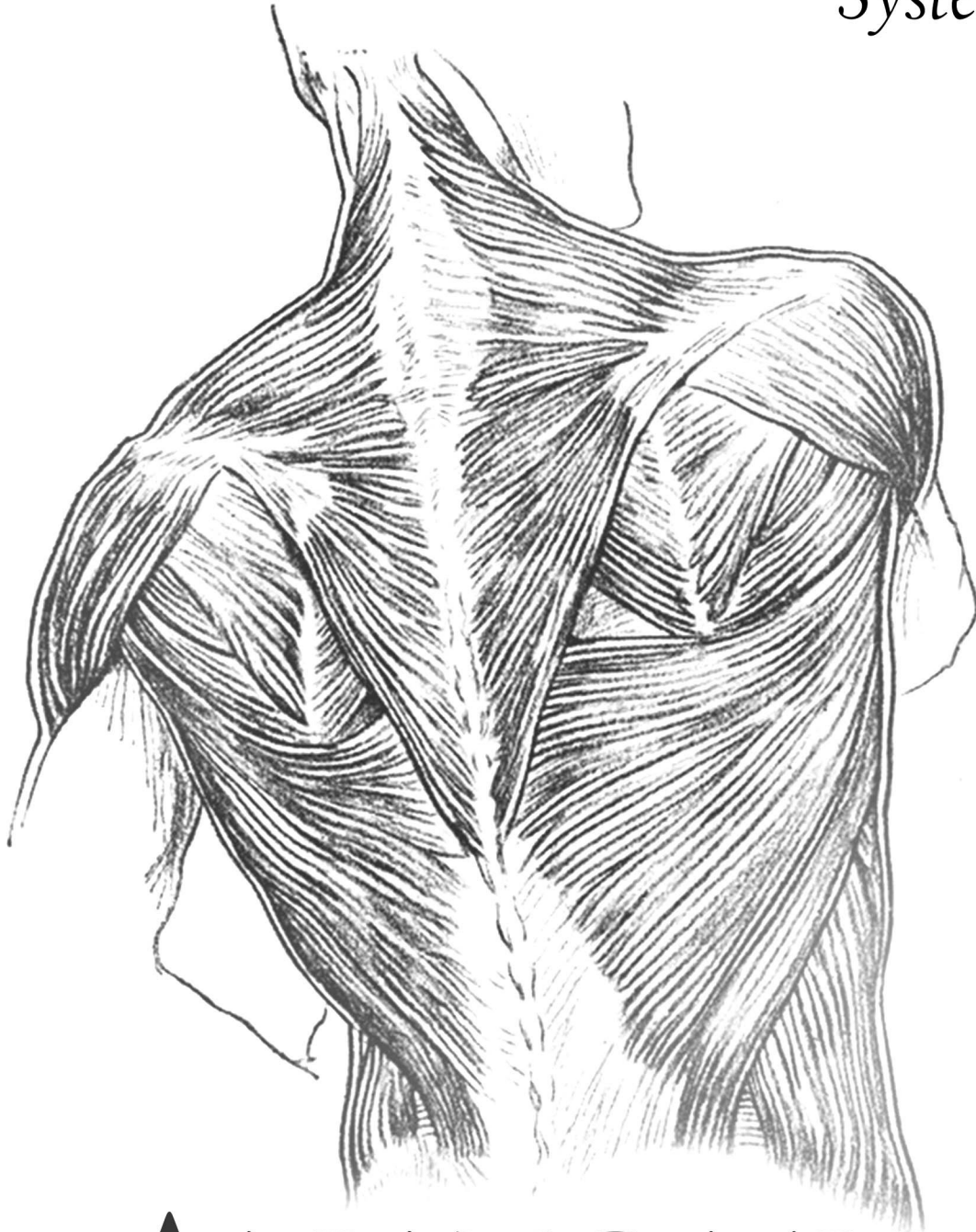




The Skin and
MUSCULOSKELETAL
System



ANATOMY

SLIDES

SHEET

SLIDE: 7

DOCTOR: Amjad Al-Shatarat

ANATOMY
OF THE LEG

Skin of the Leg

Cutaneous Nerves

1-Anteromedially:

The saphenous nerve, a branch of the femoral nerve supplies the skin on the anteromedial surface of the leg

Infrapatellar branch of saphenous nerve

Medial cutaneous nerves of leg (branches of saphenous nerve)

2- Anterolaterally:

Upper part

The lateral cutaneous nerve of the calf, a branch of the **common peroneal** nerve supplies the skin on the upper part of the lateral surface of the leg

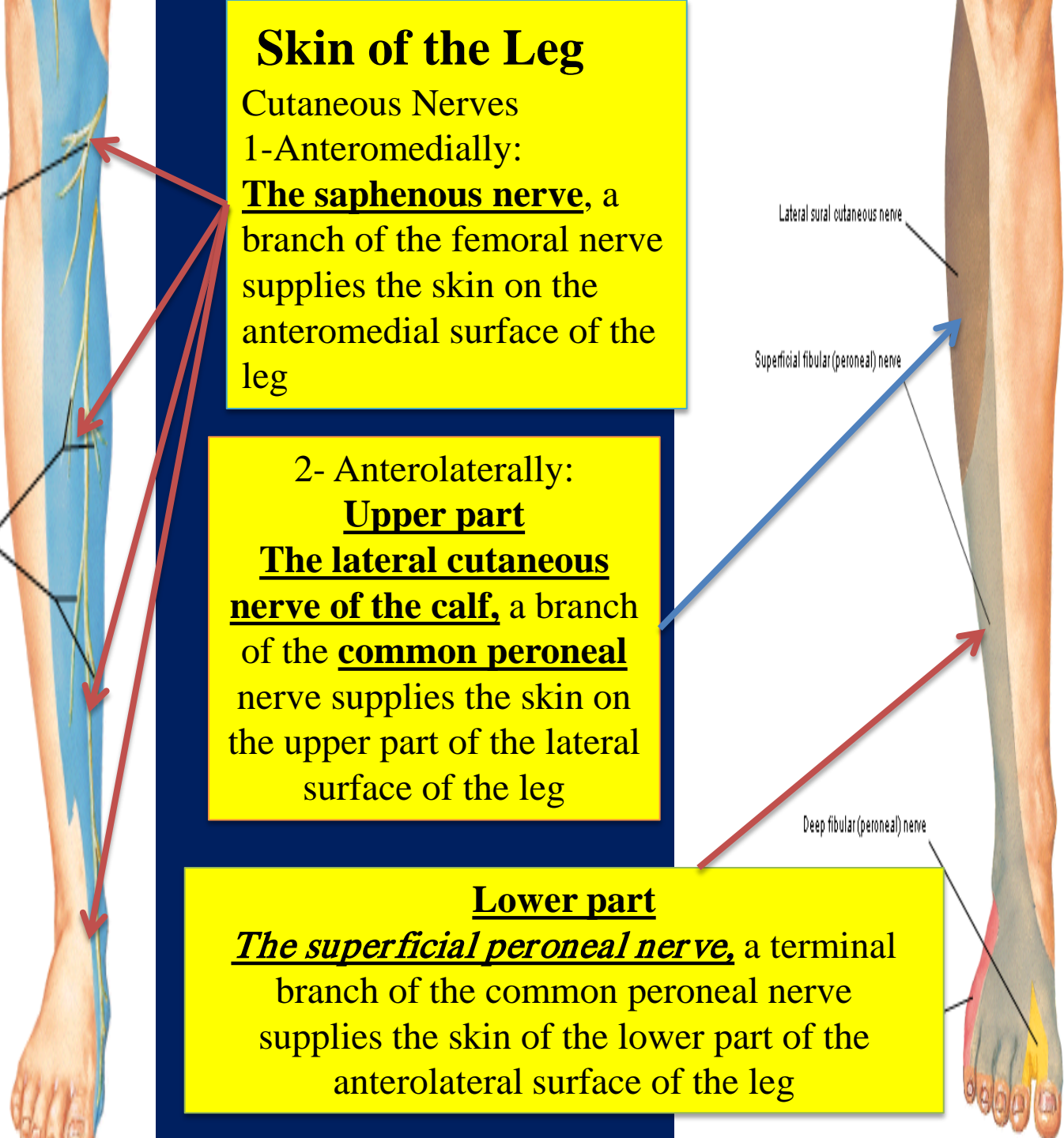
Lateral sural cutaneous nerve

Superficial fibular (peroneal) nerve

Lower part

The superficial peroneal nerve, a terminal branch of the common peroneal nerve supplies the skin of the lower part of the anterolateral surface of the leg

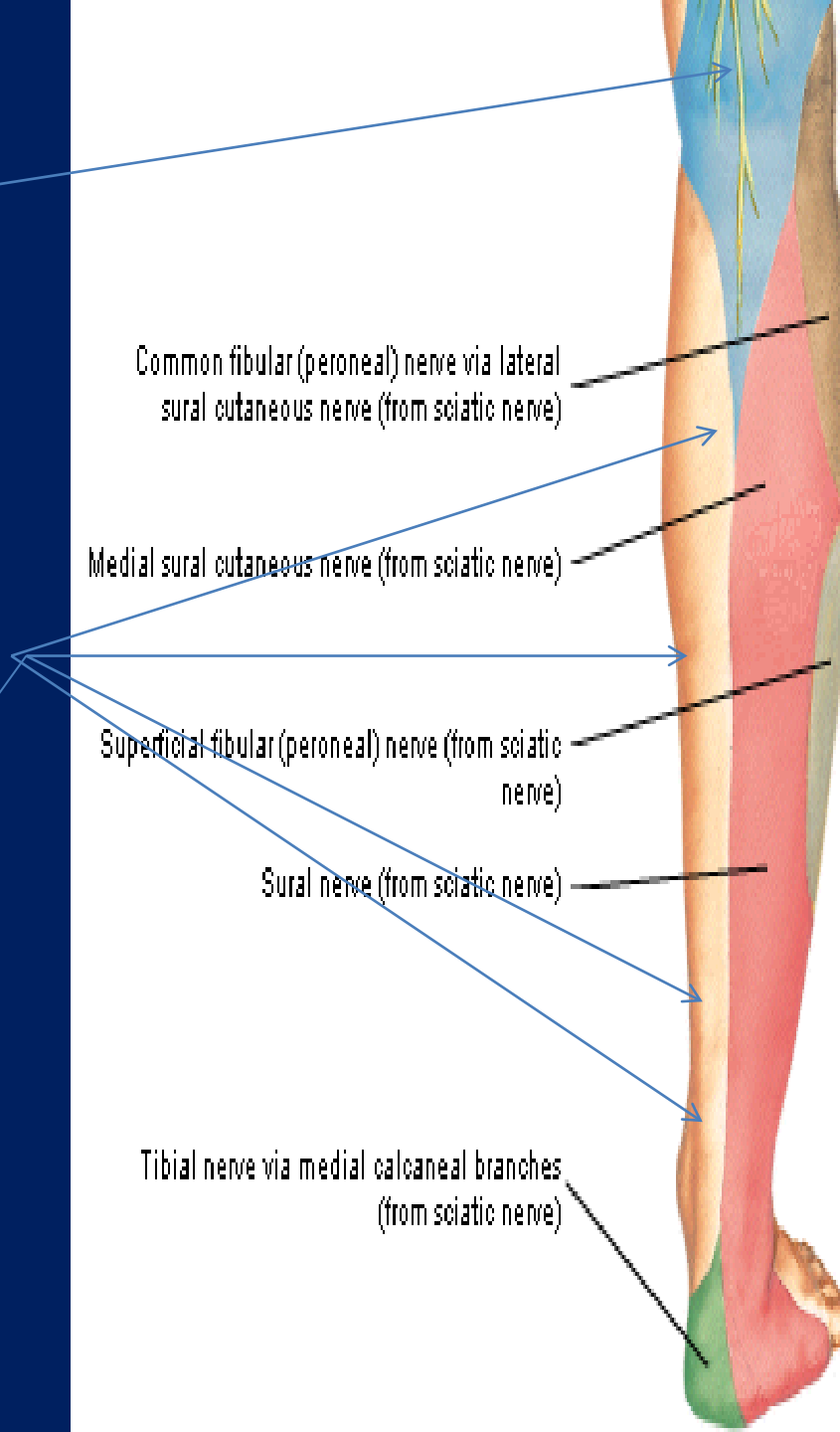
Deep fibular (peroneal) nerve



Posteriorly:
The posterior cutaneous nerve of the thigh

descends on the back of the thigh
In the popliteal fossa, it supplies the skin over the popliteal fossa and the upper part of the back of the leg

The saphenous nerve, a branch of the femoral nerve gives off branches that supply the skin on the posteromedial surface of the leg



The lateral cutaneous nerve of the calf, a branch of the common peroneal nerve supplies the skin on **the upper part of the posterolateral surface of the leg**

The sural nerve, a branch of the tibial nerve supplies the skin on **the lower part of the posterolateral surface of the leg**

FASCIAL COMPARTMENTS OF THE LEG

Fascial Compartments of the Leg

➤The deep fascia of the leg forms

Two intermuscular septa

(anterior and posterior) which

are attached to the fibula

These, together with the

interosseous membrane divide

the leg into:

Three compartments;

