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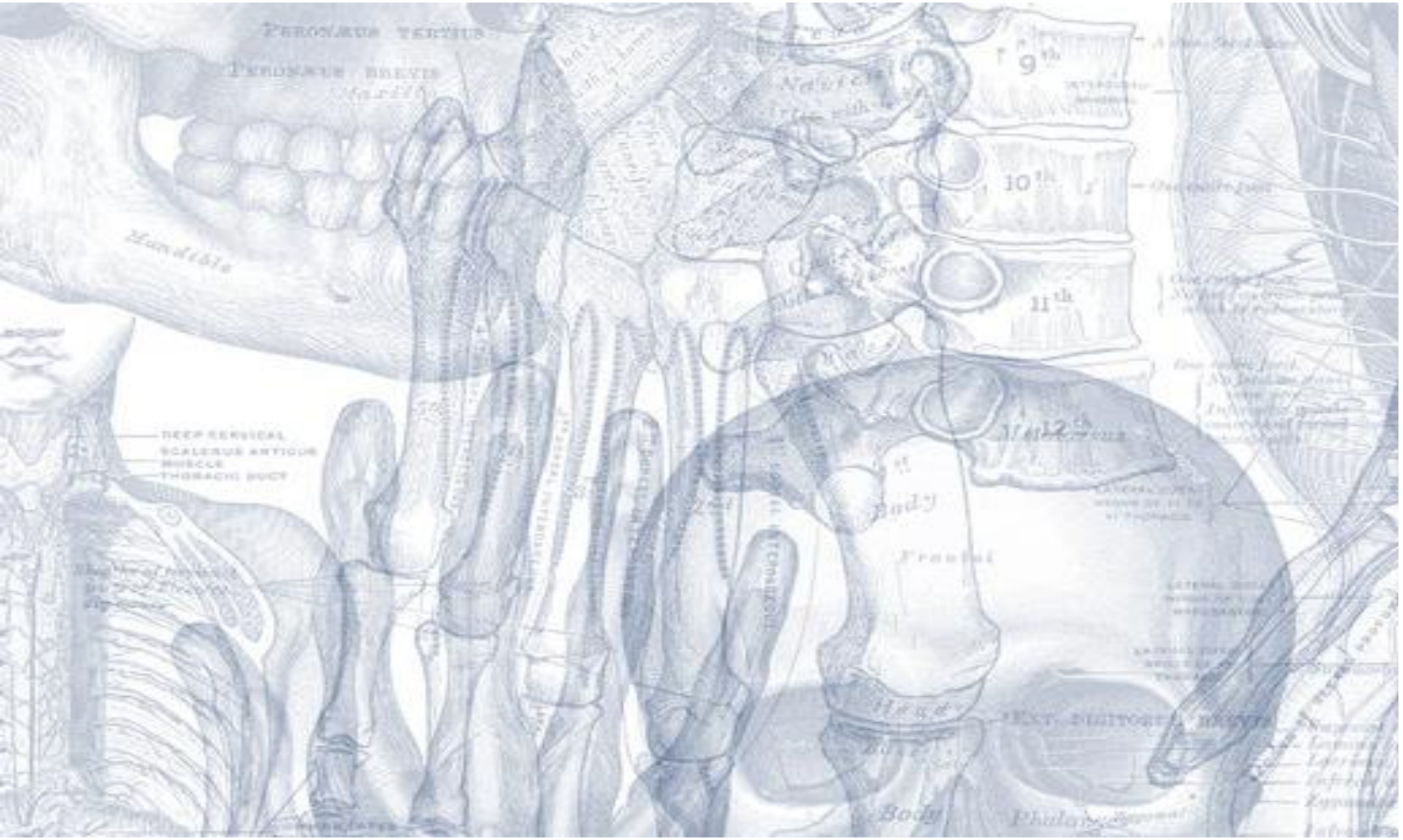


ANATOMY
TEAM 436

436
MEDICINE
KING SAUD UNIVERSITY

Revised by
شوق الأحمري & طراد الوكيل

# Popliteal Fossa, Posterior Compartment of leg & Sole of foot

Editing File

**Color Code**

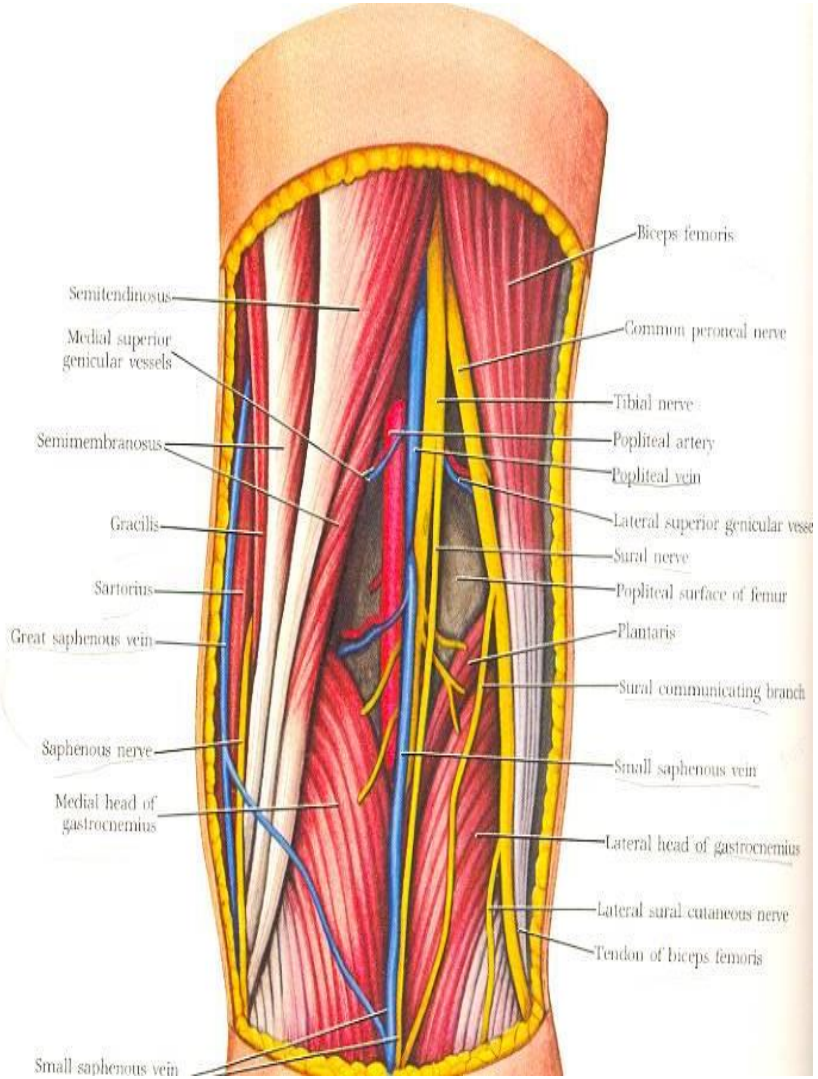
- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

# *Objectives*

**At the end of the lecture you should know:**

- ✓ The location, boundaries & contents of the popliteal fossa.
- ✓ The contents of posterior fascial. compartment of the leg.
- ✓ The structures hold by flexor retinaculum at the ankle joint.
- ✓ Layers forming in the sole of foot & bone those form the arches of the foot.

# Popliteal Fossa




Is a diamond-shaped intermuscular space <u>at the back of knee</u>

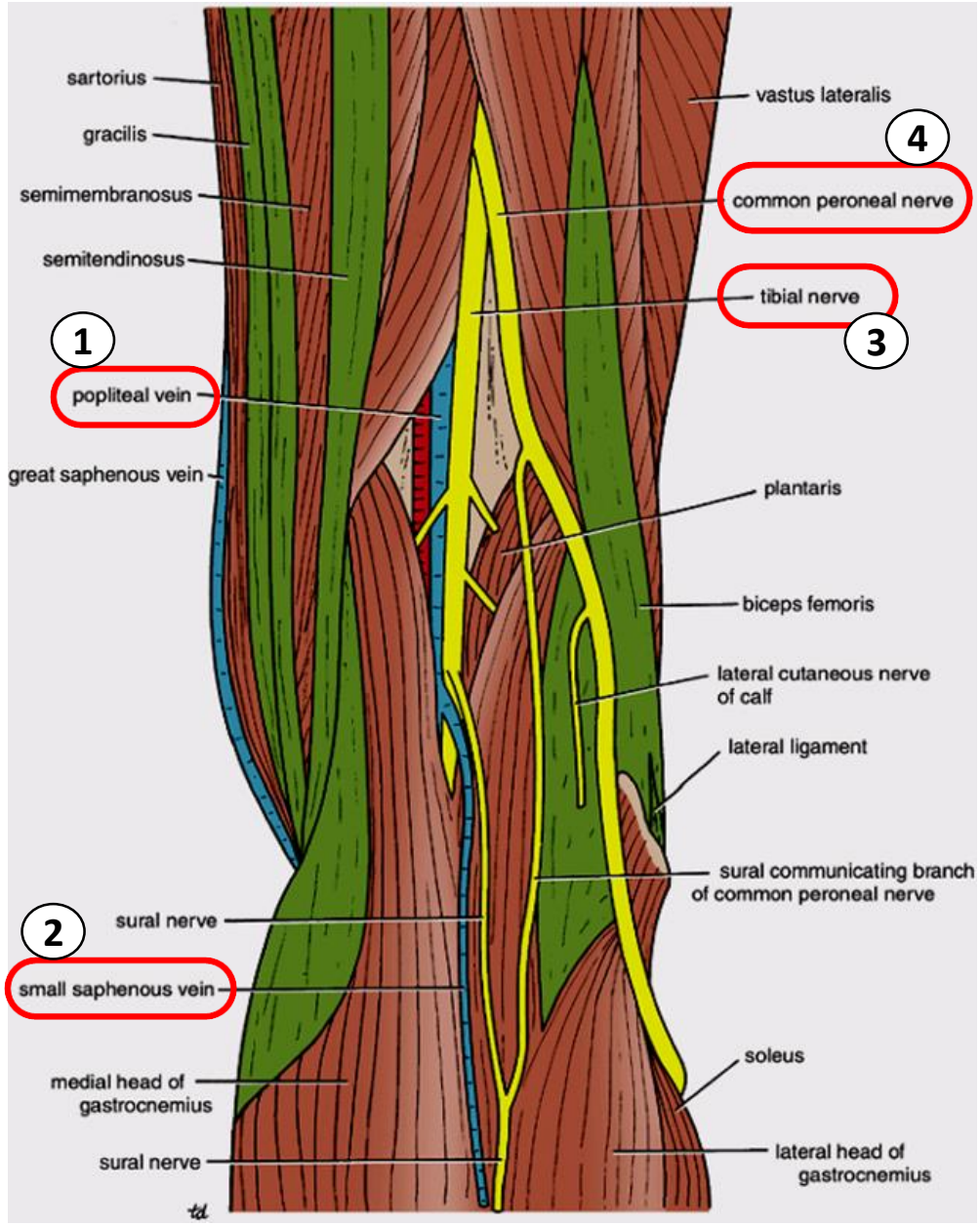
## *Boundaries*

| | |
|---|---|
| Laterally | <u>Above</u>: biceps femoris.<br><u>Below</u>: lateral head of gastrocnemius & plantaris |
| Medially | <u>Above</u>: semitendinosus & semimembranosus<br><u>Below</u>: medial head of gastrocnemius |
| Roof | Skin, superficial fascia and deep fascia of the thigh |
| Base | **Popliteal surface of femur**, posterior ligament of **knee joint** and **popliteus muscle** |

