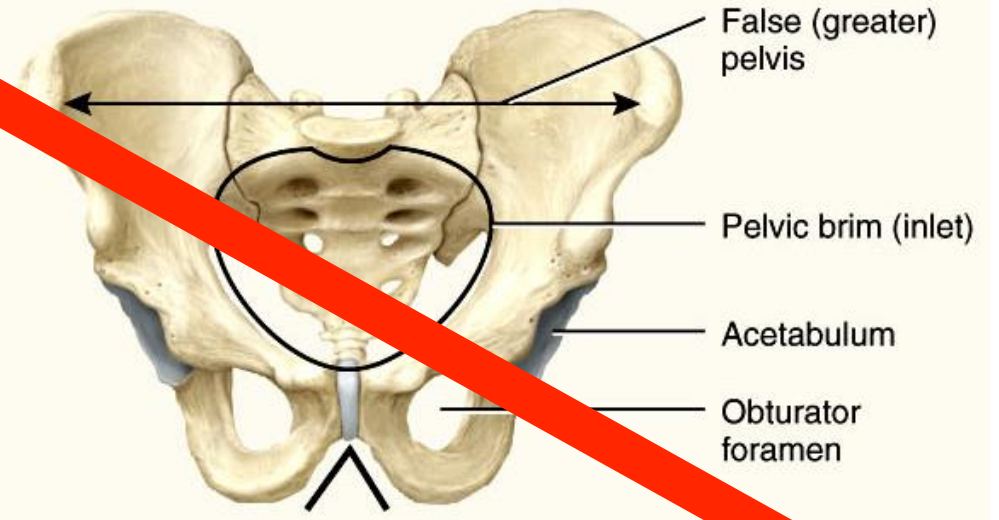
*inferior Ramus of pubis is one bone*

# Comparing Male and Female Pelvis

POINT OF COMPARISON	FEMALE	MALE
General structure	Light and thin.	Heavy and thick.
False (greater) pelvis	Shallow.	Deep.
Pelvic brim (inlet)	Large and more oval. تقريباً بيضوي	Small and heart-shaped.
Acetabulum	Small and faces anteriorly.	Large and faces laterally.
Obturator foramen	Oval.	Round.
Pubic arch	Greater than 90° angle.	Less than 90° angle.



Pubic arch (greater than 90°)  
its important for its function of  
childbirth + pregnancy



Pubic arch (less than 90°)

Anterior views

# The Femur

→ The longest bone in the body

ما يتكون مسقطية ،  
أزمر تالون ماثلت  
لتحمل الوزن

**Greater trochanter**  
large (laterally)

**Neck**

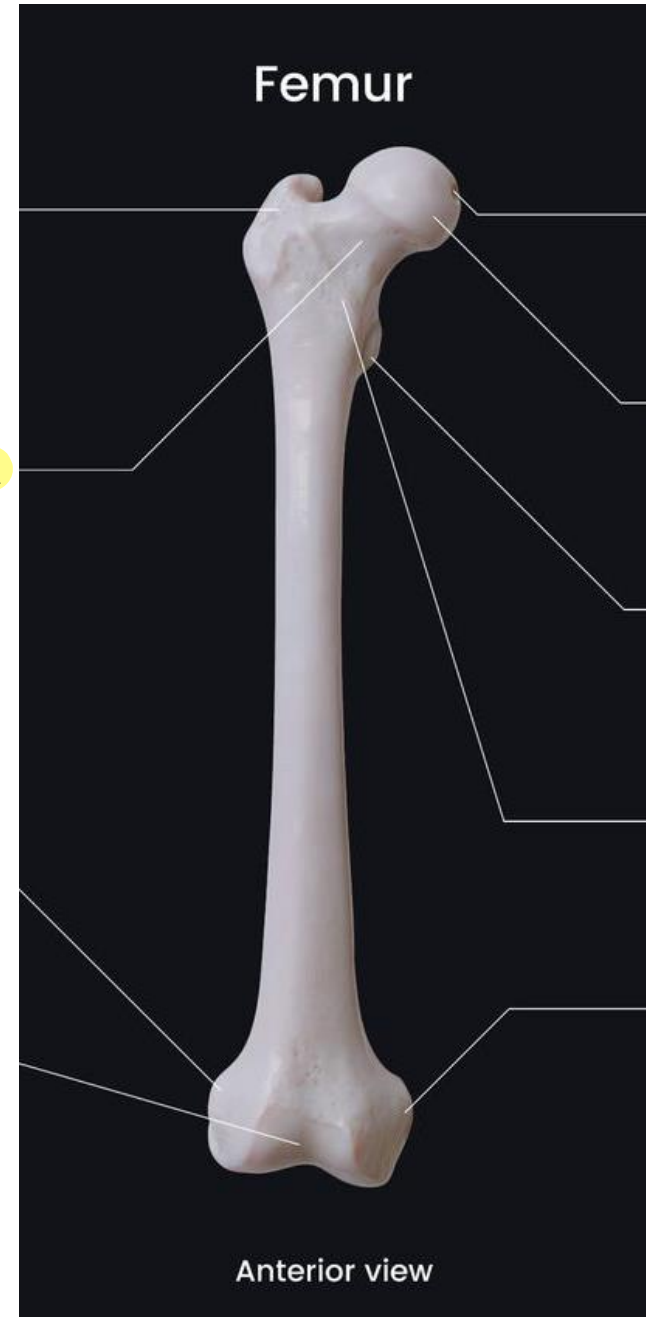
**Head** → larger than the head of the humerus (more stable)

**Lesser trochanter** small (medially)

**Intertrochanteric line** (Between lesser + greater)  
↓  
no elevation

له لما أتطلع posteriorly  
يكون crest  
ستوي elevation

- **Proximal end: head, neck, and greater and lesser trochanters.**
- **The head:** more than half of a sphere, articulates with acetabulum of the hip, to form the hip joint.
- **The neck** is about 5 cm long & connects the head to shaft.
- **The intertrochanteric line** is a rough ridge, which runs downwards and medially on **anterior aspect** of the bone from greater trochanter to lesser trochanter.