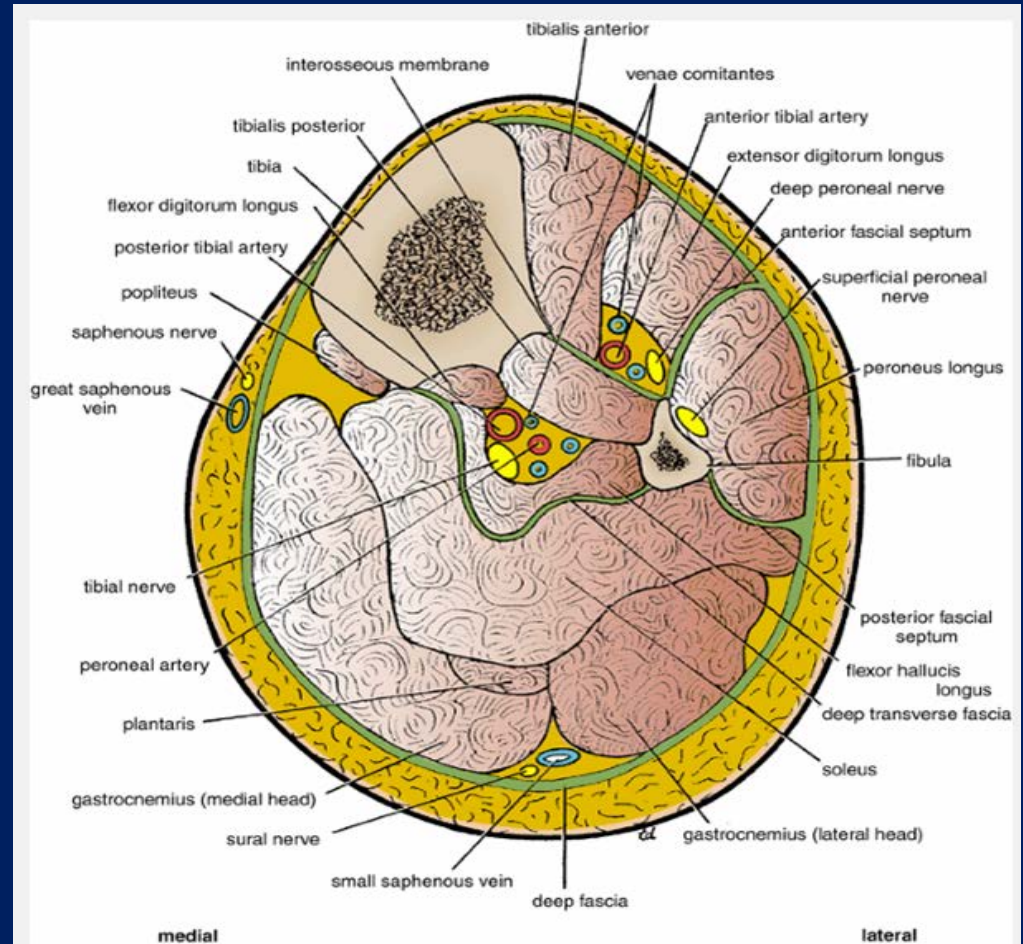
A n t e r i o r

L a t e r a l

P o s t e r i o r

(in the posterior compartment, a **superficial and deep transverse septum** further divide the posterior compartment into layers of superficial and deep muscles)

➤Each having its own muscles, blood supply, and nerve supply.



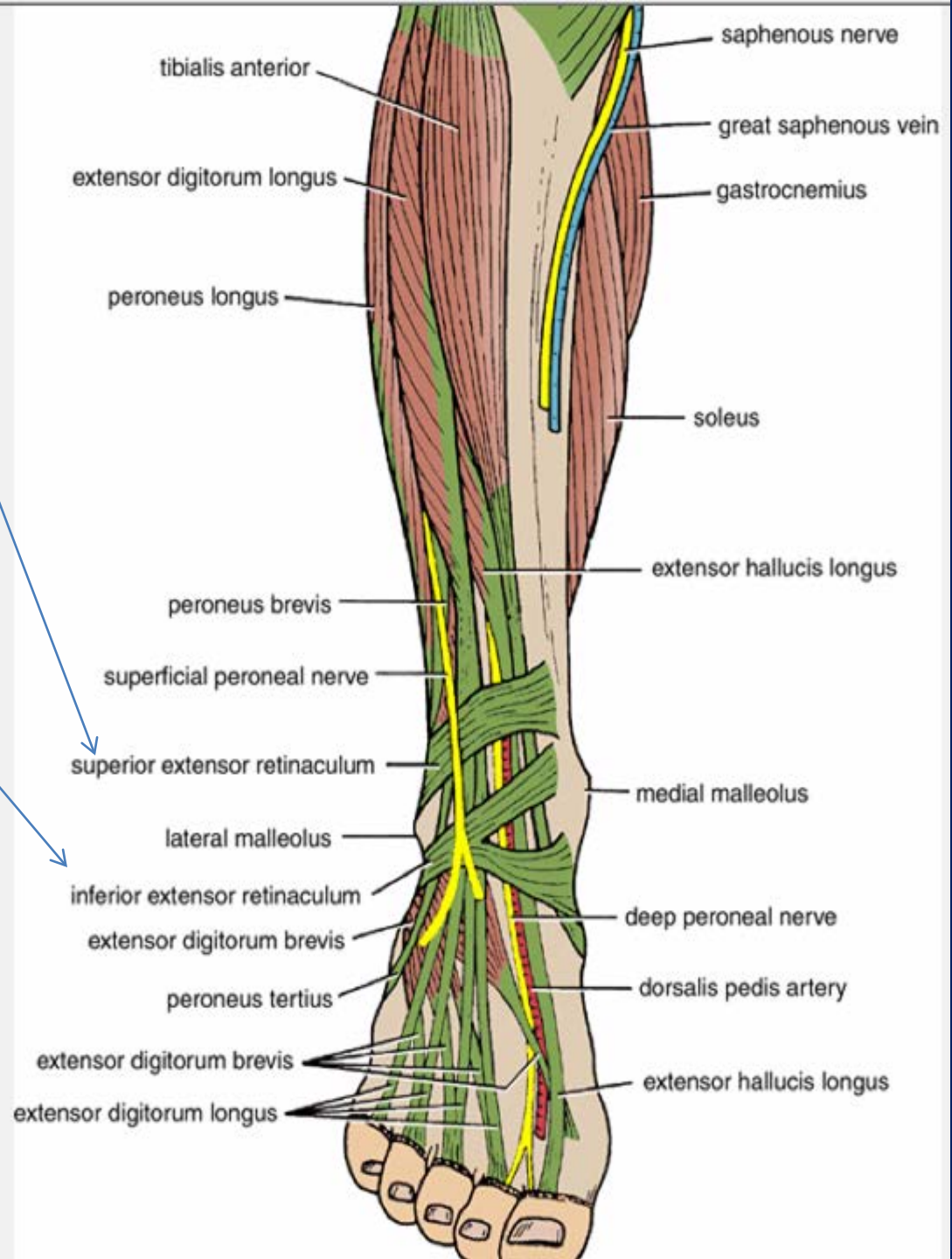
Retinacula of the Ankle

➤ The retinacula are thickenings of the deep fascia that keep the long tendons around the ankle joint in position and act as pulleys.

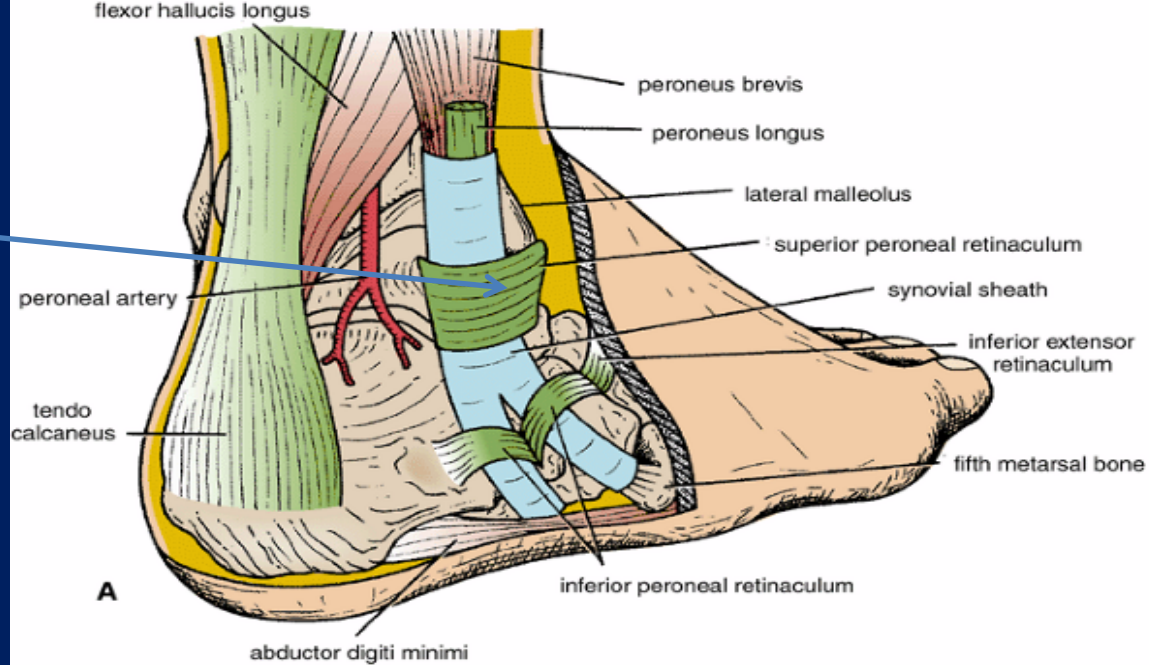
➤ Superior Extensor Retinaculum

➤ Inferior Extensor Retinaculum

The inferior extensor retinaculum is a Y-shaped band located in front of the ankle joint.

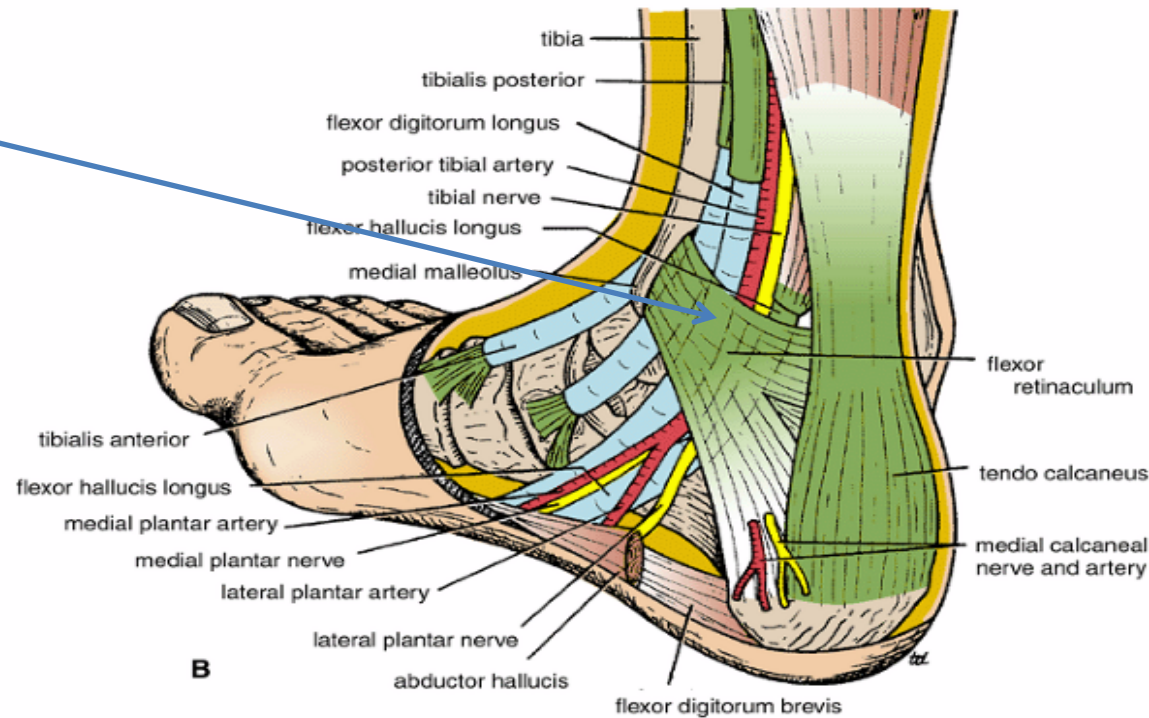


➤ Superior Peroneal Retinaculum



➤ Flexor Retinaculum

The flexor retinaculum extends from the **medial malleolus** downward and backward to be attached to the **medial surface of the calcaneum**



Contents of the Anterior Fascial Compartment of the Leg

Muscles:

The tibialis anterior

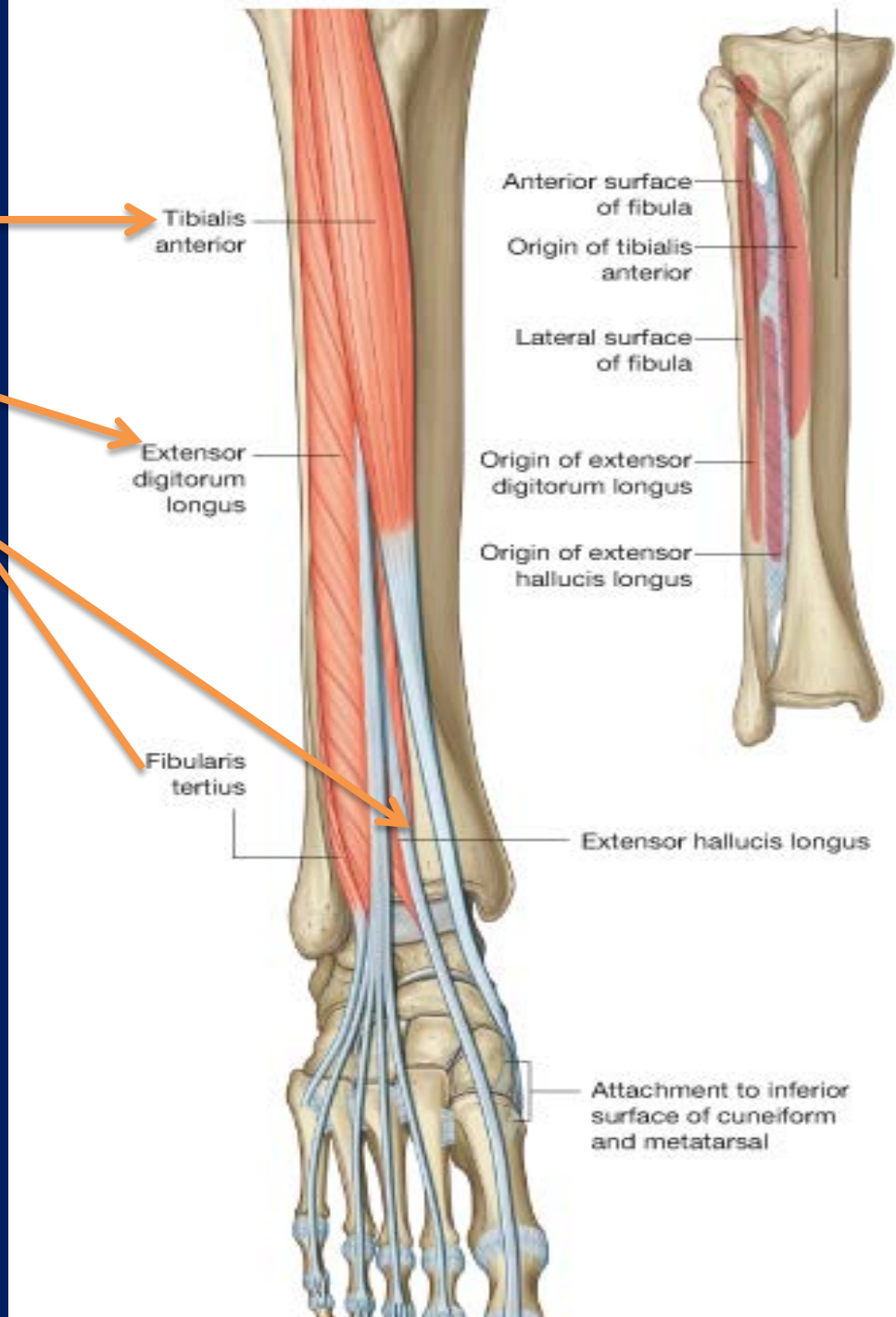
Extensor digitorum longus

Extensor hallucis longus

Peroneus tertius

Blood supply: Anterior tibial artery

Nerve supply: Deep peroneal nerve



All the muscles of the anterior compartment of the leg originate from

Lateral surface of the shaft of tibia (tibialis anterior) or

The anterior surface of shaft of fibula (extensor surface) the remaining three

muscles

Insertion?

The main actions of these muscles are

Extension of the foot at the ankle joint (dorsiflexion) to raise the toes up (in other words to stand up on the heels)

In addition any muscle that got (tibialis) in its name will invert the foot at subtalar and transverse tarsal joints

while any muscle got (peroneus) in its name will

Everts foot at subtalar and transverse tarsal joints

Nerve supply of all the muscles of the anterior compartment of the leg:

deep peroneal nerve

FROM MEDIAL TO LATERAL

In front of the medial malleolus

Tom has very nice dogs and pigs

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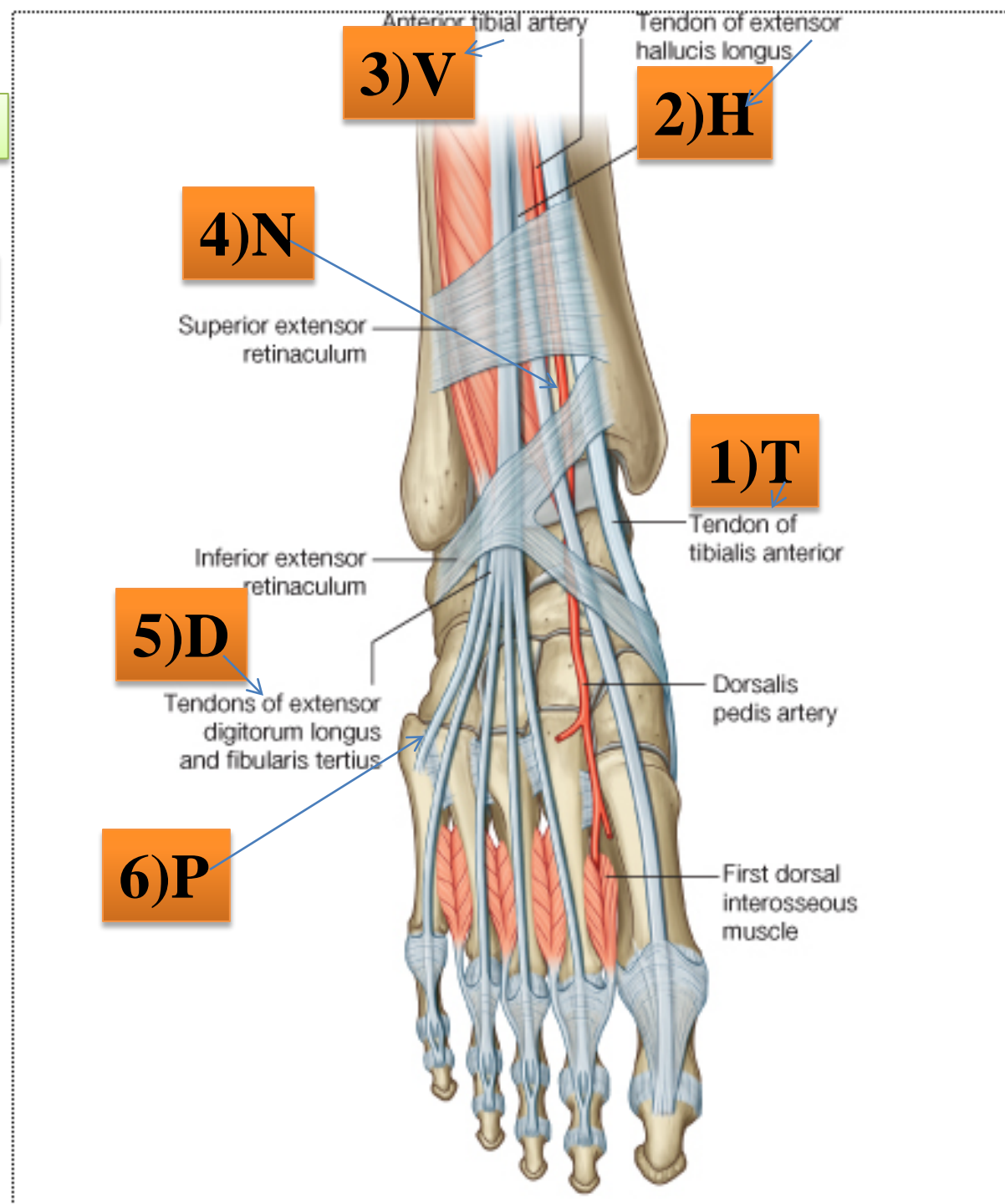
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Anterior tibial artery

Deep peroneal nerve

Peroneus tertius



Muscle	Origin	Insertion	Nerve Supply	Nerve Roots	Action
Tibialis anterior	Lateral surface of shaft of tibia and interosseous membrane	Medial cuneiform and base of first metatarsal bone	Deep peroneal nerve	L4, 5	Extends foot at ankle joint; inverts foot at subtalar and transverse tarsal joints; holds up medial longitudinal arch of foot
Extensor digitorum longus	Anterior surface of shaft of fibula	Extensor expansion of lateral four toes	Deep peroneal nerve	L5; S1	Extends toes; extends foot at ankle joint
Peroneus tertius	Anterior surface of shaft of fibula	Base of fifth metatarsal bone	Deep peroneal nerve	L5; S1	Extends foot at ankle joint; everts foot at subtalar and transverse tarsal joints
Extensor hallucis longus	Anterior surface of shaft of fibula	Base of distal phalanx of great toe	Deep peroneal nerve	L5; S1	Extends big toe; extends foot at ankle joint; inverts foot at subtalar and transverse tarsal joints
Extensor digitorum brevis	Calcaneum	By four tendons into the proximal phalanx of big toe and long extensor tendons to second, third, and fourth toes	Deep peroneal nerve	S1, 2	Extends toes

Contents of the Lateral Fascial Compartment of the Leg

➤ Muscles:

Peroneus longus:

Origin: from the lateral surface of shaft of fibula

Insertion: Base of first metatarsal and the medial cuneiform bone (passes through a groove in the Cuboid bone).

peroneus brevis:

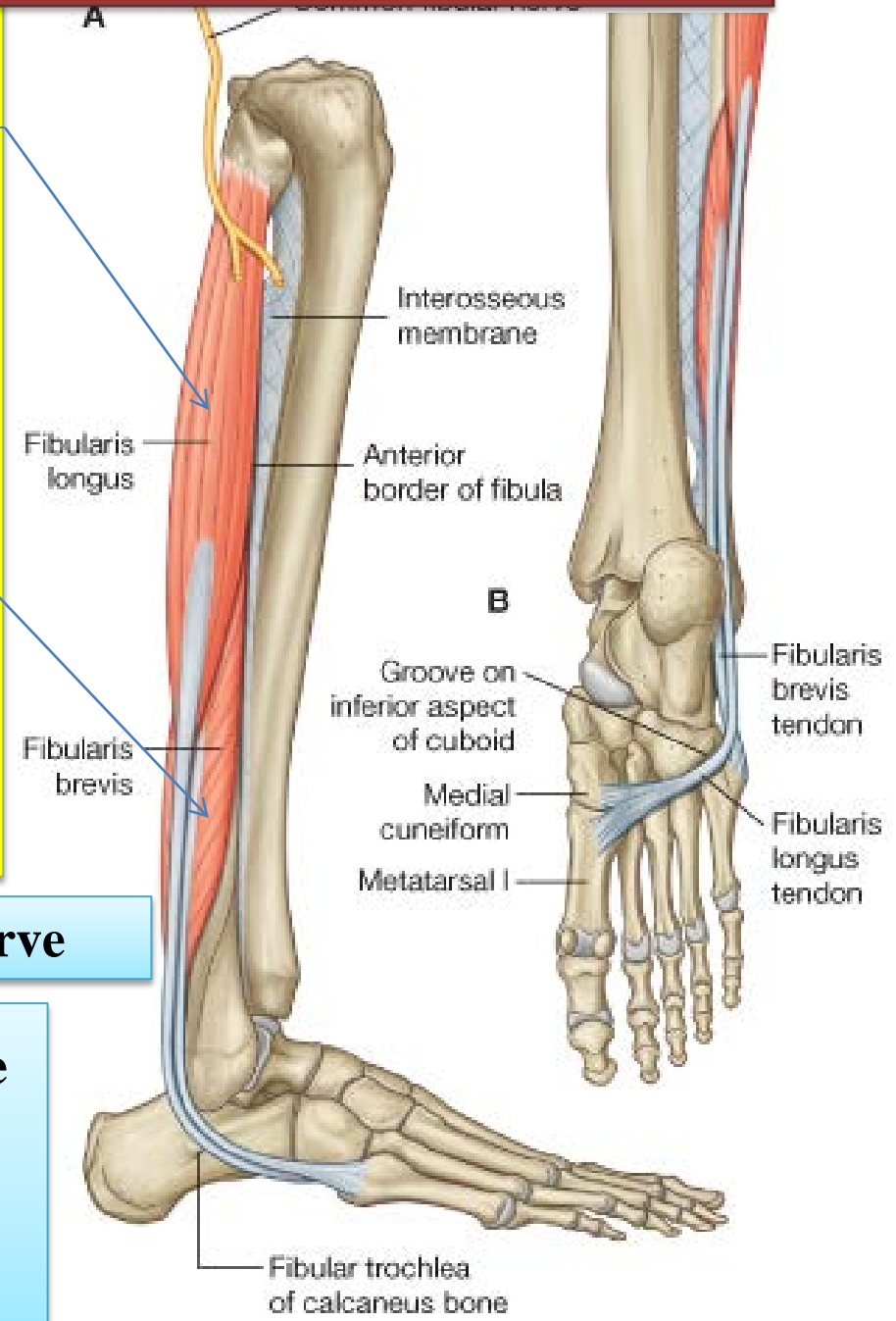
Origin: Lateral surface of shaft of fibula

Insertion: Base of fifth metatarsal bone

➤ **Blood supply:** Branches from the peroneal artery (branch from posterior tibial artery)

➤ **Nerve supply:** Superficial peroneal nerve

➤ **Actions:** both **flex** the foot at the ankle joint
Evert the foot at the subtalar and transverse tarsal joints



Contents of the Posterior Fascial Compartment of the Leg

➤ **The transverse septa of the leg divides the muscles of the posterior compartment into superficial and deep groups**

