

◆ FRONT OF THE LEG ◆

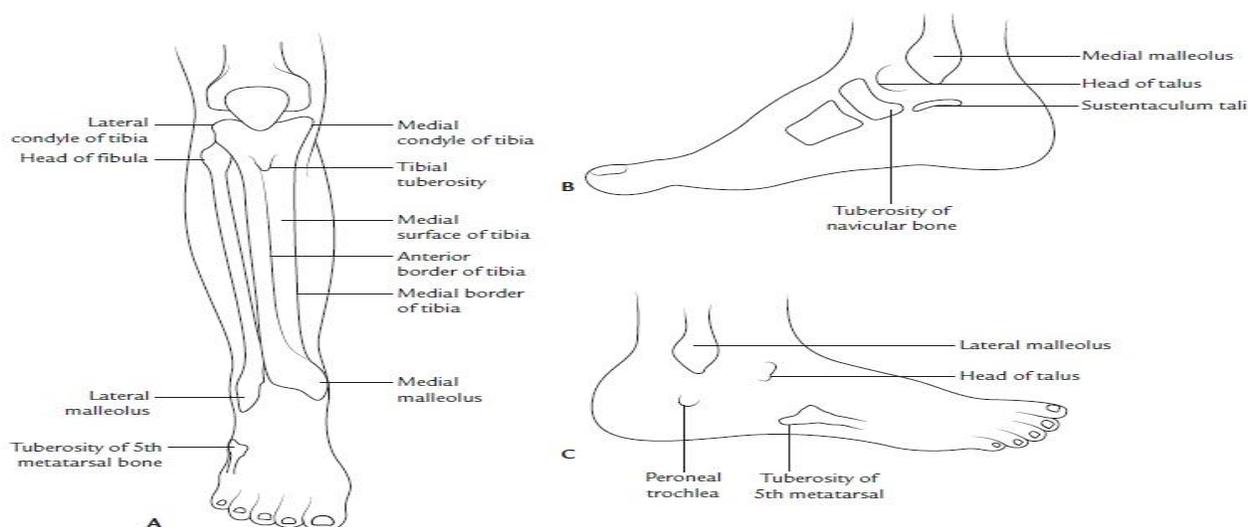
INTRODUCTION

The leg is part of the lower limb that lies between the knee and ankle. In general, the structure on the front of the leg extends on to the dorsum of the foot,

SURFACE LANDMARKS

BONY LANDMARKS

1. **Medial and lateral condyles of tibia.** These are visible and palpable landmarks at the sides of the ligamentum patellae. They are easily felt in a flexed knee with the thigh flexed and laterally rotated.
2. **Tibial tuberosity.** It is a bony prominence on the front of the upper part of tibia, 2.5 cm distal to the knee joint.
3. **Anterior border (shin) of the tibia.** It is distinct in most of its extent except in the lower part. It is easily felt as a sharp sinuously curved bony crest extending downward from the tibial tuberosity to the anterior margin of the medial malleolus.
4. **Head of the fibula.** It lies posterolaterally at the level of the tibial tuberosity. It serves as a guide to locate common peroneal nerve which winds around the posterolateral aspect of the neck of fibula where it can be rolled.
5. **Medial surface of tibia.** It is subcutaneous throughout except in the uppermost part where it provides attachment to the tendons of sartorius, gracilis, and semitendinosus. The great saphenous vein crosses the lower one-third of this surface, running obliquely upward and backward from the anterior border of medial malleolus.
6. **Medial malleolus.** It is the bony prominence on the medial side of the ankle.
7. **Lateral malleolus.** It is the bony prominence on the lateral side of the ankle. It is longer but narrower than the medial malleolus, and its tip lies about 0.5 cm below that of the medial malleolus and placed on a more posterior plane.
8. **Peroneal trochlea.** It may be felt as a little prominence about a finger breadth below the lateral malleolus.



9. **Sustentaculum tali.** It can be felt about a thumb breadth below the medial malleolus.

10. **Tuberosity of the navicular bone.** It is a bony prominence felt 1 to 1.5 inches anteroinferior to the medial malleolus. The head of the talus lies above the line joining the sustentaculum tali and tuberosity of the navicular bone.

11. **Tuberosity of the base of fifth metatarsal bone.** It is the most prominent landmark on the lateral border of the foot. It lies midway between the point of the heel and the root of the little toe.