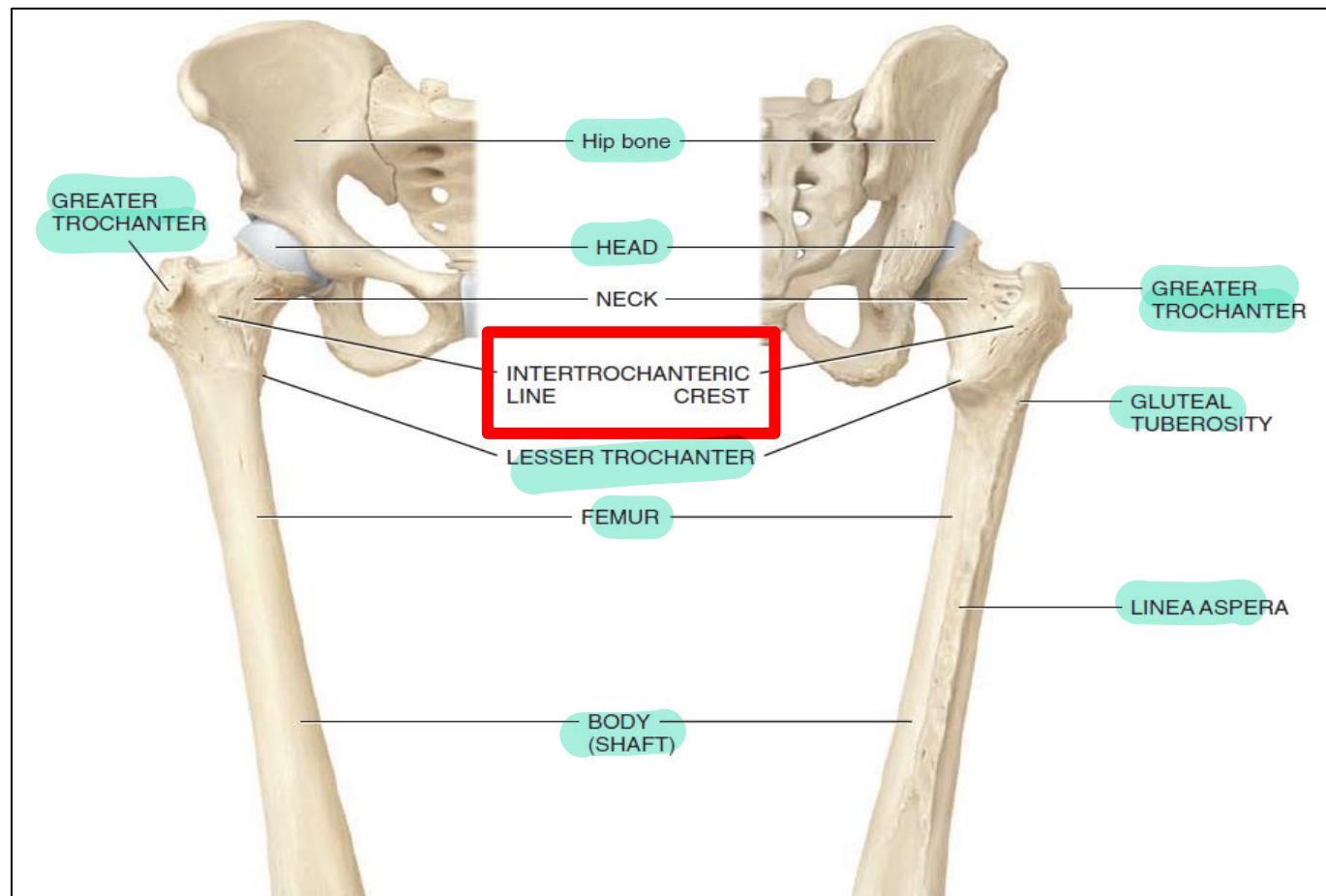


- **The intertrochanteric crest** is a smooth elevation on posterior aspect of the bone between greater and lesser trochanters.

*Anteriorly → smooth rounded, posteriorly → linear, sharp muscles 2o deep*

- **Shaft:** The middle third of the posterior aspect of femur presents a broad, rough vertical ridge termed **linea aspera** continuous superiorly with another vertical ridge, called **gluteal tuberosity**.

*posterior, important for attachment with gluteal (muscles)*





away from origin  
↑

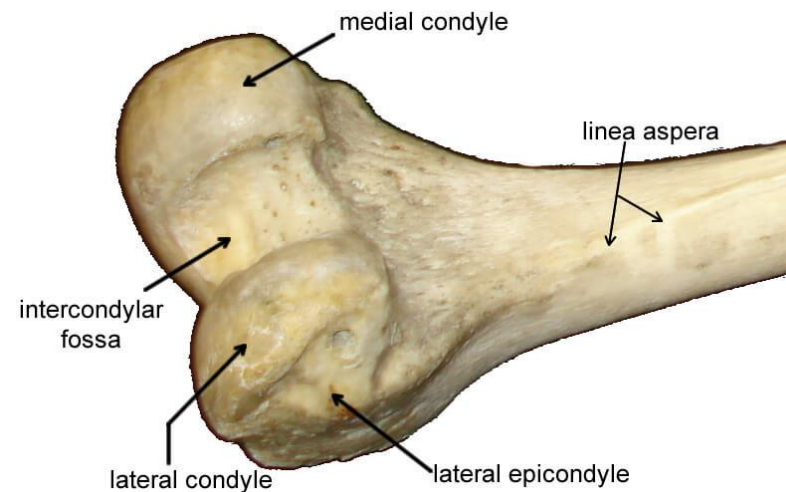
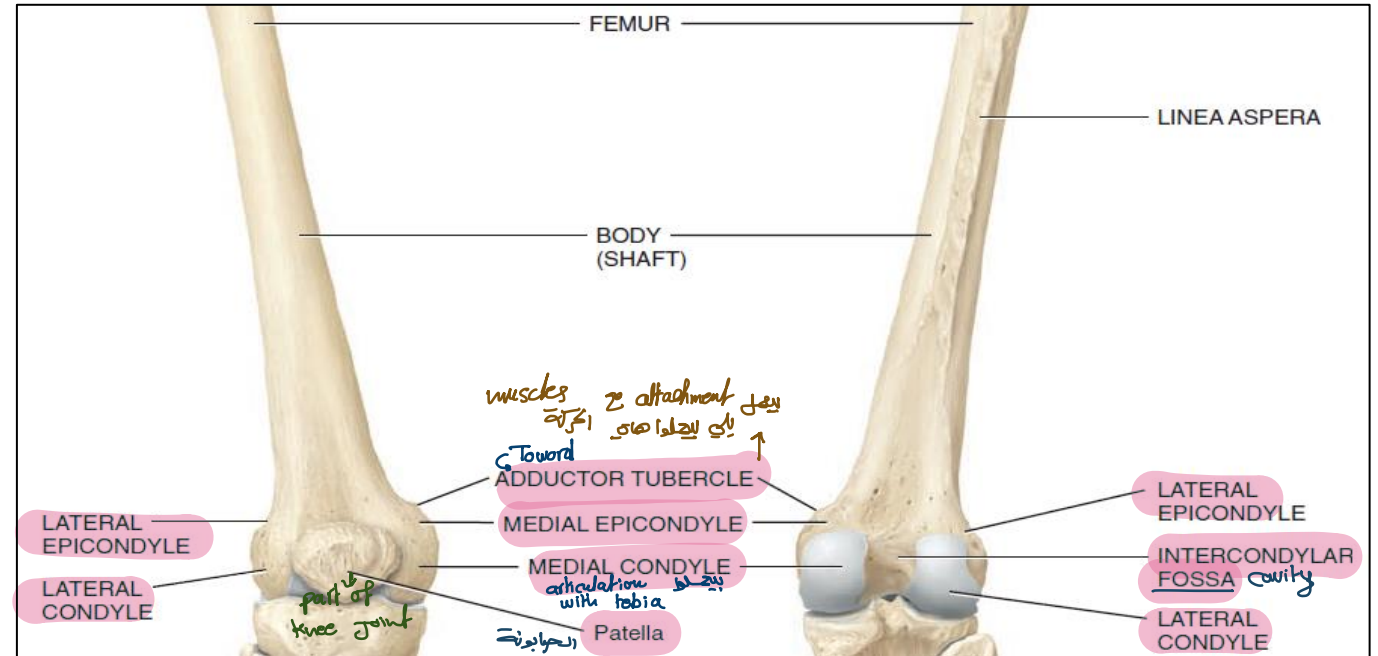
- **Distal end:** The expanded lower end consists of two large masses, the **medial and lateral condyles**, which unite anteriorly, but separated posteriorly by the deep **intercondylar fossa**.