Superficial group of muscles

Gastrocnemius

Plantaris

Soleus

Deep group of muscles

Popliteus

Flexor digitorum longus

Flexor hallucis longus

Tibialis posterior

Blood supply: Posterior tibial artery

Nerve supply: Tibial nerve

Superficial group of muscles

❖Gastrocnemius

Origin: **Lateral** head from **lateral condyle** of femur

Medial head from above **medial condyle**

Insertion: Via **tendo calcaneus** into posterior surface of calcaneum

Nerve supply: **Tibial nerve**

Actions: **Plantar flexes** foot at ankle joint

Flexes knee joint

❖Plantaris

This muscle some times is absent

Nerve supply: **Tibial nerve**

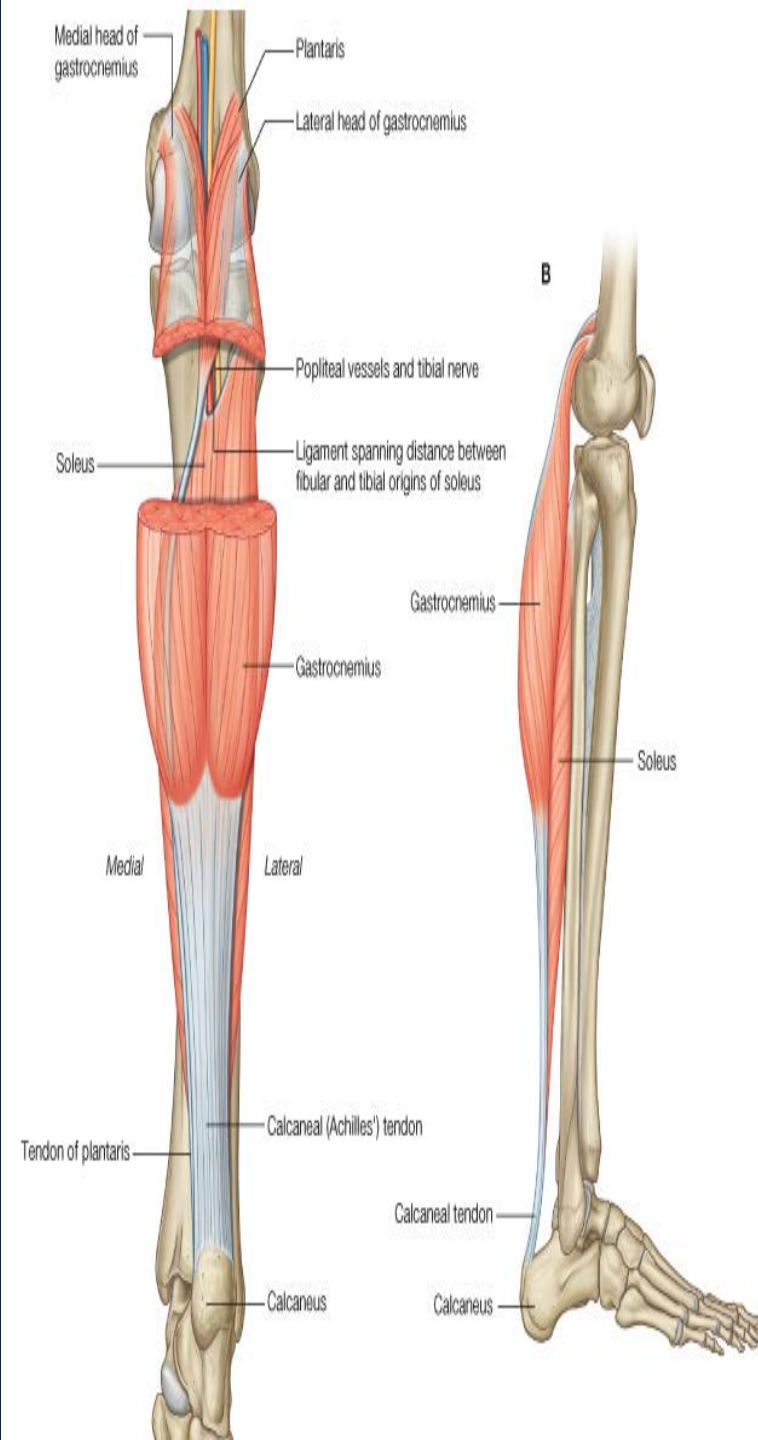
❖Soleus

Origin: **Shafts** of tibia and fibula

Insertion: Via **tendo calcaneus** into posterior surface of calcaneum

Nerve supply: **Tibial nerve**

Actions: Together with gastrocnemius and plantaris is powerful plantar flexor of ankle joint; provides main **propulsive force in walking and running**



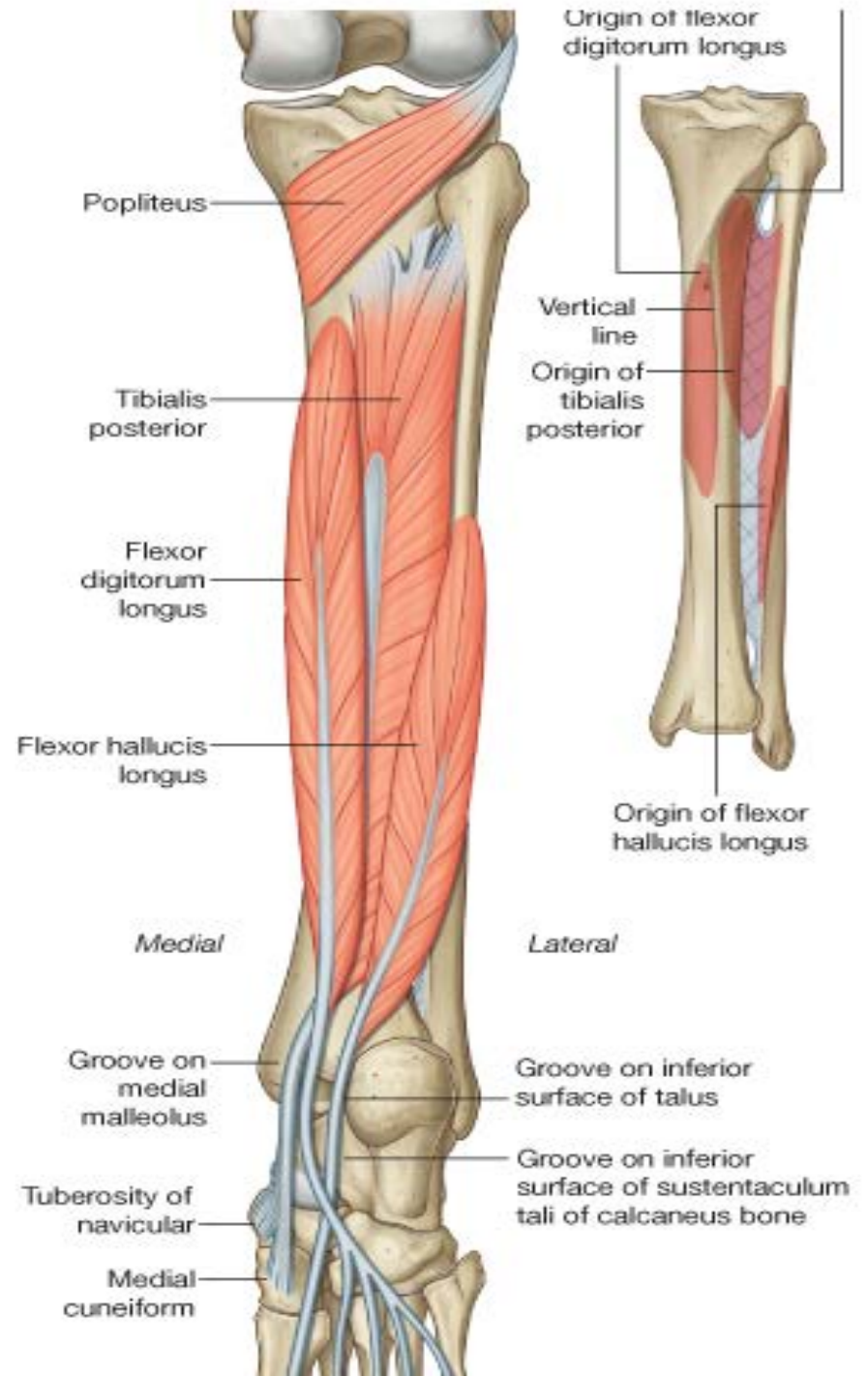
Deep group of muscles

❖ Popliteus

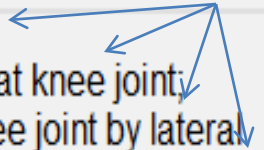
❖ Flexor digitorum longus

❖ Flexor hallucis longus

❖ Tibialis posterior



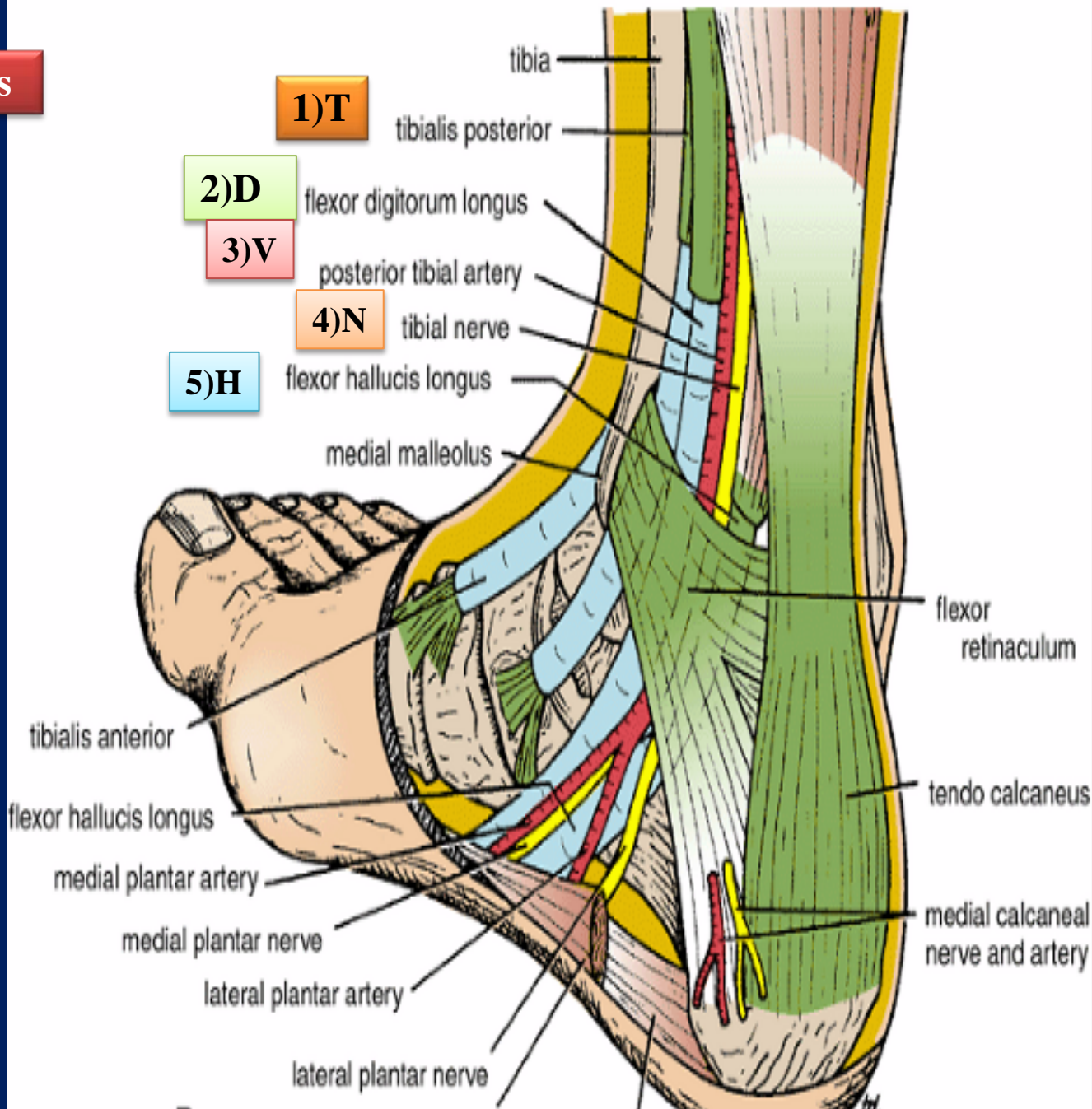
Deep Group	Origin	Insertion	Nerve		Actions
Popliteus	Lateral surface of lateral condyle of femur	Posterior surface of shaft of tibia above soleal line	Tibial nerve	L4, 5; S1	Flexes leg at knee joint; unlocks knee joint by lateral rotation of femur on tibia and slackens ligaments of joint
Flexor digitorum longus	Posterior surface of shaft of tibia	Bases of distal phalanges of lateral four toes	Tibial nerve	S2, 3	Flexes distal phalanges of lateral four toes; plantar flexes foot at ankle joint; supports medial and lateral longitudinal arches of foot
Flexor hallucis longus	Posterior surface of shaft of fibula	Base of distal phalanx of big toe	Tibial nerve	S2, 3	Flexes distal phalanx of big toe; plantar flexes foot at ankle joint; supports medial longitudinal arch of foot
Tibialis posterior	Posterior surface of shafts of tibia and fibula and interosseous membrane	Tuberosity of navicular bone and other neighboring bones	Tibial nerve	L4, 5	Plantar flexes foot at ankle joint; inverts foot at subtalar and transverse tarsal joints; supports medial longitudinal arch of foot



