

Systemic Module

MSS

“Anatomy”

Appendicular Skeleton II

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The Lower Limb

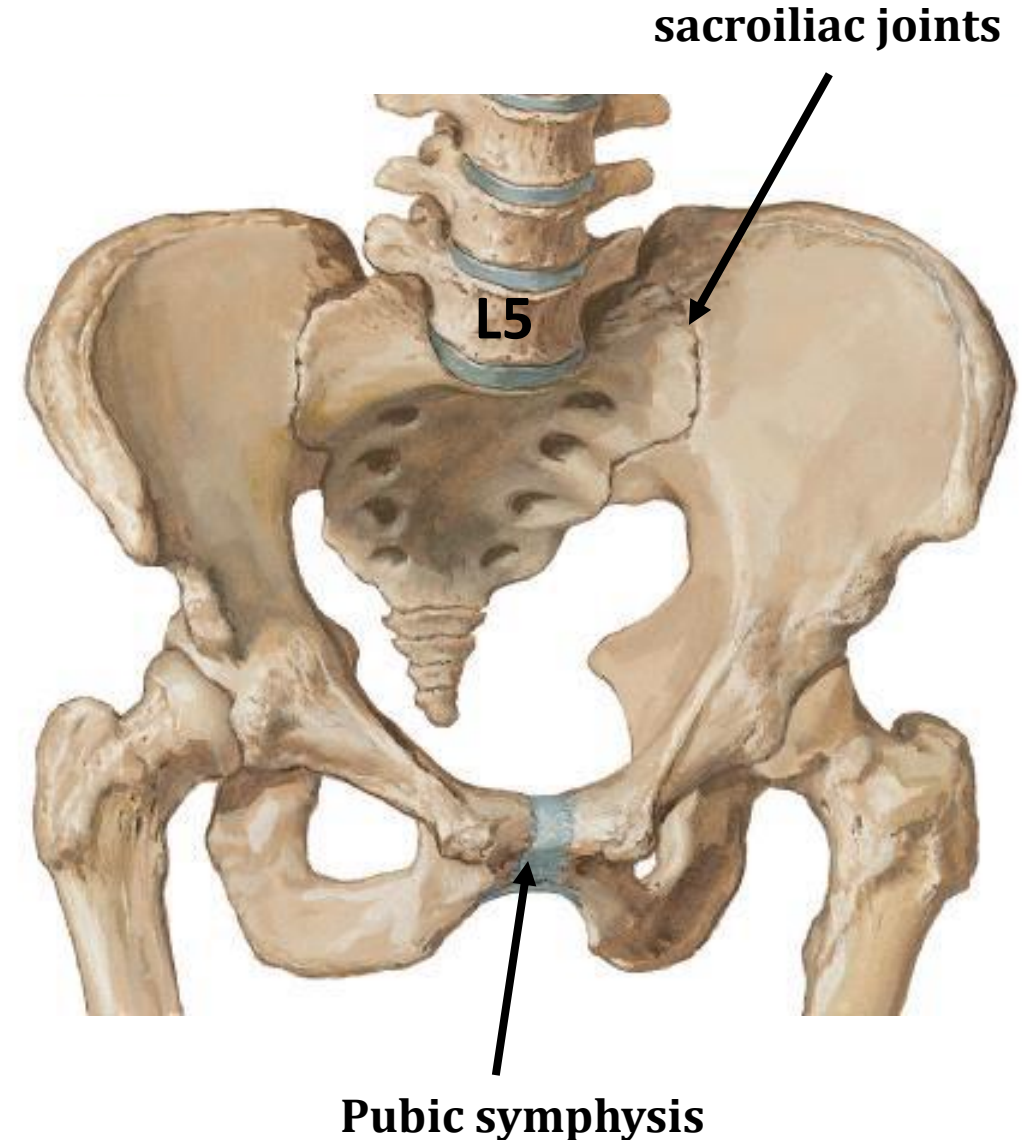
The lower limb is divided into:

- 1. Pelvis** is the area of lower limb attachment to the trunk.
- 2. Thigh** is the part of the lower limb between the hip and the knee joints
- 3. Leg** is the part of the lower limb between the knee joint and ankle joints.
- 4. Foot** is distal to the ankle joint.

Skeleton of Lower Limb

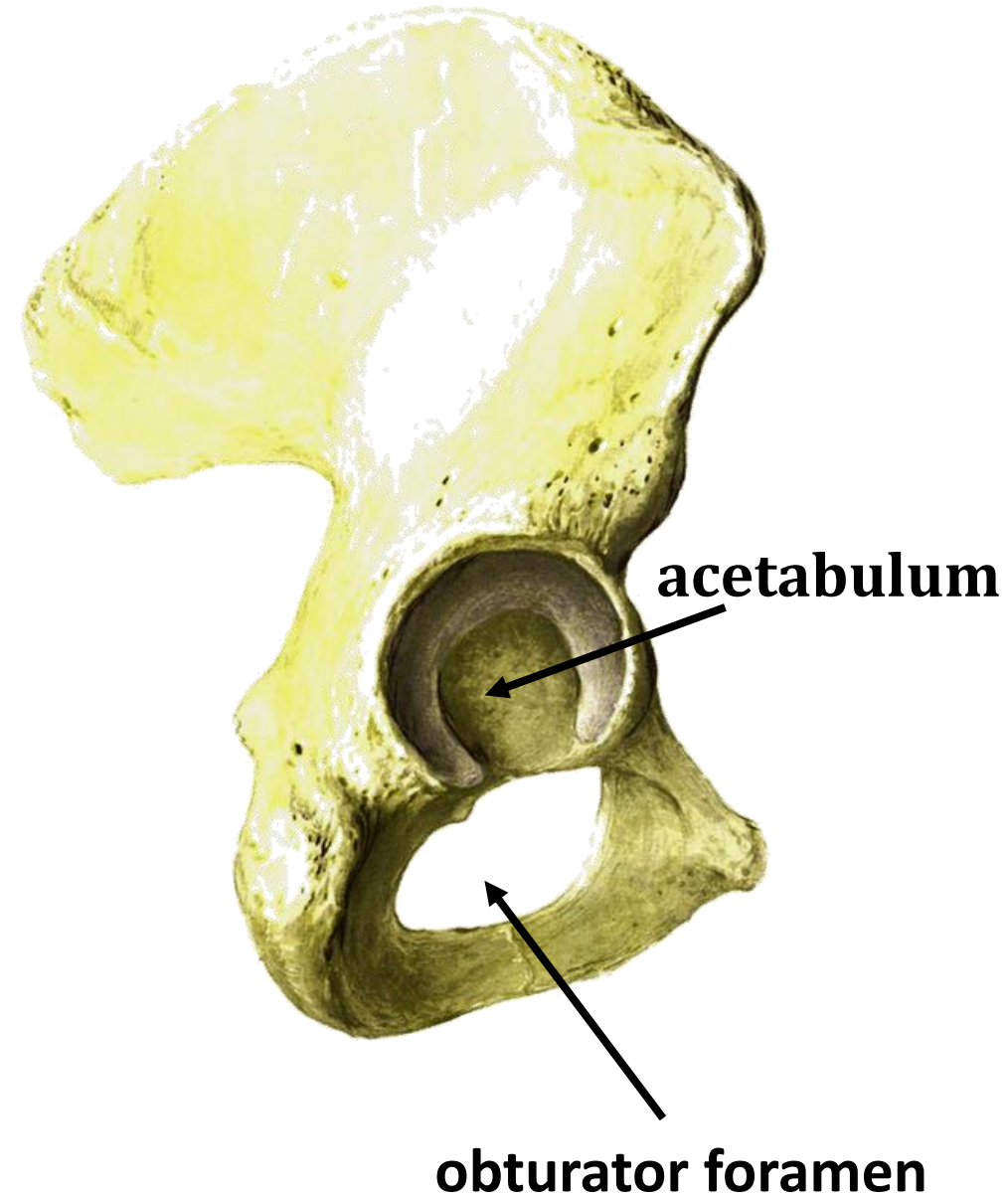
Pelvis Girdle

- The pelvic girdle is a ring of bones that connects the vertebral column to the two femurs.
- It is formed of **right and left hip bones, the sacrum, and the coccyx.**
- The sacrum articulates superiorly with vertebra L5 at the **lumbosacral joint.**
- The pelvic bones articulate posteriorly with the sacrum at the **sacro-iliac joints** and with each other anteriorly at the **pubic symphysis.**



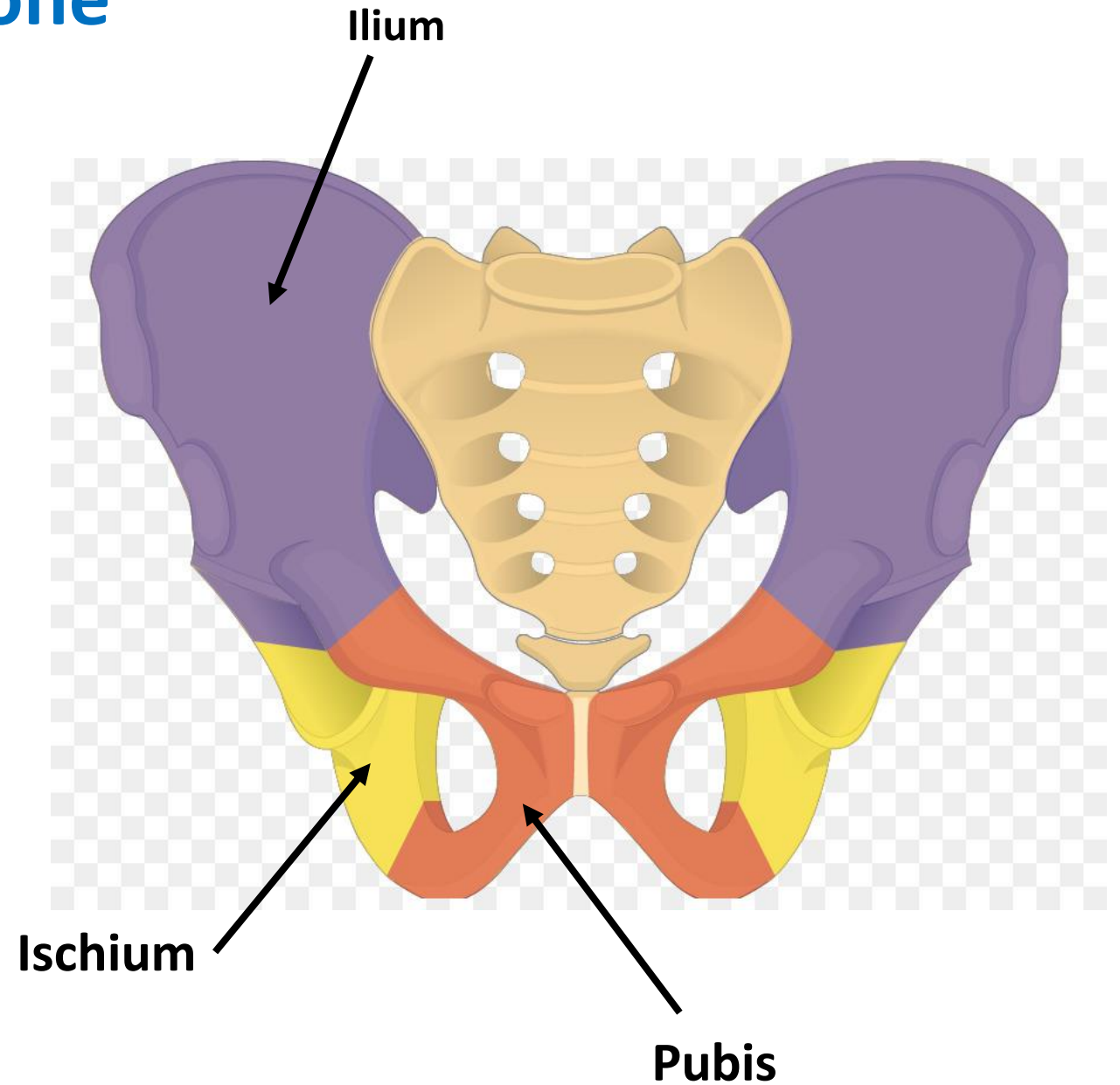
Hip Bone

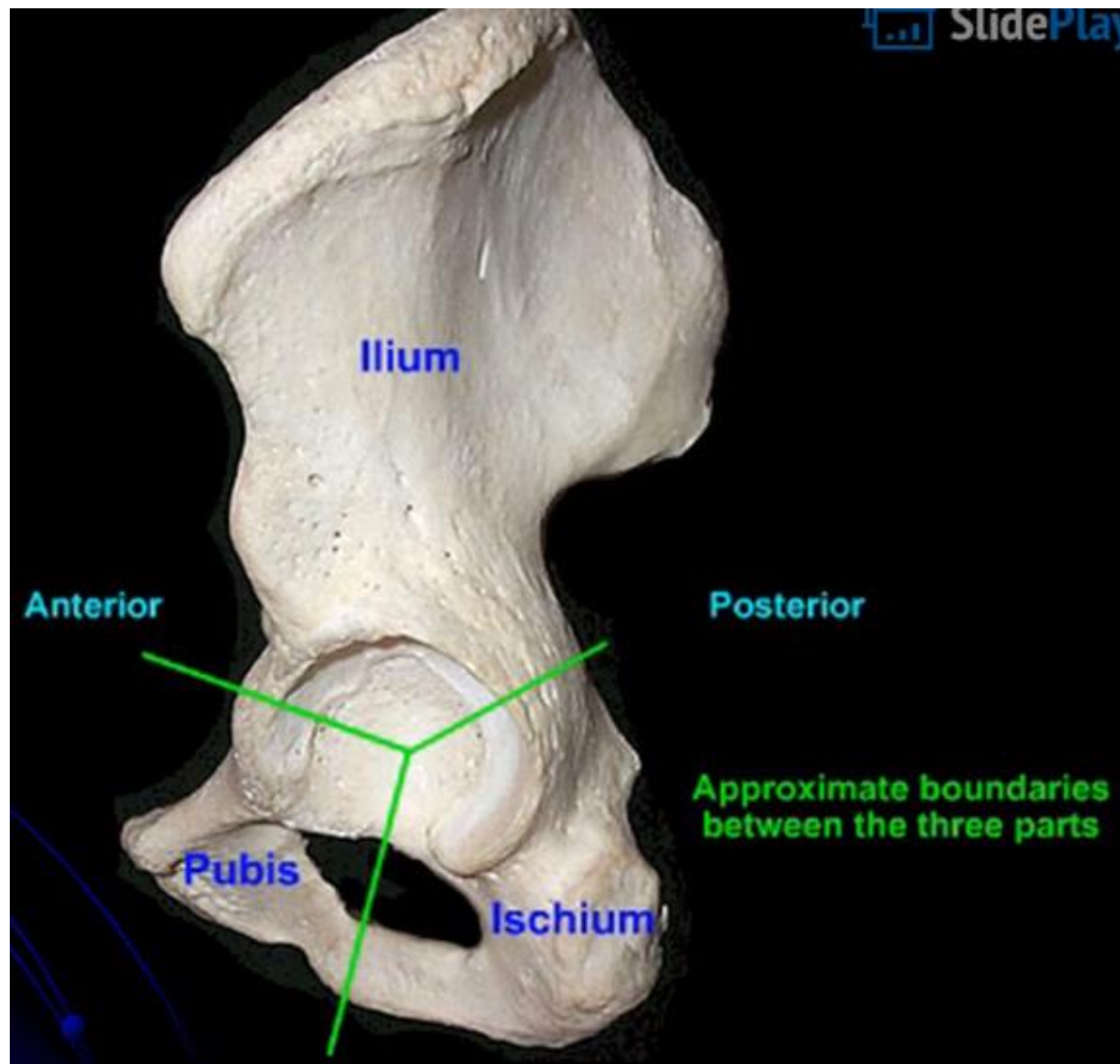
- Each hip bone is large and irregularly-shaped.
- Its lateral surface bears near its center a deep cup-shaped cavity called the **acetabulum**, which articulates with head of femur to form hip joint.
- Below the acetabulum the bone has a large foramen called the **obturator foramen**.



