

# Back of Leg II

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A photograph of a sandy dune with a series of footprints leading up the slope. The footprints are arranged in a line, receding into the distance. The sand is bright and textured.

If we are  
facing the right  
direction,  
all we have  
to do  
is keep on  
walking.

*Buddhist Proverb*

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# Learning Objectives

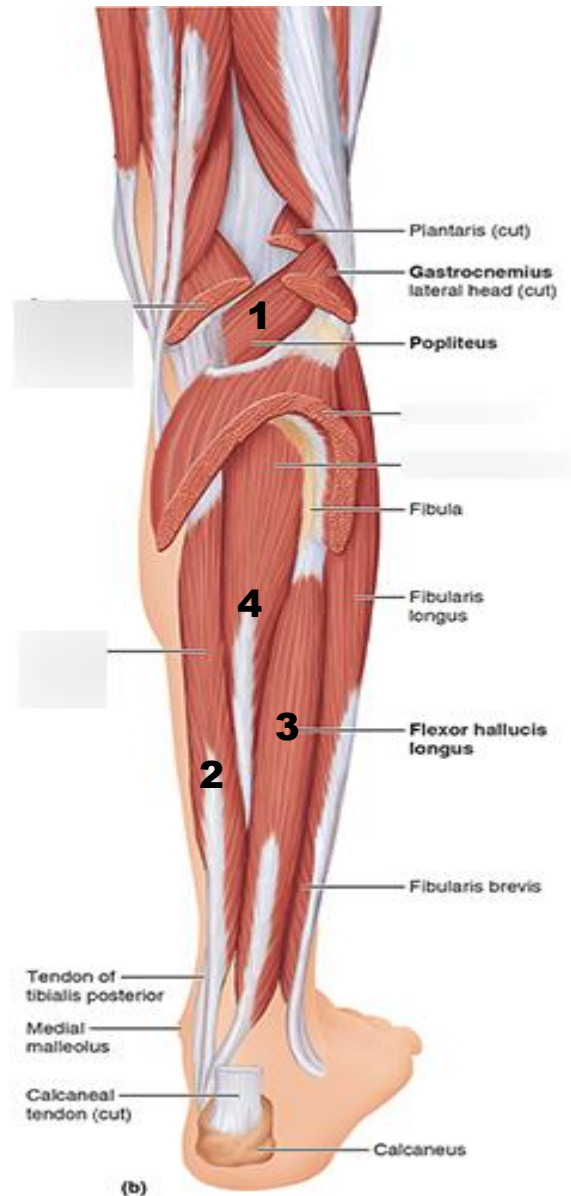
**By the end of this teaching session on Back of leg – II all the MBBS 1<sup>st</sup> year students must be able to:**

- Enumerate the deep muscles of back of leg
- Describe the origin, insertion, nerve supply & actions of deep muscles of back of leg
- Describe locking and unlocking of knee joint
- Name the nerve and arteries of posterior compartment of leg
- Describe the origin, course relations & branches of tibial nerve
- Discuss the applied anatomy of structures in posterior compartment of leg

# Deep Muscles of Back of Leg

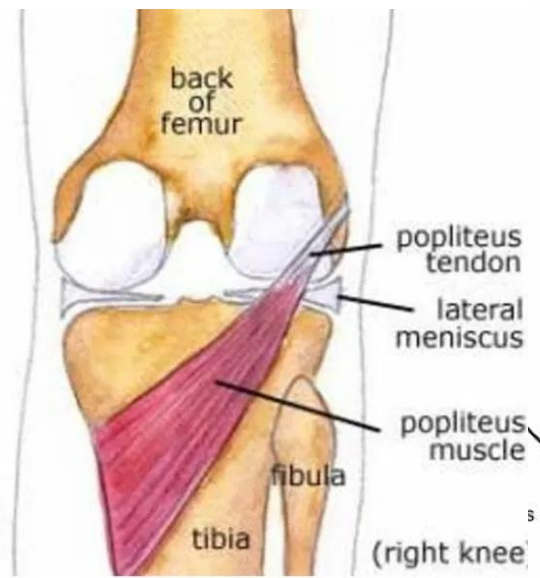
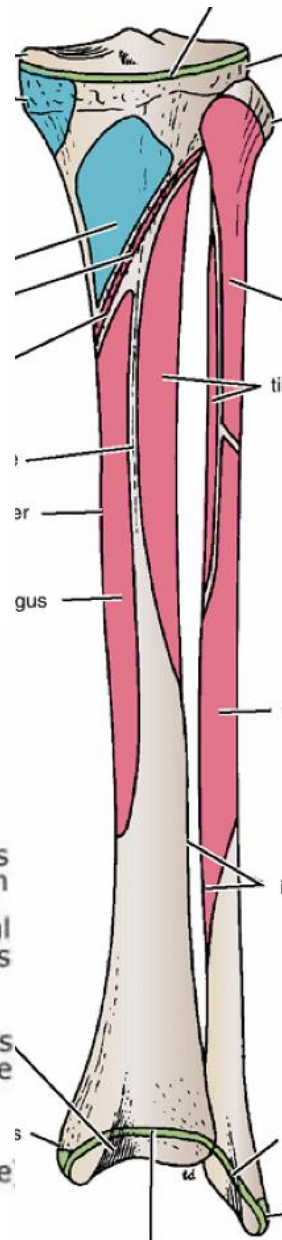
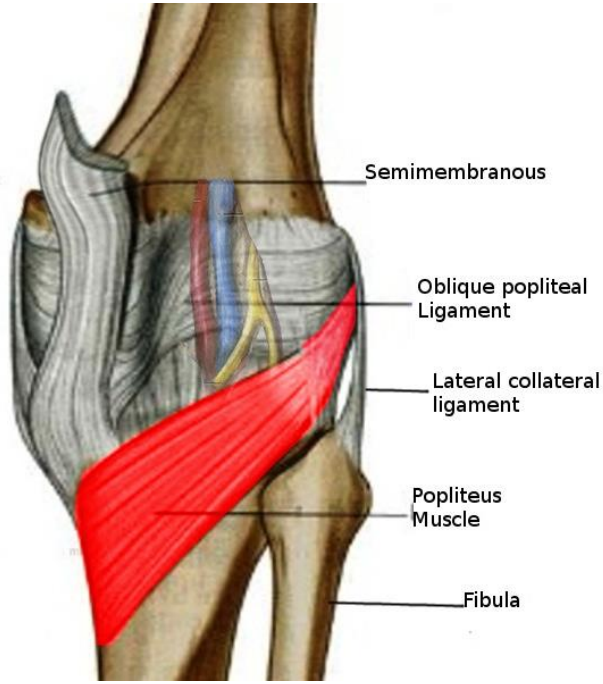
# Deep muscles of posterior compartment of leg

(Popliteus, Flexor digitorum longus, Flexor hallucis longus, Tibialis posterior)



1. Popliteus
2. Flexor digitorum longus
3. Flexor hallucis longus
4. Tibialis posterior

# Popliteus



## Origin:

- Lateral surface of lateral condyle of femur
- Outer margin of lateral meniscus

## Insertion:

Posterior surface of tibial shaft  
Above soleal line

## Actions:

Unlocking of knee joint prior to flexion

# Locking and Unlocking of knee- foot on the ground

What locks the knee joint?

Articular surface geometry

NOT

Muscles



What Unlocks the knee joint?

POPLITEUS



- At the end of extension – knee joint locked

MECHANISM- when foot is on the ground:

**LOCKING:** Femur rotates medially on the tibia for LOCKING the knee joint at the end of extension

Medial rotation of femur (MRF)

**UNLOCKING:** Femur rotates Laterally on the tibia for UNLOCKING the knee joint before flexion can be initiated/ prior to flexion



# Locking and Unlocking of knee- foot off the ground

What locks the knee joint?

**Articular surface geometry**

NOT  
Muscles



What Unlocks the knee joint?