Behind the medial malleolus

Tom does very nice hats

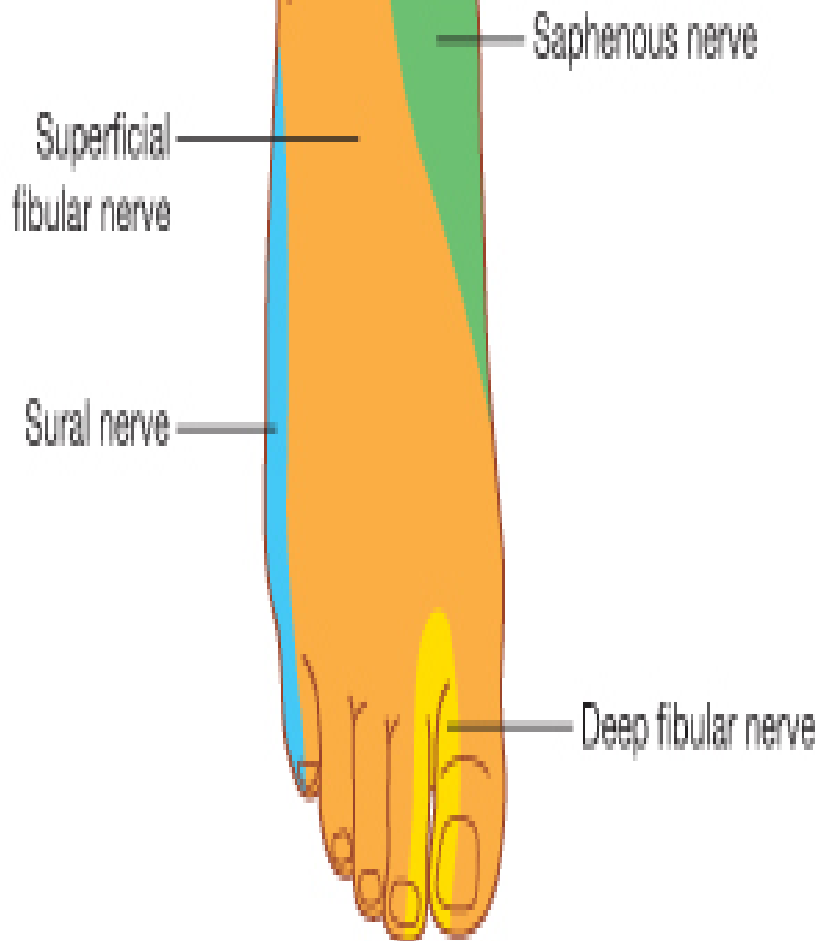
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Tibialis posterior
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Flexor hallucis



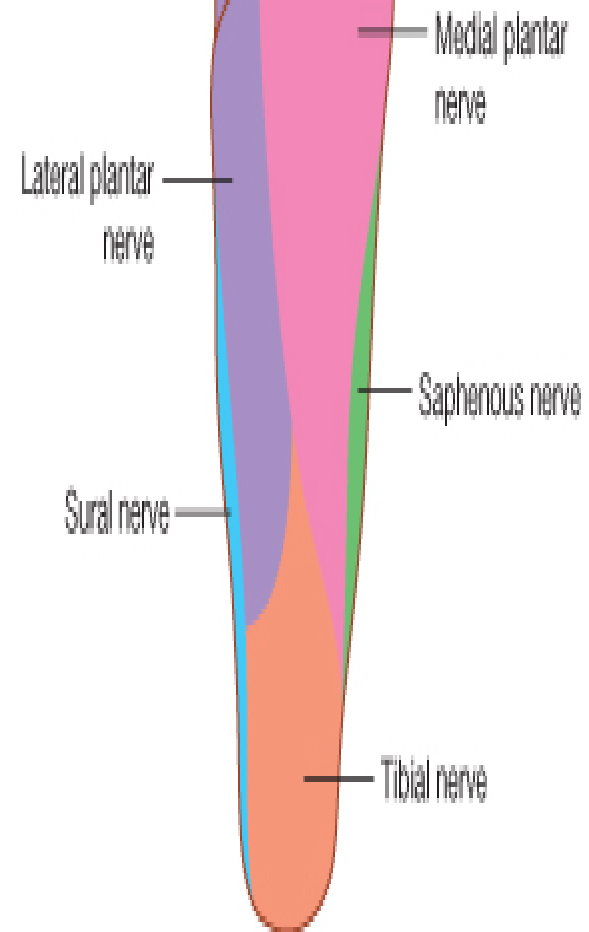
ANATOMY OF THE FOOT

B

Branches to
first and second
dorsal interosseus

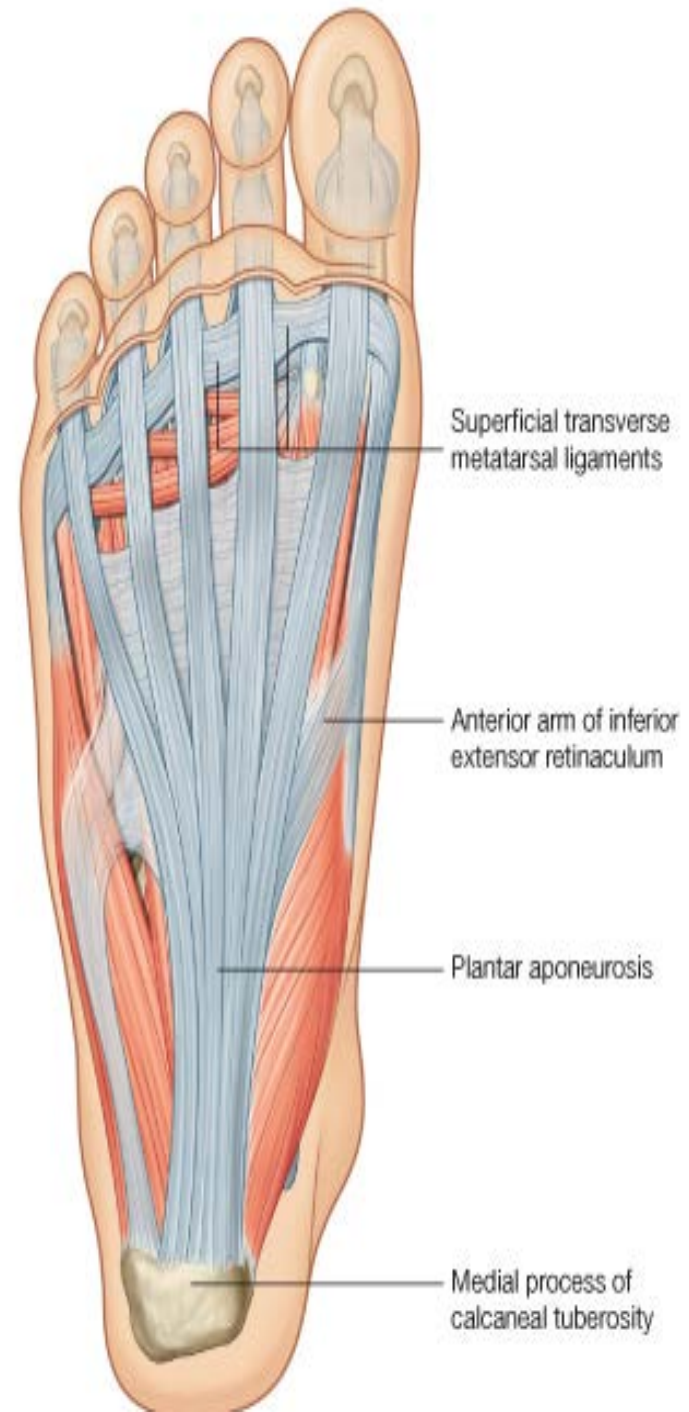


B



The plantar aponeurosis

- Is a triangular thickening of the deep fascia
- 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

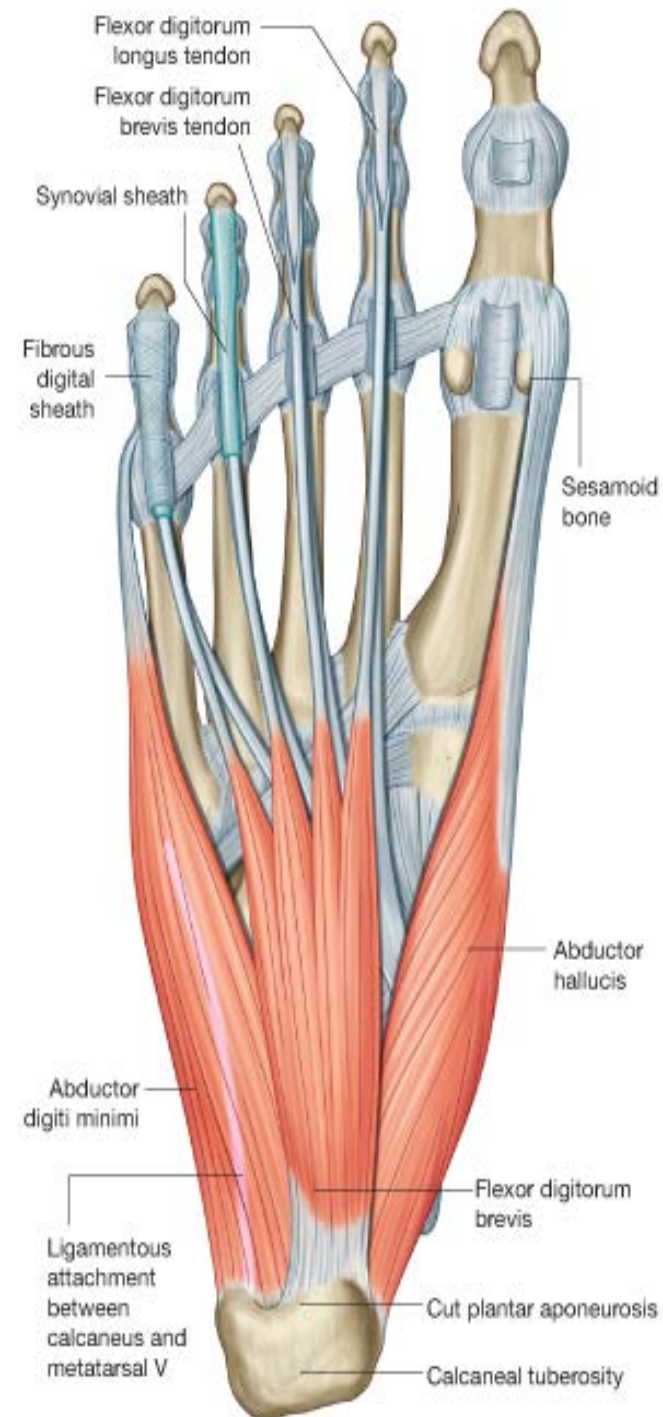


Muscles of the Sole of the Foot

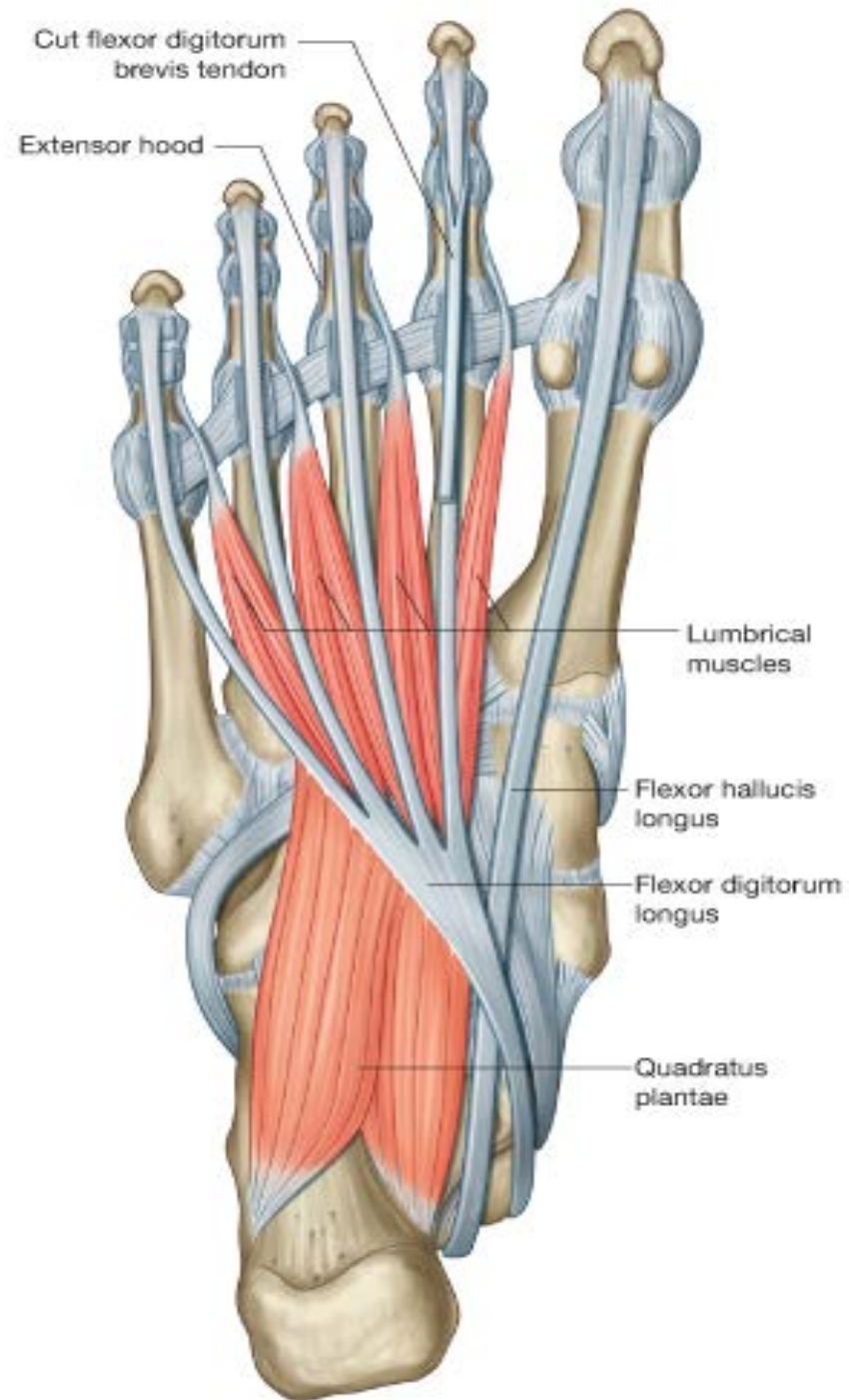
The muscles of the sole are conveniently described in four layers from the inferior layer superiorly.