Hip Bone

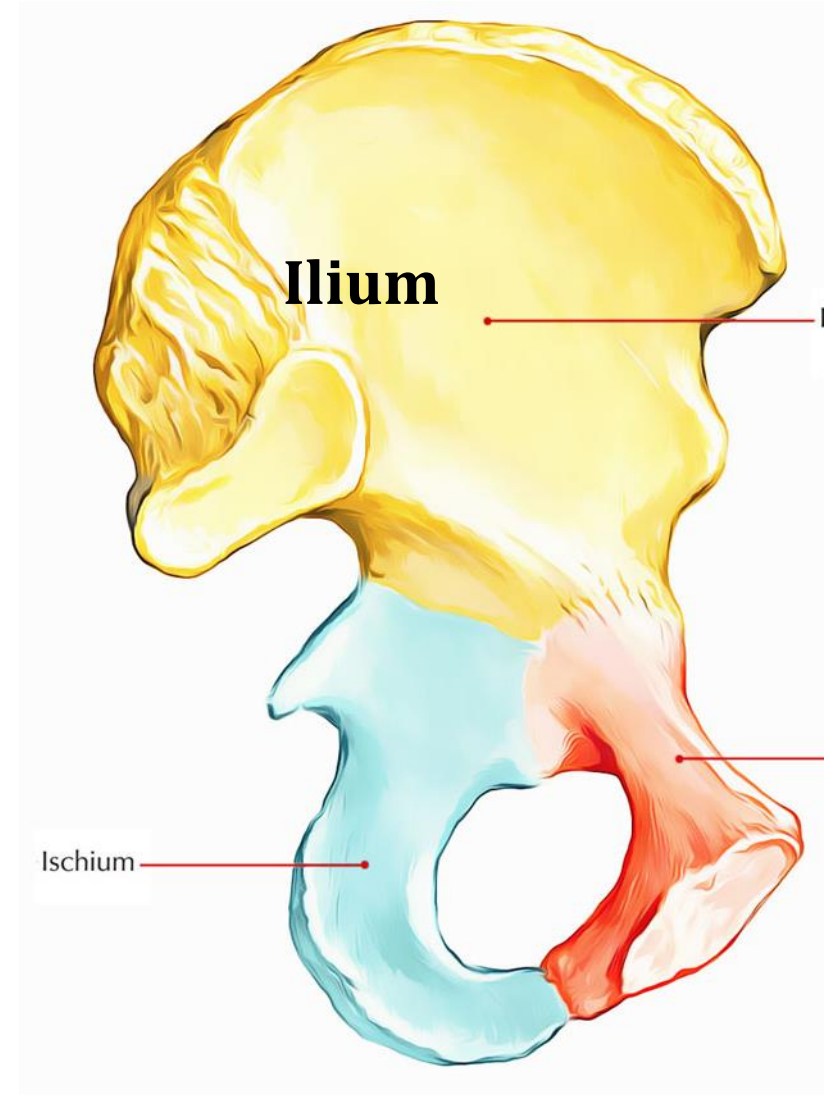
- The hip bone has three parts:
 1. Ilium
 2. Pubis
 3. Ischium



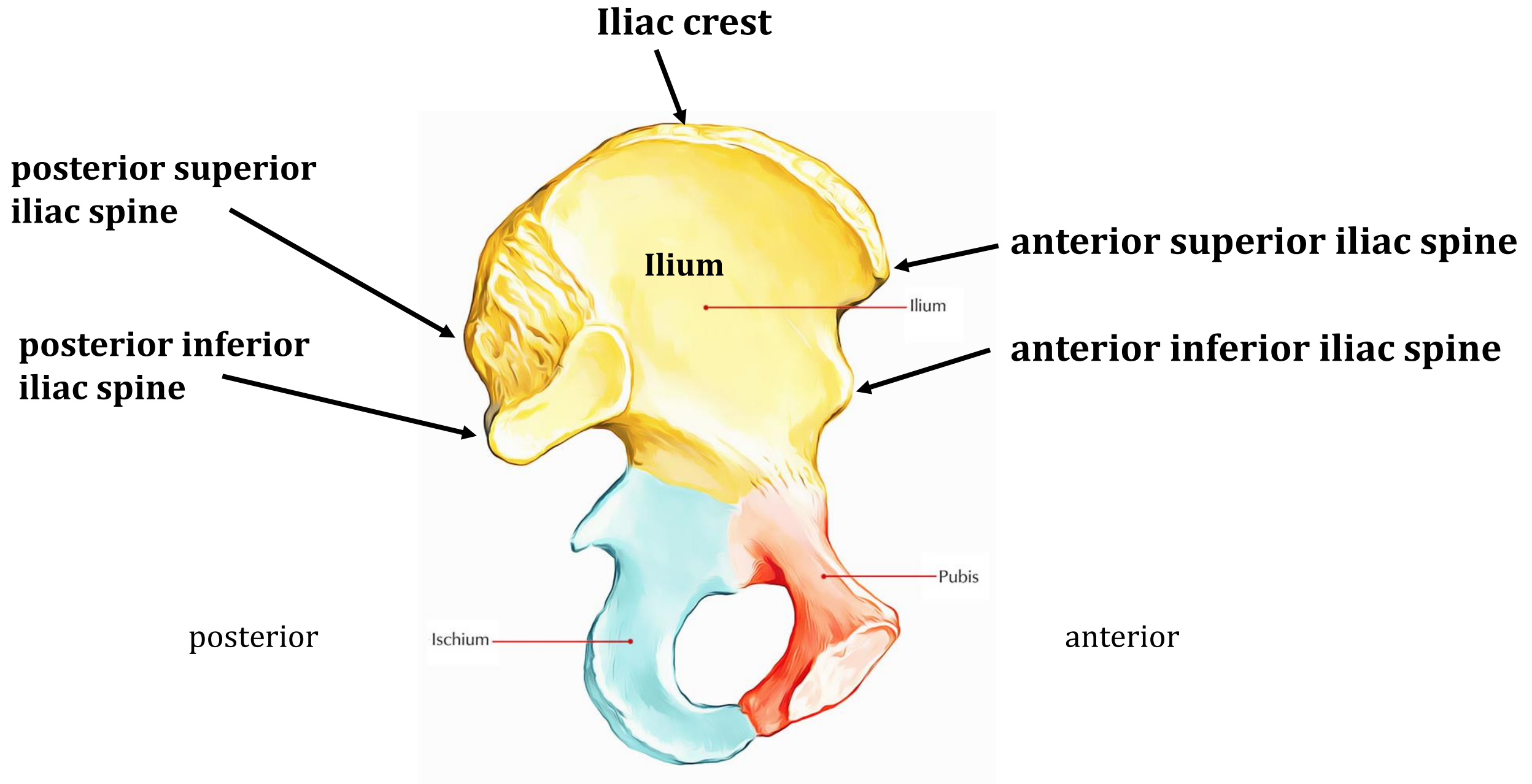


Ilium

- The flattened upper part of hip bone.
- Its upper margin is curved and is called **iliac crest**:
- The *anterior border* of iliac crest presents:
 - **anterior superior iliac spine (ASIS)**
 - **anterior inferior iliac spine (AIIS)**
- The *posterior border* of iliac crest presents:
 - **posterior superior iliac spine (PSIS)**
 - **posterior inferior iliac spine (PIIS)**