**POPLITEUS**



MECHANISM- when foot is off the ground:

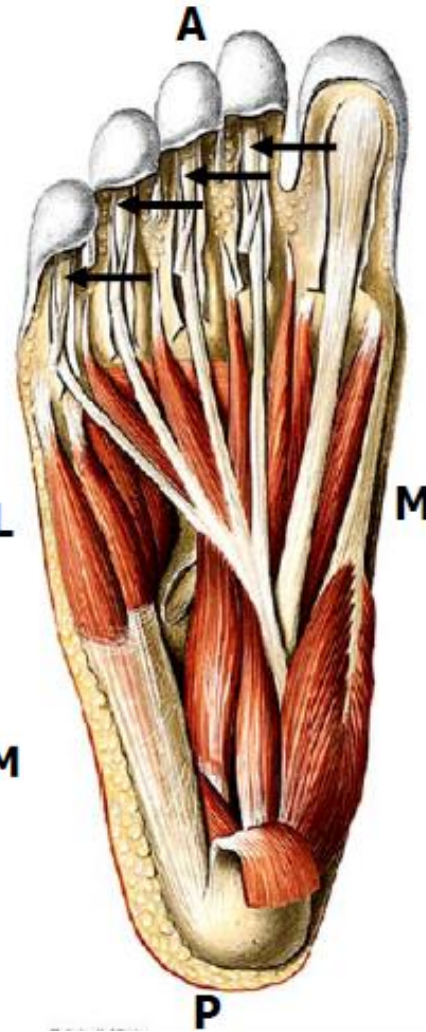
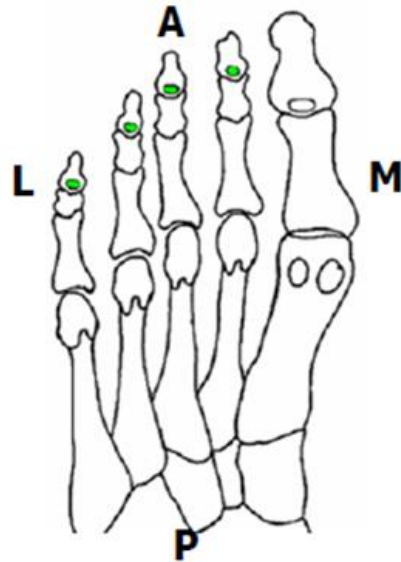
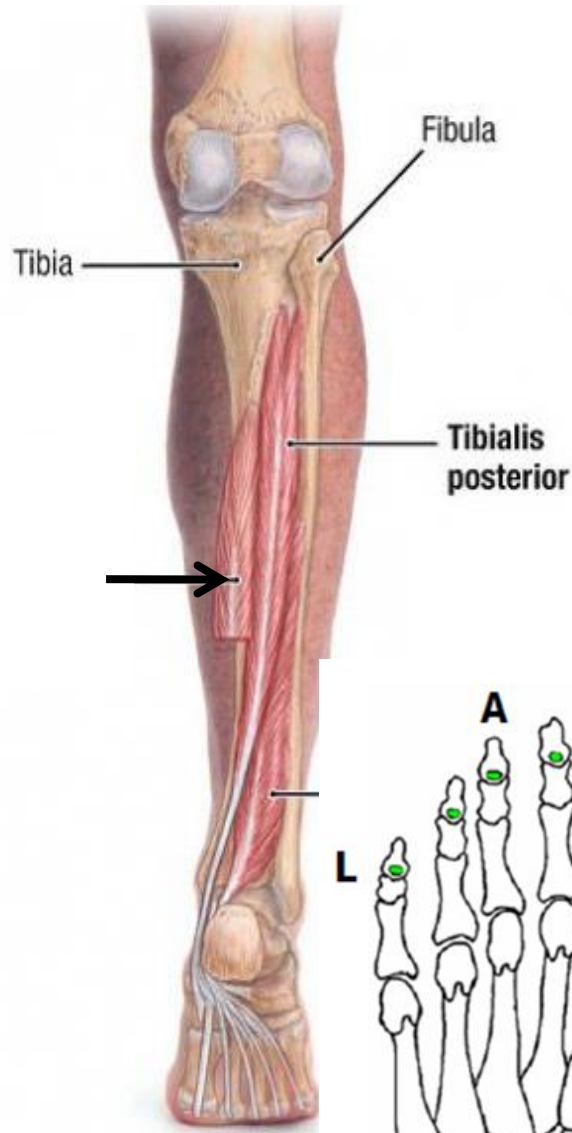
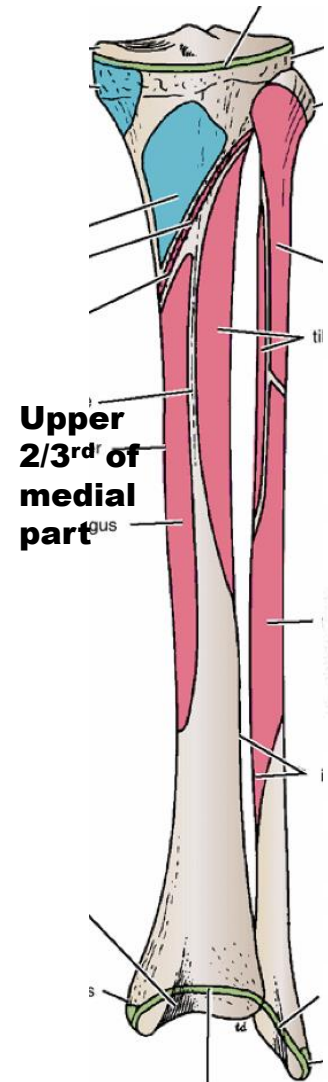
**LOCKING:** **Tibia rotates laterally** on the femur for LOCKING the knee joint **at the end of extension**

**UNLOCKING:** **Tibia rotates Medially** on the femur for UNLOCKING the knee joint **before flexion can be initiated**





# Flexor Digitorum Longus



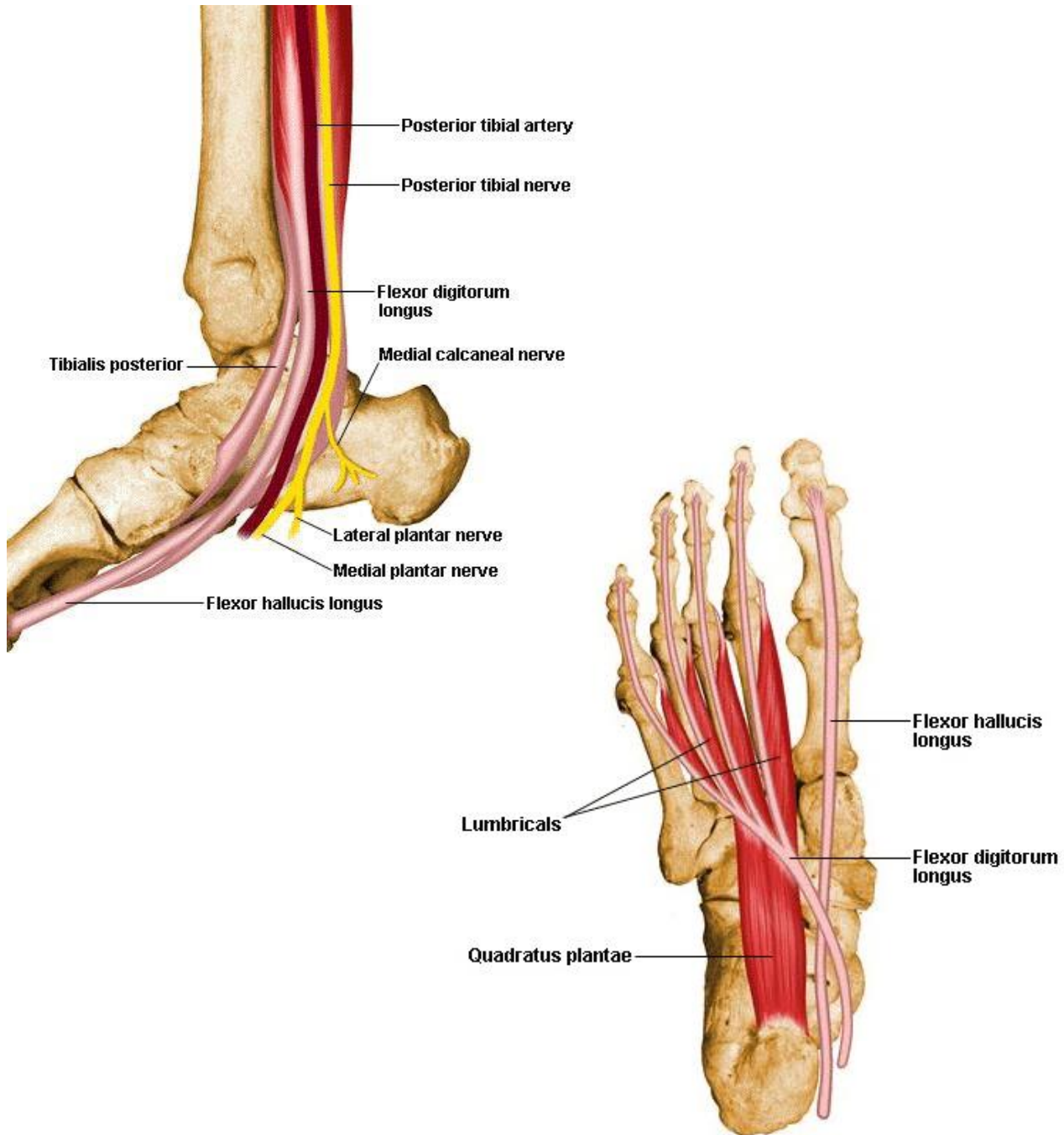
## Origin:

- Posterior surface of tibia
- Upper 2/3<sup>rd</sup> of medial part below soleal line

*Ends in tendon that divides into 4 slips  
1 for each of lateral 4 toes*

## Insertion:

Plantar surface of base of distal phalanges of lateral 4 toes

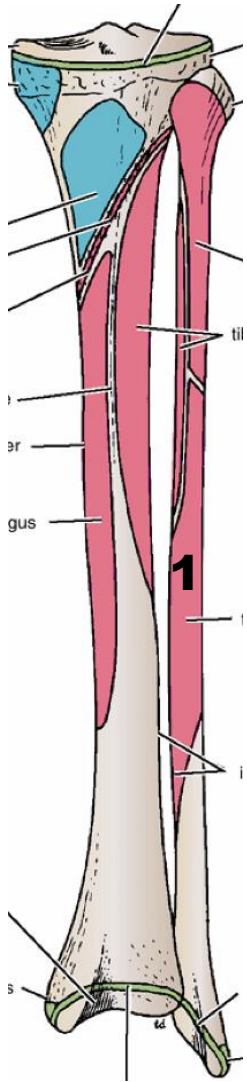


## Flexor Digitorum Longus contd.....

- FDL tendon crosses Tibialis posterior in lower leg
- FDL tendon crosses tendon of FHL in sole
- Tendon of FDL receives insertion of flexor digitorum accessories (quadratus plantae)
- Digital slips of tendons give origin to 4 lumbrical muscles

# Flexor Hallucis Longus

Deep muscles contd.....



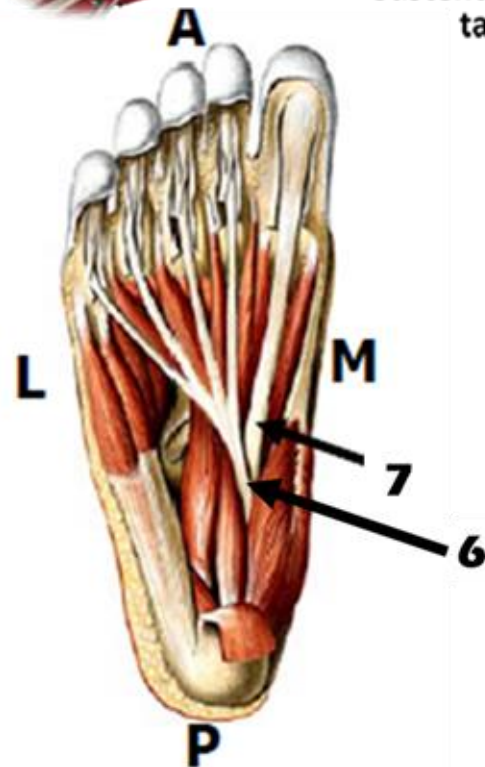
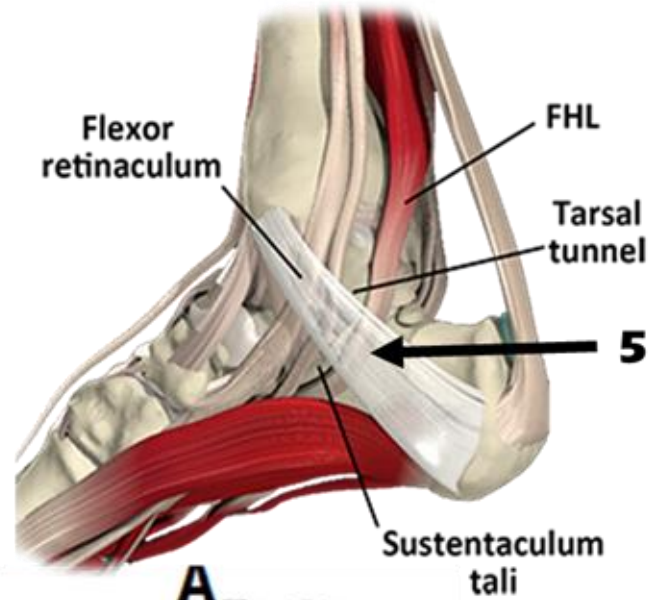
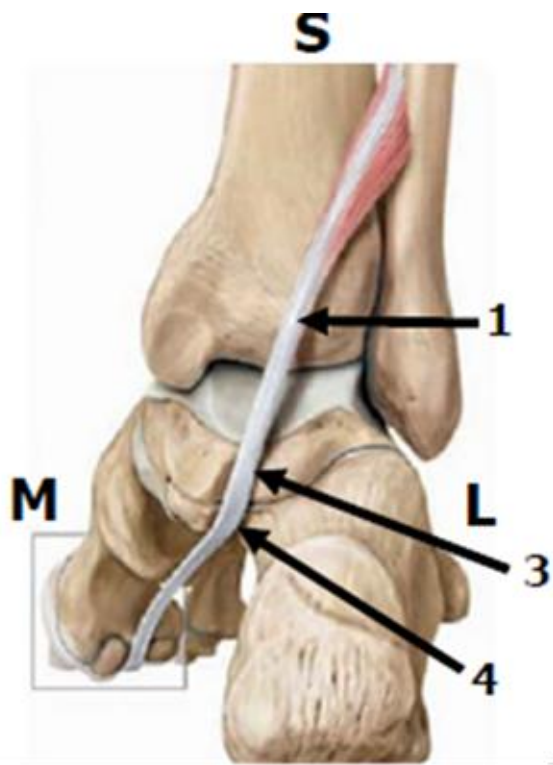
## Origin:

1. Lower 3/4<sup>th</sup> of posterior surface of fibula

## Insertion:

Plantar surface of base of distal phalanx of great toe

## Flexor Hallucis Longus contd.....



**1.** Tendon related to posterior surface of lower end of tibia

**3.** Then between the two tubercles on the posterior surface of the body of the talus

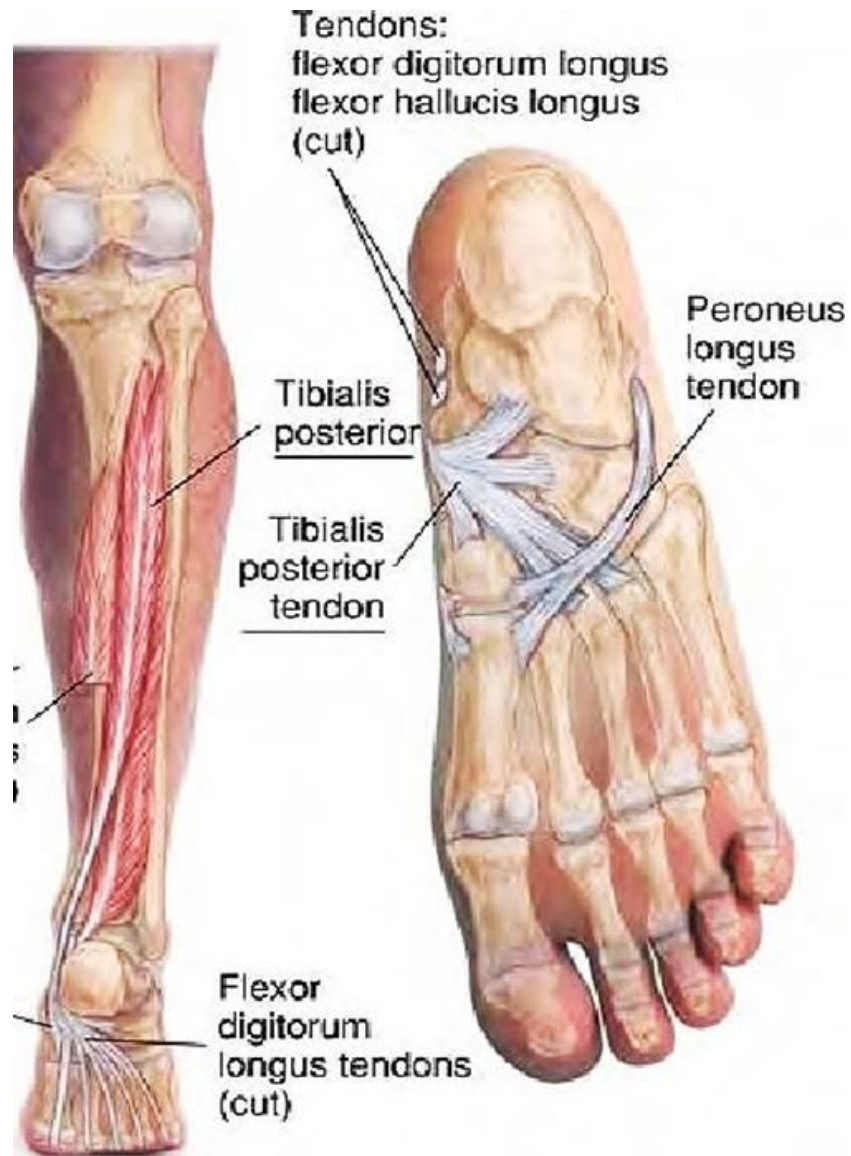
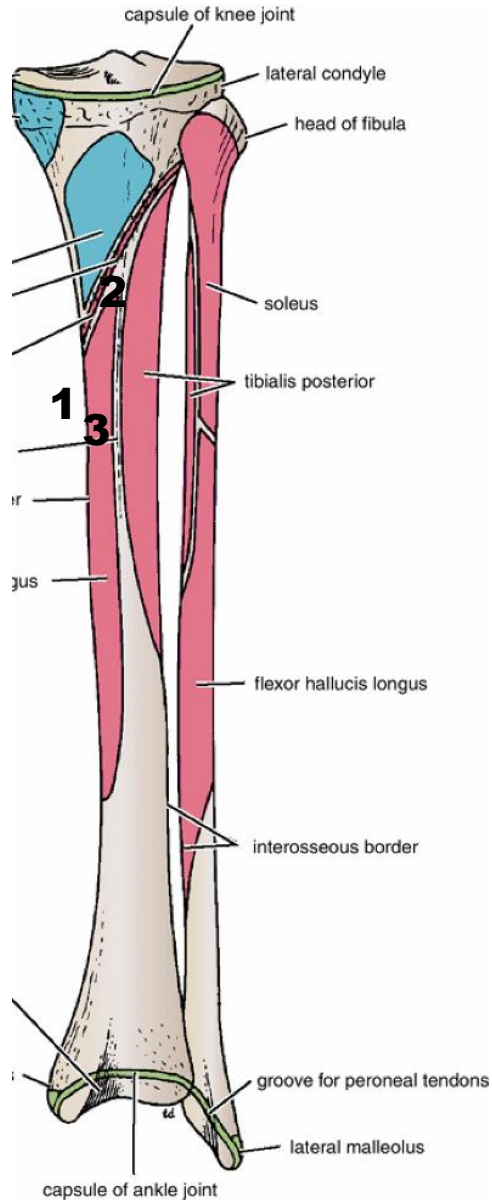
**4.** Runs forward below sustentaculum tali

**5.** Passes deep to flexor retinaculum

**6.** In sole crossed by tendon of FDL

**7.** then distally on the plantar surface of the foot in the second layer of muscles (5) where it gives rise to the Knot of Henry, then into a synovial sheath within the flexor sheath of the great toe.

# Tibialis posterior



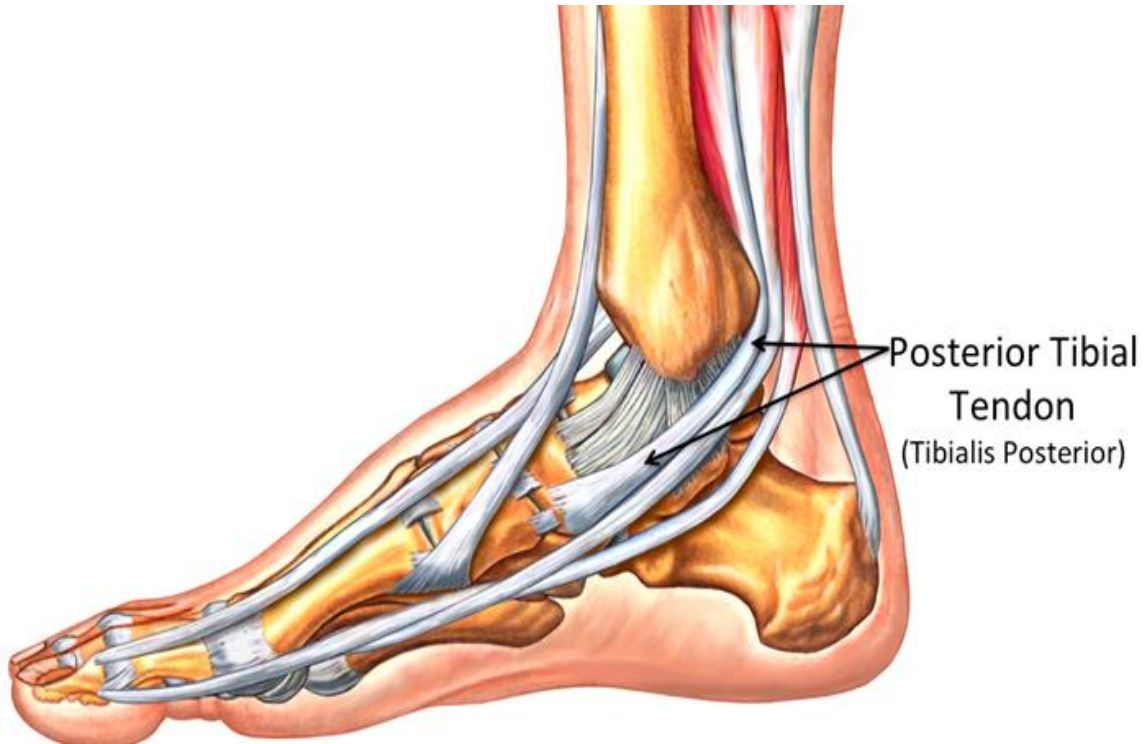
## Origin:

1. Posterior surface of tibia below soleal line, upper 2/3<sup>rd</sup> of lateral part
2. Posterior surface of fibula in front of medial crest
3. Posterior surface of interosseous membrane

## Insertion:

- Tuberosity of navicular bone
- Other tarsal bones (**except talus**)
- 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> metatarsal bones

## Tibialis posterior contd....

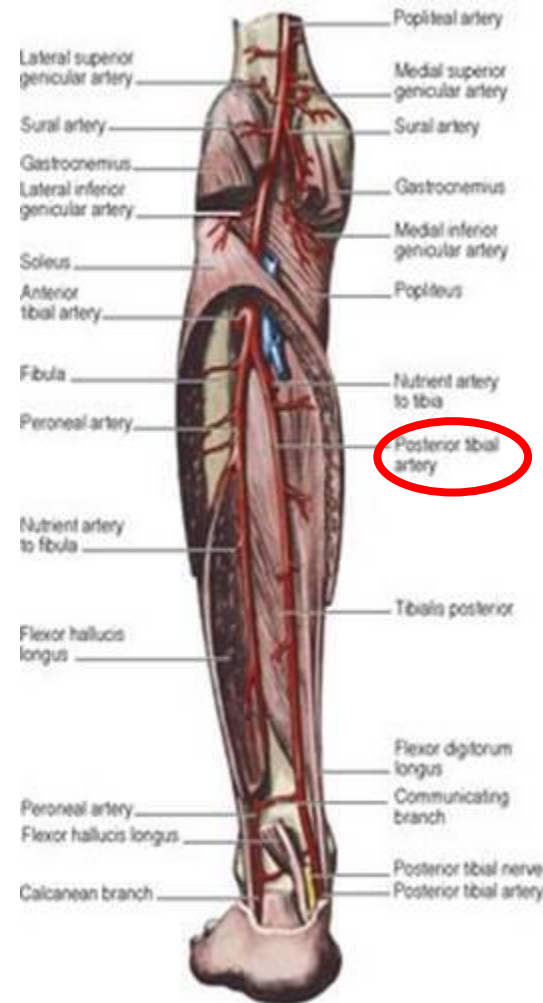
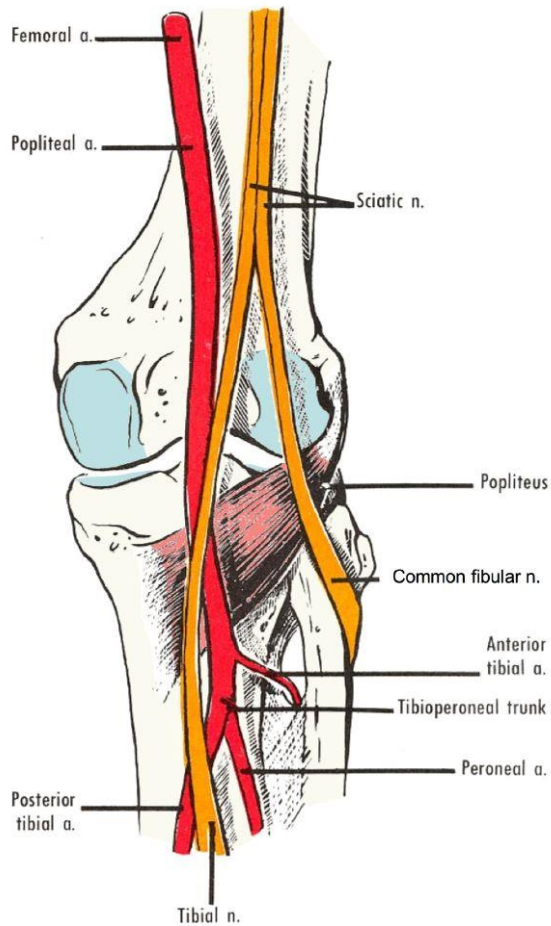