First layer:

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

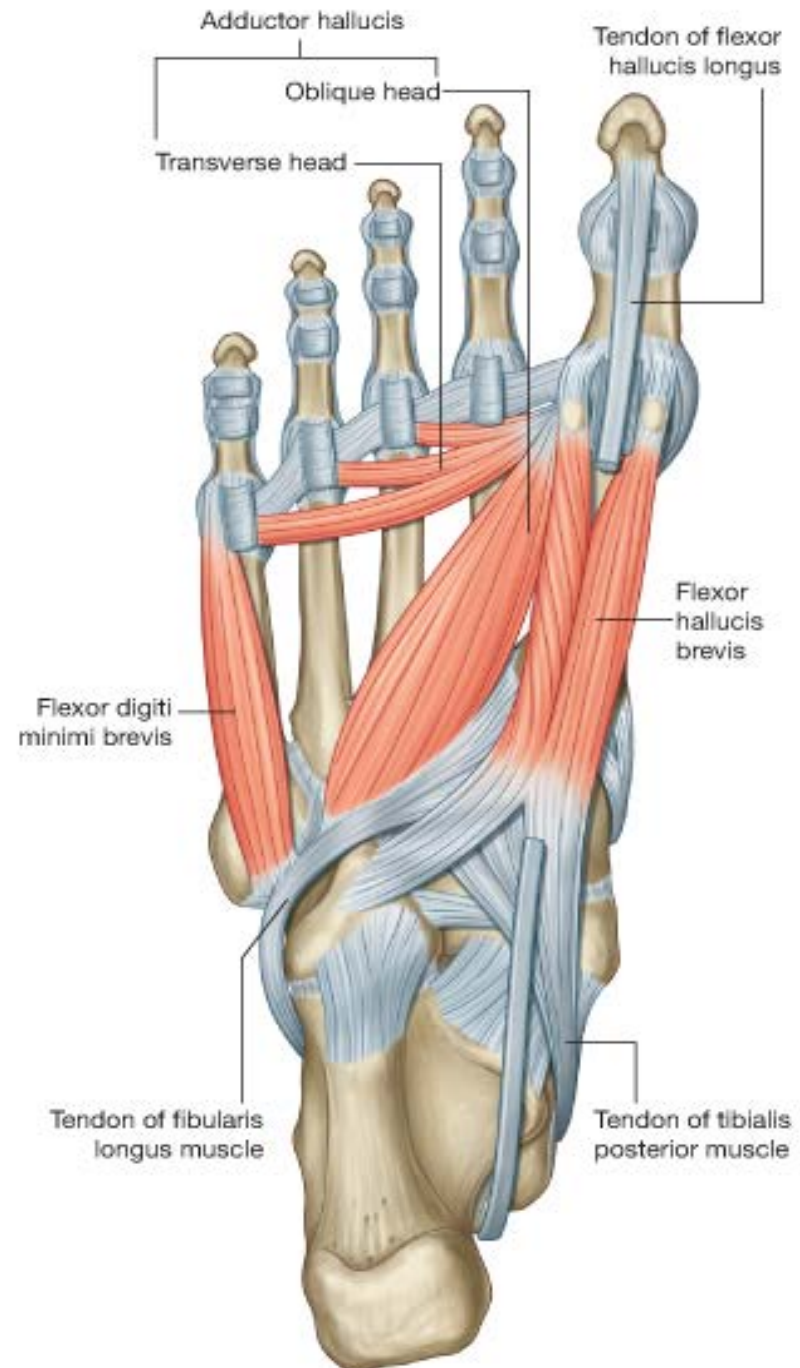


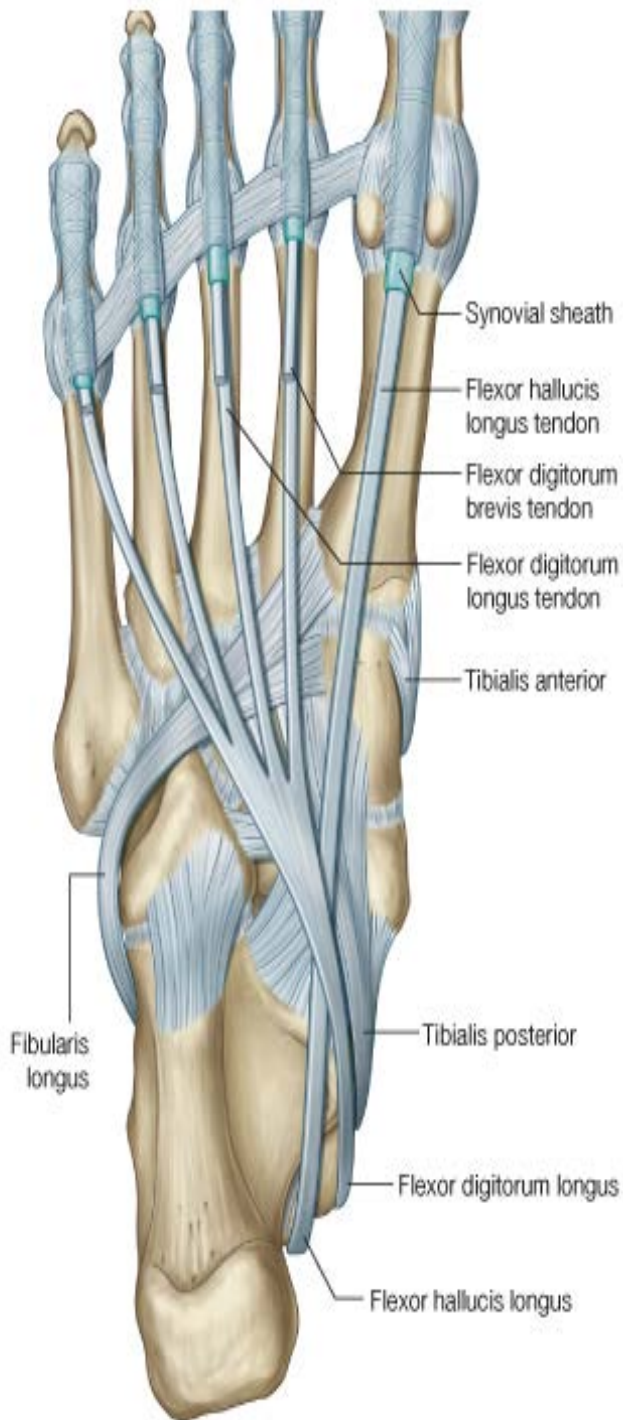
Second layer:
1-Quadratus plantae,
2-Lumbricals
3-Flexor digitorum longus
tendon,
4- Flexor hallucis longus
tendon



Third layer:

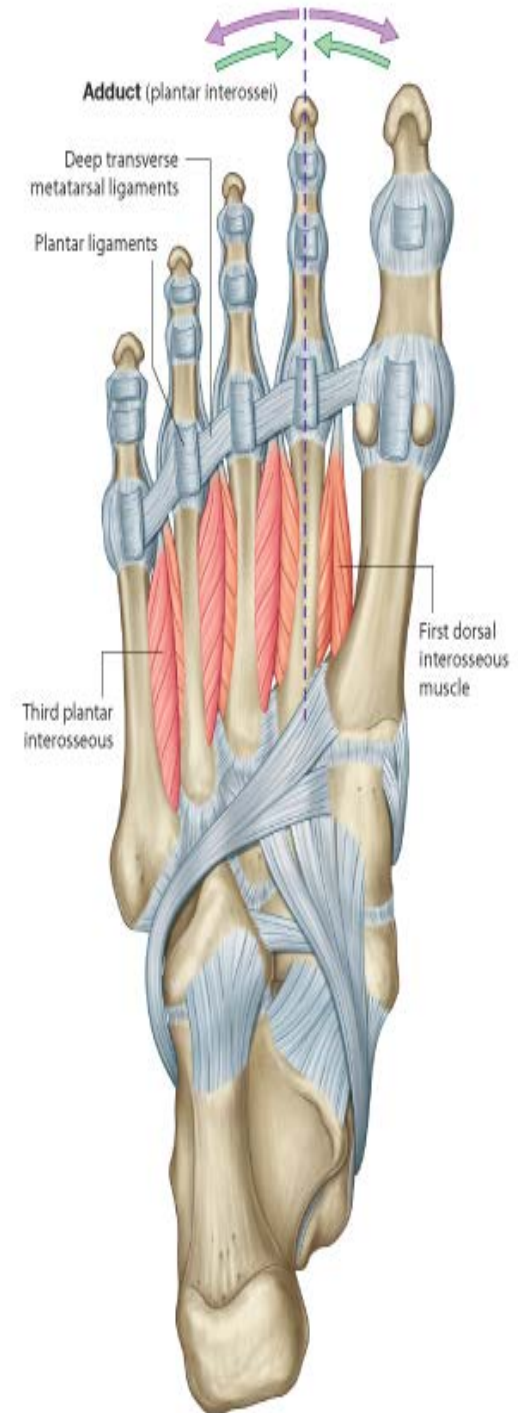
- 1-Flexor hallucis brevis**
- 2-Adductor hallucis**
- 3- Flexor digiti minimi brevis**





Fourth layer:
1- Interossei
2- peroneus longus tendon
3- tibialis posterior tendon

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 of individual toes, this function is rarely used in most people



Arteries of the Sole of the Foot

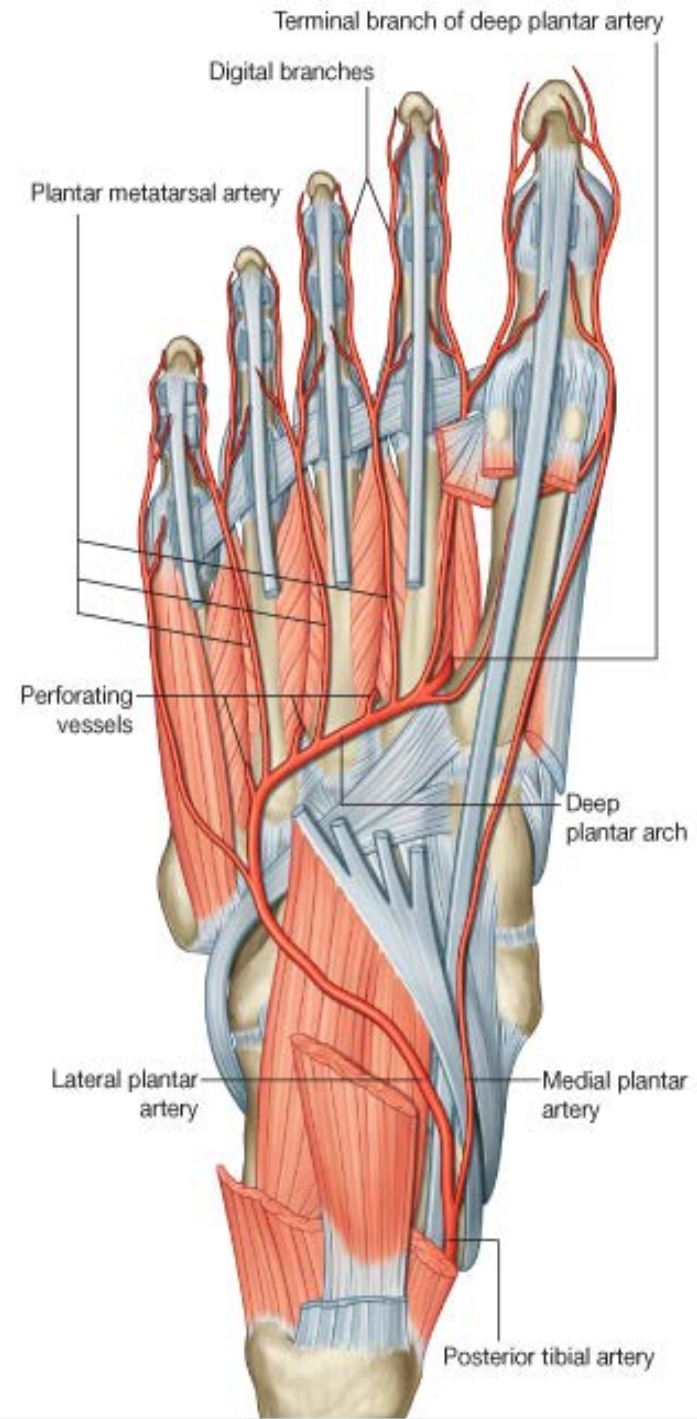
Medial Plantar Artery

➤ The medial plantar artery is the smaller of the terminal branches of the posterior tibial artery
It ends by supplying the medial side of the big toe