- Anteriorly, the condyles form a broad n-shaped articular surface for articulation with the **patella** anteriorly and the **tibia** below. → To form knee joint

- Superior to the medial and lateral condyles, are the **medial, and lateral epicondyles**, respectively

Anterior view

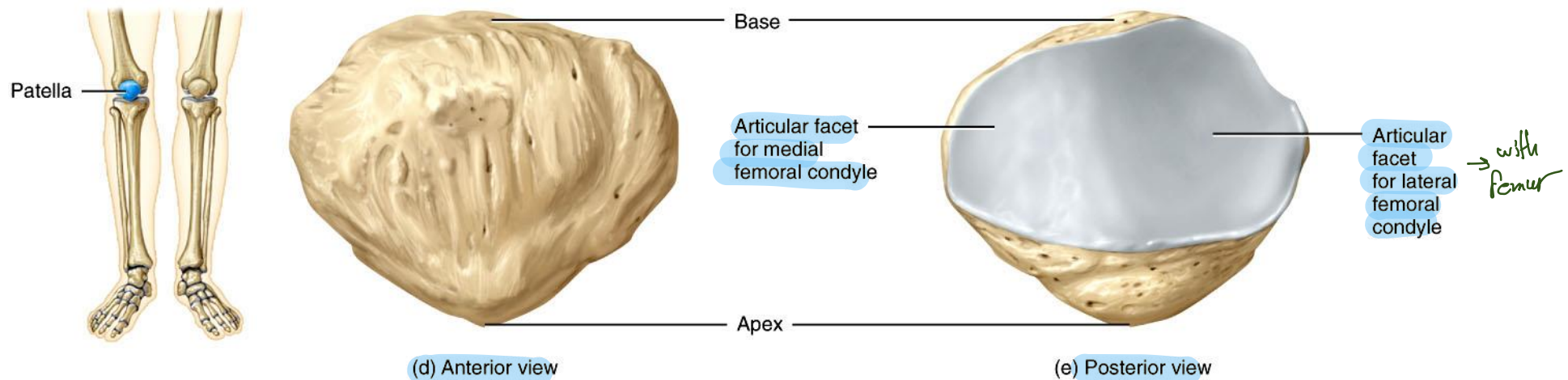
Posterior view



# The Patella

→ one of the sesamoid bones  
→ developed in tendons

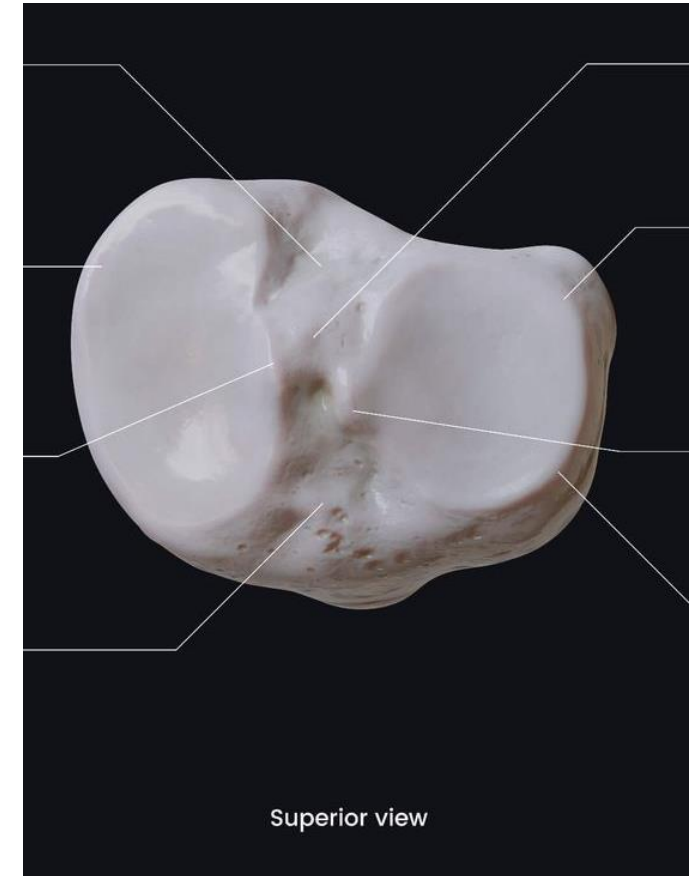
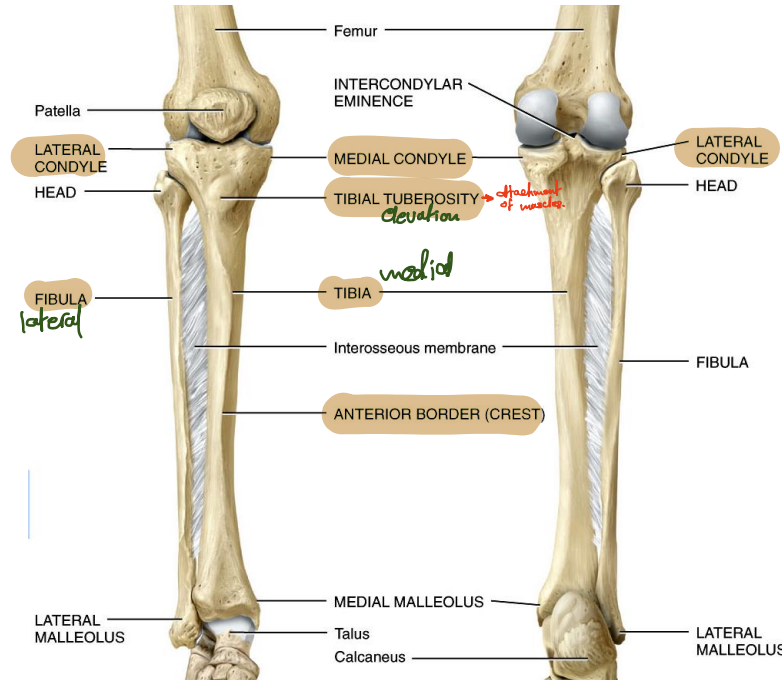
- **The patella** is a triangular sesamoid bone (bone inside tendon), located in front of the knee joint.
- Largest sesamoid bone in the body
- The **base** of the patella forms the upper border, whereas the **apex** is pointed inferiorly.
- The posterior surface contains two articular facets, for articulation with the medial and lateral condyles of the femur (in knee joint).