- Tendon passes behind medial malleolus-  
in a groove
- Beneath flexor retinaculum
- Terminal part supports the spring  
ligament

# Deep muscles- nerve supply & actions

<b>Muscles</b>	<b>Nerve Supply</b>	<b>Actions</b>
<b>Popliteus</b>	Tibial nerve	Unlocking of locked knee prior to flexion
<b>Flexor Digitorum Longus</b>	Tibial nerve	Flexes distal phalanges of lateral 4 toes , plantar flexion of ankle, supports longitudinal arches
<b>Flexor Hallucis Longus</b>	Tibial nerve	Flexes distal phalanx of great 4 toe , plantar flexion of ankle, supports medial longitudinal arch
<b>Tibialis Posterior</b>	Tibial nerve	Plantar flexion of ankle, inversion at subtalar joint, supports medial longitudinal arch

# Posterior tibial artery



## Beginning-

Lower border of popliteus, between tibia & fibula

Enters leg – deep to soleal arch

Descends medially – reaches medial ankle midway between medial malleolus and medial tubercle on calcaneum

## Termination-

Deep to flexor retinaculum

Divides into medial & lateral plantar arteries



# Posterior tibial artery- relations

## SUPERFICIAL

### In upper 2/3<sup>rd</sup>

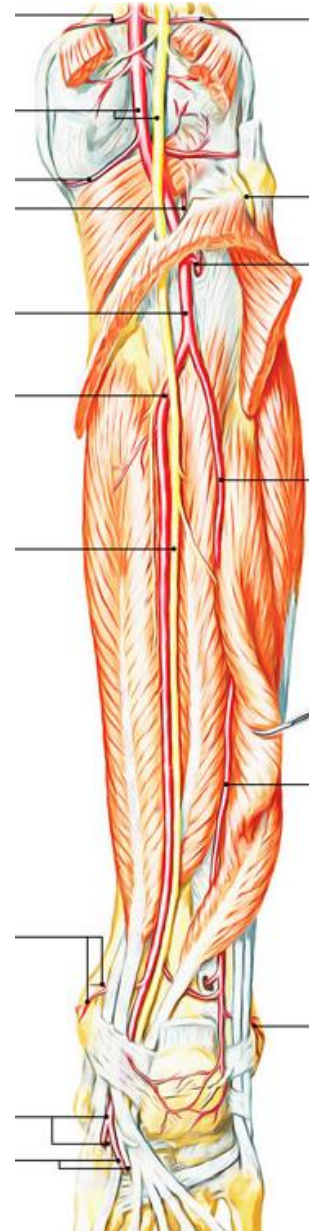
Gastrocnemius, Soleus & superficial septum

### In lower 1/3<sup>rd</sup>

Skin & fascia (2.5cm in front and parallel to tendo achilles)

### At ankle

Flexor retinaculum



## DEEP

### In upper 2/3<sup>rd</sup>

Tibialis posterior

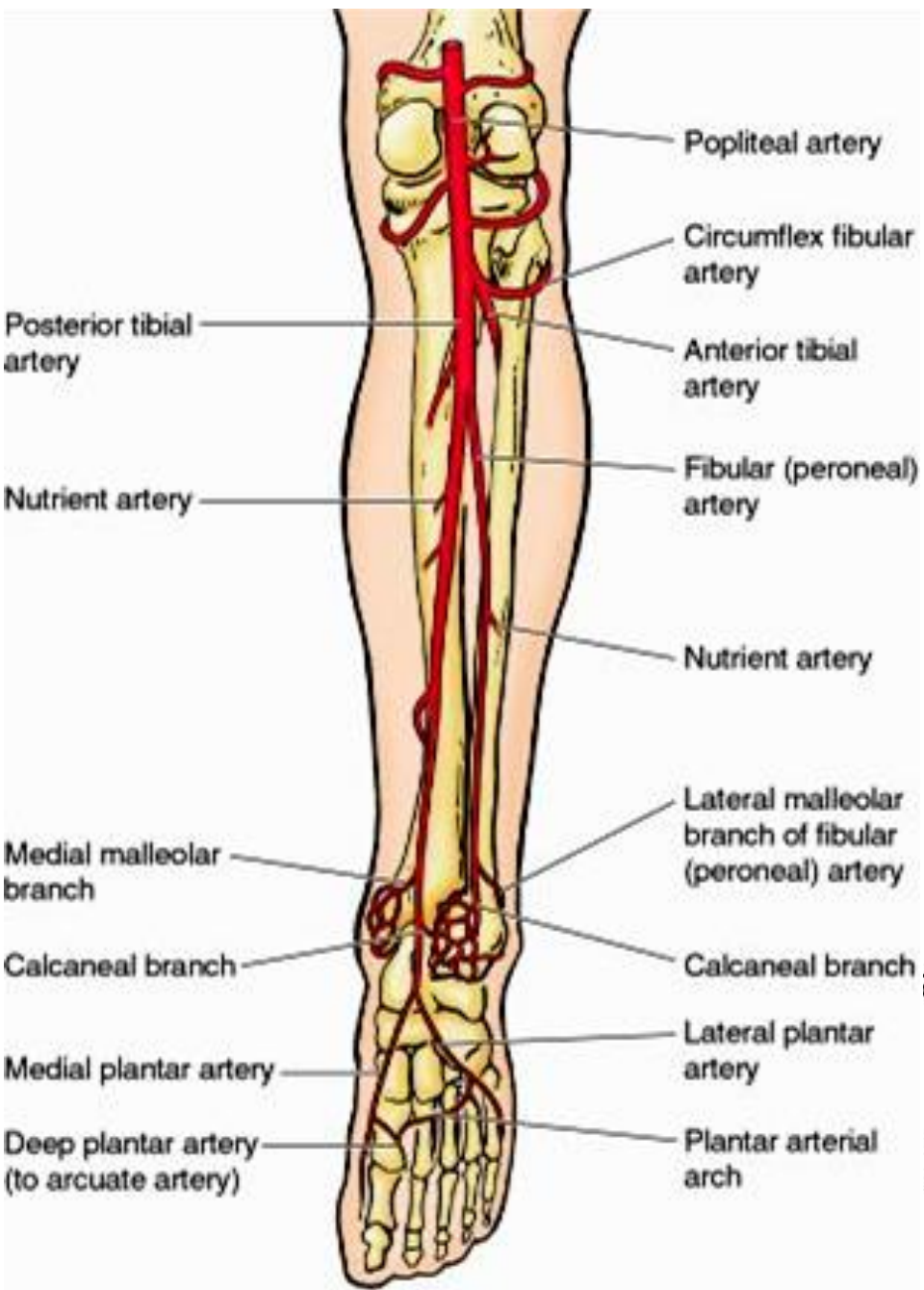
### In lower 1/3<sup>rd</sup>

Flexor Digitorum longus

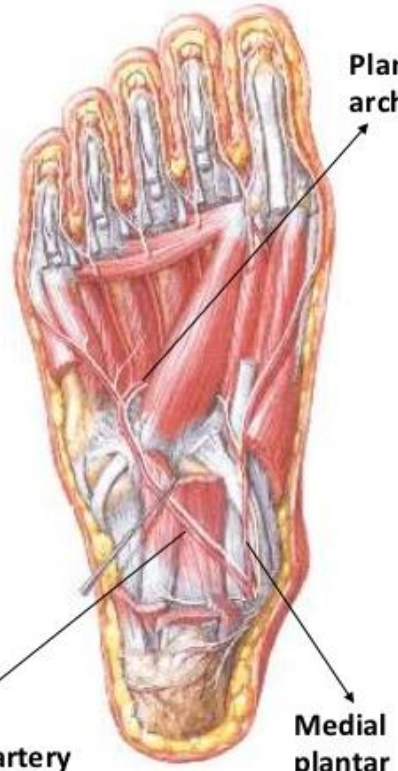
### At ankle

Capsule of ankle joint  
(between FDL & FHL)