Lateral Plantar Artery

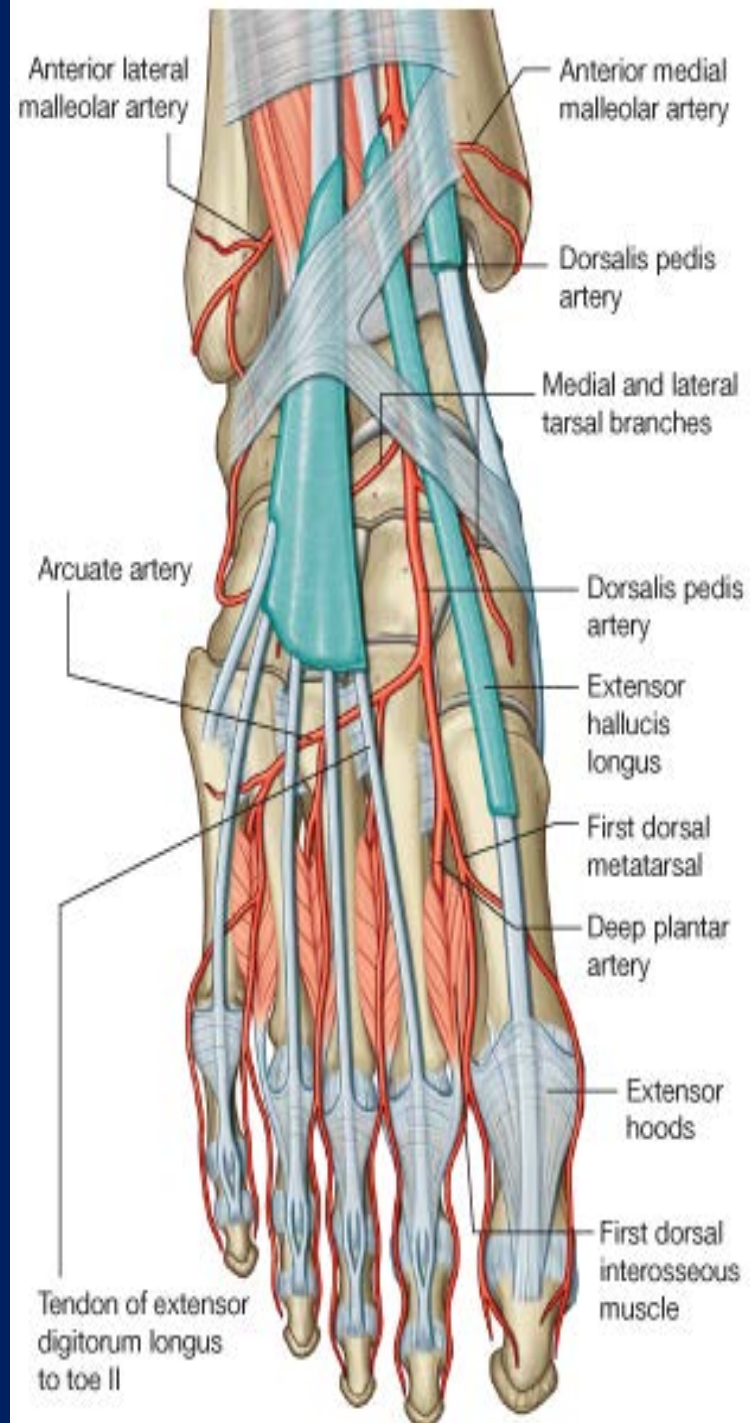
The lateral plantar artery is the larger of the terminal branches of the posterior tibial artery
forms the plantar arch

➤ at the proximal end of the first intermetatarsal space joins the dorsalis pedis artery



Dorsalis Pedis Artery (the Dorsal Artery of the Foot)

On entering the sole between the two heads of the first dorsal interosseous muscle, the dorsalis pedis artery immediately joins the lateral plantar artery



Nerves of the Sole of the Foot

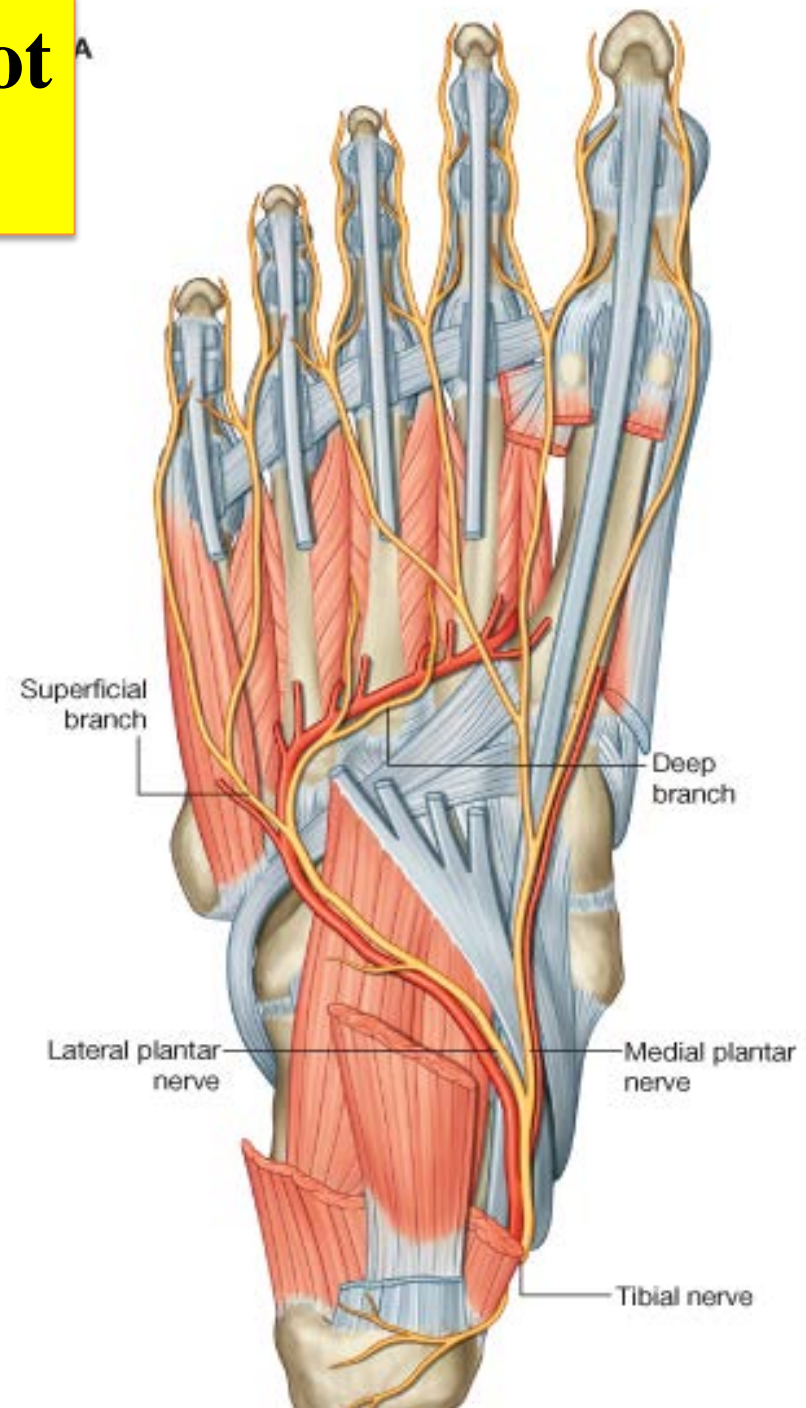
Medial Plantar Nerve

The medial plantar nerve is a terminal branch of the tibial nerve
Cutaneous branches: Plantar digital nerves run to the sides of the medial three and a half toes. The nerves extend onto the dorsum and supply the nail beds and the tips of the toes

Remember it is similar to the median nerve

Lateral Plantar Nerve

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



Arches of the Foot

The bones of the foot are arranged in two arches that are held in position by ligaments and tendons

The arches provide an ideal distribution of body weight over the soft and hard tissues of the foot

Normally, the ball of the foot carries about 40% of the weight and the heel carries about 60%.

Usually, the arches are fully developed by age 12 or 13.

body weight
100%

50%
On the
right side

50%
On the
left side

20%

30%

The ball of the foot

The heel

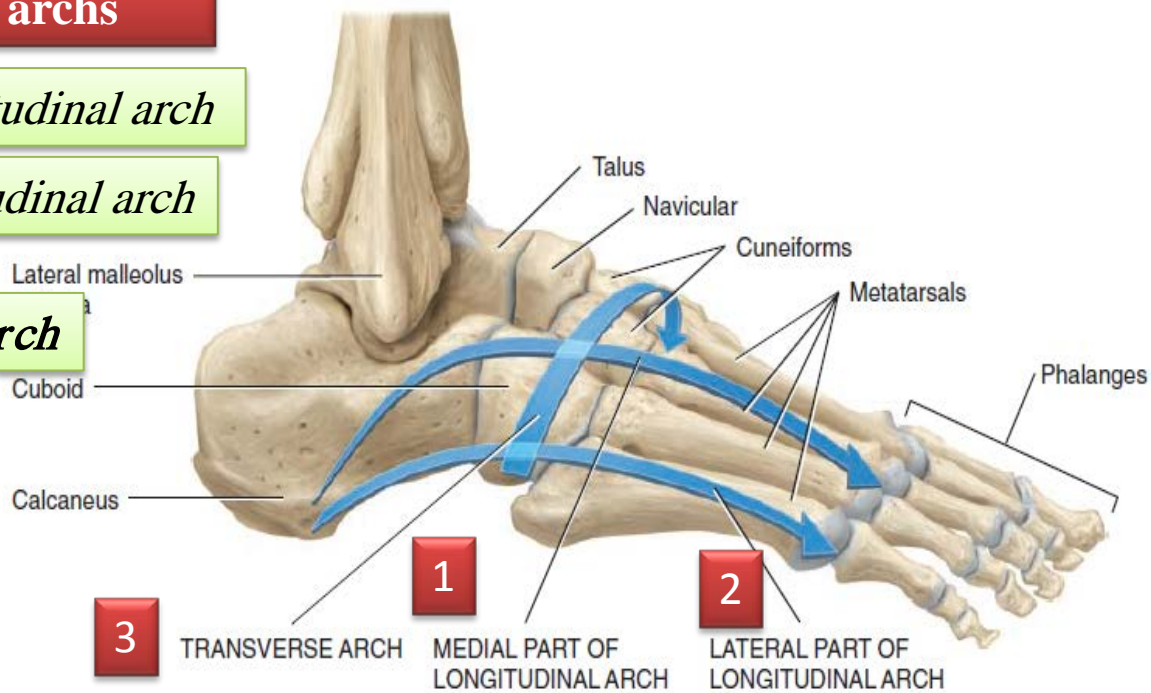


A- longitudinal arches

1-The medial Longitudinal arch

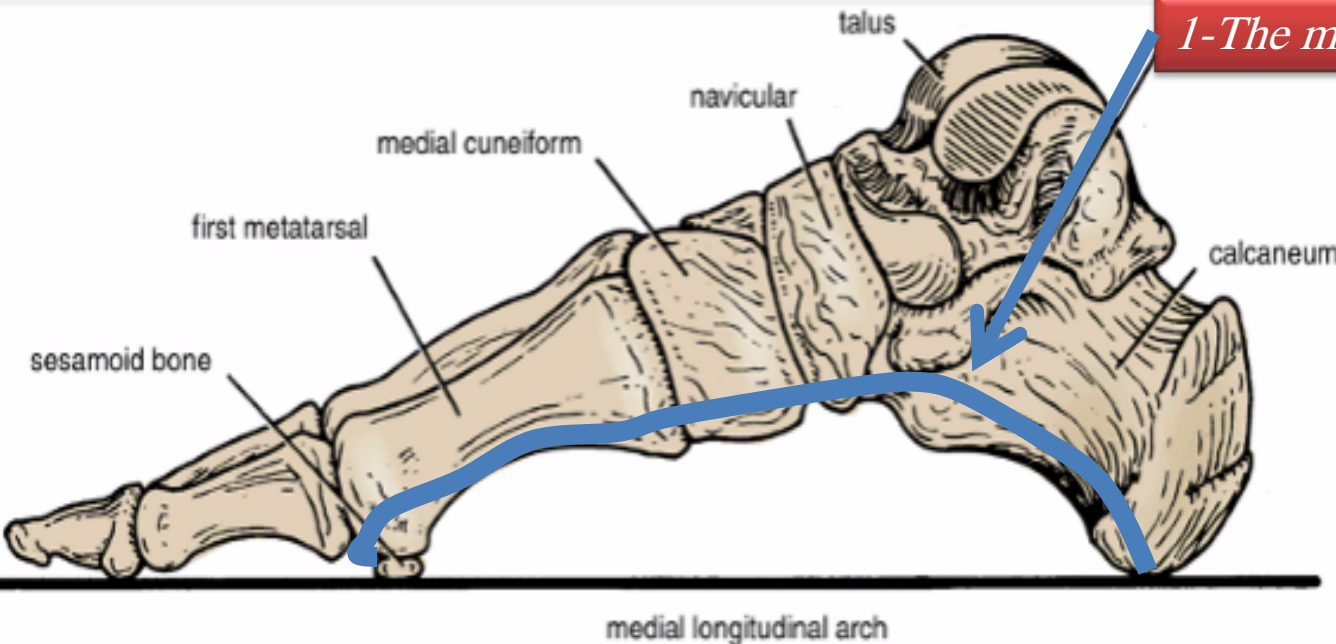
2-The lateral longitudinal arch

B- The transverse arch



1-The medial Longitudinal arch

Made of:
a- Calcaneus
b- Talus
c- Navicular,
d- The three cuneiforms,
e- The heads of the three medial metatarsals.