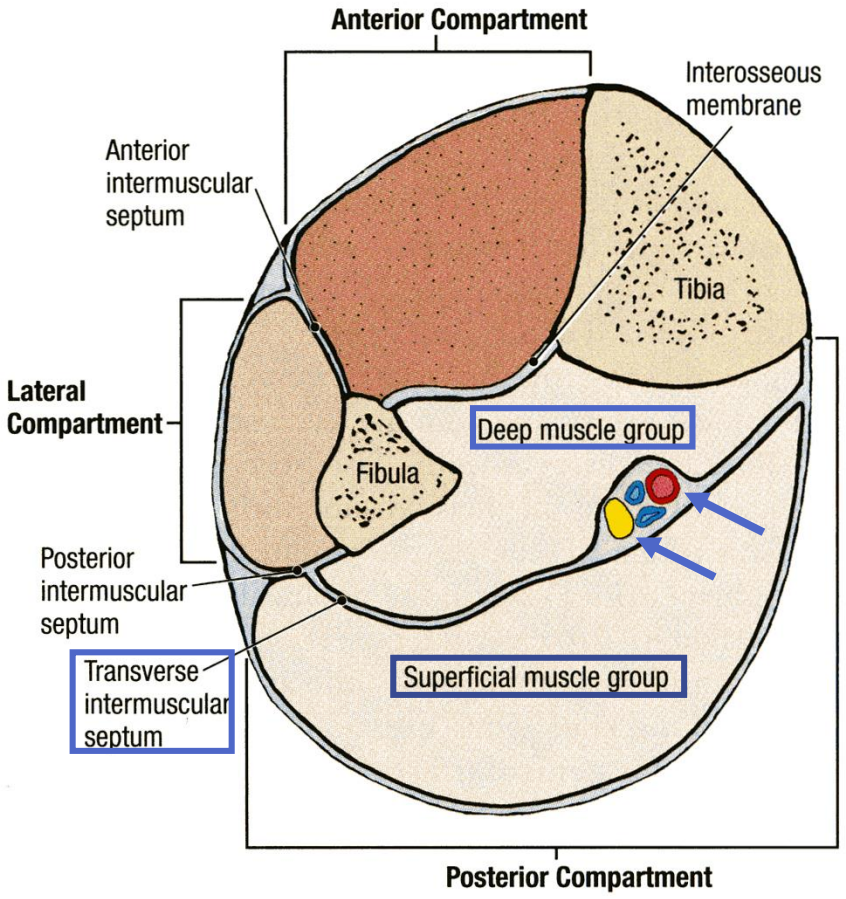
# Content Of Popliteal Fossa

1. Popliteal vessels (vein and artery)
2. Small saphenous vein.
3. Tibial nerve.
4. Common peroneal nerve.
5. Posterior cutaneous nerve of thigh.
6. Connective tissue & popliteal lymph nodes.

**The <u>deepest</u> structure is POPLITEAL ARTERY***



# Contents Of The Posterior Fascial Compartment Of The Leg




**Recall**: the leg is divided into 3 compartments (anterior, lateral and posterior) by the interosseous membrane, anterior intermuscular septum and posterior intermuscular septum. The posterior compartment is further divided into 2 groups (superficial and deep).

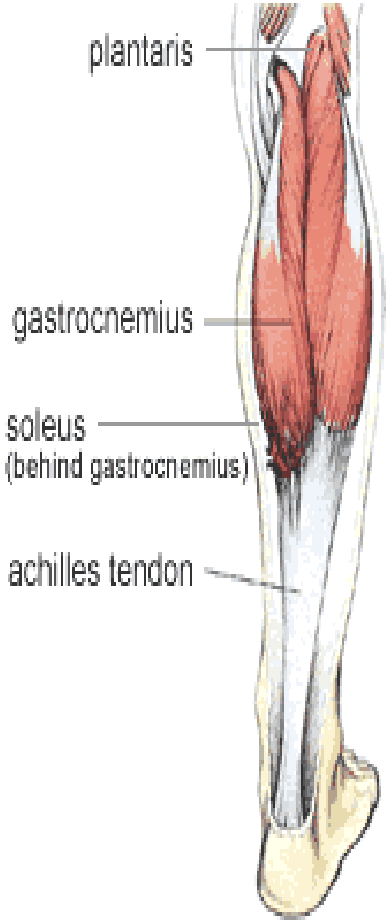
*The deep transverse fascia* of the leg is a septum that divides the muscles of the posterior compartment into superficial and deep groups.

**Contents:**

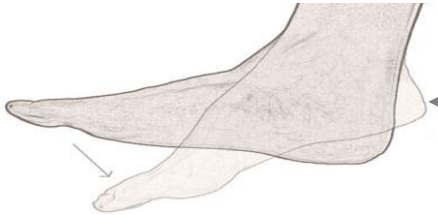
1. Superficial group of muscles
2. Deep group of muscles
3. Posterior tibial artery
4. Tibial nerve

# Superficial Group

| Muscle | Origin | Insertion | Nerve | Action |
|---|---|---|---|---|
| **Gastrocnemius** | Lateral head: from lateral condyle of femur. Medial head: from above medial condyle. | Posterior surface of calcaneum via tendo calcaneus | Tibial nerve | • Plantar flexion at ankle joint.<br>• flexes knee joint. |
| **Soleus** | Shafts of tibia (soleal line) and fibula | | | • Together with gastrocnemius and plantaris is powerful plantar flexor of ankle joint.<br>• provides main propulsive force in walking and running |
| **Plantaris** ( a very thin muscle ,some people may not have it ) | Lateral supracondylar ridge of femur | Posterior surface of calcaneum | | • Plantar flexion at ankle joint.<br>• flexes knee joint. |

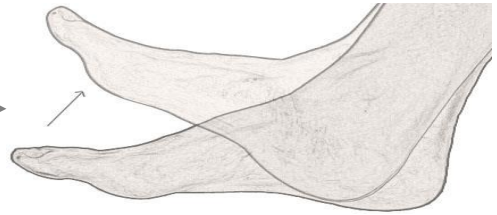



Remember *



Plantarflexion: Flexion of the ankle

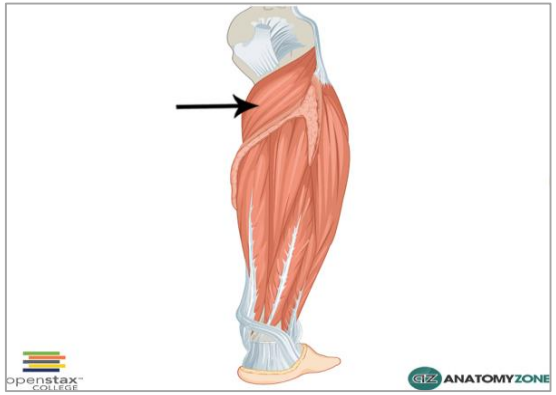
Dorsiflexion: Extension of the ankle

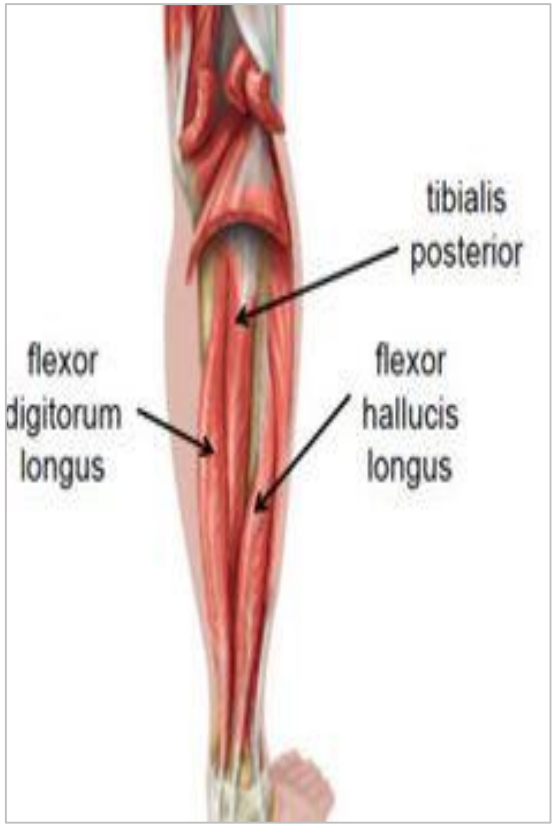


# Deep Group

| | |
|---|---|
| Popliteus | Origin : groove on lateral surface of lateral condyle of femur (Intracapsular).<br>Insertion : Posterior surface of tibia **above soleal line**.<br>Action : flexes the knee and **Unlocks knee joint** by **lateral rotation** of femur on tibia (or slight medial rotation of leg which accompanies the flexion) |
| Flexor digitorum longus | Origin : **Posterior surface of shaft of *tibia*.**<br>Insertion : Bases of distal phalanges of lateral 4 toes.<br>Action : Flexes phalanges of lateral 4 toes and **PF***.<br>Supports medial and lateral longitudinal arches |
| Flexor hallucis longus | Origin : **Posterior surface of shaft of *fibula*.**<br>Insertion : Base of distal phalanx of big toe.<br>Action : Flexes phalanx of big toe and **PF*.**<br>Supports medial longitudinal arch |
| Tibialis Posterior | Origin : **Posterior surface of tibia** & fibula and interosseous membrane.<br>Insertion : Tuberosity of navicular bone and All tarsal bones except talus.<br>Action : inverts foot at subtalar and transverse tarsal joints and **PF*.**<br>supports medial longitudinal arch |