# Branches



Posterior view



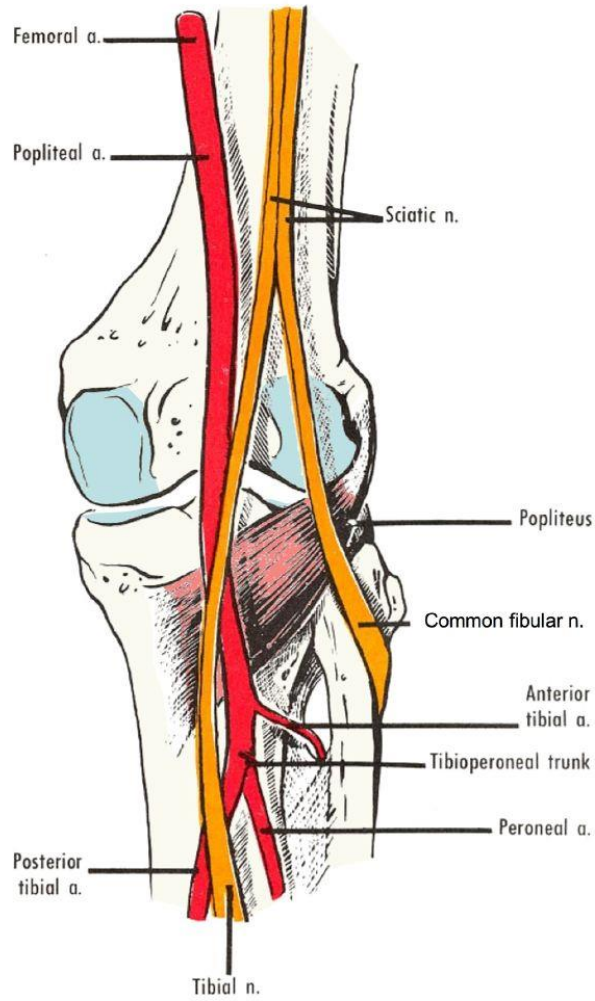
Lateral Plantar artery

Medial plantar artery

- Peroneal artery (*largest branch*)
- Muscular branches (*to muscles of back*)
- Nutrient artery to tibia
- Anastomotic branches
  - Circumflex fibular (*around knee joint*)
  - Malleolar (*medial malleolus*)
  - Communicating (*5cm above ankle*)
  - Calcanean (*around heel*)
- Terminal branches
  - Medial plantar
  - Lateral plantar

# Peroneal artery

(largest branch of posterior tibial artery)



## Beginning-

2.5 cm below lower border of popliteus

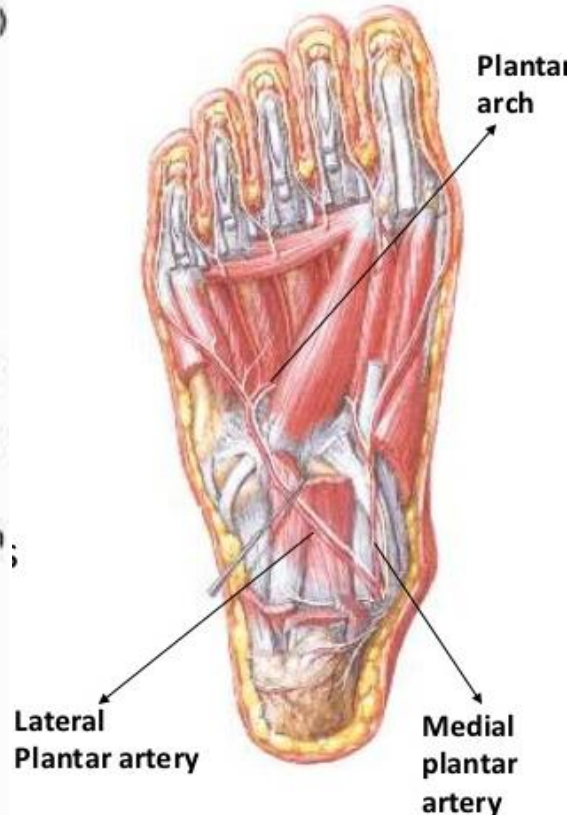
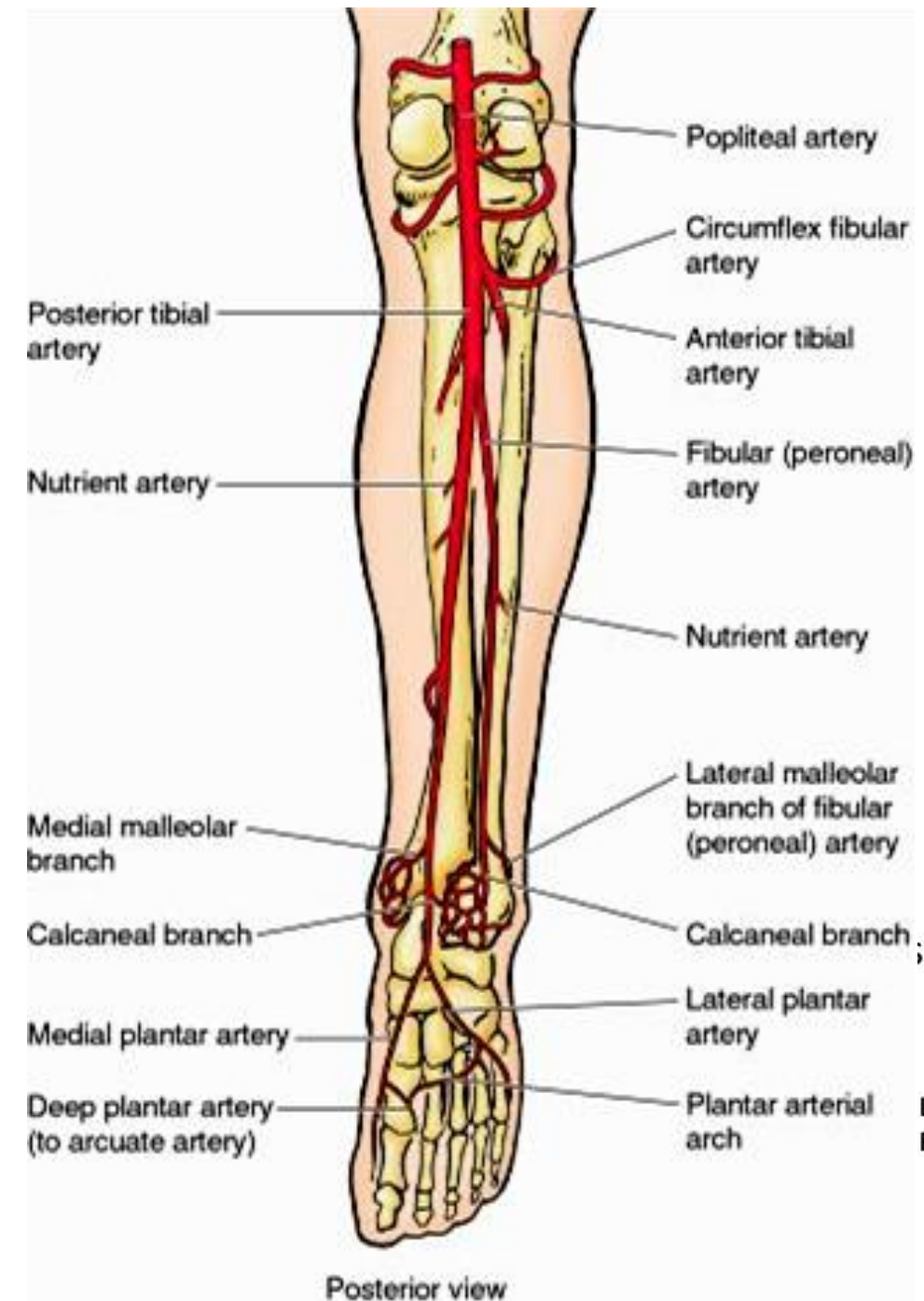
Descends laterally – along medial crest of fibula