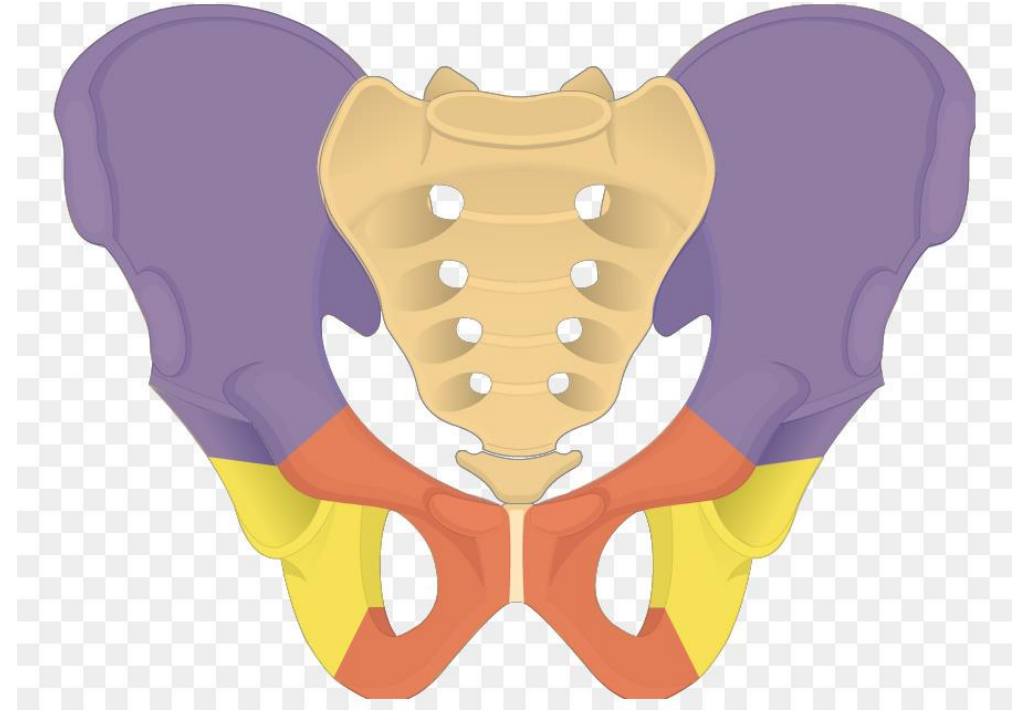
Medial view

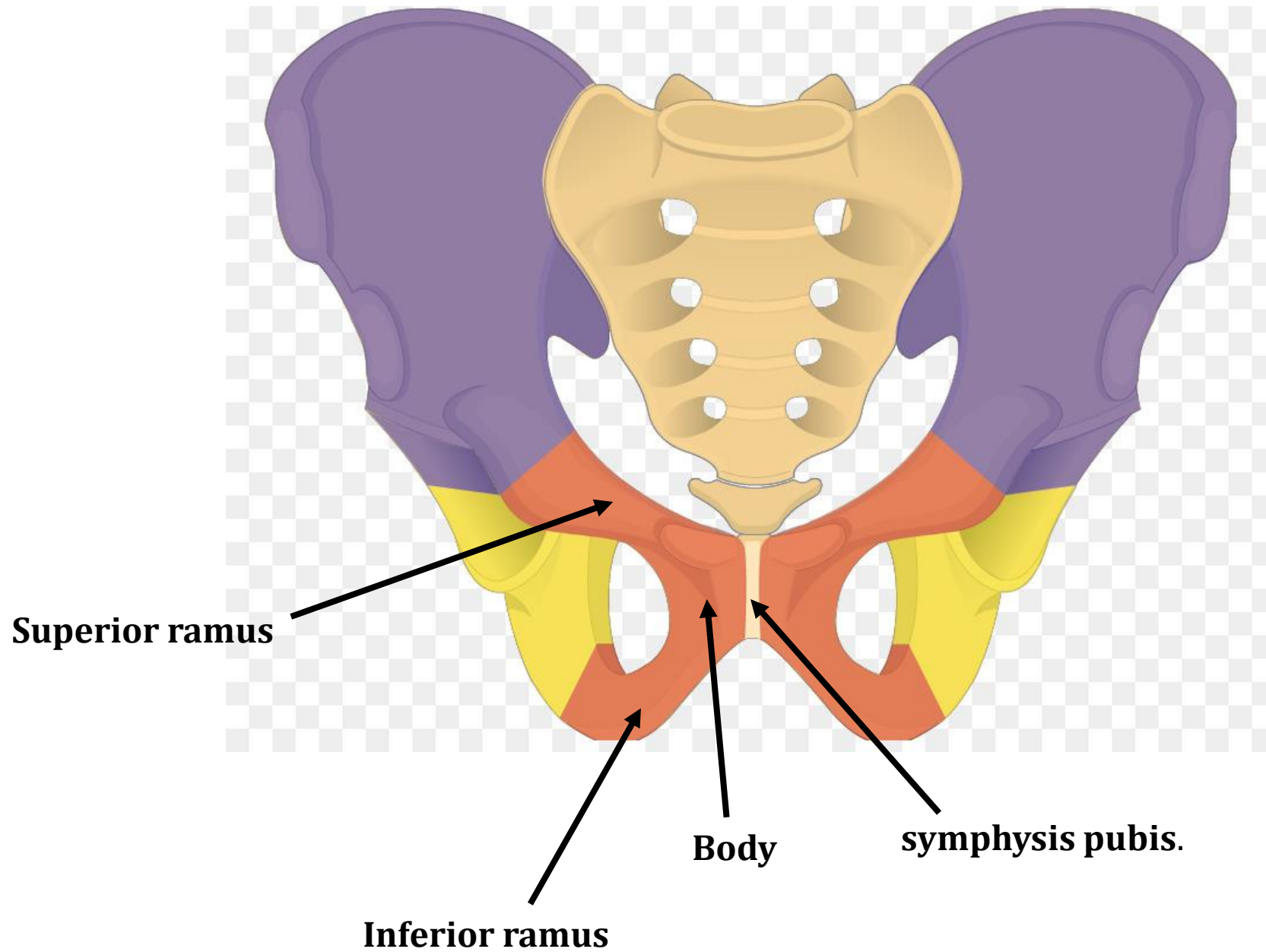


Medial view

Pubis

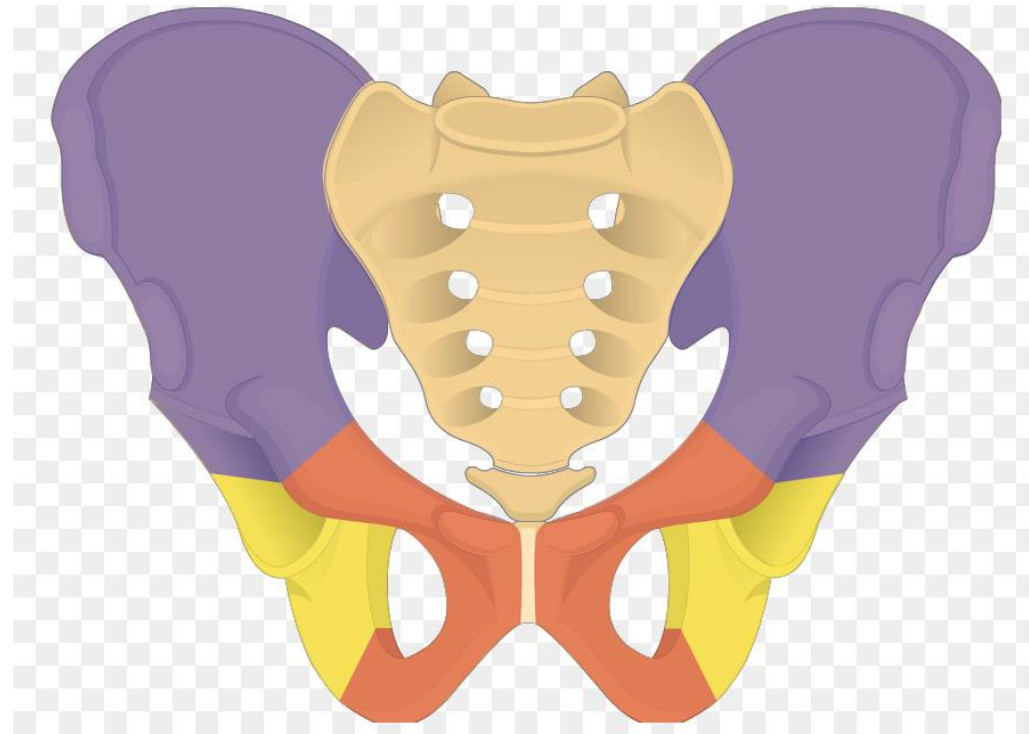
- The *lower anterior part* of hip bone.
- **It consists:**
 - Body
 - Superior ramus
 - Inferior ramus
- The body articulates with the body of the opposite pubis forming the **symphysis pubis**.

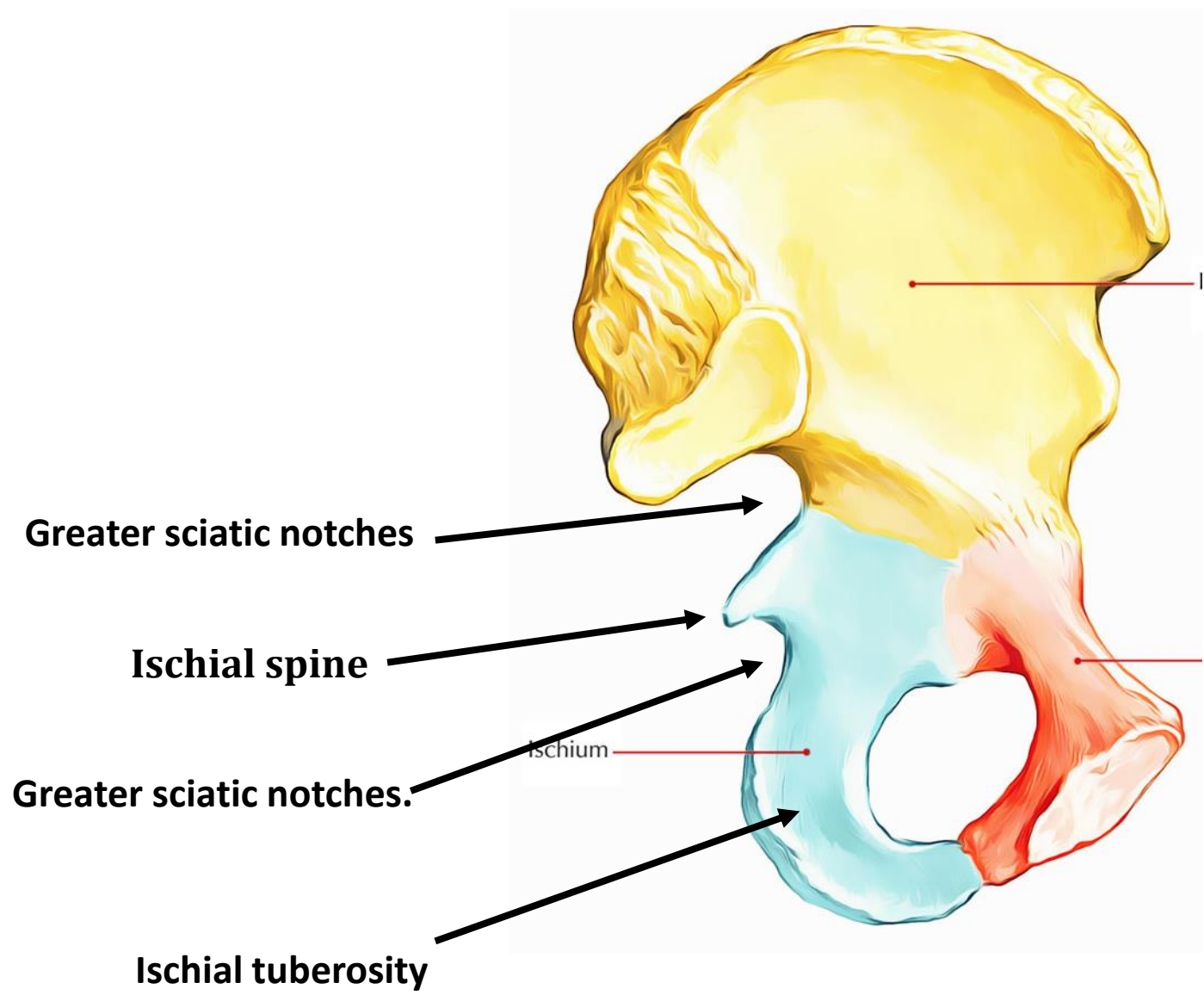


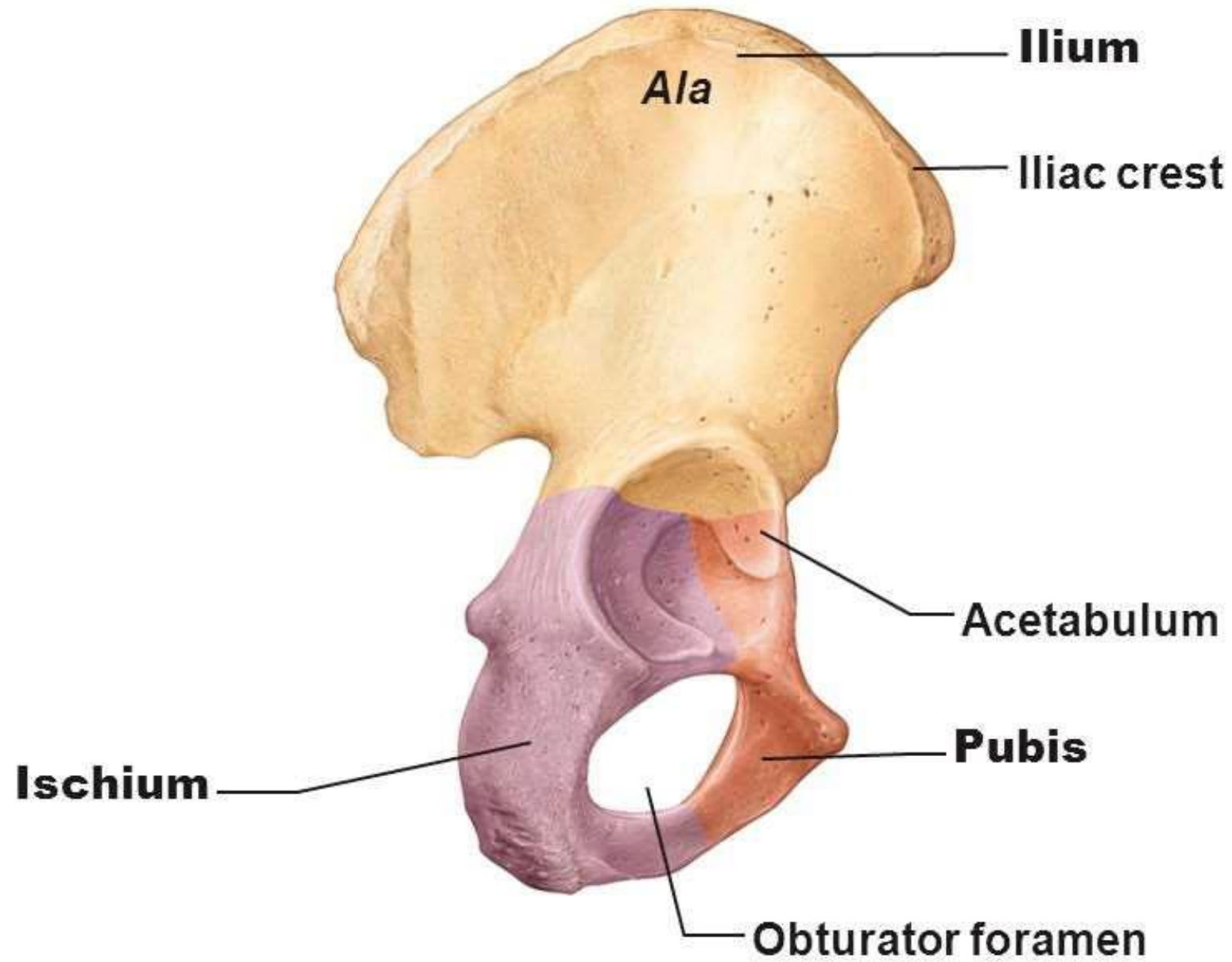


Ischium

- The lower posterior part of hip bone.
- **It consists of:**
 - body
 - 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.
- The posterior border of ischium has sharp projection called **ischial spine**, which lies between the **greater and lesser sciatic notches**.