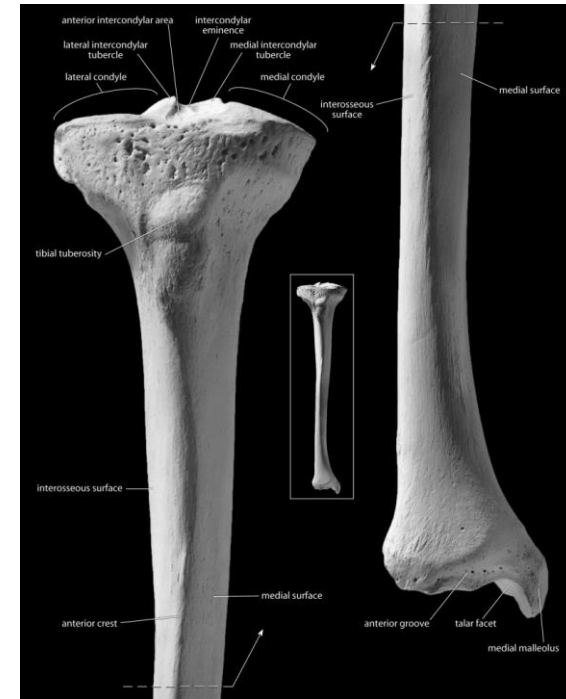
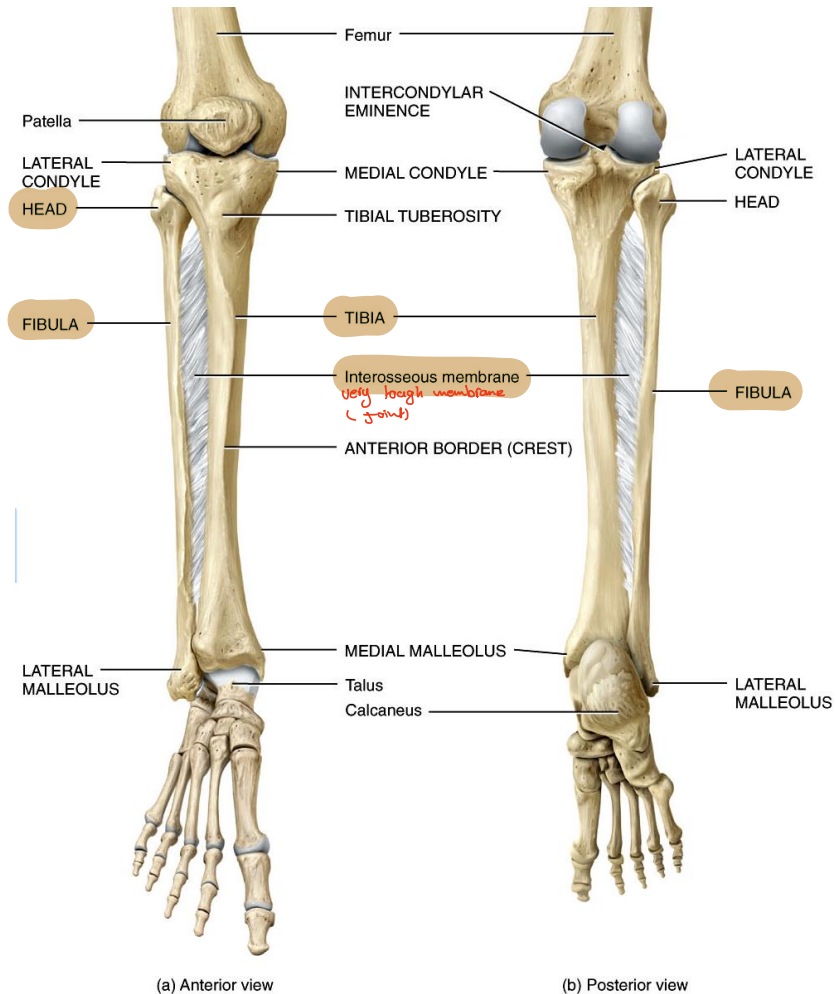
# Tibia

→ articulates with the femur

- The tibia is the medial, larger, and much stronger one of the two bones of the leg.
- **Proximal end:** Shows the **medial and lateral condyles**.
- The medial condyle is relatively larger than the lateral one.
- The upper surface of each condyle is smooth and articulates with the corresponding condyle of femur (in the knee joint).



- **Shaft:** **The tibial tuberosity** lies at the upper end of anterior border of the shaft.
- The lateral border is sharp and is called the **interosseous border** to which the interosseous membrane is attached *articulation ↓ مع medial of fibula*
- On the posterior aspect of the lateral condyle there is a facet for articulation with the head of fibula forming the **superior tibio-fibular joint**.



