

Anatomy Team

433

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**King Saud University
College of medicine
Musculoskeletal block**

BONES OF LOWER LIMB

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For any comments

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Objectives

You Should:

- **Classify** the bones of the three regions of the lower limb (thigh, leg and foot).
- **Differentiate** the bones of the lower limb from the bones of the upper limb.
- **Memorize** the main features of the
 - Bones of the thigh (femur & patella)
 - Bones of the leg (tibia & Fibula).
 - Bones of the foot (tarsals, metatarsals and phalanges)
- **Recognize** the side of the bone

You Can Do It 😊

Color Index:

- Red : Important.
- Violet: Explanation.
- Gray: Additional Notes.

Other colors are for
Coordination

Say "bsm Allah" then start

General notes:

Word	Meaning	Example
Processes	A projection, a prominence	Coracoid process in the scapula
Notch	An indentation (incision) on an edge or surface	Radial notch in the ulna
Fossa	A hollow place	Radial fossa in the humerus
Tubercles	A nodule or a small rounded projection on a bone	Dorsal tubercle in the radius
Groove	A channel, a long narrow depression	Intertubercular groove in the humerus
Interosseous	Between bones	Sharp medial interosseous in the radius

Just muscles, ligaments and capsules are attached to the bone.

-Usually if there is a head in the bone then there will be a neck.

#Femur:

- Articulates above with **acetabulum of hip bone** to form the hip joint.
- Involved in the formation of the **knee** joint.

#UPPER END OF FEMUR:

- **Head :**

It articulates with acetabulum (hip joint)

Has a depression in the center (**fovea capitis**)

(attachment of ligament of the head of femur)

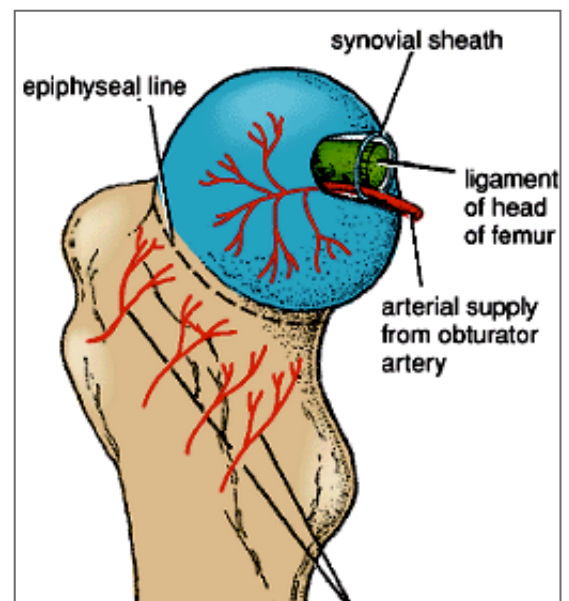
- **Neck :**

It connects head to the shaft

- **Greater & lesser trochanters :**

Anteriorly, connecting the 2 trochanters the inter-trochanteric line, where the iliofemoral ligament is attached.

Posteriorly, the inter-trochanteric crest, on which is the quadrate tubercle

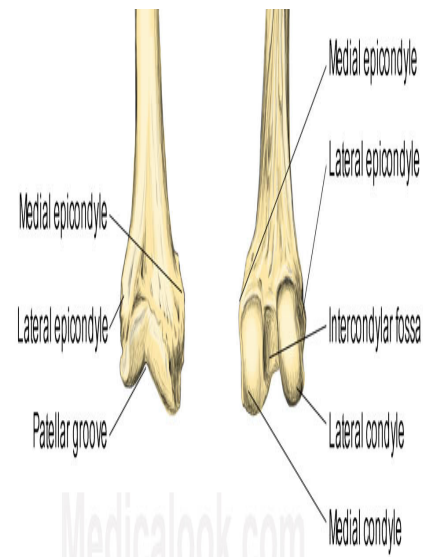


#Shaft of the femur :

- **It has 3 surfaces:** anterior, medial and lateral.
- **It has 3 borders:** 2 rounded medial and lateral, and a thick posterior border or ridge called **linea aspera**.

#LOWER END OF FEMUR:

- Has **lateral** and **medial** condyles.
- Separated anteriorly by **articular patellar surface**, and posteriorly by **intercondylar notch or fossa**.
- The 2 condyles take part in the **knee joint**.
- Above the condyles are the medial & lateral **epicondyles**.



#Patella

- It is a largest sesamoid bone
- Its anterior surface is rough and subcutaneous.
- Its posterior surface articulates with femur to form knee joint.
- Its apex lies inferiorly and is connected to tuberosity of tibia by ligamentum patellae.
- Its upper, lateral, and medial margins give attachment to Quadriceps femoris muscles.



it is a bone to support the knee joint.