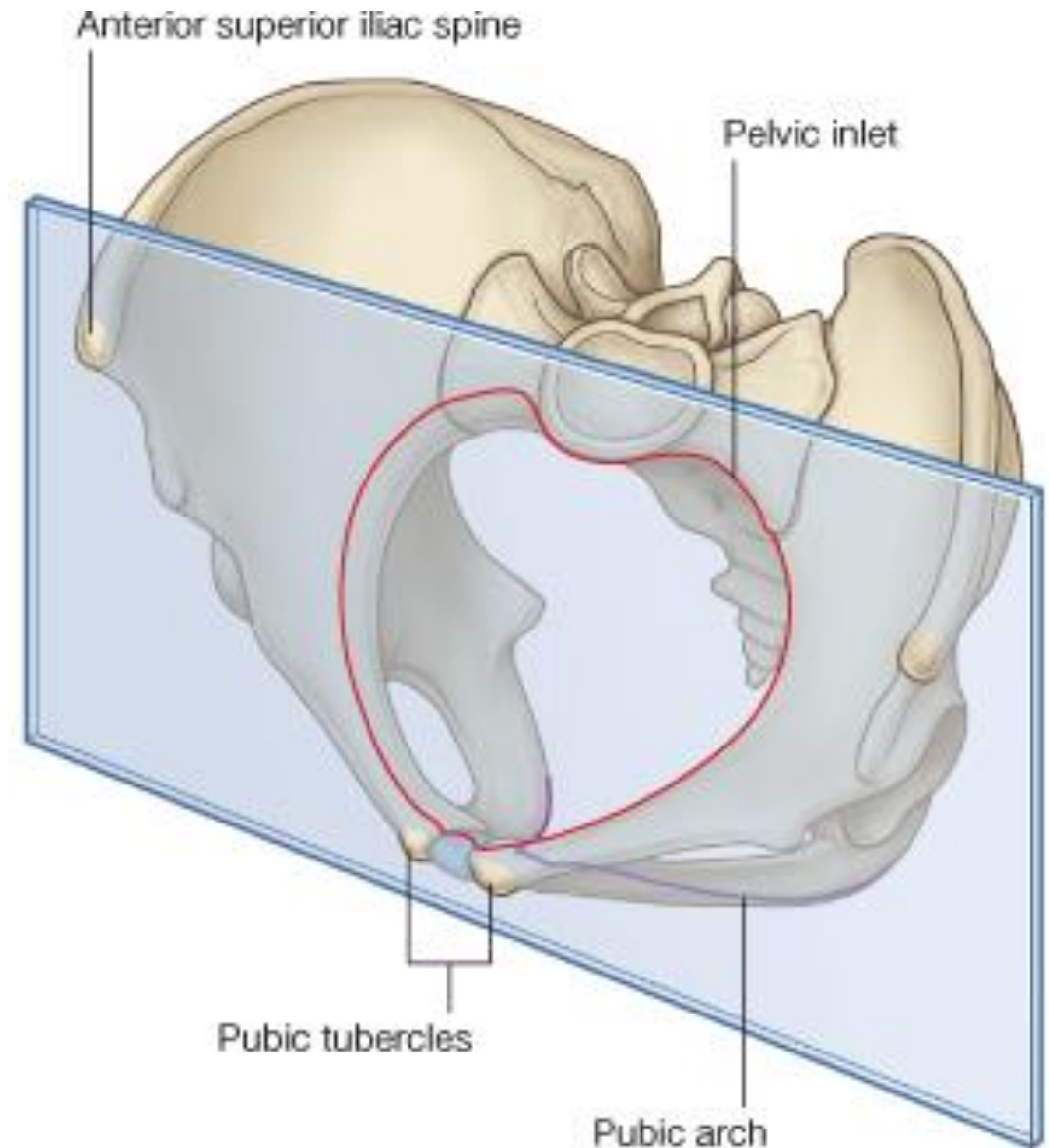


(a) Lateral view, right hip bone

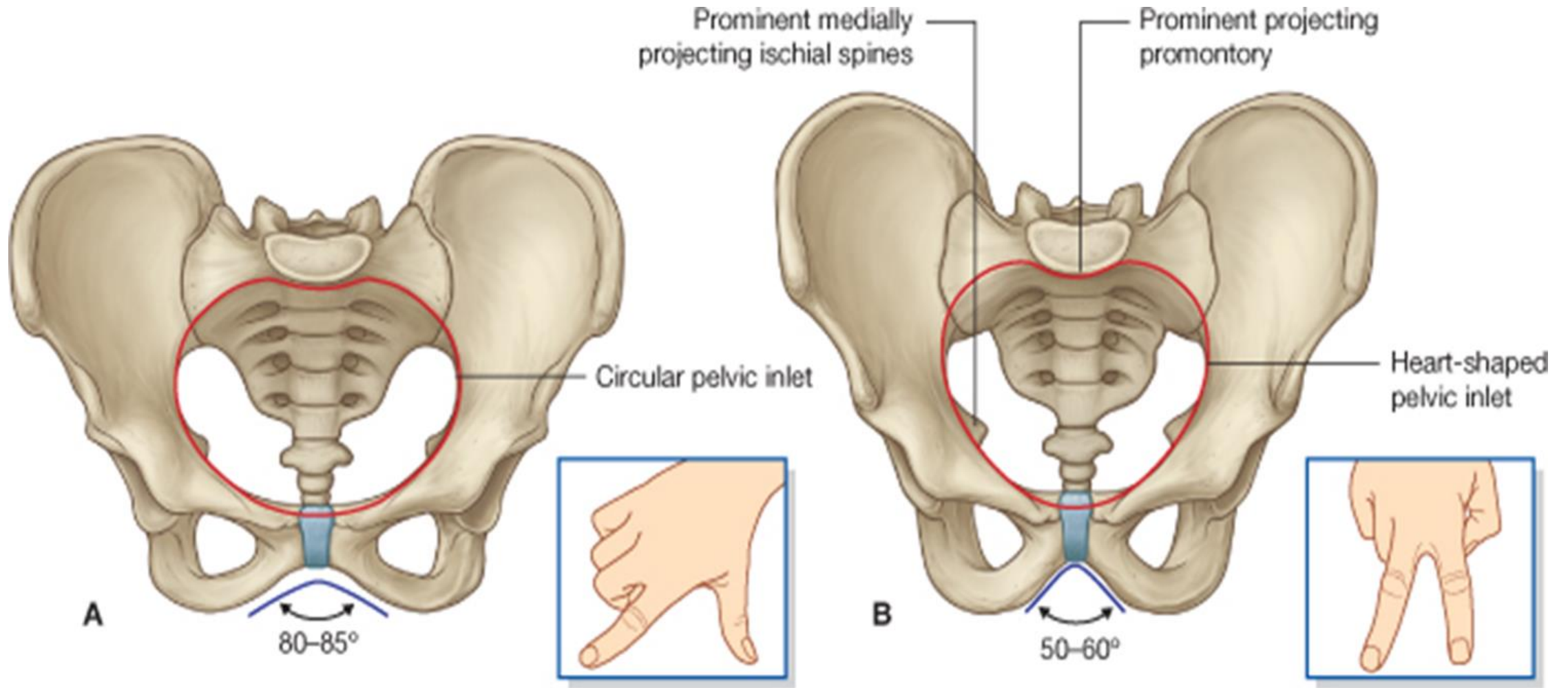
Orientation

In the anatomic position:

- The pelvis is oriented so that **the front edge of the top of the *pubic symphysis* and the *anterior superior iliac spines* lie in the same vertical plane.**
- The pelvic inlet, is tilted to face anteriorly and superiorly.
- The bodies of the pubic bones and the ischiopubic arch are positioned in a nearly horizontal plane facing downward.



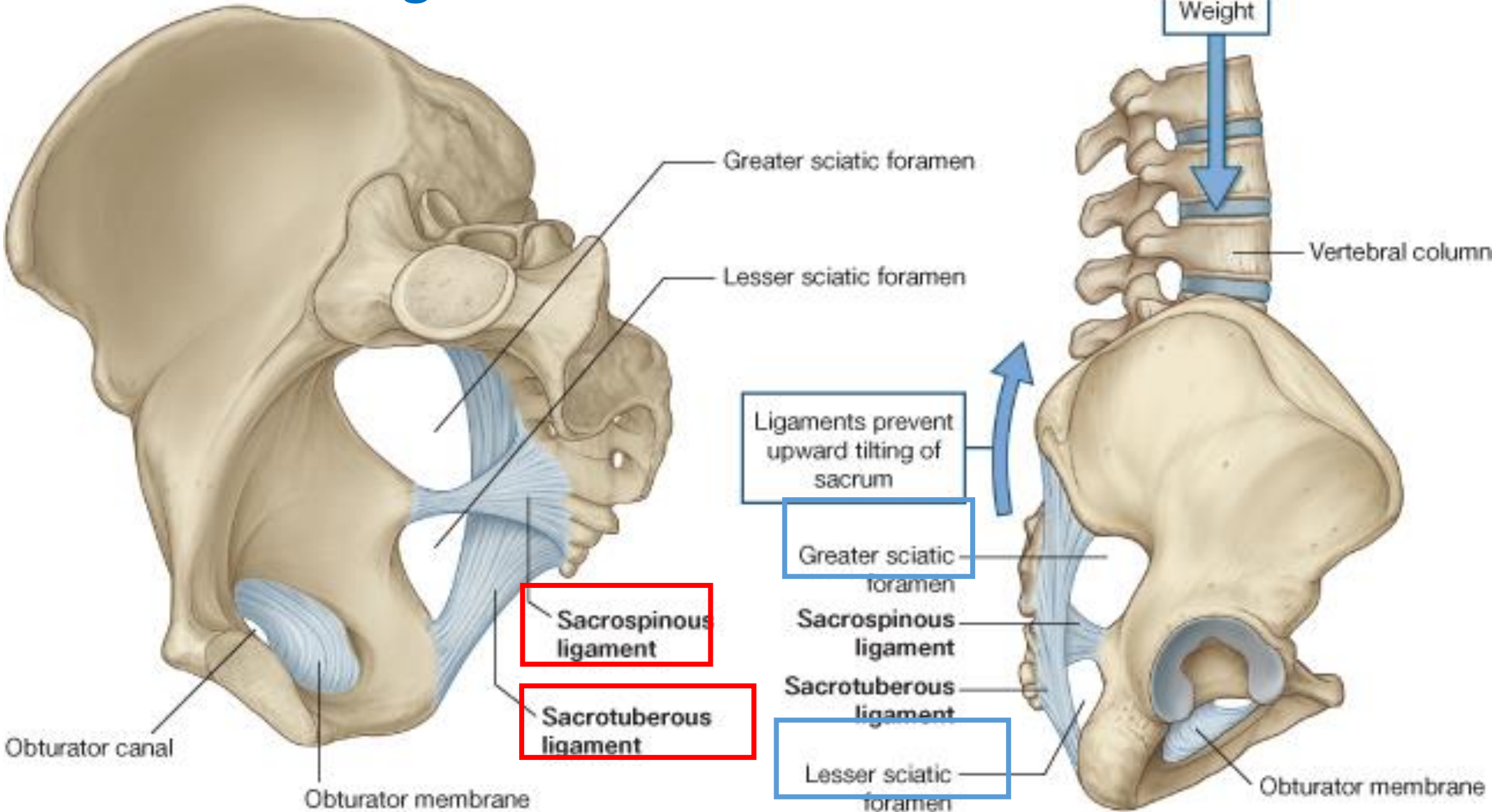
Gender Differences



Women

Men

Ligaments of the Pelvic Wall



Femur

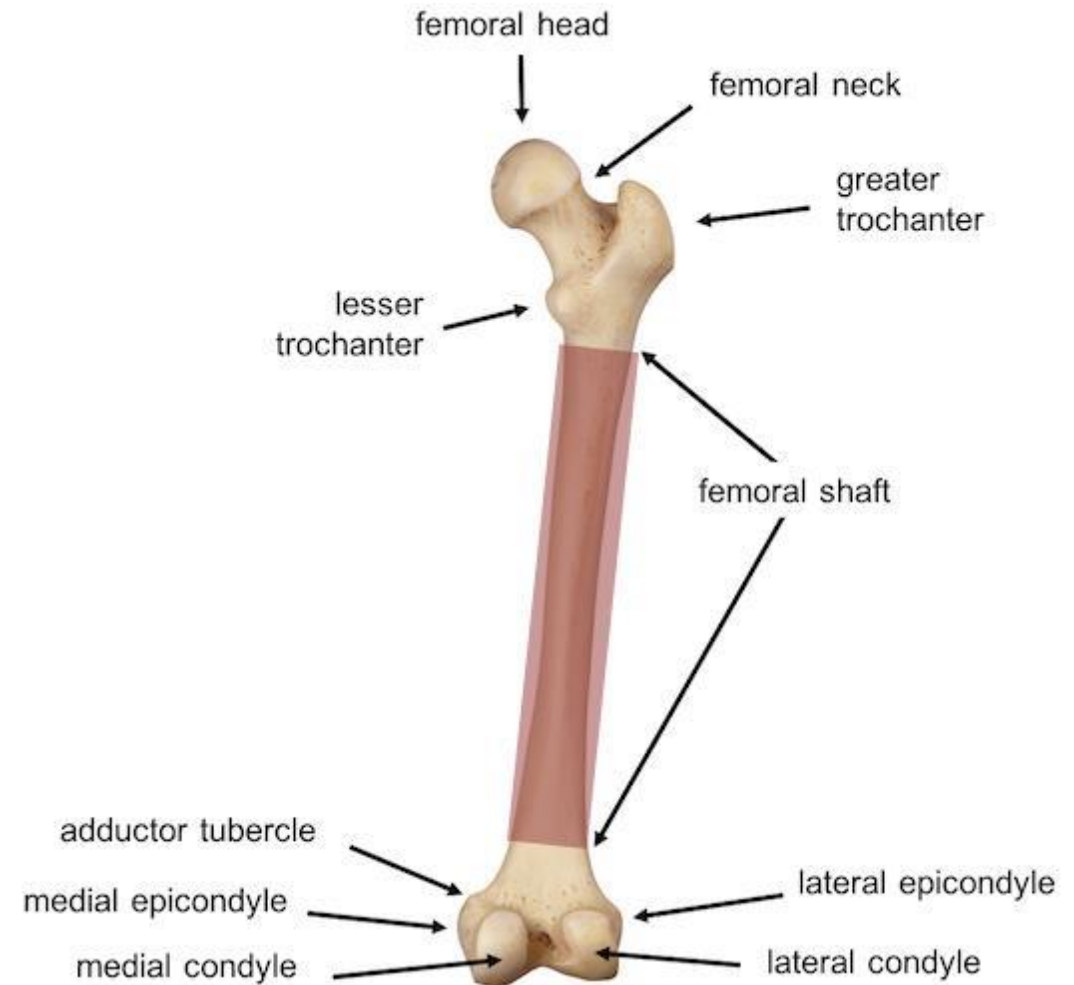
- Is the thigh bone
- The longest, heaviest, and strongest bone in the body
- **Articulations:**
 1. with the **acetabulum** (to form the **hip joint**)
 2. With the **tibia and patella** (to form the **knee joint**)
- **Structure:**
 1. Proximal (upper)end
 2. Shaft (body)
 3. Distal (lower) end



Femur

A. Upper end:

- Presents a **head**, **neck**, and **greater** and **lesser trochanters**.
- **The head:** which is 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.
 - Makes an angle of about 125 with the long axis of the shaft



- **Greater and lesser trochanters:** large eminences situated at the junction of the neck and the 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.