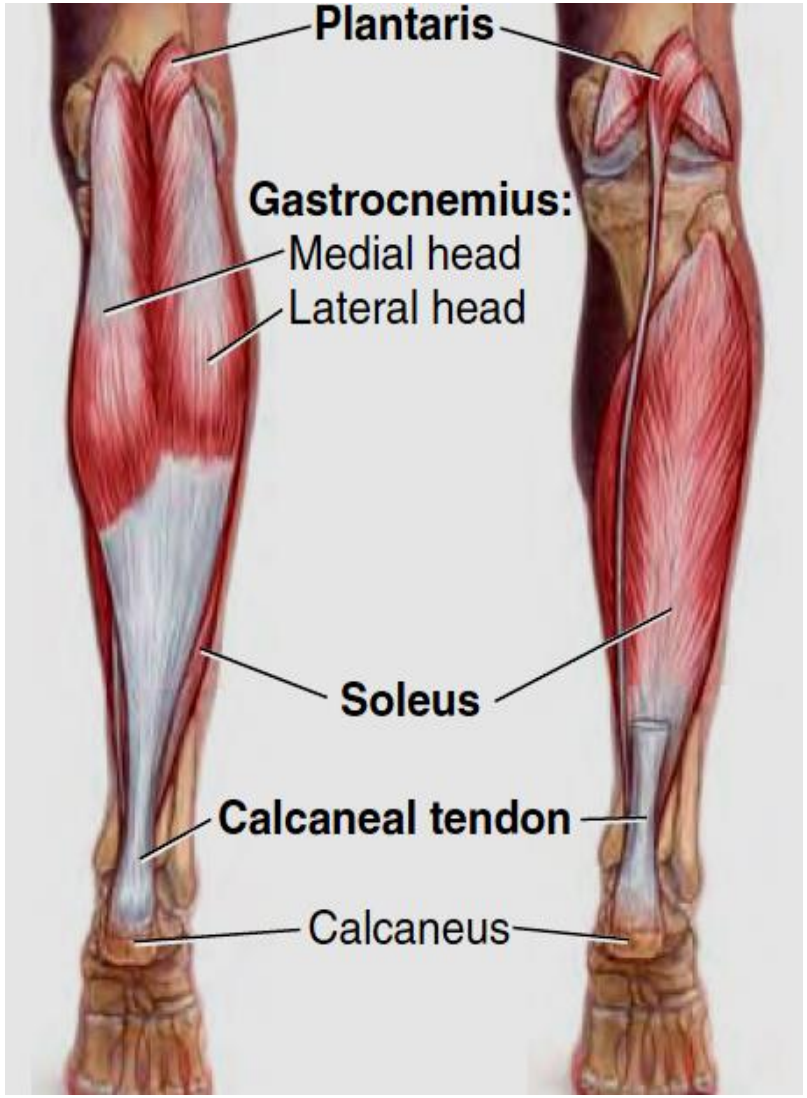
**They are all supplied by the tibial nerve**



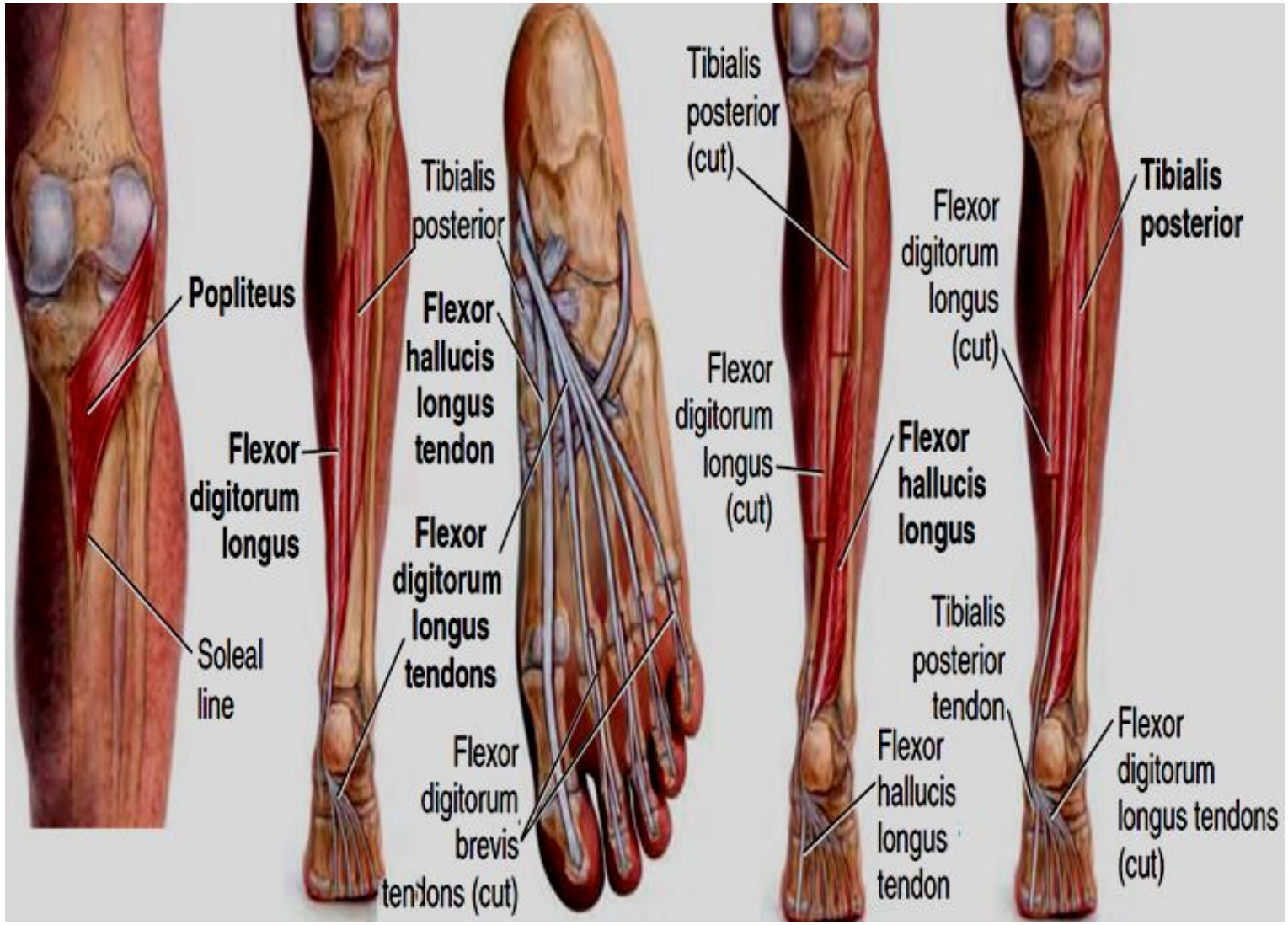




PF* : -Plantar Flexes foot at ankle joint.

Superficial Group

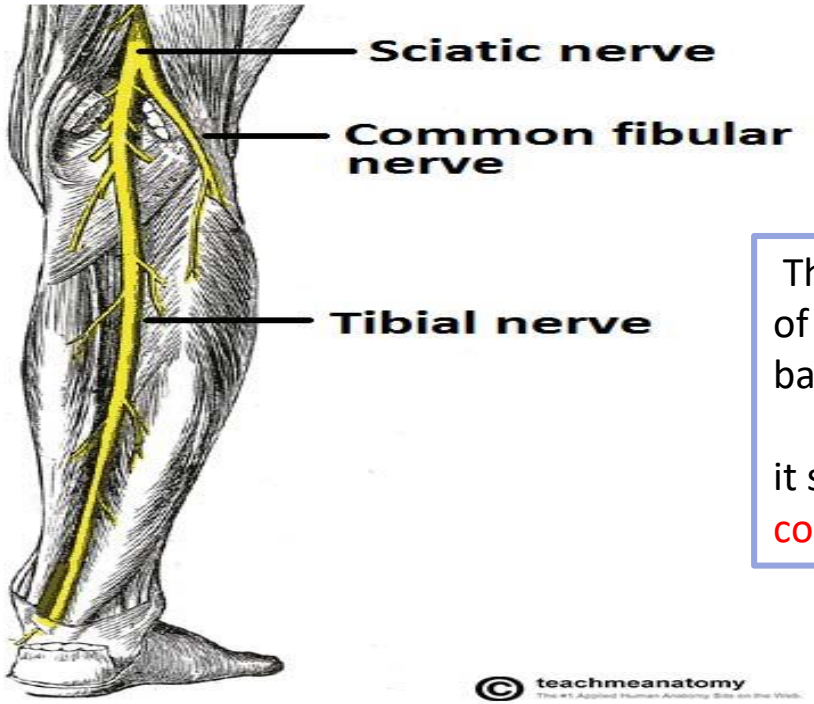



Deep Group



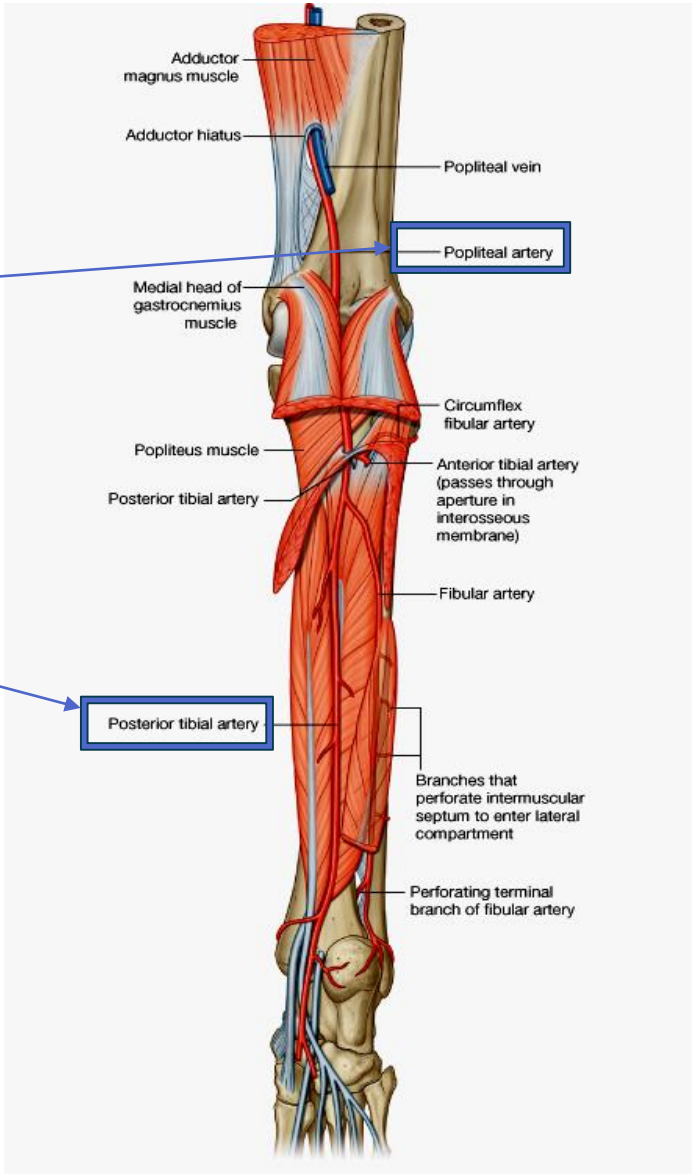
# Posterior Tibial Artery And Tibial Nerve