#POSITION OF FEMUR (RIGHT OR LEFT)

- **Head** is directed upward & medially
- **Shaft** is smooth and convex anteriorly
- **Shaft** is rough and concave posteriorly

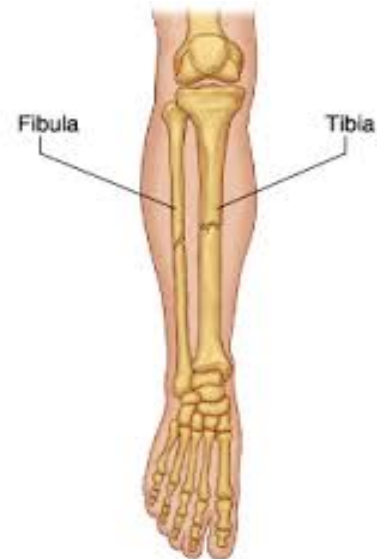
#BONES OF LEG (TIBIA AND FIBULA)

- **Tibia**: It is the medial bone of leg
- **Fibula**: It is the lateral bone of leg
- **Each of them has:**

Upper end

Shaft

Lower end



#TIBIA

#Upper end has

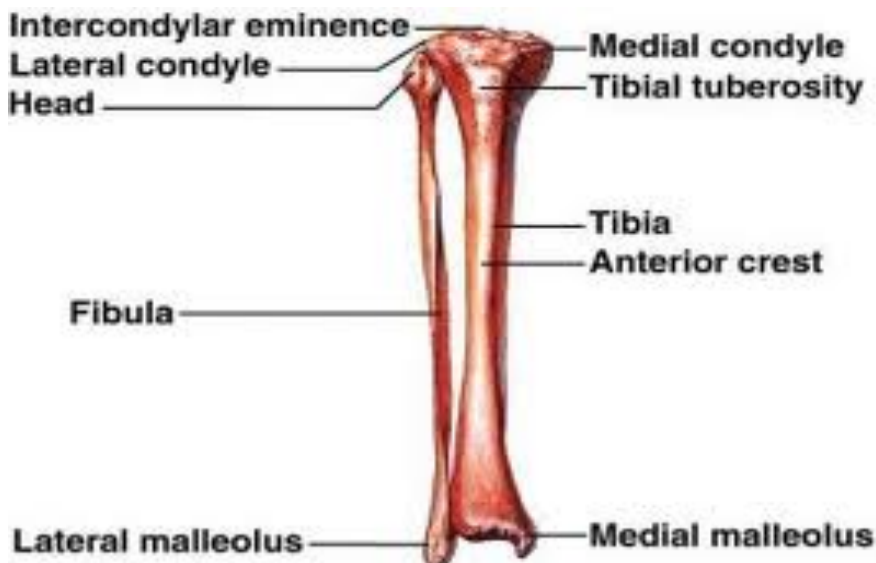
- **Two tibial condyles:**

Medial condyle

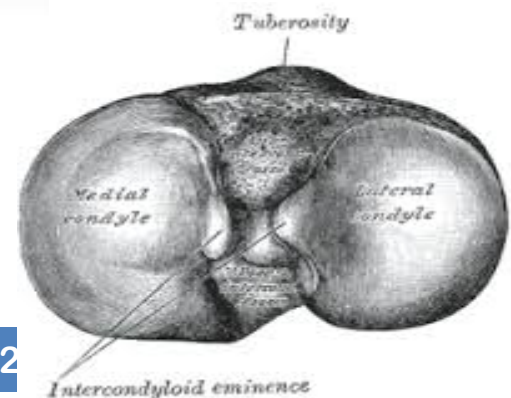
It is larger and articulates with medial condyle of femur. It has a groove on its posterior surface for semimembranosus muscle

Lateral condyle

Is smaller and articulates with lateral condyle of femur. It has facet to articulate with the head of fibula laterally to form proximal tibio-fibular joint.



- **Intercondylar area:**



It is rough and has intercondylar eminence.