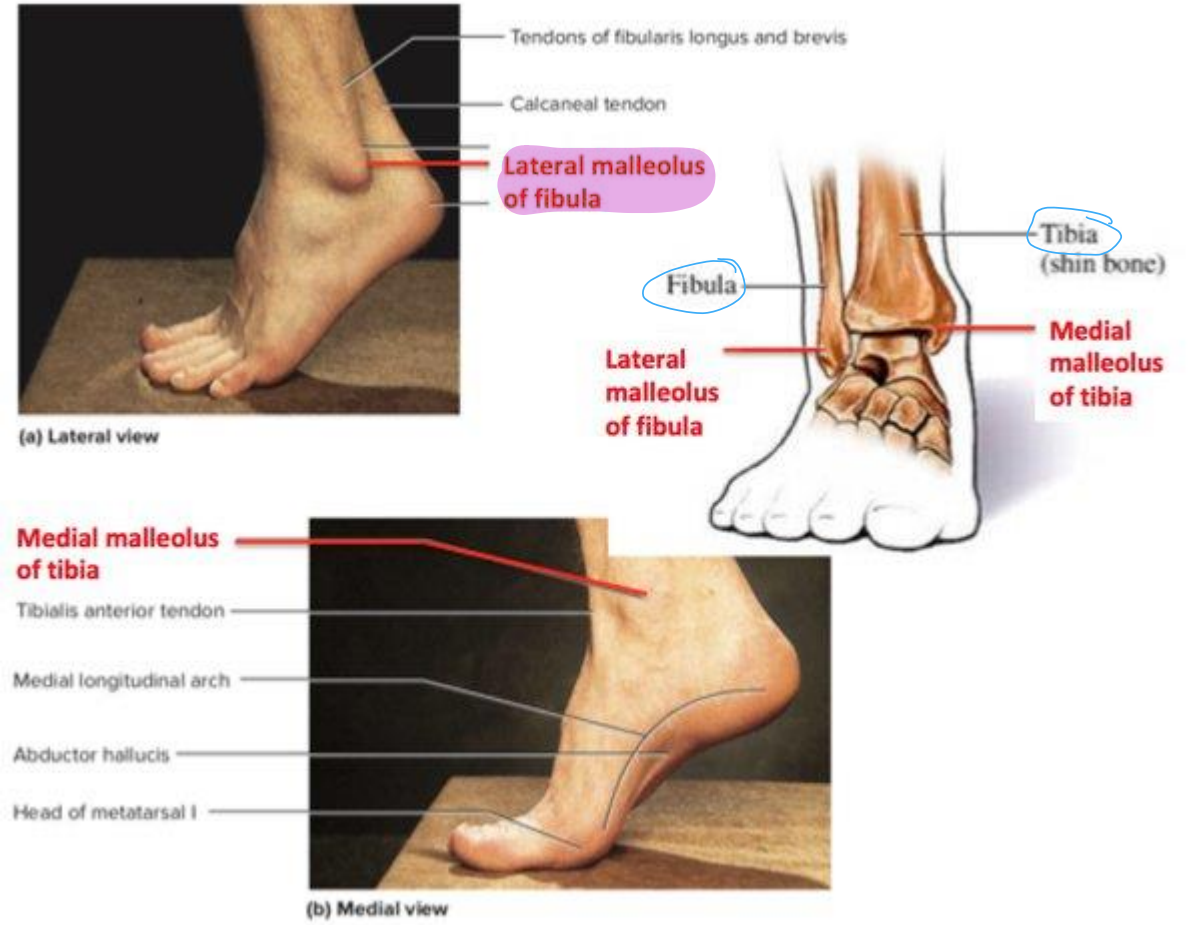


بیشتر حصہ القدم  
میں آئے

- **Distal end:** The medial aspect of the lower end presents inferiorly the **medial malleolus**. This forms the prominence on medial aspect of ankle.   
*lateral → part of fibula*  
*medial → " " tibia*

- The inferior surface of this end articulates with talus bone (in ankle joint). \* On the lateral aspect of lower end, there is a rough depression, the fibular notch, to which the lower end of fibula → **inferior tibio fibular joint**.

1+2 → from articulation of tibia with fibula.



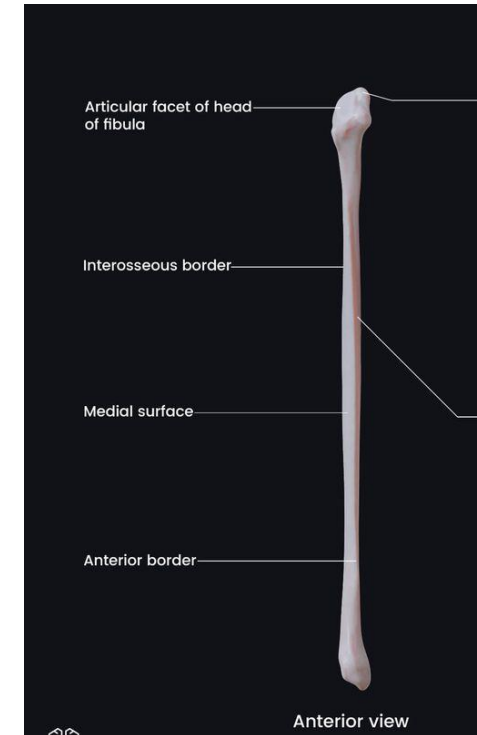
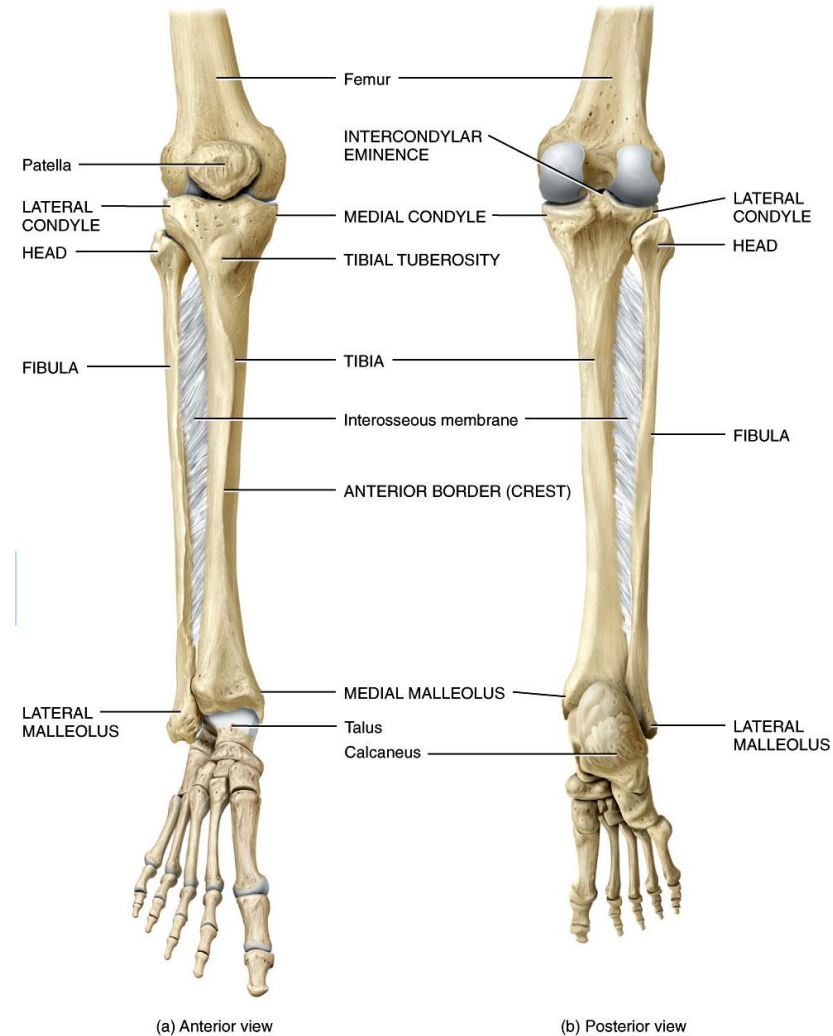
شظیرہ