**Posterior tibial artery is one of the terminal branches of the popliteal artery.**




The **tibial nerve** is the larger terminal branch of the sciatic nerve in the lower third of the back of the thigh.

it supply the Muscles of posterior compartment of leg.



# Flexor Retinaculum

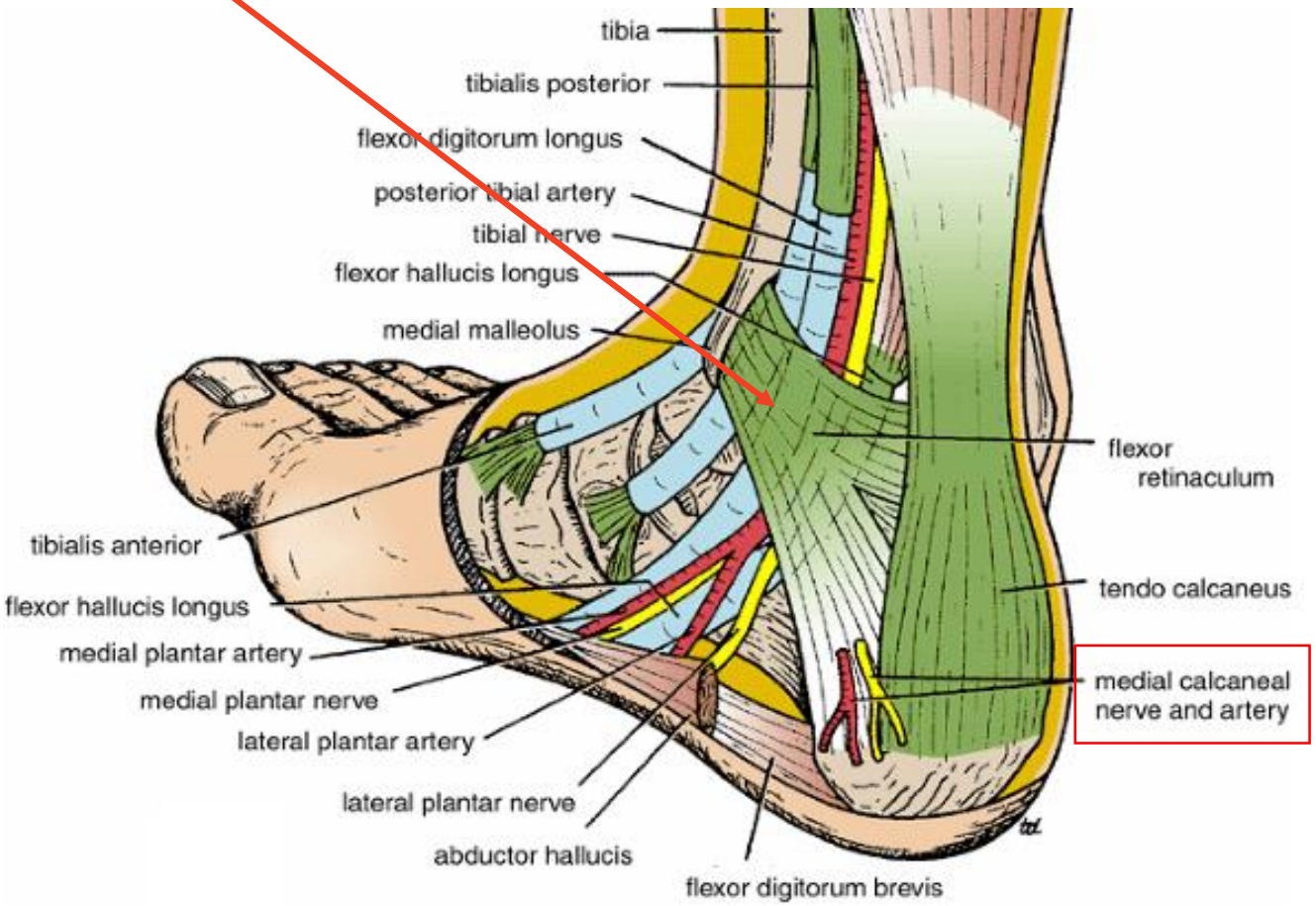
Extend from back of **medial malleolus** to medial side of **calcaneum**.

Structures passing **posterior** to medial malleolus, **deep** to flexor retinaculum:

***Medial to lateral*** *:*

I. Tibialis posterior tendon
II. Flexor digitorum longus tendon
III. Posterior tibial artery with venae comitantes
IV. Tibial nerve
V. Flexor hallucis longus tendon

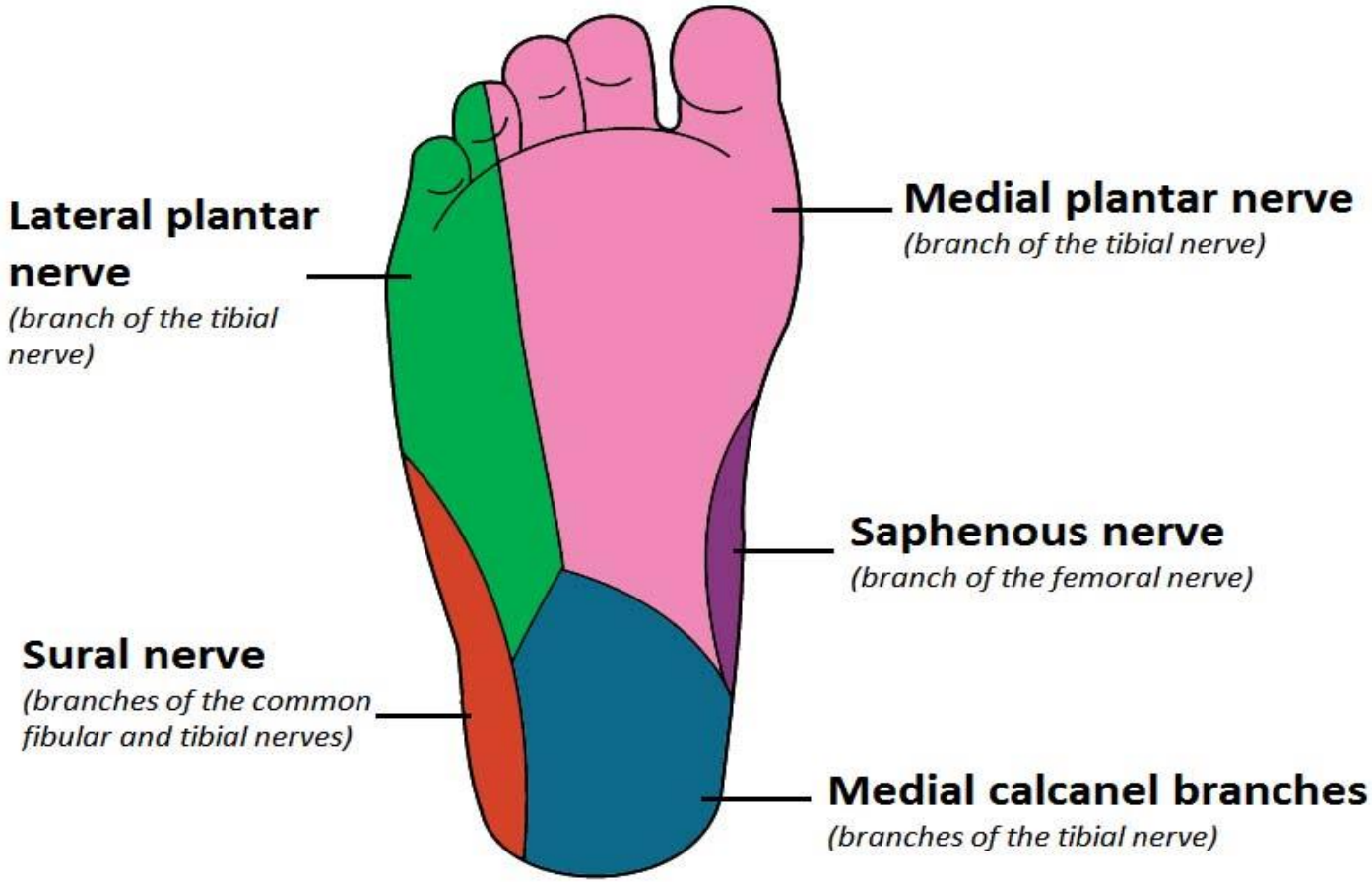
(*All the tendons are surrounded by a synovial sheath*)



# Sensory Nerve Supply

***The sensory nerve supply to the skin of the sole of the foot is derived from:***

- Lateral plantar nerve innervate the lateral third of the sole.
- Tibial nerve innervates the medial side of the heel.
- Medial plantar nerve innervate the medial two thirds of the sole.