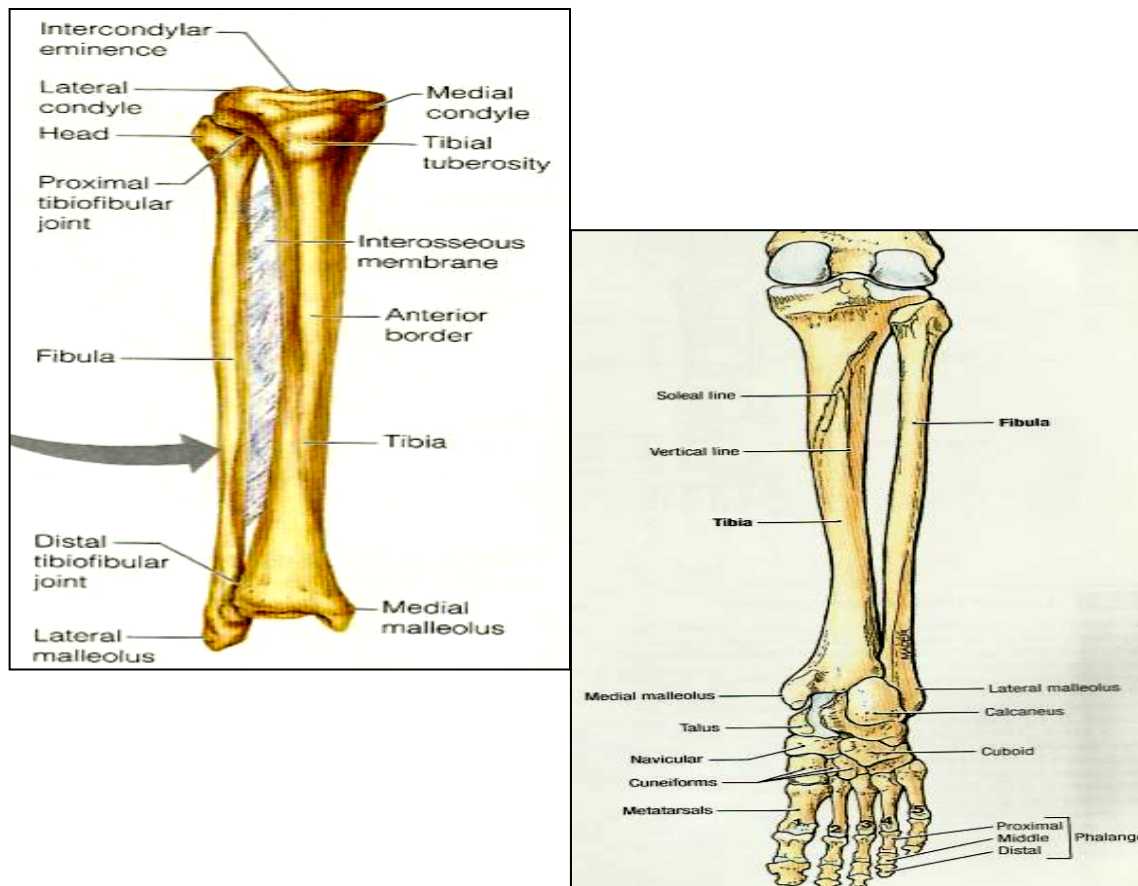
#Shaft (body)has :

- **Tibial tuberosity**
 - Its upper smooth part gives attachment to ligamentum patellae.
 - Its lower rough part is subcutaneous
- **3 borders**
 - Anterior border is sharp and subcutaneous
 - Medial border
 - Lateral border also called **interosseous border**.
- **3 surfaces**
 - Medial: subcutaneous.
 - Lateral
 - Posterior has oblique line, soleal line for attachment of soleus muscle

#Lower end

- Its medial surface is subcutaneous (medial malleolus)
- Its lateral surface articulate with talus to form ankle joint

Fibular notch lies on its lateral surface of lower end to form distal tibiofibular joint



Some points about Tibia:

- **Upper end** is larger than lower end

- **Medial malleolus** is directed downward and medially
- **Shaft** has sharp anterior border

#FIBULA

#Upper end:

- It is the slender (thin) lateral bone of the leg.
- It takes **no part** in articulation of knee joint.
- **Its upper end has**
 - Head : articulates with lateral condyle of tibia
 - Styloid process
 - Neck

#Shaft has

- 4 borders
- 4 surfaces

-interosseous border gives attachment to interosseous membrane.

Interosseous membrane (interosseous ligaments)



Important notes:

Femur and tibia each of them has 3 surfaces and 3 borders BUT fibula has 4 surfaces and 4 borders

For each leg we have just 2 malleolus, the lateral one comes from fibula and the medial one comes from the tibia

#Lower end forms

- Lateral malleolus is **subcutaneous**

- Its medial surface is smooth for articulation with talus to form ankle joint.

Bones of foot

Seven (7) Tarsal bones

-They start to ossify before birth and end ossification by 5th year in all tarsal bones. They are

1. Calcaneum.
2. Talus .
3. Navicular.
4. Cuboid.
5. Three cuneiform bones.

-**Only Talus** articulates with tibia & fibula at ankle joint.

-**Calcaneum**: the largest bone of foot, forming the heel

Five (5) Metatarsal bones

- They are numbered from medial to lateral.
- 1st metatarsal bone is large and lies medially.
- Each metatarsal bone has a base (proximal) a shaft and a head (distal)

Notes:

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- The 1st metacarpal is the shortest of all the metacarpals BUT the 1st metatarsal is the largest of all the metatarsals
- Metacarpals and metatarsals are always numbered from the thumb (the biggest finger) and the big to

Fourteen (14) phalanges

- Two phalanges for big toe (*proximal & distal*)
- Three phalanges for each of the lateral 4 toes (*proximal, middle & distal*)
- Each phalanx has base, shaft and a head.