Greater Trochanter



Greater trochanter

Intertrochanteric line

Intertrochanteric line



Shaft

Lateral epicondyle

Lateral condyle

Patellar surface

Medial condyle

supraco

Adductor tubercle

Medial epicondyle

Anterior view

Head



Neck



Lesser Trochanter



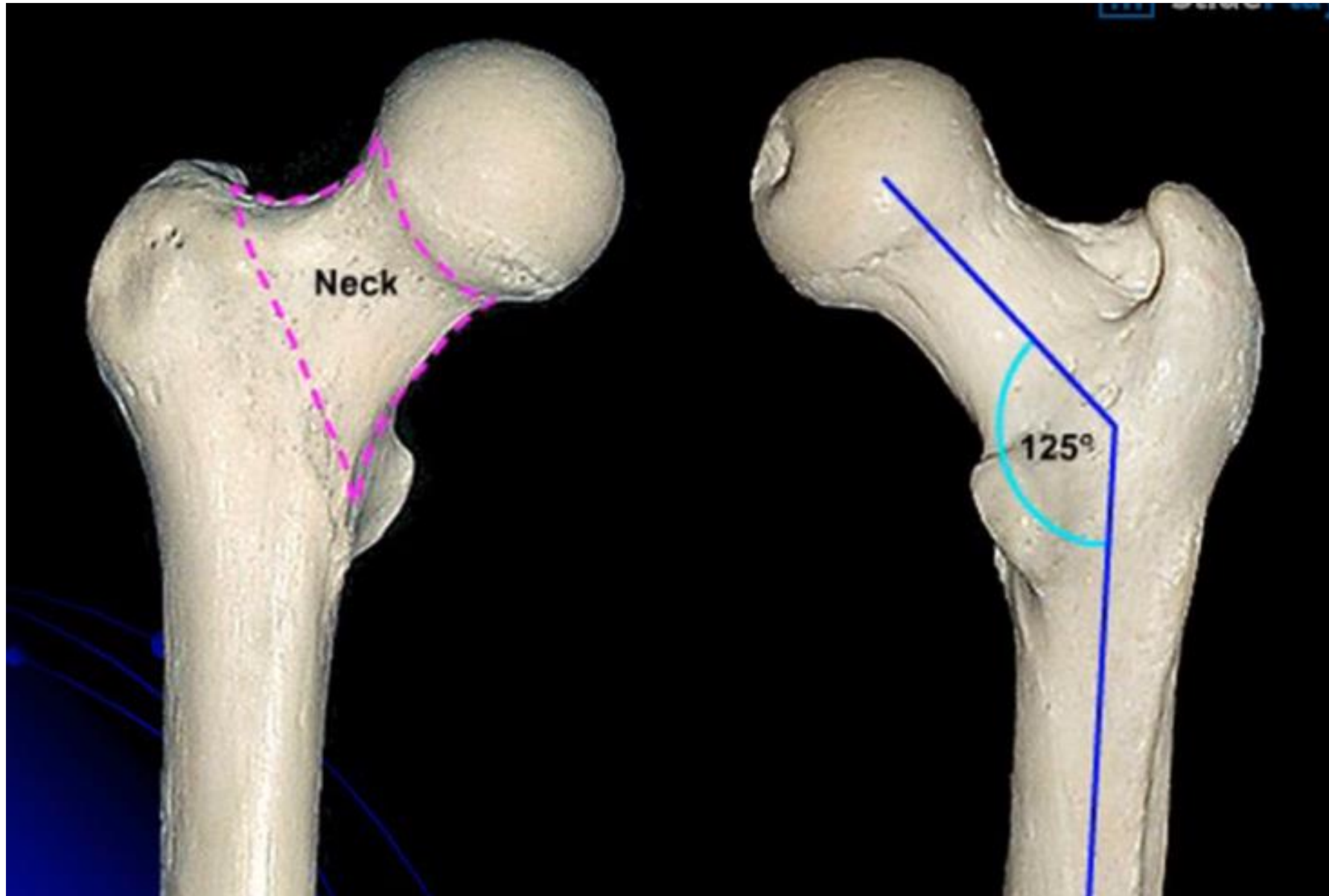
Greater Trochanter



Intertrochanteric crest

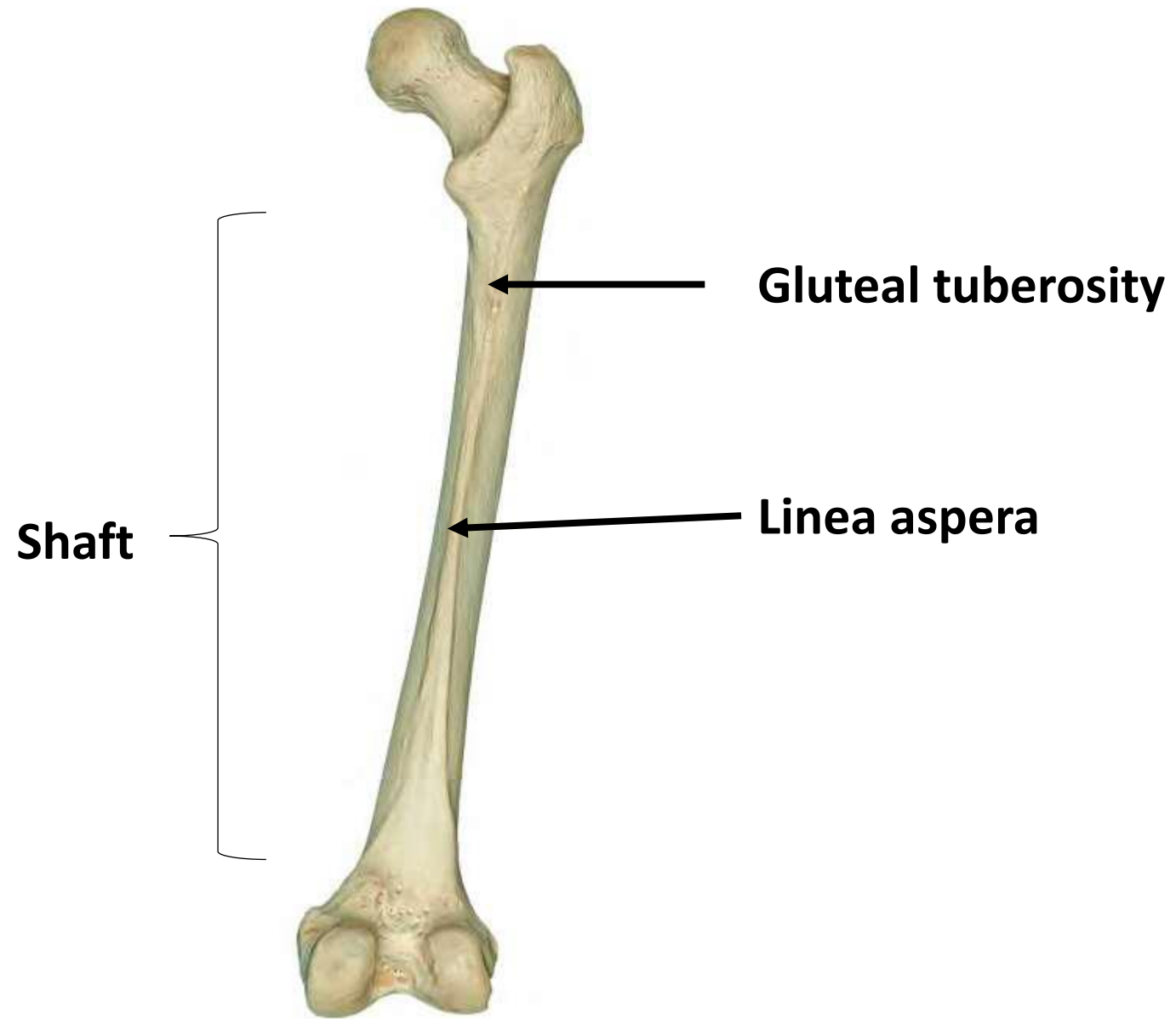


Posterior view



B. Shaft:

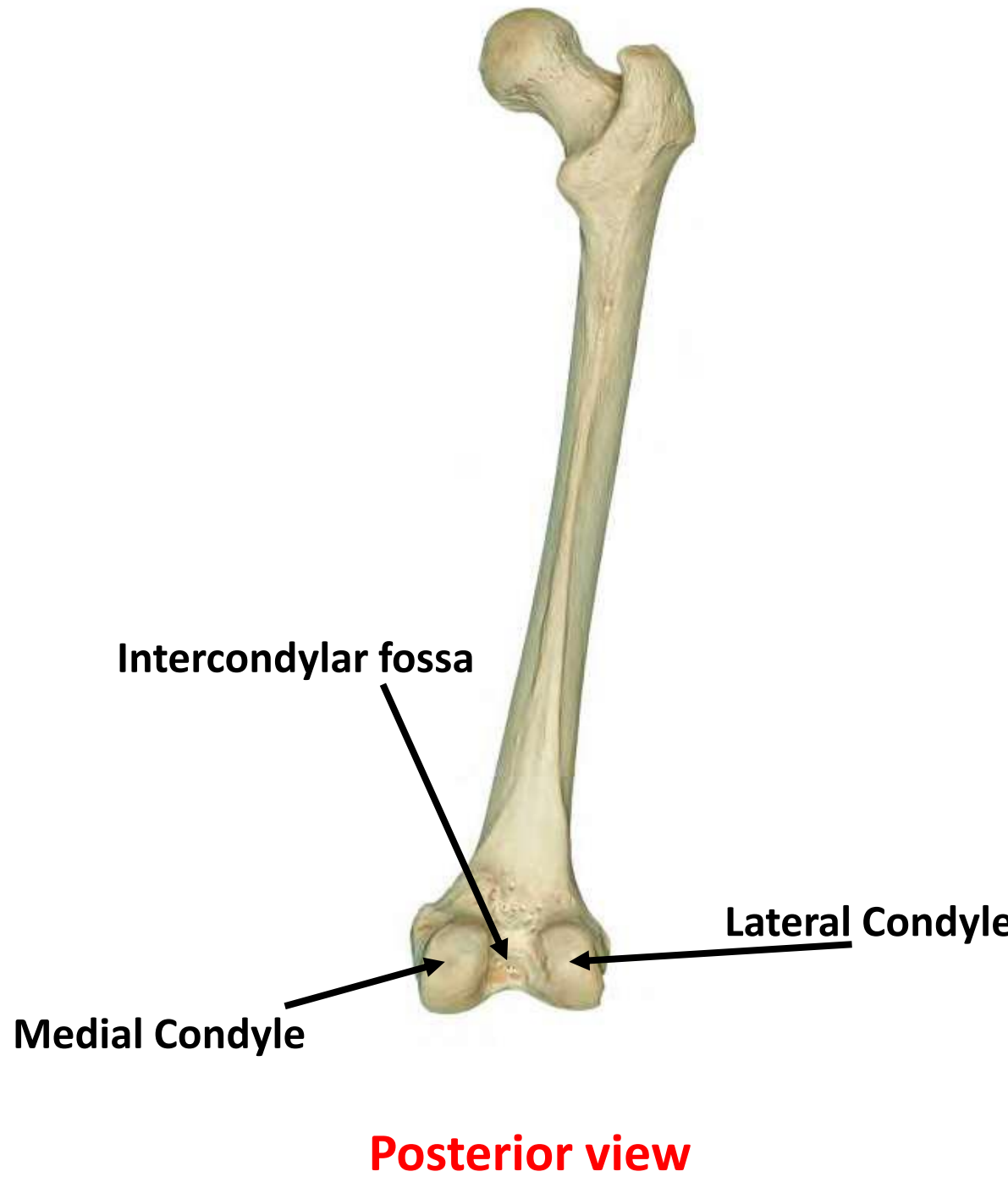
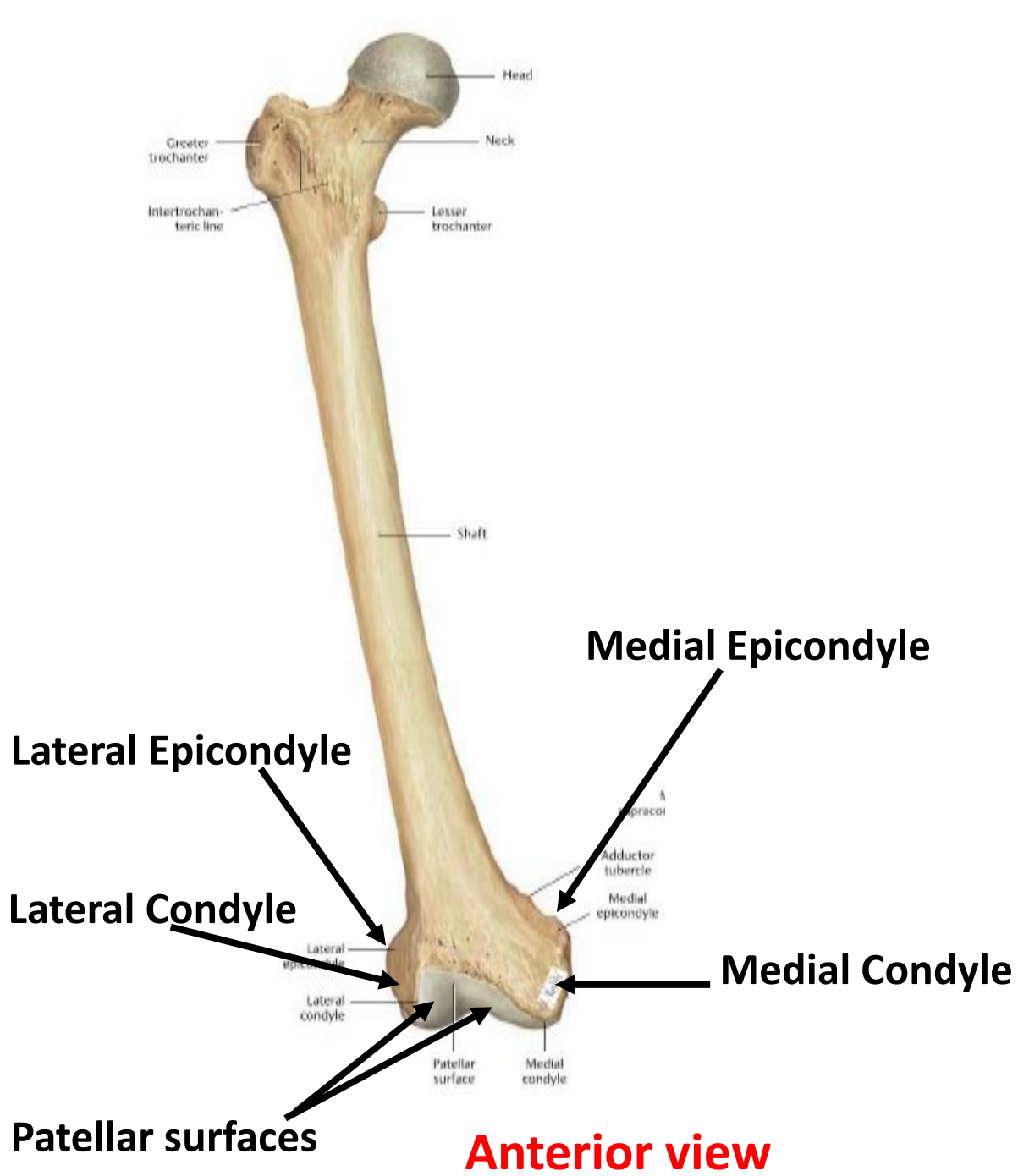
- The middle third of the posterior aspect of femur presents a broad, rough vertical ridge termed **linea aspera**.
- Superiorly, the linea aspera is continuous with another vertical ridge, called **gluteal tuberosity**.