Passes behind inferior tibiofibular & ankle joints

## Termination-

Divides into many calcanean branches

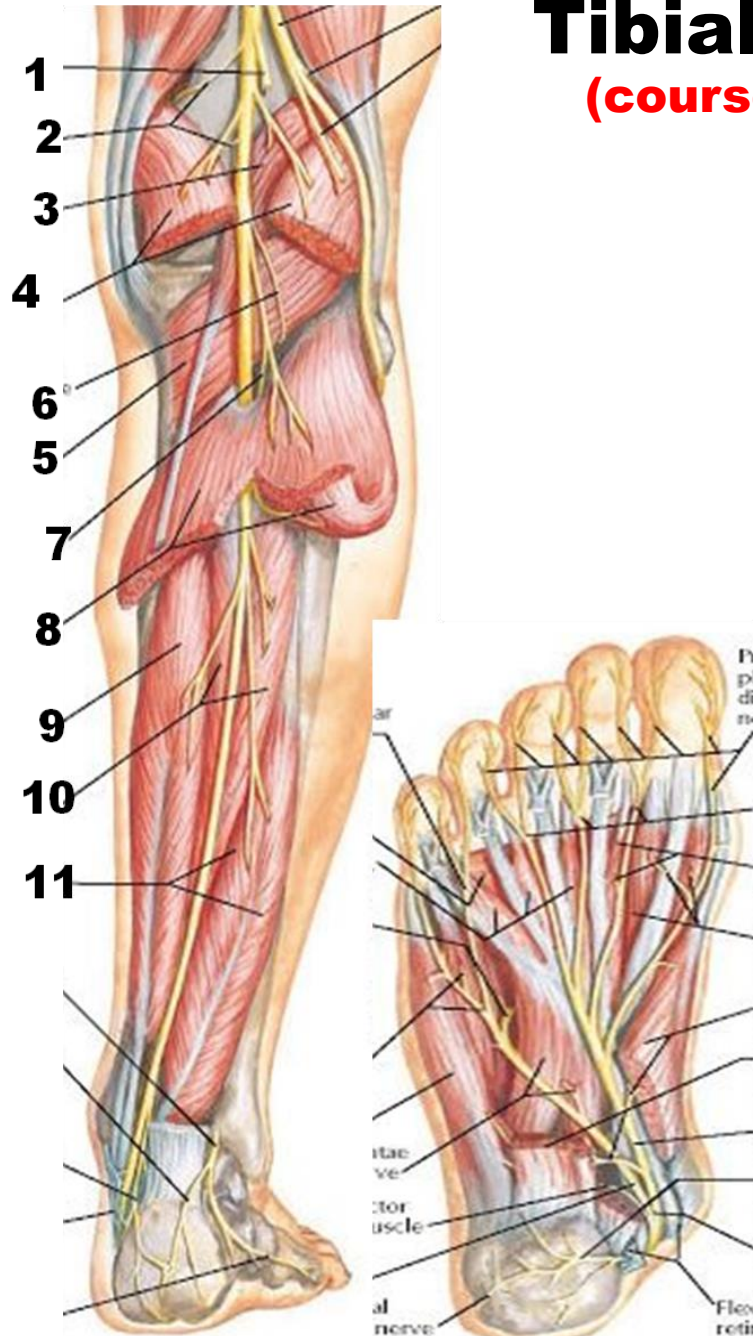
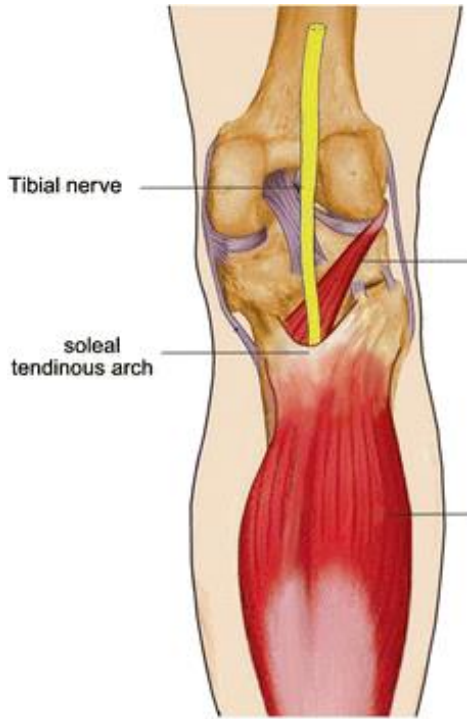
# Branches of peroneal artery



- Muscular branches (*to muscles of posterior & lateral compartment*)
- Nutrient artery to fibula
- Anastomotic branches
  - Communicating (*5cm above ankle*)
  - Perforating branch (*pierces interosseus membrane 4 cm above ankle*)
  - Lateral malleolar
  - Calcanean (*around heel*)

# Tibial nerve

(course in leg)



Enters leg – deep to soleal arch

Descends medially – reaches medial ankle midway between medial malleolus and medial tubercle on calcaneum

## Termination-

Deep to flexor retinaculum

Divides into medial & lateral plantar arteries

# Tibial nerve- relations in leg

(similar to posterior tibial artery)

## SUPERFICIAL

### In upper 2/3<sup>rd</sup>

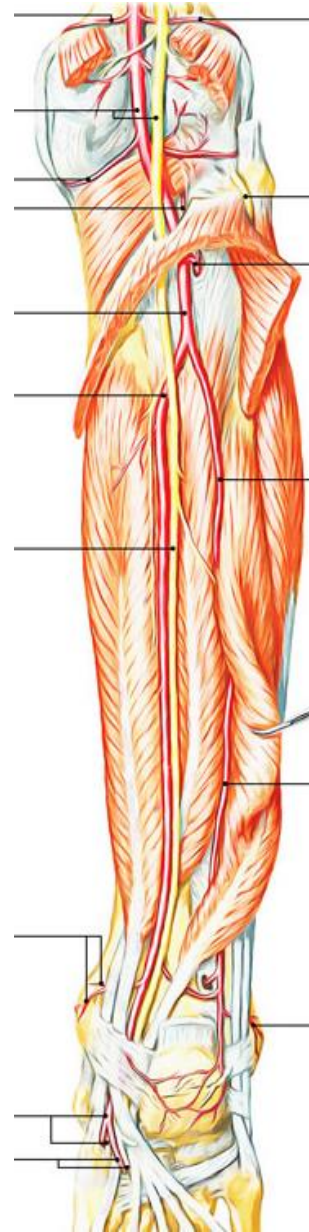
Gastrocnemius, Soleus & superficial septum

### In lower 1/3<sup>rd</sup>

Skin & fascia (2.5cm in front and parallel to tendo achilles)

### At ankle

Flexor retinaculum



## DEEP

### In upper 2/3<sup>rd</sup>

Tibialis posterior

### In lower 1/3<sup>rd</sup>

Flexor Digitorum longus

### At ankle

Capsule of ankle joint  
(between FDL & FHL)

# Tibial nerve – Branches in leg

## MUSCULAR:

Muscles of posterior compartment superficial & deep (*to popliteus & gastrocnemius in popliteal fossa*)