The Arches of the Foot

A segmented structure can hold up weight only if it is built in the form of an arch.
The foot has three such arches:

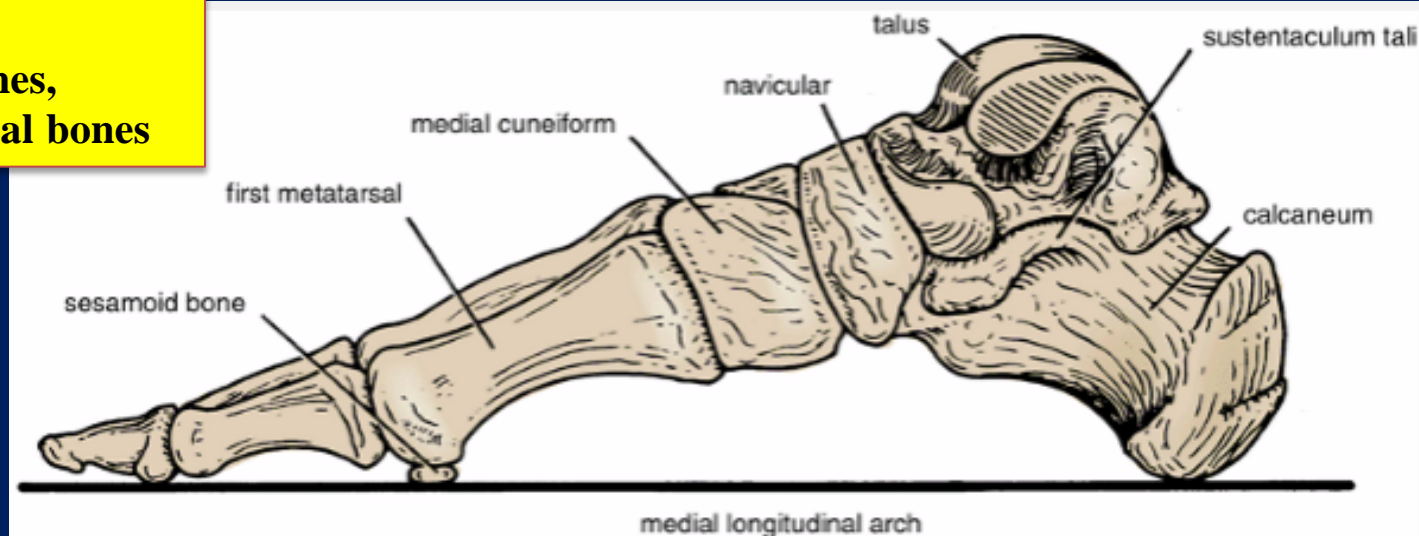
- 1-The medial longitudinal
- 2-Lateral longitudinal
- 3-Transverse arches

1-The medial longitudinal

Consists of :

- 1-The calcaneum,
- 2-The talus,
- 3- The navicular bone,
- 4-The three cuneiform bones,
- 5- The first three metatarsal bones

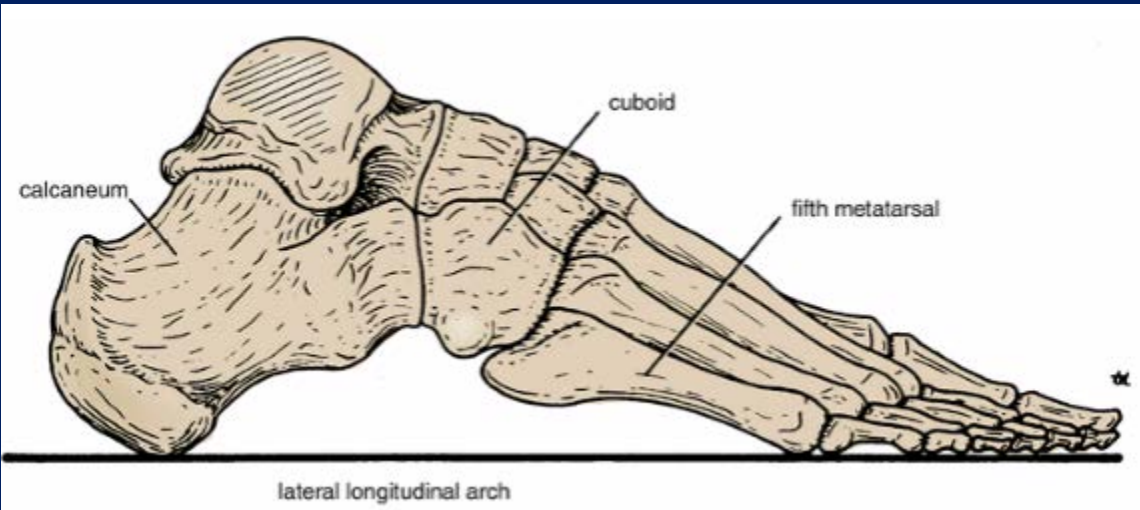
In the young child, the foot appears to be flat because of the presence of a large amount of subcutaneous fat on the sole of the foot.



2-Lateral longitudinal arch:

Consists of:

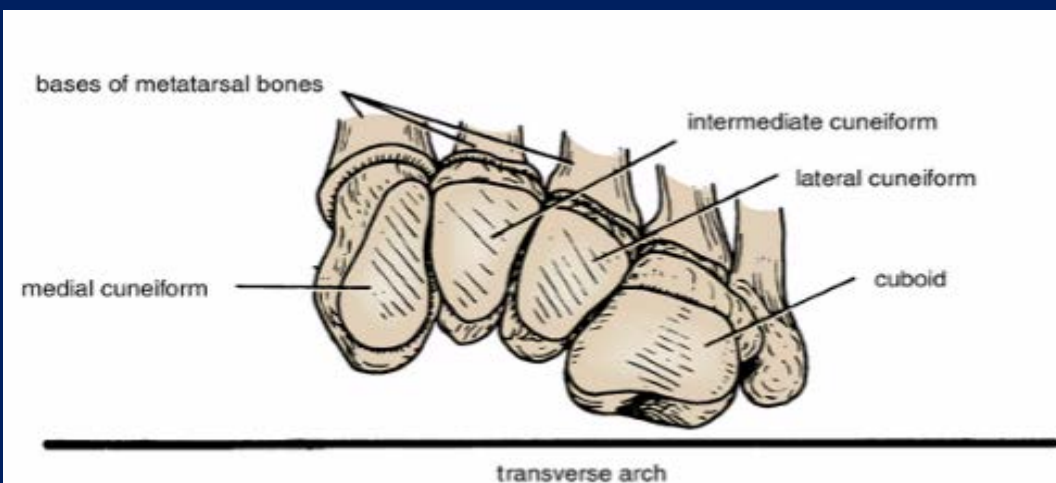
- 1- *The calcaneum,*
- 2-*The cuboid*
- 3-*The fourth and fifth metatarsal bones*



3-Transverse arch:

Consists of :

- 1-*The bases of the metatarsal bones*
- 2-*The cuboid*
- 3- *The three cuneiform bones*



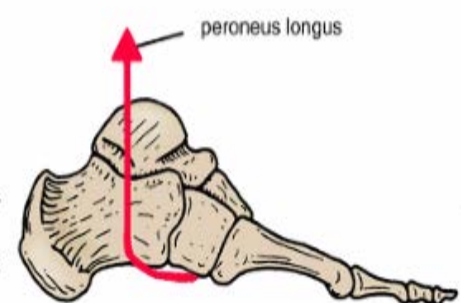
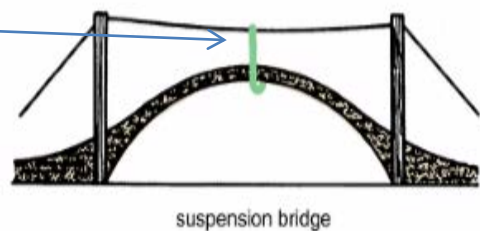
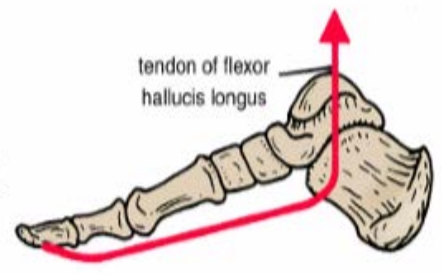
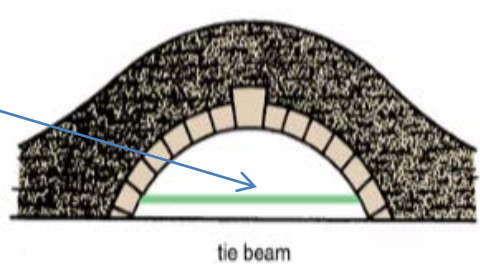
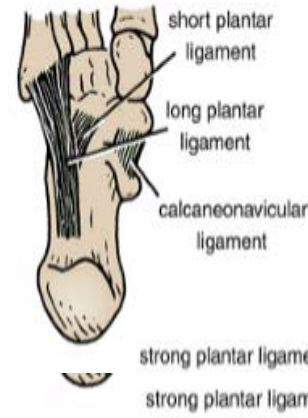
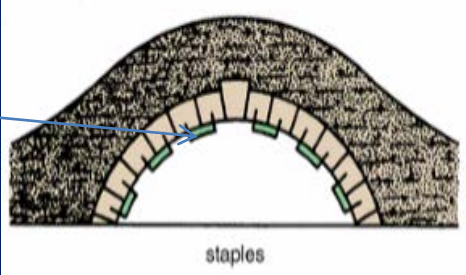
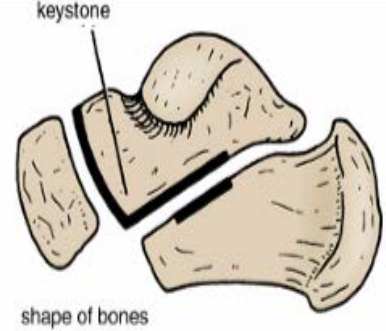
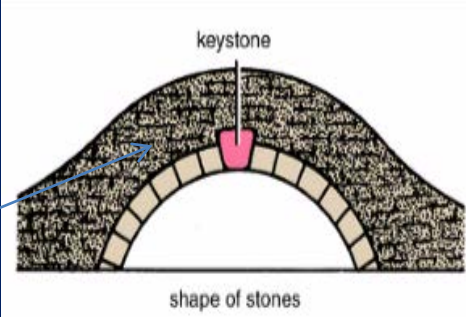
Mechanisms of Arch Support
 Examination of the design of any stone bridge reveals the following engineering methods used for its support

The shape of the stones: the stones are wedge shaped

The inferior edges of the stones are tied together: This is accomplished by binding their lower edges together with metal staples

The use of the tie beams: a tie beam connecting the ends effectively prevents separation of the pillars and consequent sagging of the arch

A suspension bridge: multiple supports suspending the arch from a cable above the level of the bridge



Maintenance of the Medial Longitudinal Arch

1-Shape of the bones:

for example, the sustentaculum tali holds up the talus

The rounded head of the talus is the keystone in the center of the arch

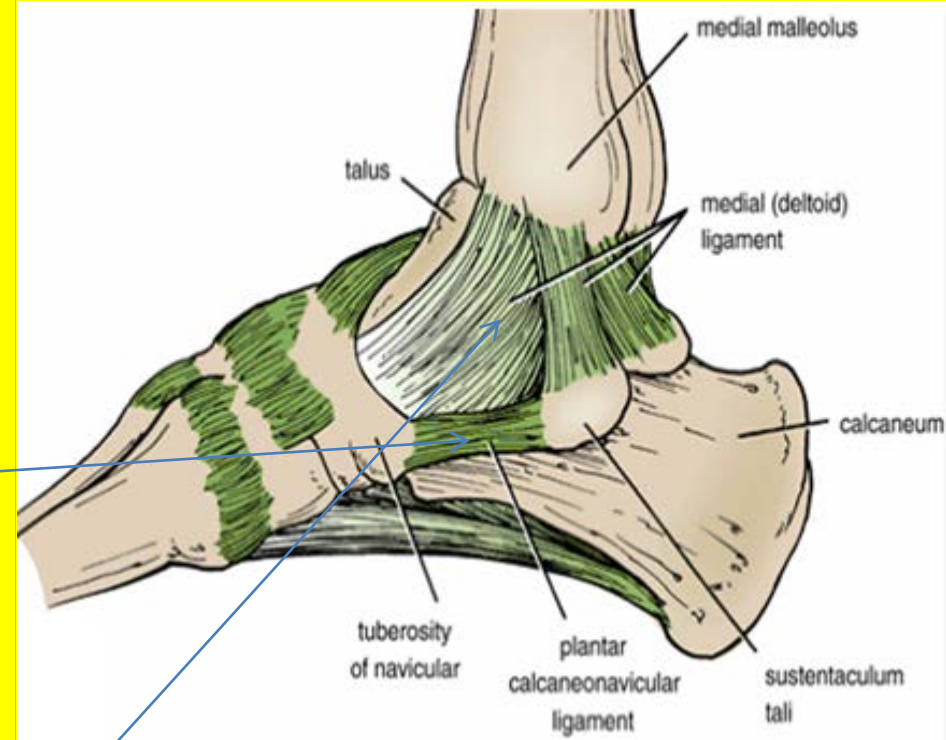
2-The inferior edges of the bones are tied together by the plantar ligaments

The most important ligament is the **plantar calcaneonavicular ligament**

(spring ligament)

3-Tying the ends of the arch together are the plantar aponeurosis, and short muscles of the foot for example, the abductor hallucis, the flexor hallucis longus

4-Suspending the arch from above are the tibialis anterior and posterior and the medial ligament of the ankle joint



Maintenance of the Lateral Longitudinal Arch

1-Shape of the bones: Minimal shaping of the distal end of the calcaneum and the proximal end of the cuboid.

The cuboid is the keystone.

2-The inferior edges of the bones are tied together by the long and short plantar ligaments

3-Tying the ends of the arch together , FOR EXAMPLE, the plantar aponeurosis

4-Suspending the arch from above are the peroneus longus and

the brevis

Maintenance of the Transverse Arch

1-Shape of the bones: The marked wedge shaping of the cuneiform bones and the bases of the metatarsal bones

2-The inferior edges of the bones are tied together by the deep transverse ligaments, the strong plantar ligaments

3-Tying the ends of the arch together is the peroneus longus tendon.

4-Suspending the arch from above are the peroneus

longus tendon and the peroneus

brevis

Flat foot

Is a condition in which the medial longitudinal arch is depressed or collapsed.

As a result,

- 1-The forefoot is displaced laterally everted.*
- 2-The head of the talus is no longer supported*
- 3-The body weight forces it downward and medially between the calcaneum and the navicular bone.*

The causes of flat foot are both congenital and acquired

When a person wears high-heeled shoes, however, the distribution of weight changes so that the ball of the foot may carry up to 80% and the heel 20%. As a result, the fat pads at the ball of the foot are damaged, joint pain develops, and structural changes in bones may occur.