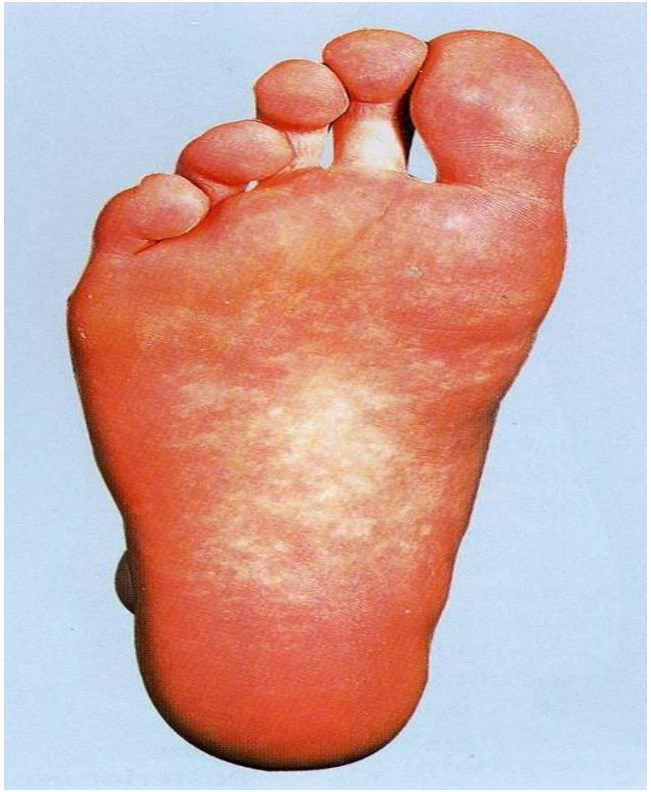



Only on the boys' slides

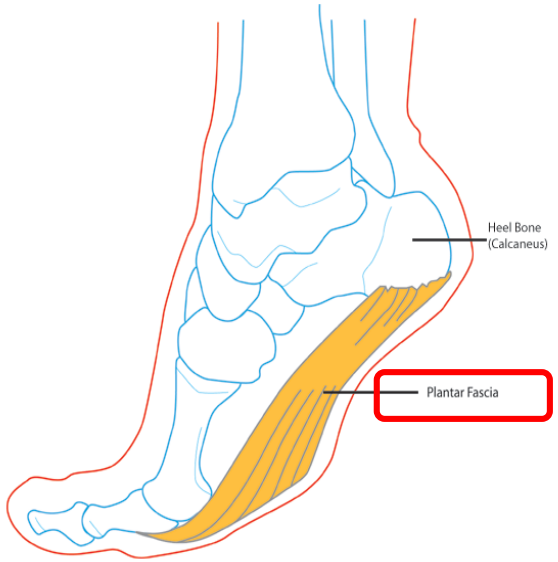
# Sole Of The Foot

Only in the girls' slides

- The skin of the sole of the foot is **thick** and hairless(بدون شعر)
- The skin of the sole shows a **few flexure creases** at the sites of skin movement
- Sweat glands are present **in large numbers.**



Extra picture for understanding

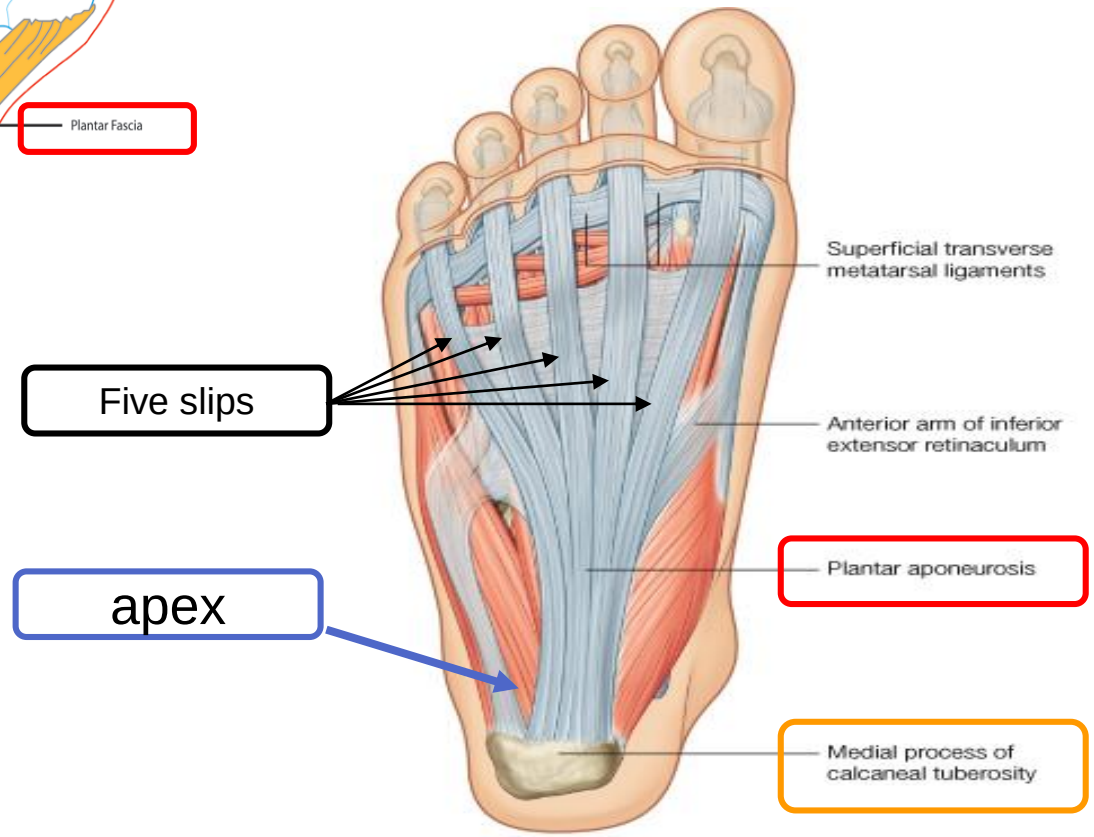



# Deep Fascia

- The **plantar aponeurosis** is a triangular thickening of the deep fascia that protects the underlying nerves, blood vessels, and muscles.

Its apex is attached to the medial and lateral tubercles of the calcaneum.

The base of the aponeurosis divides into five slips that pass **into the toes**.



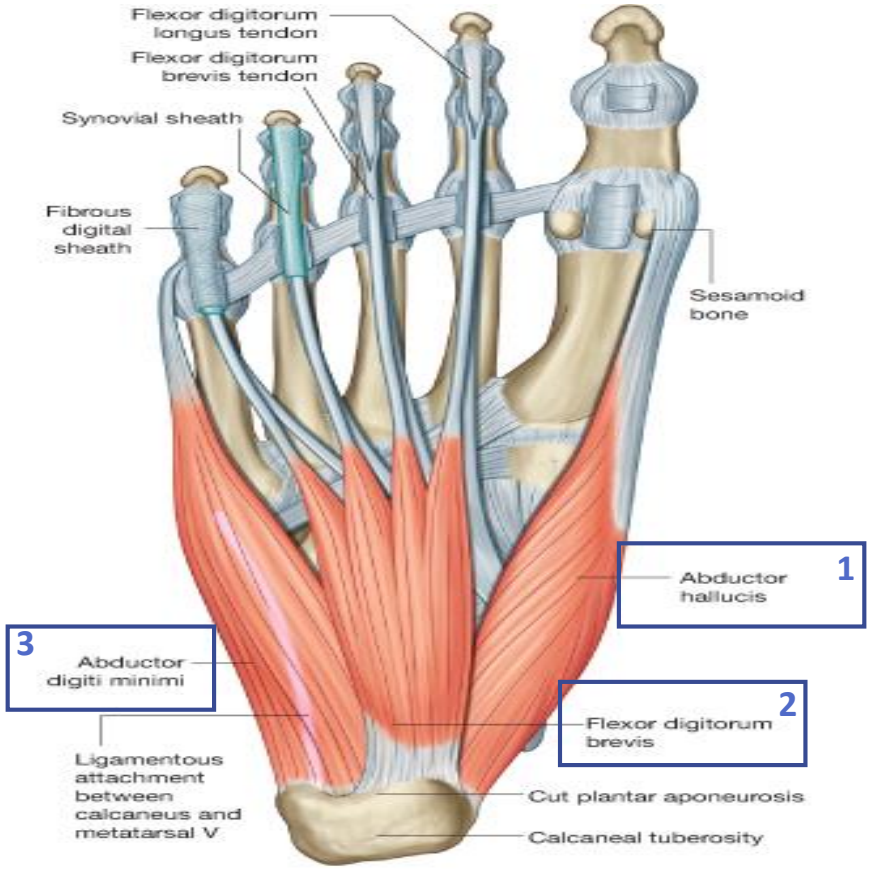
# Muscles Of The Sole Of The Foot

The muscles of the sole are conveniently described in **four layers** from superficial to deep.

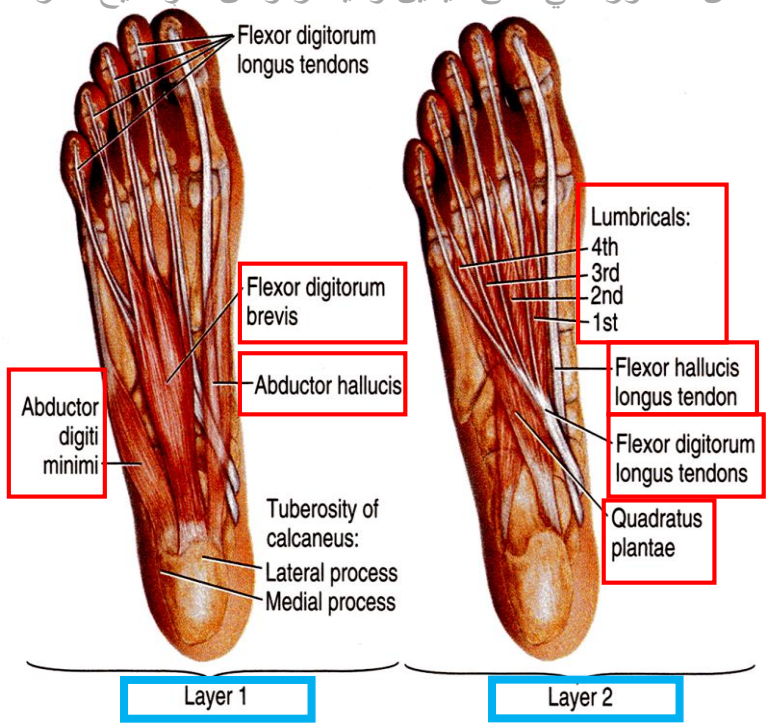
Superficial(First Layer) → Deep(Fourth Layer)