# Fibula

→ it is not part of knee joint

- The fibula is the lateral bone of the leg.
- It has an upper end (**head**), **shaft**, and **lower end**.
- The medial border of the shaft is called **interosseous border**, to which the interosseous membrane is attached.
- The lower end has a projection, **the lateral malleolus**. This forms the prominence on the lateral aspect of the ankle.
- <sup>ما تحمل وزن</sup> it is not a weight-bearing bone. Its main function is to combine with the tibia and provide stability to the ankle joint.

• fibula هي من الأساس تعمل كدعم مع التibia



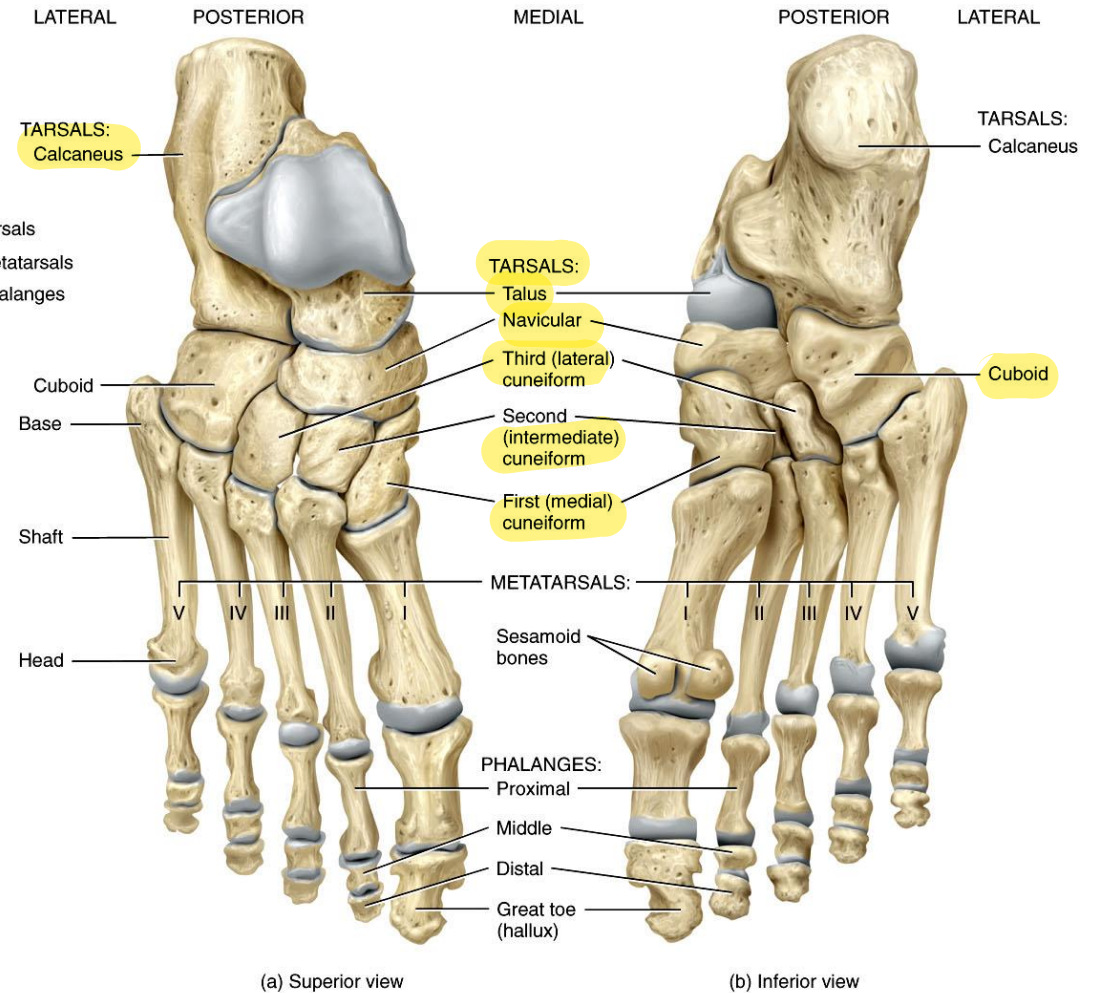
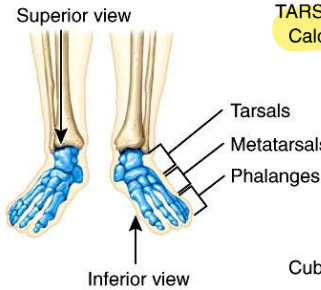
# Bones of Foot

## • The Tarsal Bones (Tarsus):

Form the proximal region of foot. consist of two large bones: **talus** & **calcaneus** + five smaller bones: **cube shaped** **③ cuboid** & **④ navicular bones** and **⑤ the medial, intermediate & lateral cuneiform bones**.