## CUTANEOUS:

Medial calcanean branches

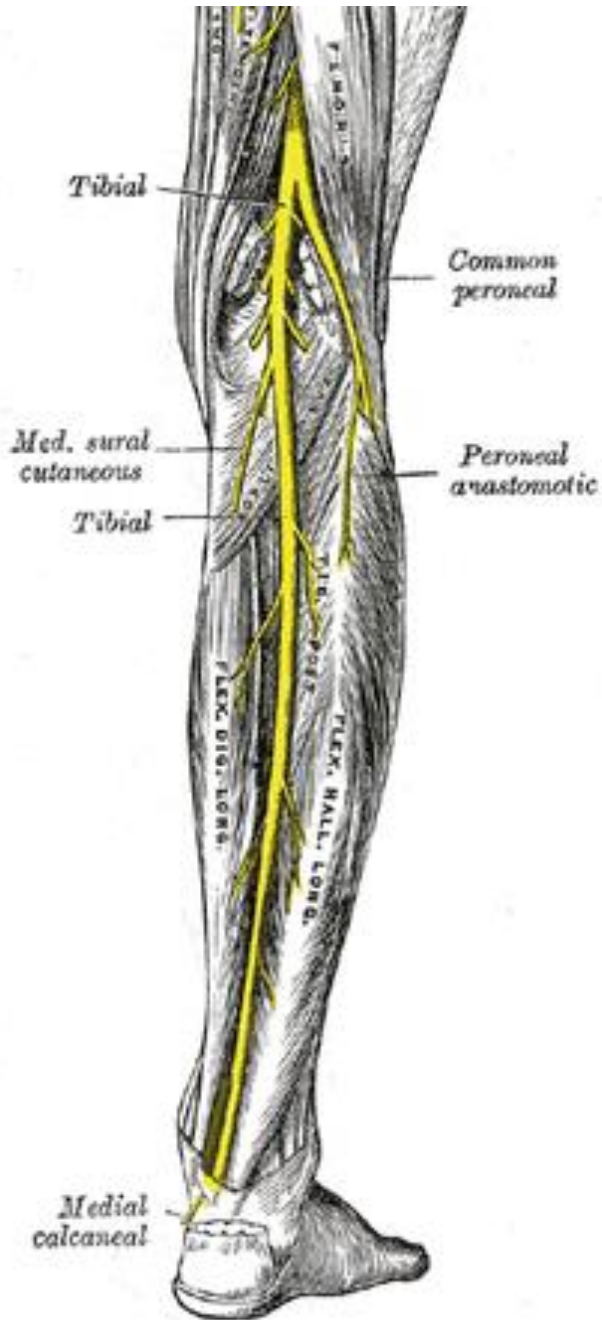
## ARTICULAR:

To the ankle joint

## TERMINAL:

Medial & Lateral plantar nerves

# Tibial nerve injury in the leg



## **DUE TO:**

1. Fracture of tibia
2. Tight plasters
3. Compression under flexor retinaculum

## **SENSORY LOSS:**

## **MOTOR LOSS:**

- Superficial and deep muscles of calf
- Muscles of sole



# Ankle jerk reflex



- Achilles tendon reflex is tested by tapping the calcaneal tendon to elicit **plantar flexion** at the ankle joint.
- Both afferent and efferent limbs of the reflex arc are carried in the **tibial nerve (S1, S2)**.
- **Ankle jerk reflex**: tests spinal nerves **S1-S2**.

# Venous Thrombosis



• Sitting immobile for long periods like-Long distance air travel

• Thrombosis of soleal venous sinuses

• May cause thromboembolism

# Posterior tibial Pulse



LOCATION:

2 cm below and behind the  
medial malleolus

Felt against Calcaneum

# Achilles Tendon Rupture

- most common initial symptom of **Achilles tendon rupture** is a sudden snap at the lower calf, intense pain, and inability to point the foot downward.



# What is Fabella?



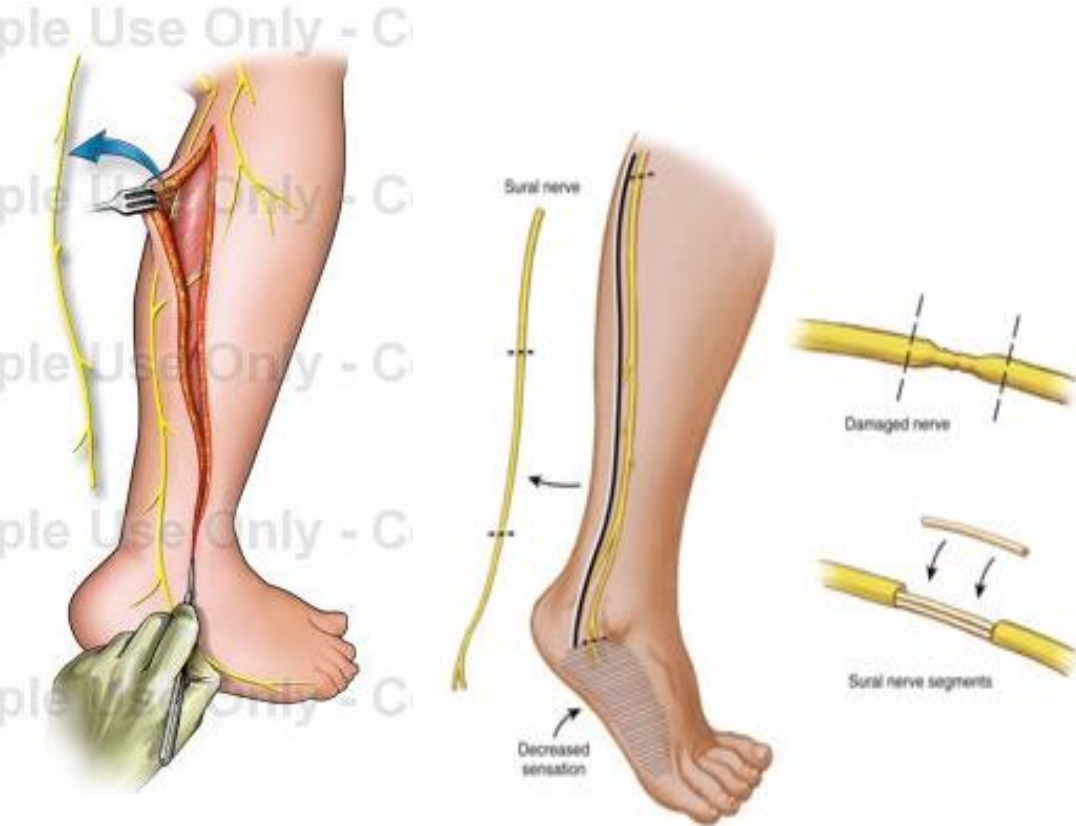
- Latin word **faba** means bean and '-ella' is a Latin diminutive suffix...thus fabella means *a little bean*.
- small sesamoid bone found embedded in the tendon of the lateral head of the gastrocnemius muscle behind the lateral condyle of the femur

# Tarsal Tunnel syndrome



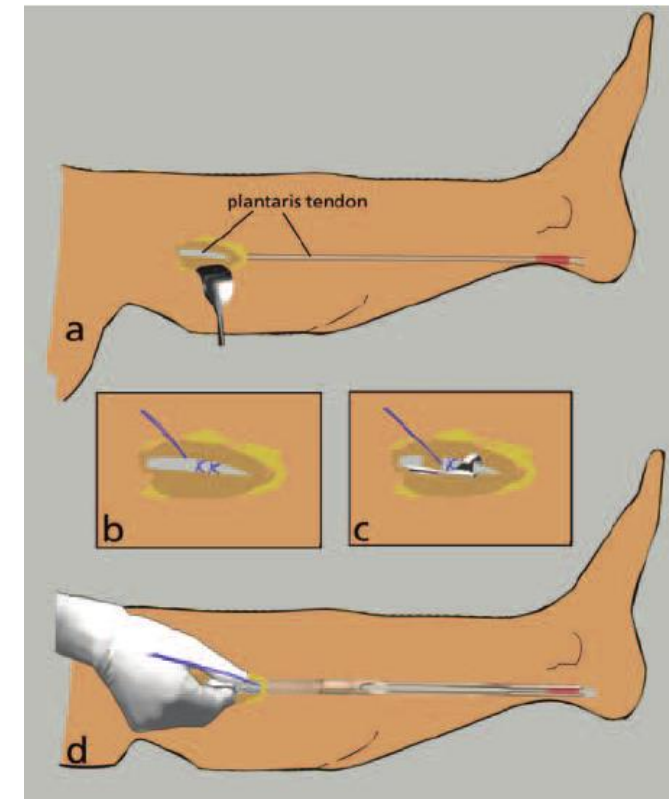
Tarsal tunnel syndrome causes burning pain with pins and needles or numbness in the heel and arch of the foot.

# Sural nerve & Plantaris Tendon Graft



## Nerve grafting

Replacement of an area of defective nerve with a segment from a sound one



The **plantaris tendon** is an extremely tensile structure used for flexor **tendon** replacement in hand surgery,  
Removal has no effect on normal limb function.  
Absent in 9% of the population

- Muscles that help to plantar flex the foot at ankle joint
- Muscles that flex the toes
- Muscle that brings about unlocking of knee joint
- Posterior tibial artery.....
- Tibial nerve.....
- Structures deep to flexor retinaculum....**TDANH**





**The hardest walk is walking alone, but it's also  
the walk that makes you the strongest**