SUMMARY

FEMUR

Proximal end

Head, Neck, Greater trochanter, Lesser trochanter, Intertrochanteric line and Intertrochanteric crest

Shaft

3 surfaces Lateral, Medial and **Anterior**

3 borders Lateral, Medial and **THICK Posterior**

-Gluteal tuberosity

-medial margin of linea aspera  medial supracondylar ridge

- Lateral supracondylar ridge  lateral margin of linea aspera

-the popliteal surface

Distal end

-lateral condyle

- Medial condyle

-lateral epicondyl

-medial epicondyle

-patella surface (separate the 2 condyles anteriorly)

-intercondylar notch (separate the 2 condyles posteriorly)

Patella

The largest sesamoid bone in the body

Tibia

Proximal end: medial condyle, lateral condyle, intercondylar area *and* intercondylar eminence

Shaft: Tibial tuberosity, 3 borders and 3 surfaces

Distal end: medial malleolus *and* fibular notch

Fibula

Proximal end: Head, Styloid process and Neck

Shaft: 4 borders The medial surfaces attaches with the interosseous membrane *and* 4 surfaces

Distal end

-lateral malleolus (subcutaneous)

The foot

7 tarsals

- **T**alus
- **C**alcaneus
- **N**avicular
- **M**edial cuneiform
- **I**ntermediate cuneiform
- **L**ateral cuneiform
- **C**uboid

A mnemonic: 1-**T**hin **C**ountry **N**erds **M**et **I**ncredible **L**ovely **C**uties.

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Talus – calcaneus – cuboid – navicular – and 3cuneiforms.

5 metatarsal

The 1st metatarsal the largest

14 phalanges

The big toe has just 2 and each of the others has 3.

Note: this table does **NOT contain everything**. It just summarizes some of the main points in the lecture!

Femur	Patella	Tibia	Fibula	Tarsals	Metatarsals + Phalanges
<p>-Articulation: with hipbone above and patella and tibia below</p> <p>-Structures: head, neck, greater and lesser trochanters, intertrochanteric line (iliofemoral ligament attachment), intertrochanteric crest (has quadrat tubercle), linea aspera (ridge on POSTERIOR PART), epicondyles, condyles, patellar groove (anterior), and intercondylar notch (posterior).</p> <p>-Position: head is medial + upward – shaft convex + smooth anteriorly – Shaft is rough + concave posteriorly.</p>	<p>-Largest sesamoid bone</p> <p>-anterior part is subcutaneous</p> <p>-its posterior surface articulates with the condyles of femur</p> <p>-Apex is inferior</p> <p>-gives attachment to quadriceps femoris muscles</p>	<p>-Upper end: 2 condyles + intercondylar area (eminence)</p> <p>-Shaft: tibial tuberosity – lower part subcutaneous – soleal line posteriorly</p> <p>-Lower end: articulates with talus – has fibular notch – medial malleolus (medial surface: subcutaneous – lateral surface: articulates with talus)</p> <p>-Position: upper end is large – medial malleolus is downward and medial – shaft has sharp anterior border</p>	<p>-lateral bone of the leg</p> <p>-takes no part in knee joint articulation BUT it has to do with the ankle joint</p> <p>-has lateral malleolus at the distal end and its medial surface articulates with the talus to form the ankle joint!</p>	<p>-7 bones (calcaneum – talus – navicular – cuboid – 3 cuneiforms)</p> <p>-Talus: for ankle joint</p> <p>-Calcaneus: largest bone of the foot + forms the heel of the foot</p>	<p>-Metatarsals: numbered from medial to lateral (opposite to the hand → lateral to medial)</p> <p>-long bones</p> <p>-Phalanges: 3 for each toe except big toe has 2 only.</p>

Multiple Choice Questions

1- *In the adult, the neck of the femur makes an angle of about _____ degrees with the long axis of the shaft:*

- A) 155
- B) 125
- C) 165
- D) 145

2- *The posterior surface of tibia shows an oblique line for the attachment of the soleus muscle. This line is called:*

- A) Popliteal line
- B) Malleolar line
- C) Soleal line
- D) Interosseous line

3- *The Lower end of the fibula forms the triangular:*

- A) Lateral malleolus
- B) Medial malleolus
- C) Styloid process
- D) Malleolar fossa

4- *True or false: The linea aspera is present on the anterior surface of the Femur.*

- A) T
- B) F

Answers:

- 1- B
- 2- C
- 3- A
- 4- B (posterior)

Goodluck 😊...