## First Layer

1- Abductor hallucis
2- Flexor digitorum brevis
3- Abductor digiti minimi

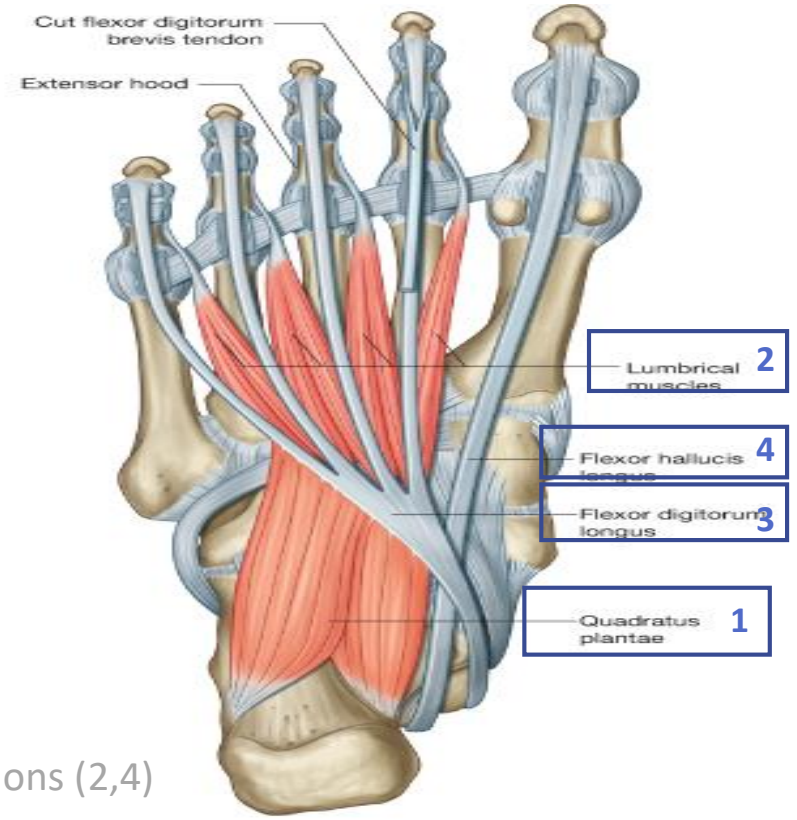



نفس الصور اللي على اليمين واليسار ولكن للتوضيح أكثر




## Second Layer

1- Quadratus plantea
2- Lumbricals (4 muscles)
3- Flexor digitorum longus **tendon***
4- Flexor hallucis longus **tendon***




*Only the TENDON not the muscle
To remember: only the even layers have tendons (2,4)

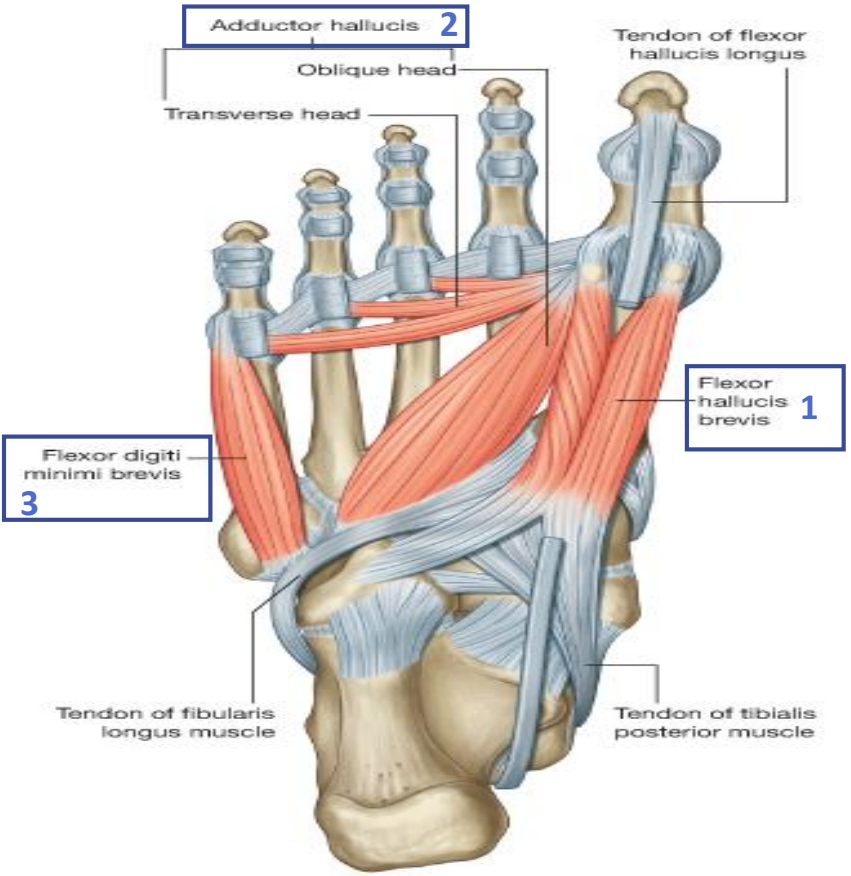
# Muscles Of The Sole Of The Foot Cont.

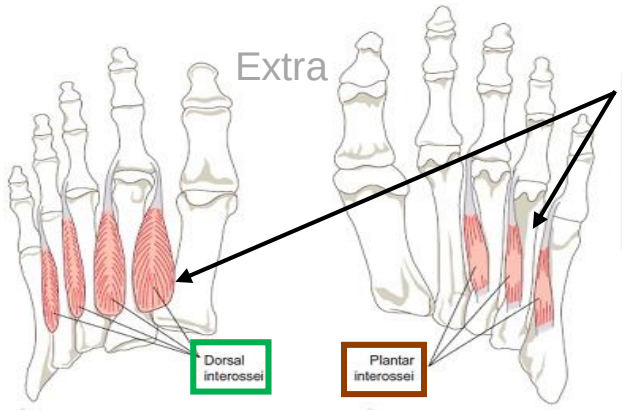
The muscles of the sole are conveniently described in **four layers** from superficial to deep.

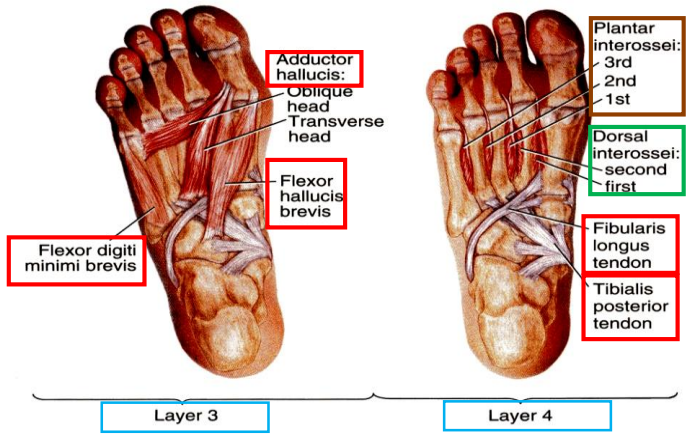
Superficial(First Layer) → Deep(Fourth Layer)

## Third Layer

1-Flexor hallucis brevis
2-Adductor hallucis
3-Flexor digiti minimi brevis

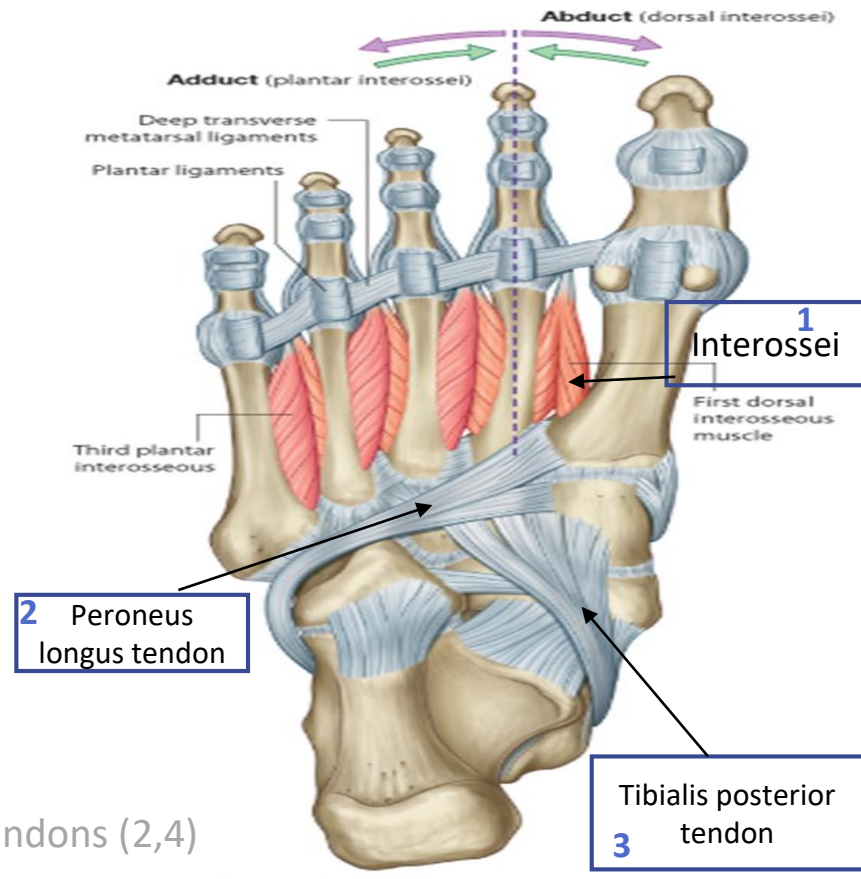



## Fourth Layer

1-Interossei, (3 plantar + 4 dorsal).
2-Peroneus longus **tendon**,
3-Tibialis posterior **tendon**