Posterior view

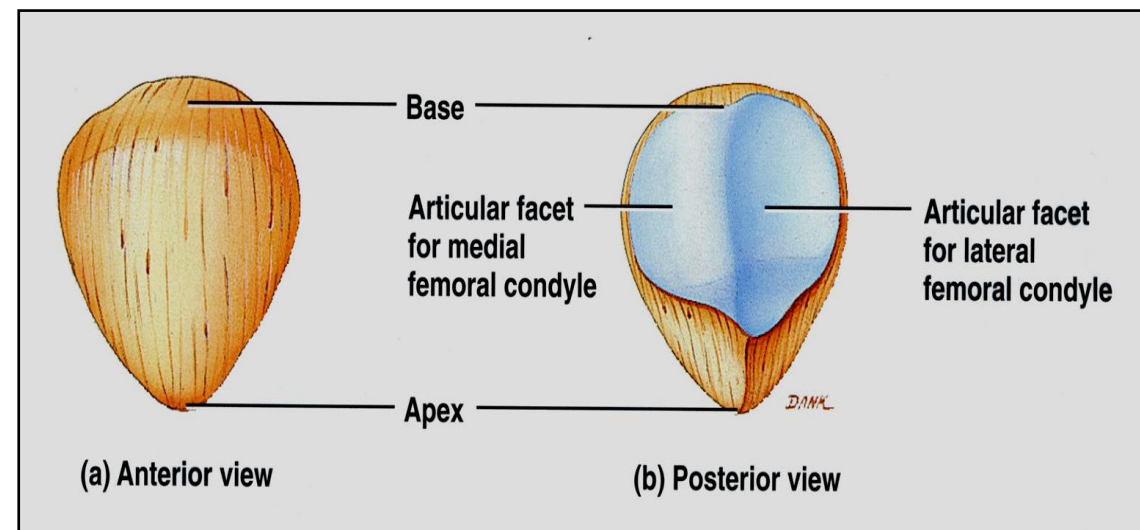
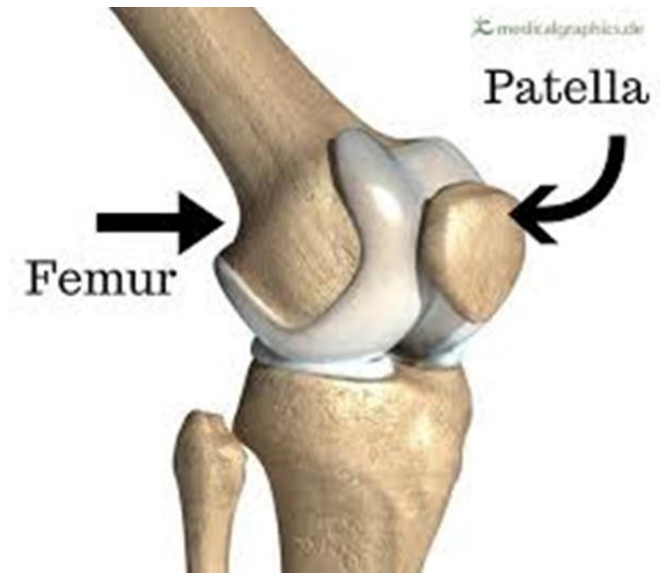
C. Lower end:

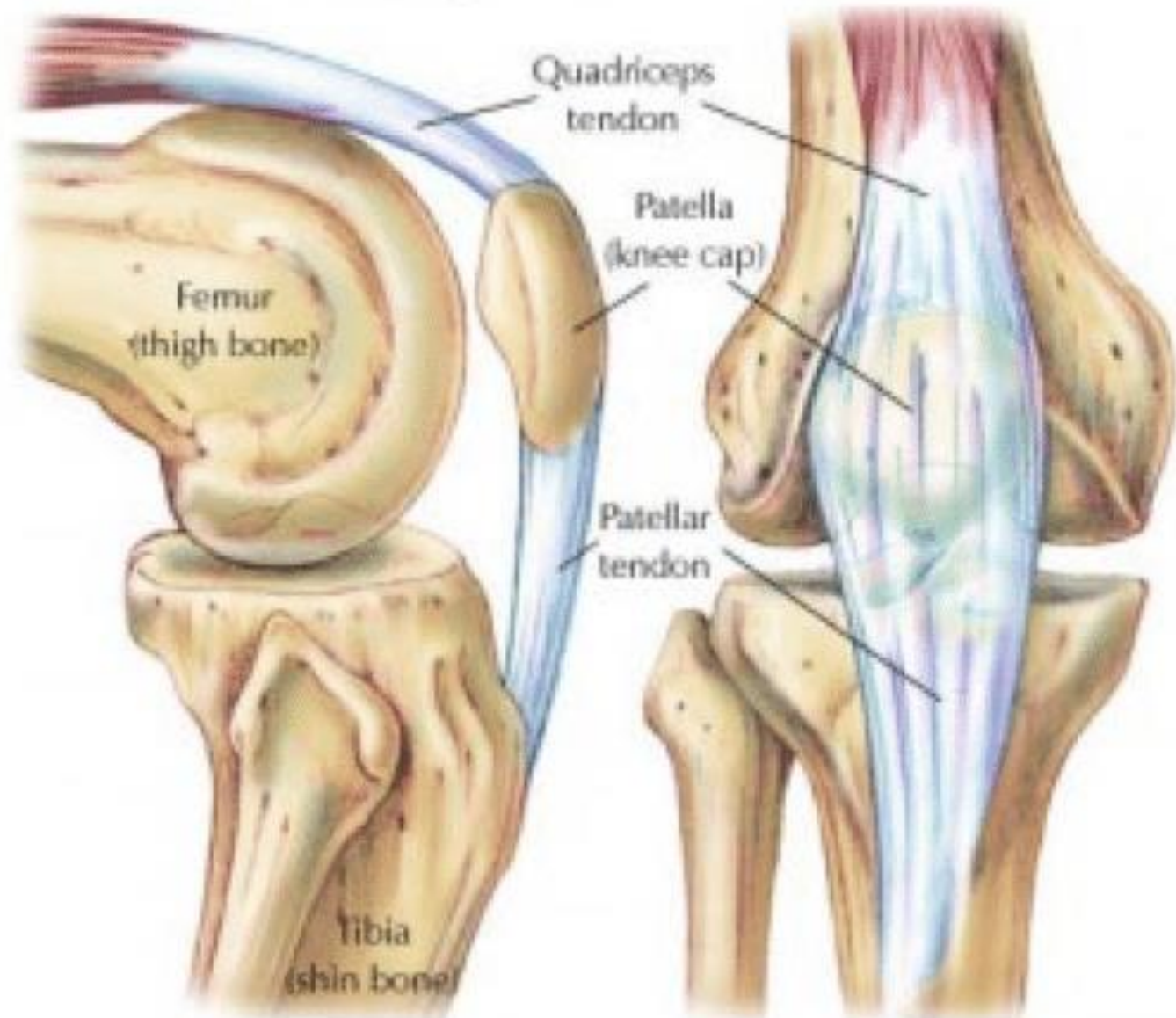
- The expanded lower end consists of two large masses, **the medial and lateral condyles**, which unite anteriorly, but separated posteriorly by the deep intercondylar fossa or notch.
- Anteriorly, the condyles exhibit a broad n-shaped articular surface for articulation with the patella anteriorly and the tibia below.
- Superior to the medial and lateral condyles, are the **medial, and lateral epicondyles**, respectively.



The Patella (kneecap)

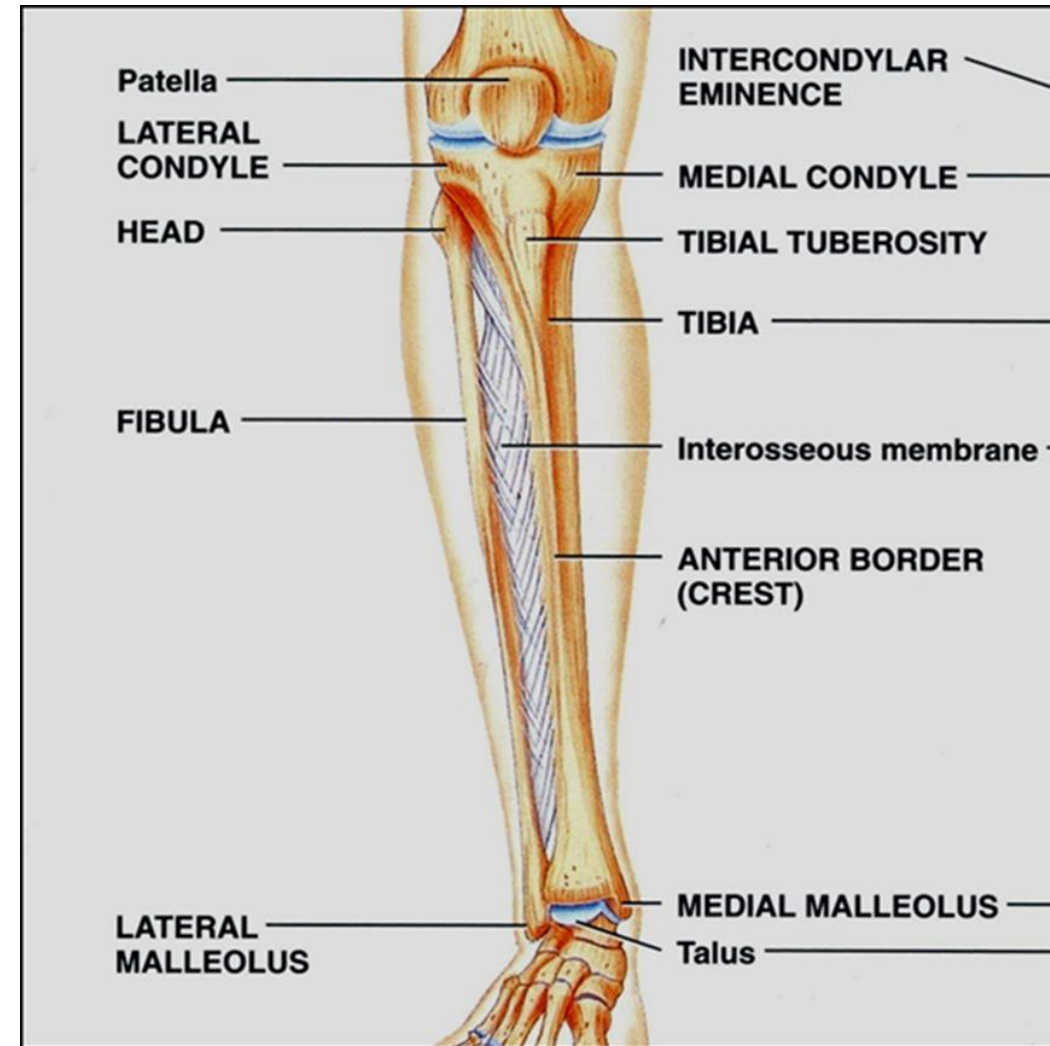
- The patella is a triangular **sesamoid bone** (bone inside tendon), **located in front of the knee joint**.
- The base of the patella forms the upper border, whereas the apex is pointed inferiorly.
- The posterior surface contains two articular facets, for articulation with the medial and lateral condyles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





Tibia

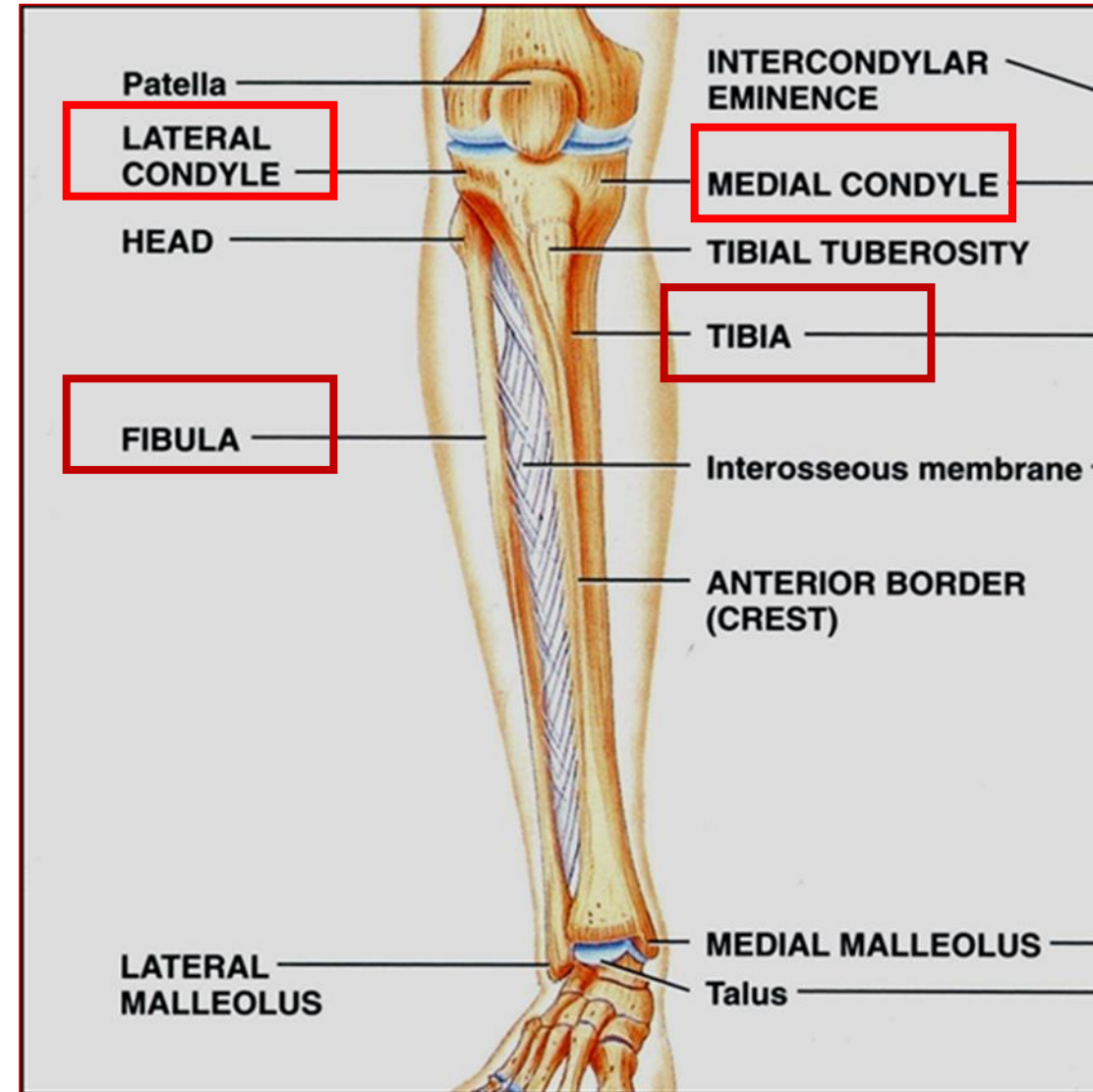
- The tibia is the medial, larger, and much stronger one of the two bones of the leg.
- **Structure:**
 1. Proximal (upper) end
 2. Shaft (body)
 3. Distal (lower) end
- **Articulations:**
 1. Its proximal end with the femur and fibula
 2. Its distal end with the fibula and the talus bone of the ankle.