The talus bone articulates superiorly with lower end of the tibia to form ankle joint, inferiorly with <sup>heel bone</sup> calcaneus, and anteriorly with navicular bone.

Talus tibia articulates on this bone to form ankle joint

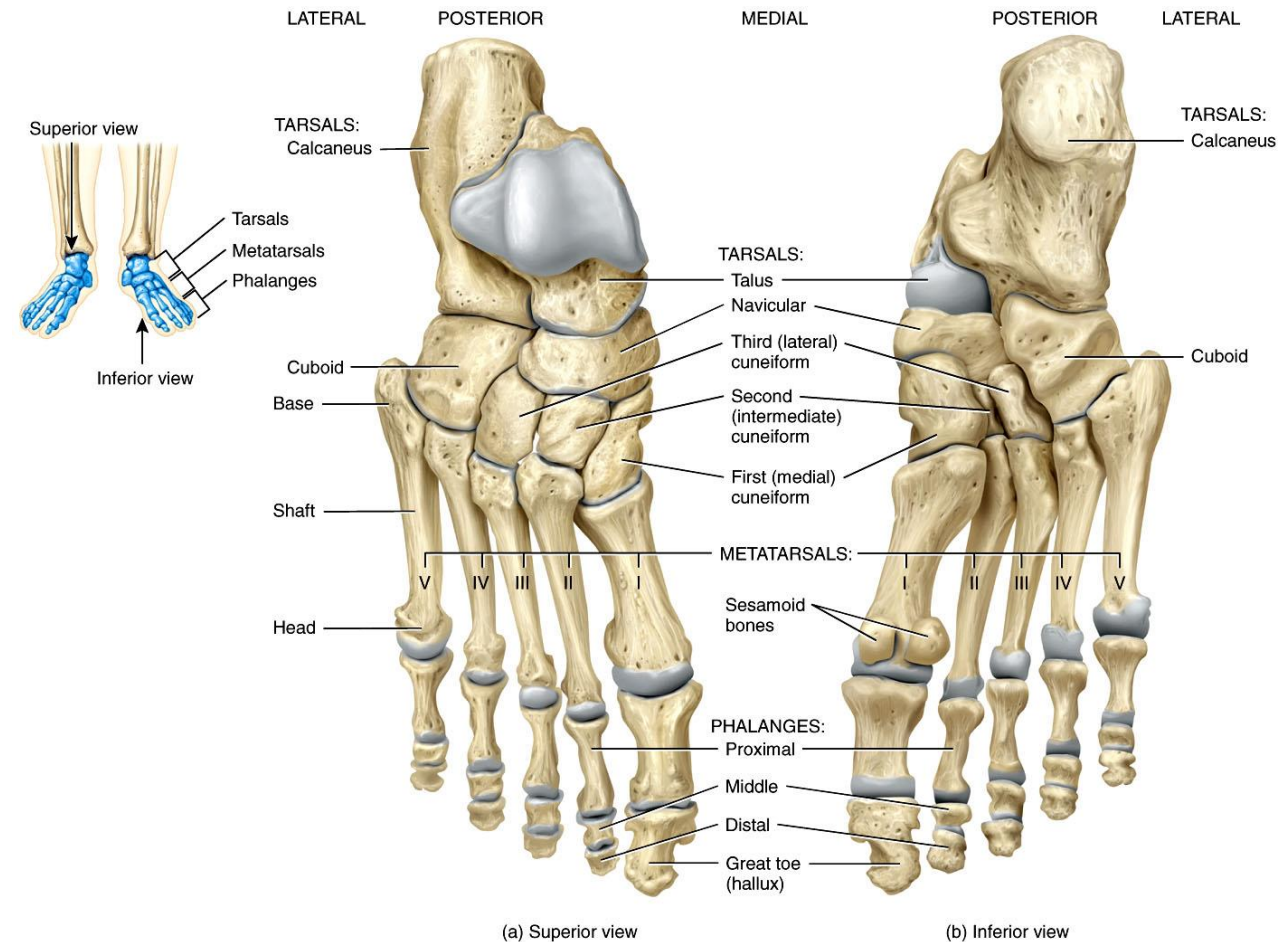


(a) Superior view

(b) Inferior view



- The three cuneiform bones articulate posteriorly with the navicular bone and anteriorly with the 1st, 2nd & 3rd metatarsal bones.
- The cuboid bone articulates posteriorly with calcaneus, <sup>عظمة الكعب</sup> medially with lateral cuneiform, and anteriorly with the fourth and fifth metatarsal bones.
- Joints between tarsal bones are called the **intertarsal joints**