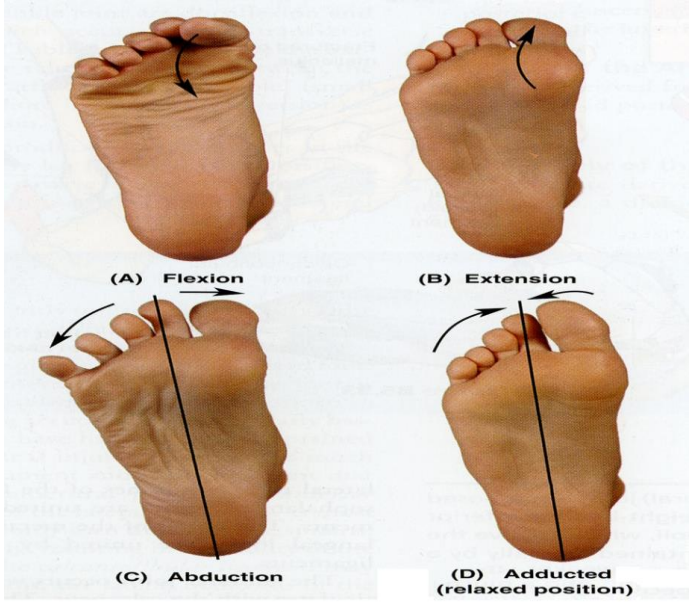



*Only the TENDON not the muscle
To remember: only the even layers have tendons (2,4)

# Functions Of The Small Muscles Of The Sole Foot

## Metatarsophalangeal joints

| *Movement* | *Muscle* |
|---|---|
| Flexion(A) | **Flexor digitorum brevis**<br>**Lumbricals**<br>**Interossei**<br>**Flexor hallucis brevis**<br>**Flexor hallucis longus**<br>Flexor digiti minimi brevis<br>Flexor digitorum longus |
| Extension(B) | **Extensor hallucis longus**<br>**Extensor digitorum longus**<br>**Extensor digitorum brevis** |
| Abduction(C) | **Abductor hallucis**<br>**Abductor digiti minmi**<br>**Dorsal interossei** |
| Adduction(D) | **Adductor hallucis**<br>**Plantar interossei** |




Unlike the small muscles of the hand, the **sole muscles** have few delicate functions and are chiefly concerned with supporting the arches of the foot.
Although their names would suggest control movements of individual toes, this function is **rarely used in most people**.

## Interphalangeal joints

| *Movement* | *Muscle* |
|---|---|
| Flexion(A) | **Flexor hallucis longus**<br>**Flexor digitorum longus**<br>**Flexor digitorum brevis**<br>Quadrate plantae |
| Extension(B) | **Extensor hallucis longus**<br>**Extensor digitorum longus**<br>**Extensor digitorum brevis** |

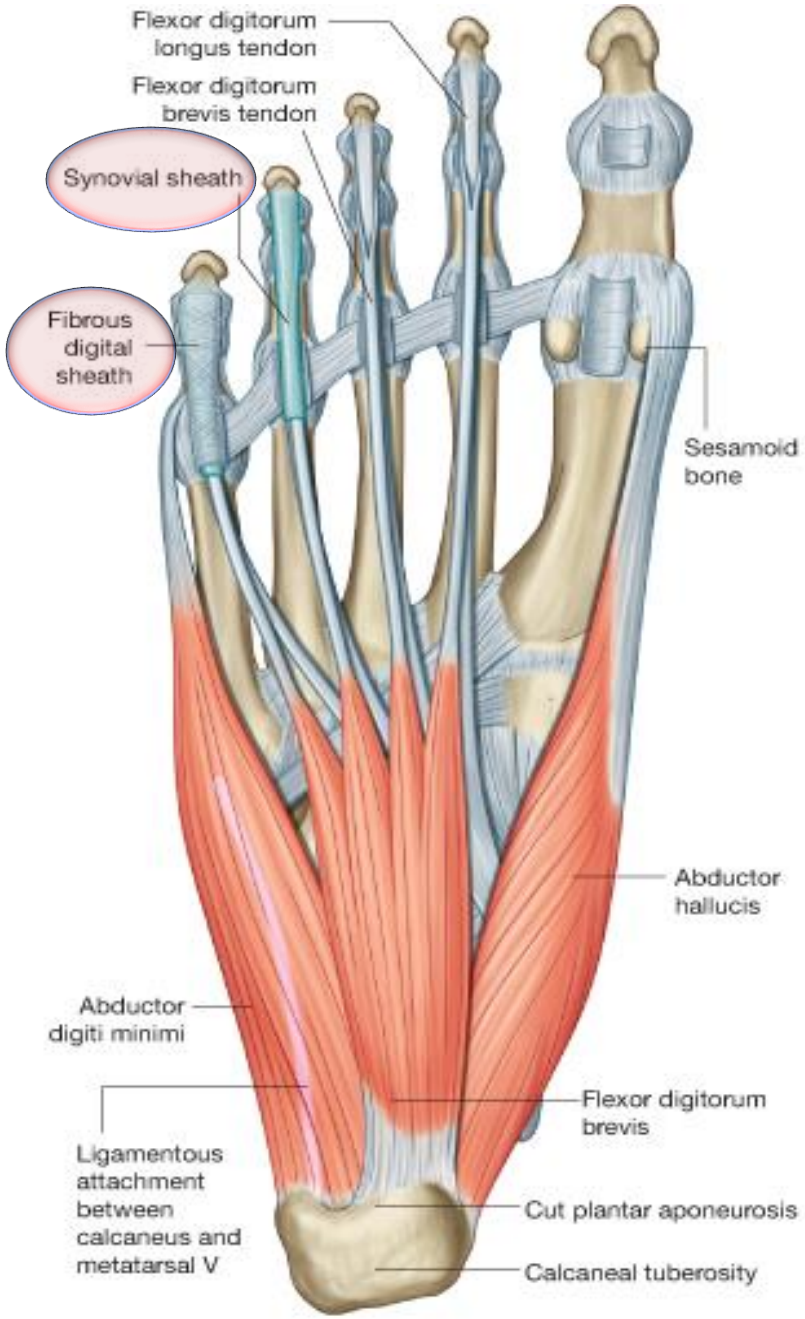
In both tables
Muscles in boldface are chiefly responsible for movement; the other muscles assist them

## Fibrous flexor sheath:

The inferior surface of each toe, from the **head** of the metatarsal bone to the base of the distal phalanx, is provided with a **strong fibrous sheath,** which is attached to the sides of the phalanges.
The fibrous sheath, together with the inferior surfaces of the phalanges and the interphalangeal joints, forms a **blind tunnel** in which lie the flexor tendons of the toe.

## Synovial flexor sheath:

The tendons of the flexor hallucis longus and the flexor digitorum longus are surrounded by **synovial sheaths.**



# Arches of the Foot

Only on girls' slides

## Medial longitudinal arch

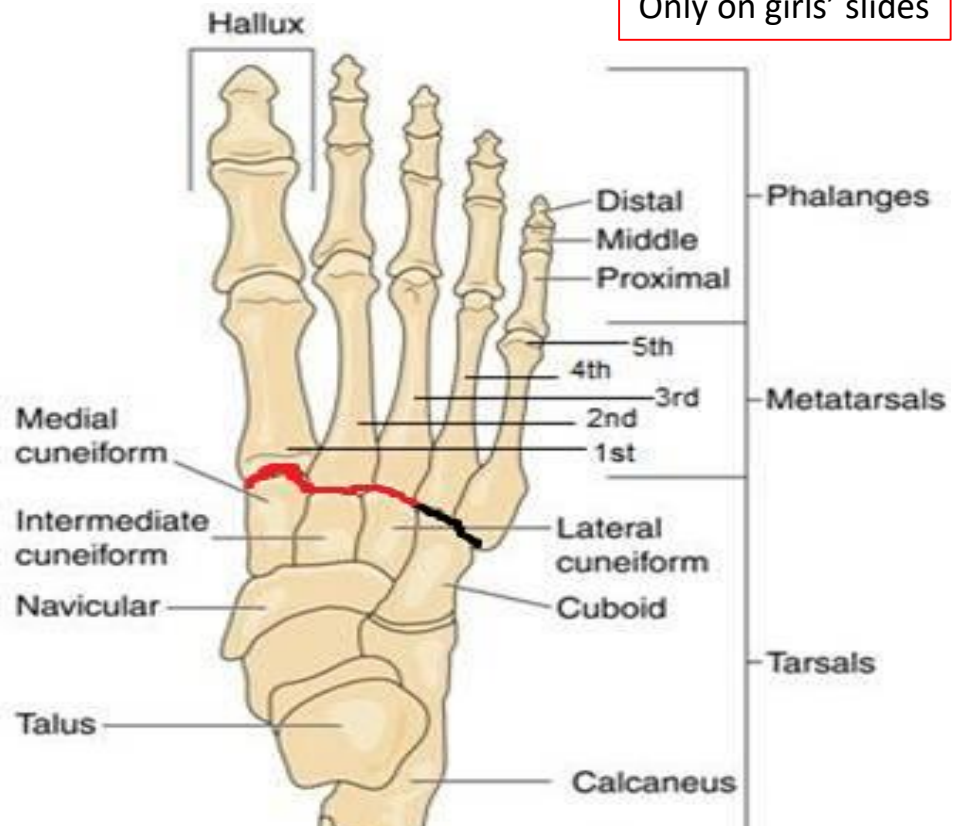
Is formed of calcaneum, talus, navicular, 3 cuneiform bones, and first medial 3 metatarsal bones

## Lateral longitudinal arch

Is formed of calcaneum, cuboid & lateral 4th & 5th metatarsal bones

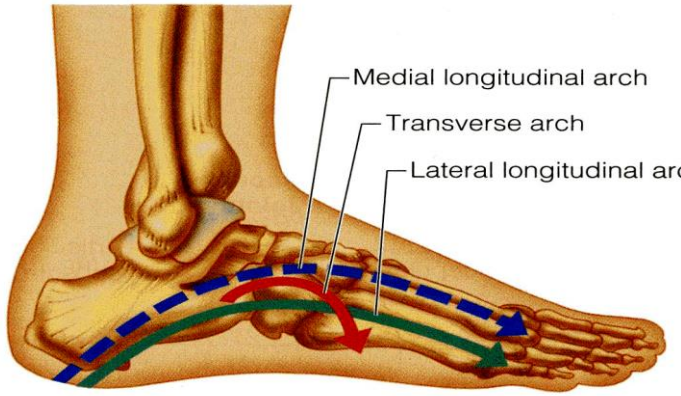
## Transverse arch

Lies at the level of **tarso-metatarsal joints**, formed of bases of metatarsal bones, cuboid & 3 cuneiform bones.