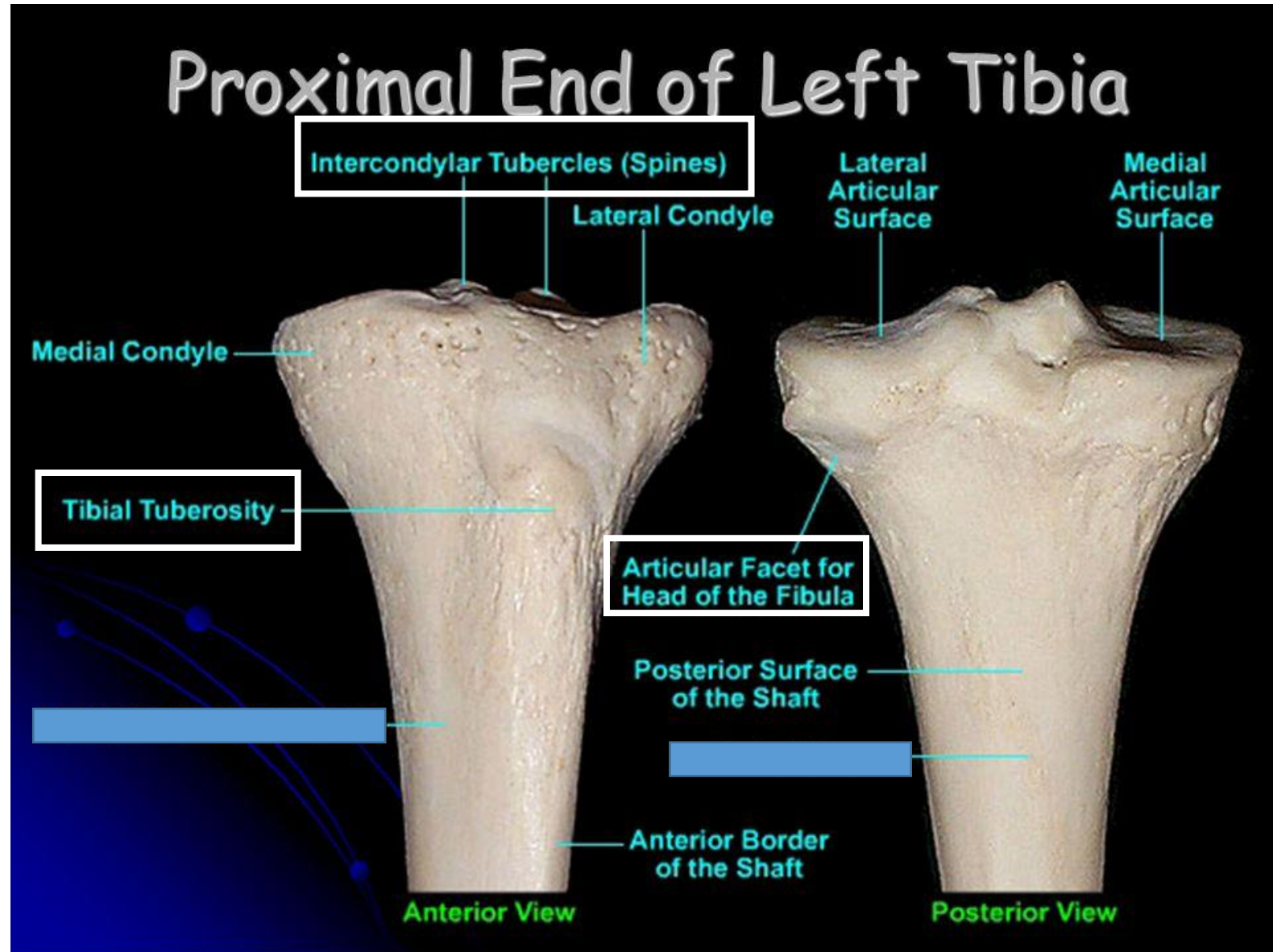
Tibia

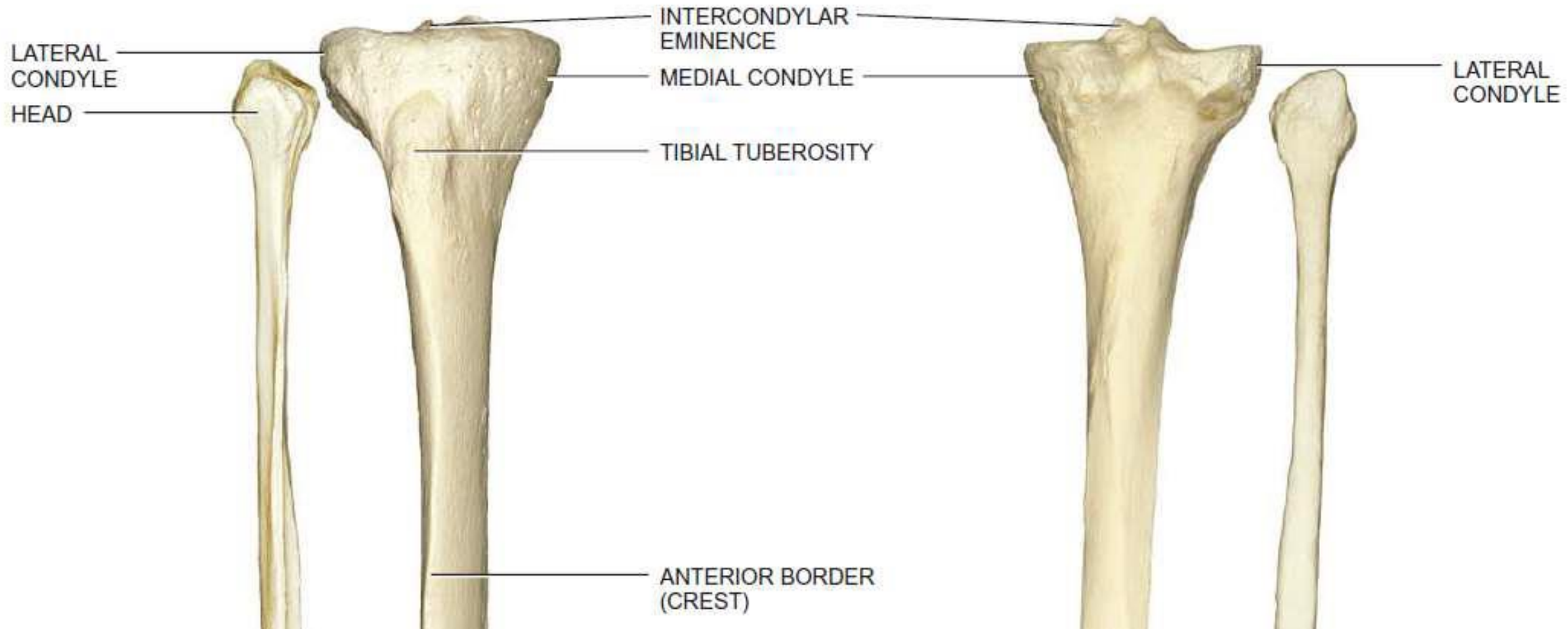
A. Upper end:

- 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).
- **Intercondylar eminence:** upward projection lying between condyles.



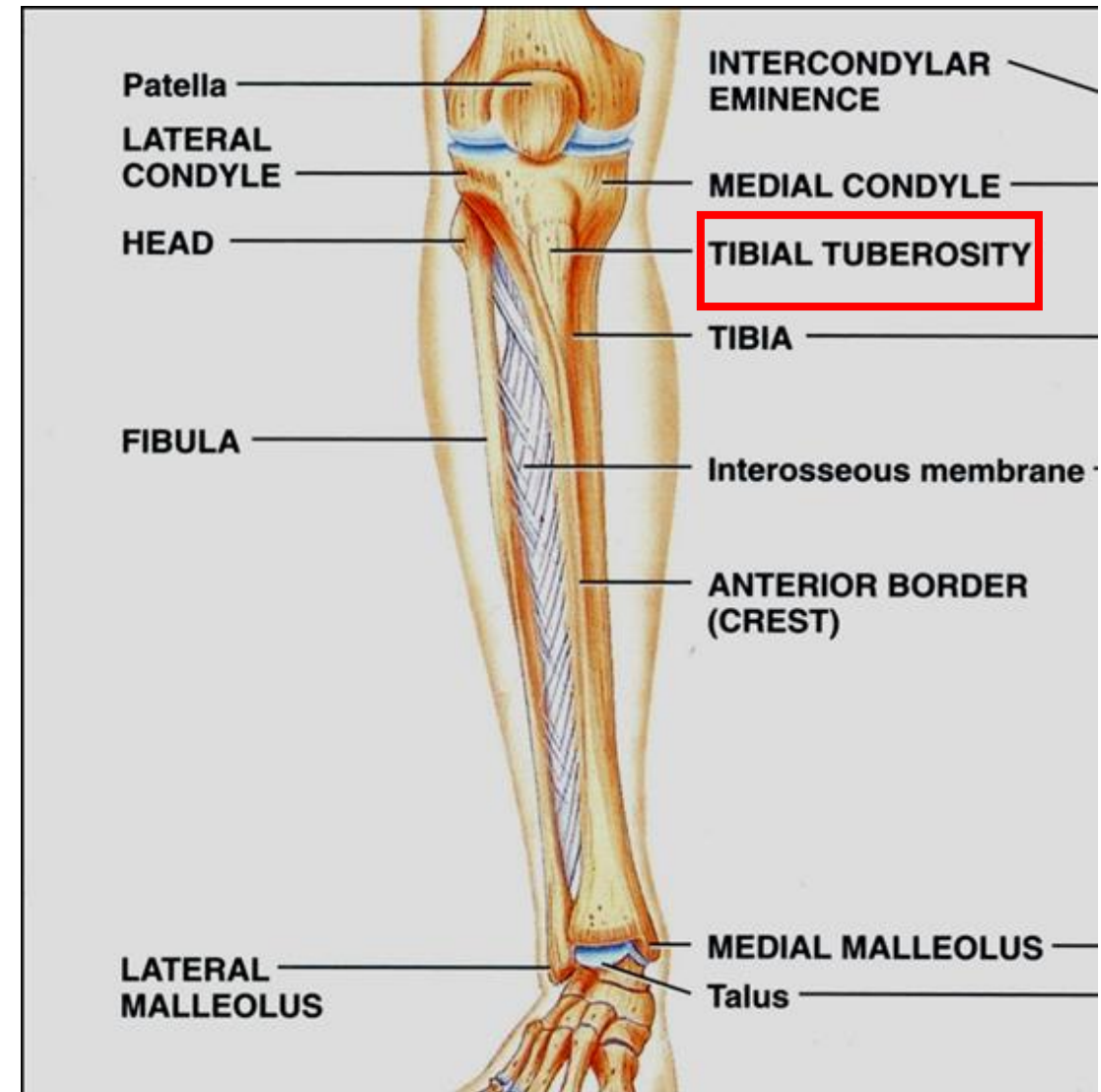
- On the posterior aspect of the lateral condyle there is a facet for articulation with the head of fibula forming the superior **tibio-fibular joint**.





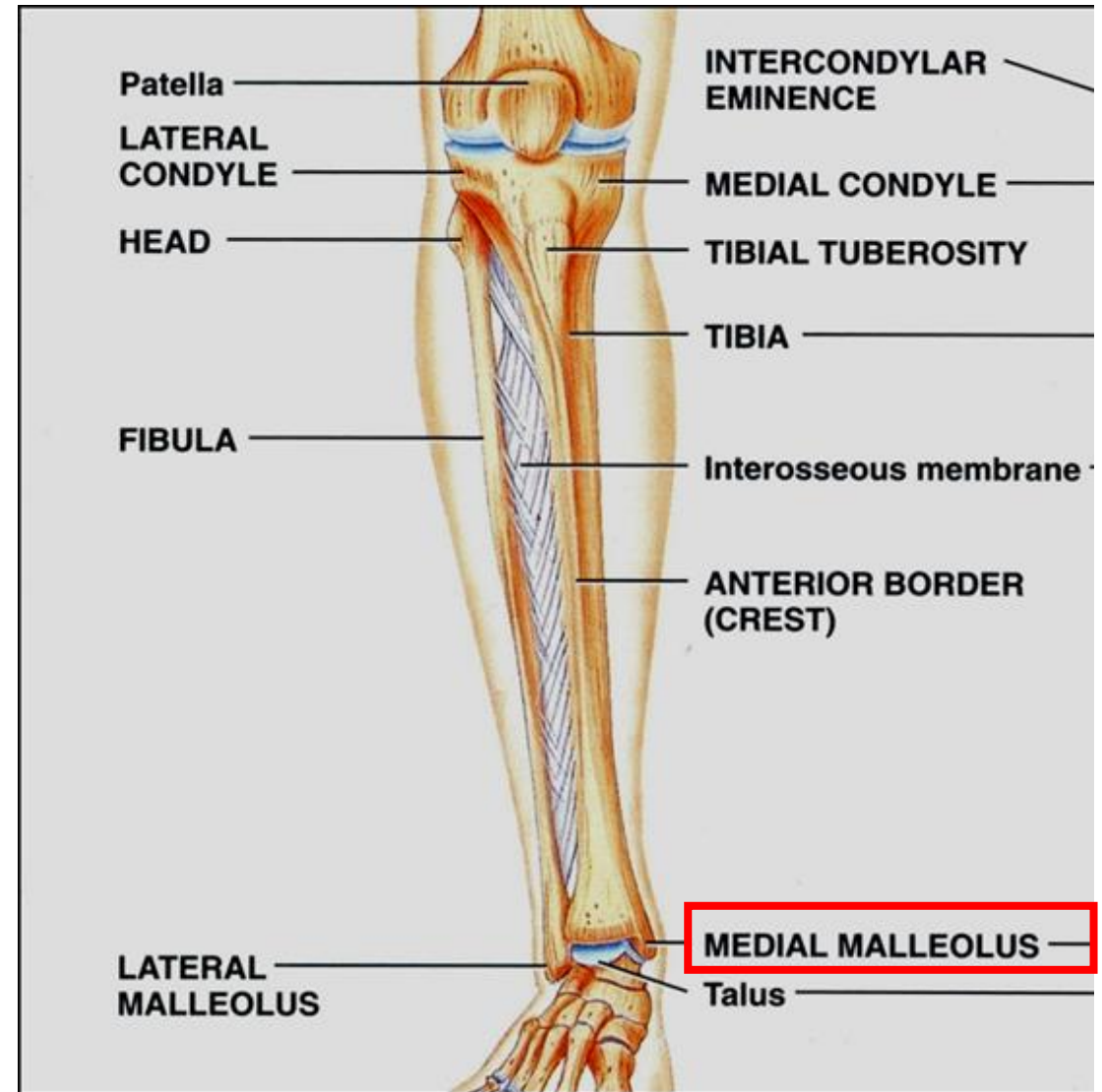
B. Shaft:

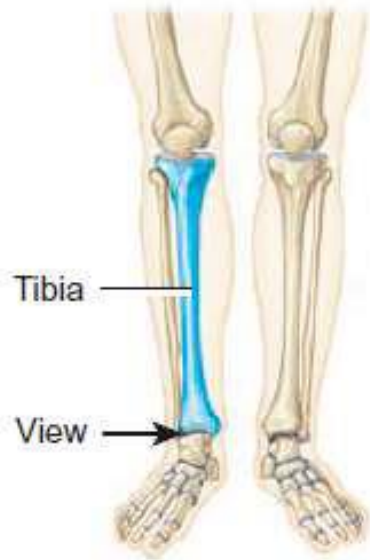
- The **tibial tuberosity** lies at the upper end of anterior border of the shaft.
- The lateral border is sharp and is called the **interosseous border** to which the interosseous membrane is attached.



C. Lower end:

- The medial aspect of the lower end presents inferiorly the **medial malleolus**. This forms the prominence on medial aspect of ankle.
- The inferior surface of this end articulates with **talus** bone at **ankle joint**.
- On the lateral aspect of lower end, there is a rough depression, the fibular notch, to which the lower end of fibula articulates forming the inferior tibio-fibular joint.





POSTERIOR

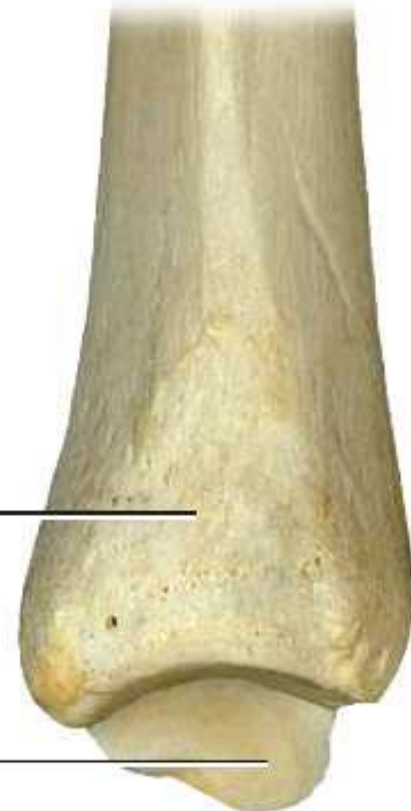
ANTERIOR



FIBULAR
NOTCH

MEDIAL
MALLEOLUS

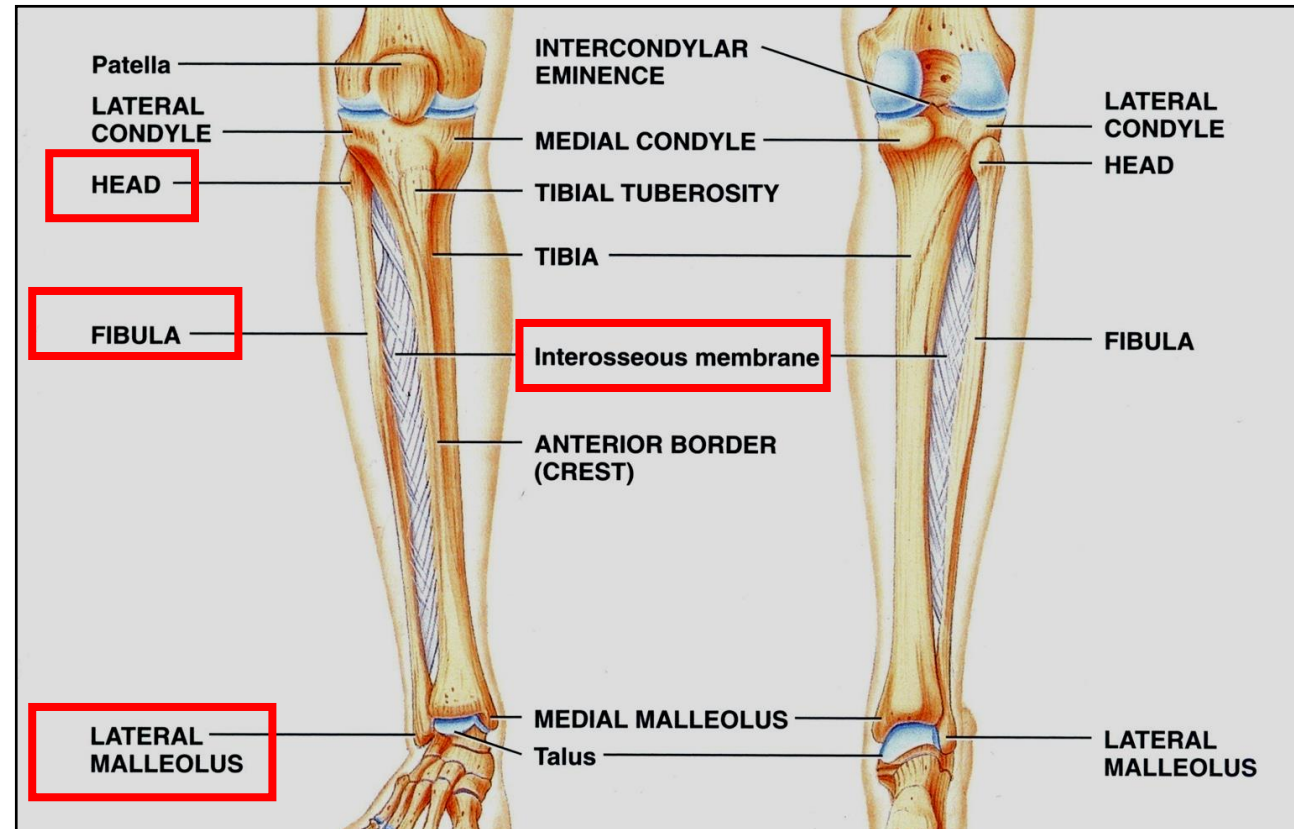
(e) Lateral view of distal end of tibia



(f) Lateral view

Fibula

- 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.



Bones of Foot

There are three groups of bones in the foot:

- 1. The seven tarsal bones**, which form the skeletal framework for the ankle
- 2. Metatarsals (I to V)**, which are the bones of the metatarsus
- 3. Phalanges**, which are the bones of the toes- each toe has three phalanges, except for the great toe, which has two.



A. The Tarsal Bones (Tarsus):

- Form the proximal region of foot.
- It consist of two large bones: **talus** & **calcaneus** + five smaller bones: **cuboid** & **navicular** bones and the **medial, intermediate & lateral cuneiform** bones.
- The **talus bone** articulates *superiorly with lower end of the tibia to form **ankle joint***, inferiorly with calcaneus, and anteriorly with navicular bone.

- 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, medially with lateral cuneiform, and anteriorly with the fourth and fifth metatarsal bones.
- Joints between tarsal bones are called the intertarsal joints.

Tarsal Bones

Superior view

- Calcaneus
- Talus bone
- Cuboid bone
- Navicular bone
- Cuneiform bones

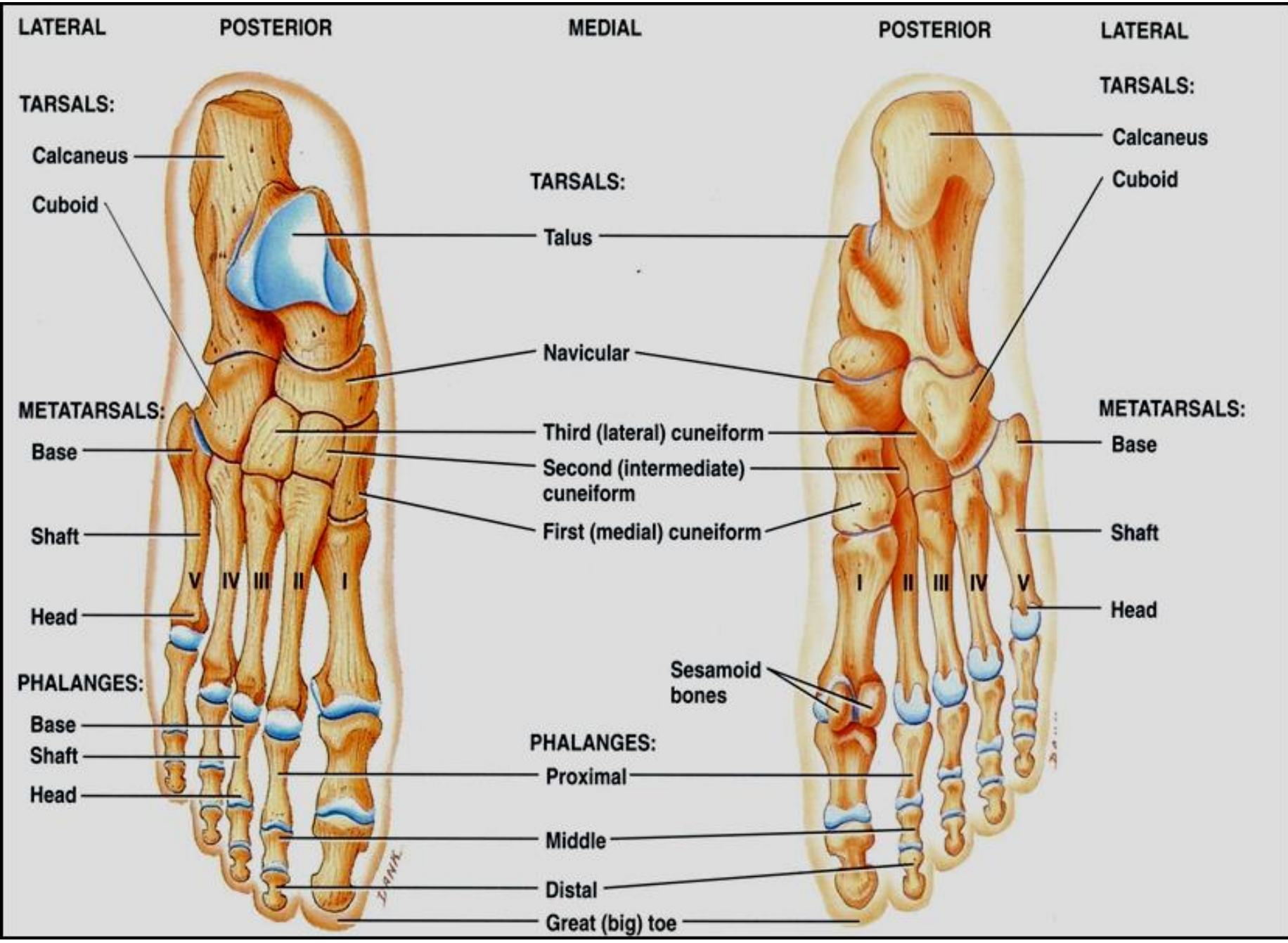


B. The Metatarsal Bones:

- In each foot there are five metatarsal bones.
- The 1st 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.
- Each phalanx has a proximal base, a body & a distal head.

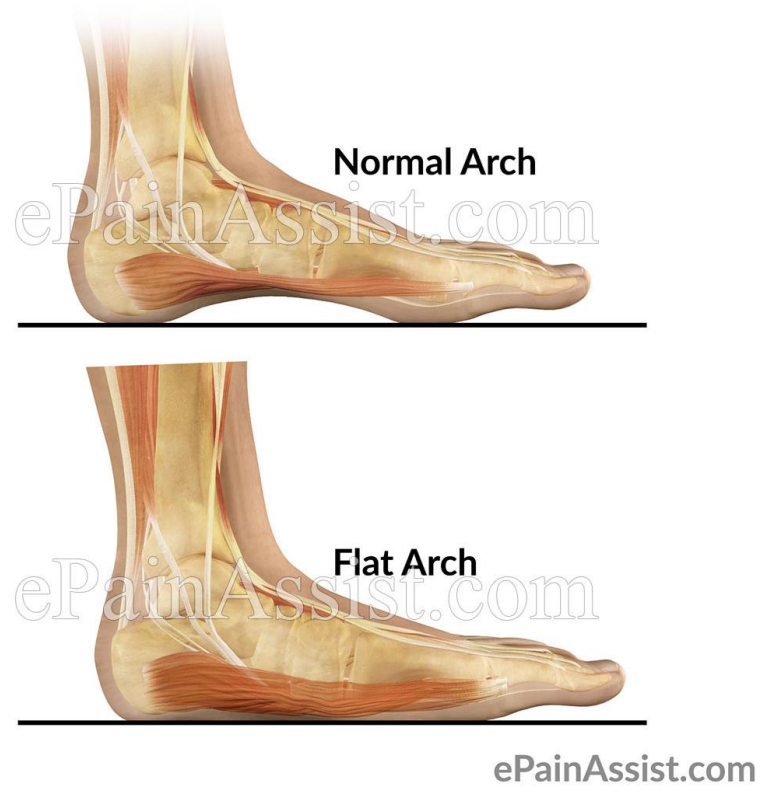


Arches of the Foot

- 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.
- **Flat 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



Thank you

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