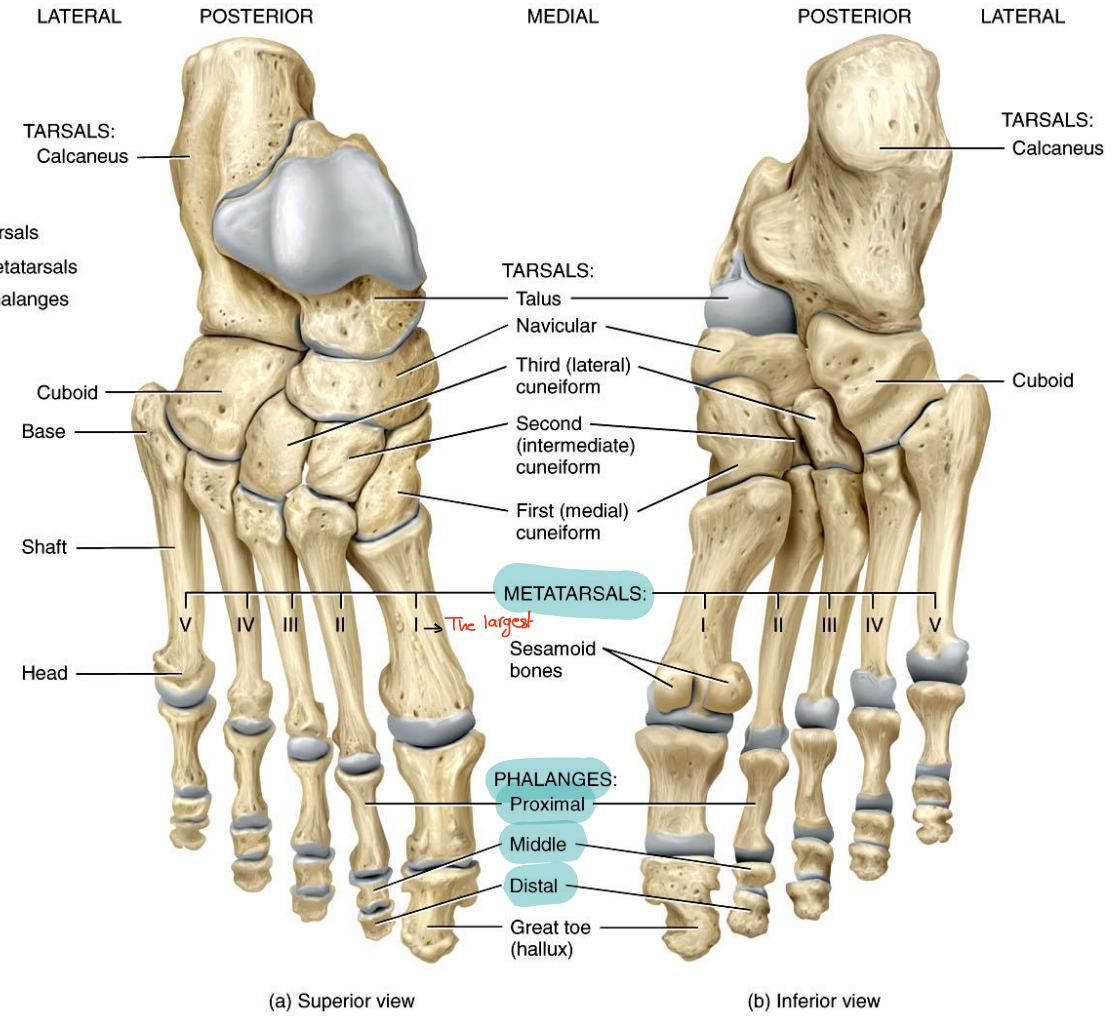
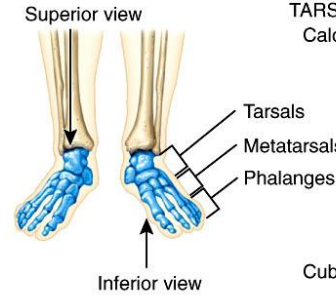
They are long bones → head → distal  
 → body (shaft)  
 → base → proximal

# The Metatarsal Bones

111

- In each foot there are five metatarsal bones.
- **The 1<sup>st</sup> one is that of the big toe.**
- Each one has a proximal base, a body & a distal head. C. The phalanges: There are two phalanges in the big toe and three in each one of the lateral four digits.

14



METATARSALS:

PHALANGES:

muscles + ligaments

بأي يلاحظهم هو

أحواس

# Arches of the Foot

① Medical  
② lateral  
③ transverse

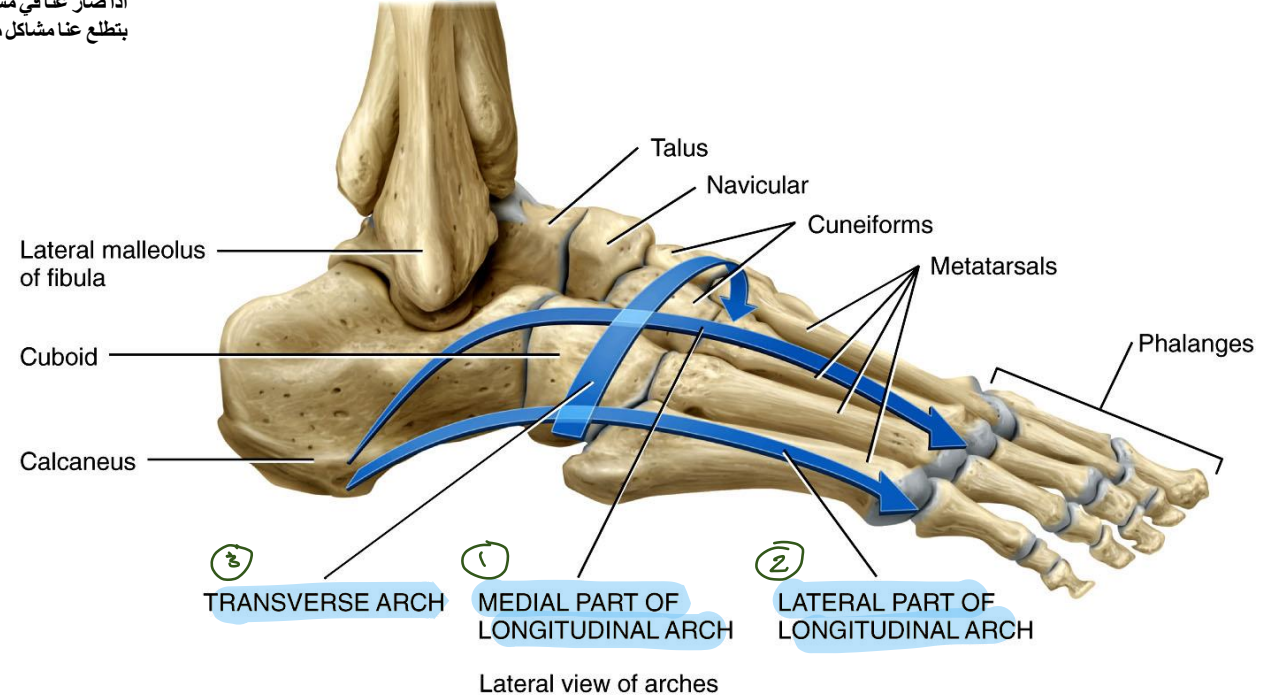
إذا صار عنا في مشاكل ب muscles رح يصير تغير في شكل arch و بتطلع عنا مشاكل مثل flat foot

The tarsal and metatarsal bones are arranged in such a way that they form arches in longitudinal and transverse axes of the foot.

The function of these arches is to distribute body weight over the soft and hard tissues of the foot.

Bones are held in position by ligaments and muscles tendons, Weakness of these ligaments and tendons results in a decrease in the height of the arches

Flat foot الوزن بينزل من vertebral column الى femur عن طريق hip bone الى knee joint و بيحمل جزء مهم جداً من وزن الجسم، و بيعدين ينقل الى foot و فيها اجزاء معينة مش كلها مثل calcaneus و head of the metacarpal bones، اذا صار في خلل ب balance رح يصير خلل بتوزيع الوزن



- Thank you!