**Functions:**

- Weight bearing
- Support walking & running
- Provide potential space for neurovascular bundle of the sole
- Act as shock absorber

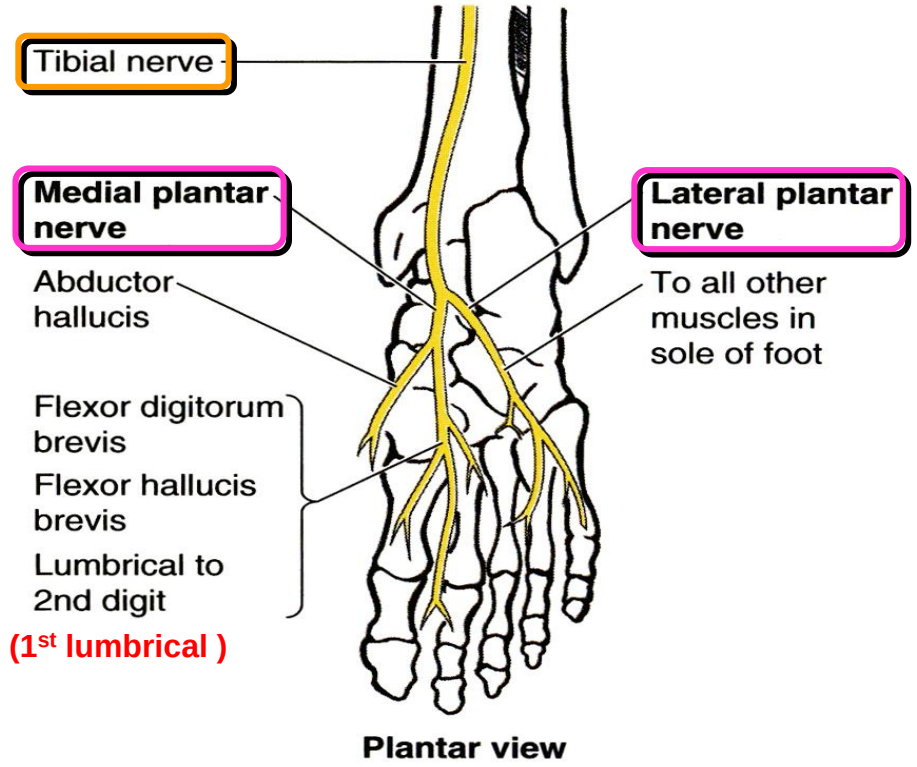



***In young child the foot appears to be flat because of presence of a large amount of subcutaneous fat on the sole of foot***

# Medial And Lateral Planter Nerves And Arteries

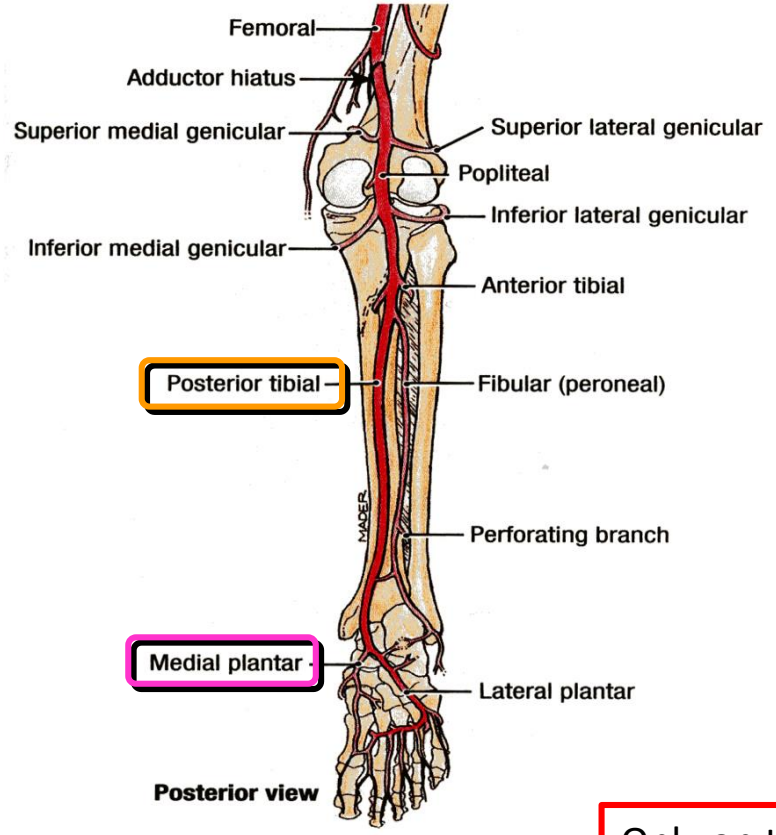
The **medial plantar nerve** is a terminal branch of the **tibial nerve.**

The **lateral plantar nerve** is a terminal branch of the **tibial nerve.**



Plantar view

The **medial plantar artery** is the smaller & **lateral plantar artery** is the larger of the terminal branches of the *posterior tibial artery.*



Posterior view

Only on the boys' slides

# MCQs

1. Deep muscles of the leg is part of :
   A. Anterior compartment
   B. Posterior compartment
   C. Lateral compartment
   D. Non of these

2. Which one of the following muscles provides the main propulsive force in walking and running ?
   A. Gastrocnemius
   B. Soleus
   C. Plantaris
   D. Popliteus

3. Which one of the following muscle is inserted in Posterior surface of calcaneum ?
   A. Tibialis Posterior
   B. Plantaris
   C. Gastrocnemius
   D. B & C

4. Tibialis posterior is inserted in all tarsal bones except talus :
   A. True
   B. False

5. The apex of the plantar aponeurosis is attached to:
   A. Metatarsals.
   B. Interphalangeal joints.
   C. Tarsometatarsal joint.
   D. Medial & lateral tubercles of calcaneum.

6. Which of the following nerves is supplying 1st lumbrical :
   A. Branch of peroneal nerve
   B. Medial plantar nerve
   C. Lateral plantar nerve
   D. Saphenous nerve

ANSWERS:
1.B
2.B
3.D
4.A
5.D
6.B

# SAQs

Q1.Define the plantar aponeurosis.

Q2.Why does the sole of the foot appears flat in children?

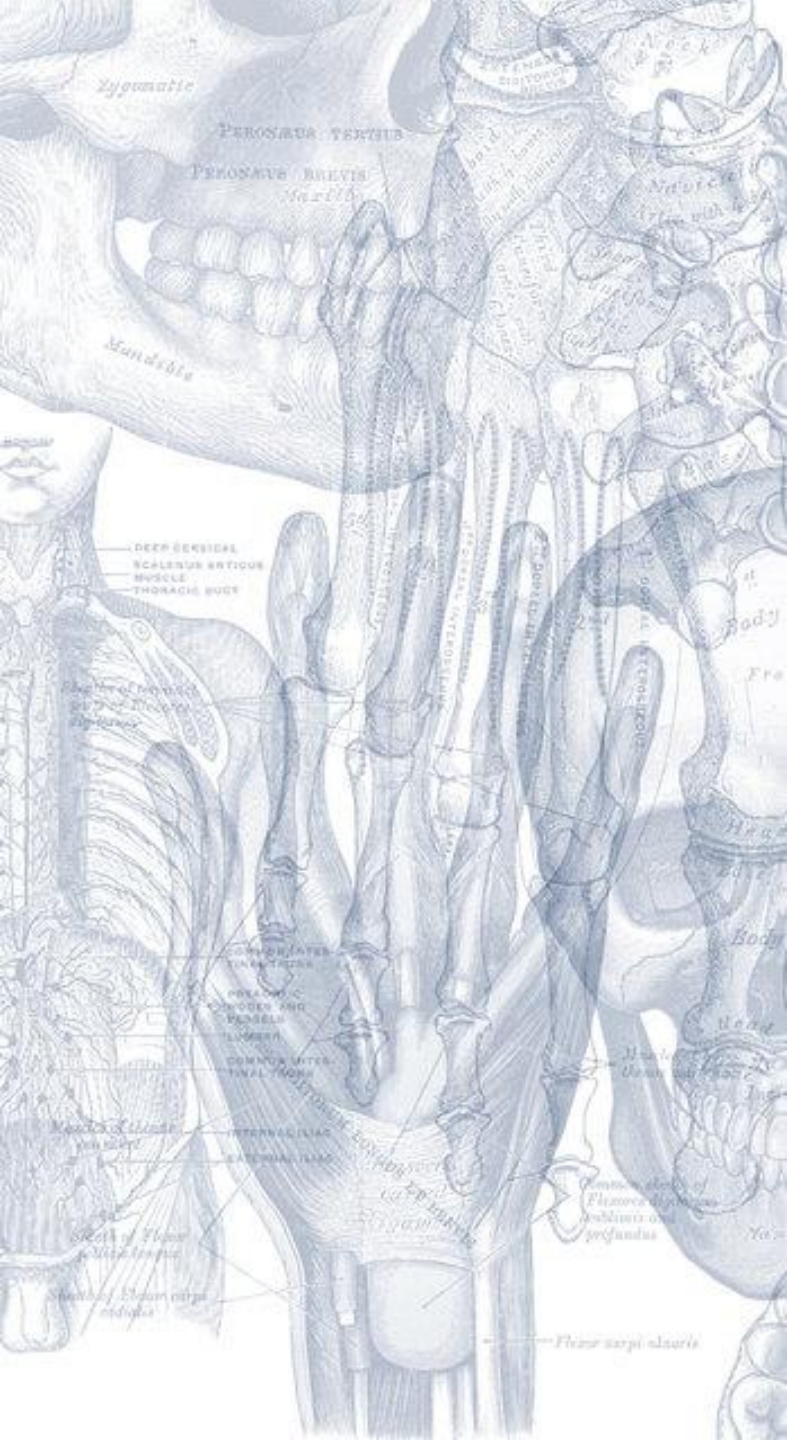
Q3.Mention three Structures passing posterior to medial malleolus :

**Answer1:** It is a triangular thickening of the deep fascia that protects the underlying nerves, blood vessels and muscles.

**ANSWER2**: subcutaneous fat

**ANSWER3:Answer:**

1. Tibialis posterior tendon
2. Tibial nerve
3. Flexor hallucis longus tendon



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