SUPERFICIAL FASCIA

SUPERFICIAL VEINS

The superficial veins on the dorsum of the leg and foot are as under:

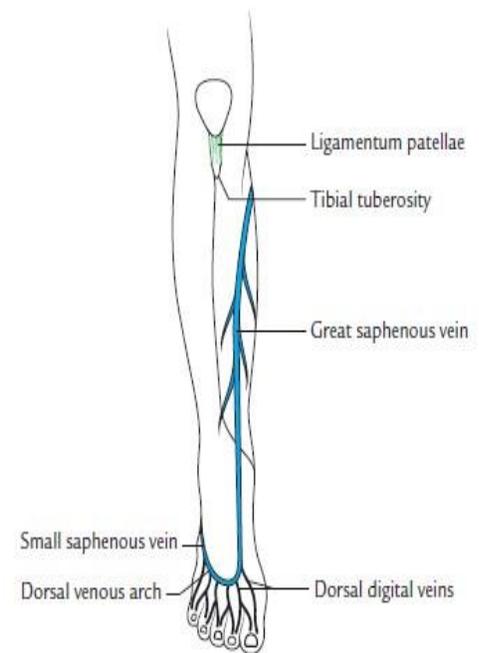
1. **Dorsal veins arch.** It lies on the dorsum of the foot over the proximal parts of the metatarsals.

2. **Dorsal digital veins.** There are two dorsal digital veins in each toe. Each joins the corresponding vein of the adjacent toe to form the dorsal metatarsal vein which terminates in the dorsal venous arch. The dorsal digital vein on the medial side of the big toe joins the medial end of the dorsal venous arch to form the great saphenous vein.

The dorsal digital vein on the lateral side of the little toe joins the lateral end of the dorsal venous arch to form the small (short) saphenous vein.

3. **Great saphenous vein.** It passes upward in front of the medial malleolus, crosses lower one-third of the medial surface of the tibia to reach the medial border of the tibia along which it ascends to reach the back of the knee. The saphenous nerve runs in front of the great saphenous vein.

4. **Small saphenous vein.** It passes upward behind the lateral malleolus to reach the back of the leg where sural nerve accompanies it.



CUTANEOUS NERVES

The cutaneous nerves on the front of leg and dorsum of the foot are as under:

1. **Infrapatellar branch of the saphenous nerve.** It pierces the deep fascia on the medial side of the knee, curves downward and forward to supply the skin over the ligamentum patellae.

2. **Saphenous nerve (L3, L4).** It pierces the deep fascia on the medial side of the knee between the sartorius and gracilis and runs downward in front of the great saphenous vein. It supplies skin on the medial side of the leg and medial border of the foot up to the ball of the big toe.

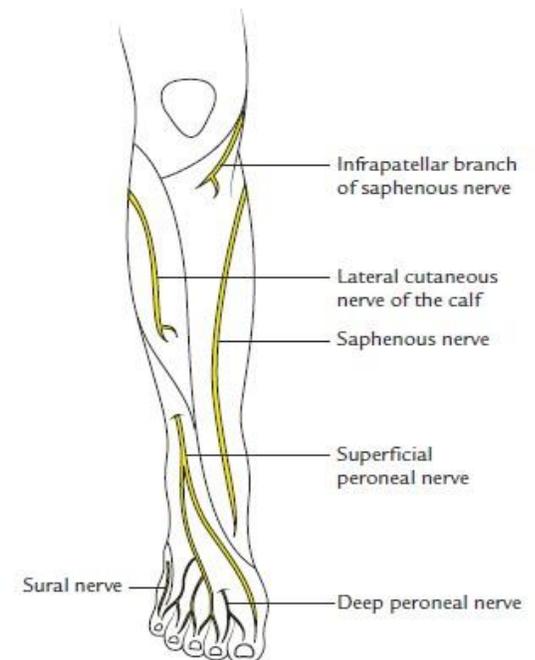
3. **Lateral cutaneous nerve of calf (L5; S1, S2).** It is a branch of the common peroneal nerve. It pierces the deep fascia over the lateral head of the gastrocnemius and then descends to supply the skin of the upper two-third of the leg laterally.

4. **Superficial peroneal nerve (L4, L5; S1)**: It arises from the common peroneal nerve on the lateral side of the neck of the fibula. It pierces the deep fascia at the junction of the upper two-third and lower one-third of the lateral side of the leg and divides into medial and lateral branches.

The superficial peroneal nerve supplies:

- (a) Skin over the lower one-third of the lateral side of the leg.
- (b) Whole of the skin on the dorsum of the foot except for:
 - (i) cleft between the first and second toes which is supplied by the deep peroneal nerve, (ii) lateral border of the foot which is supplied by sural nerve, and (iii) medial border of the foot up to the big toe which is supplied by the saphenous nerve.

5. **Digital branches of the medial and lateral plantar nerves** curve upward and supply the distal parts of the dorsal aspects of the toes.

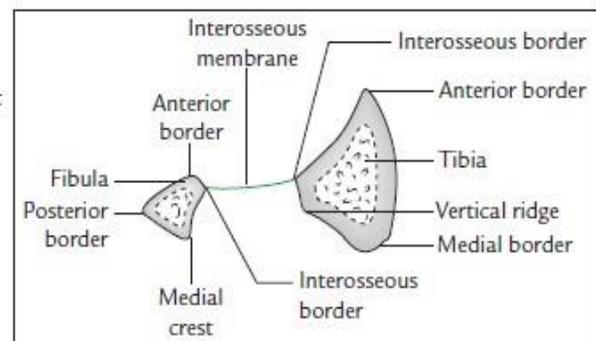
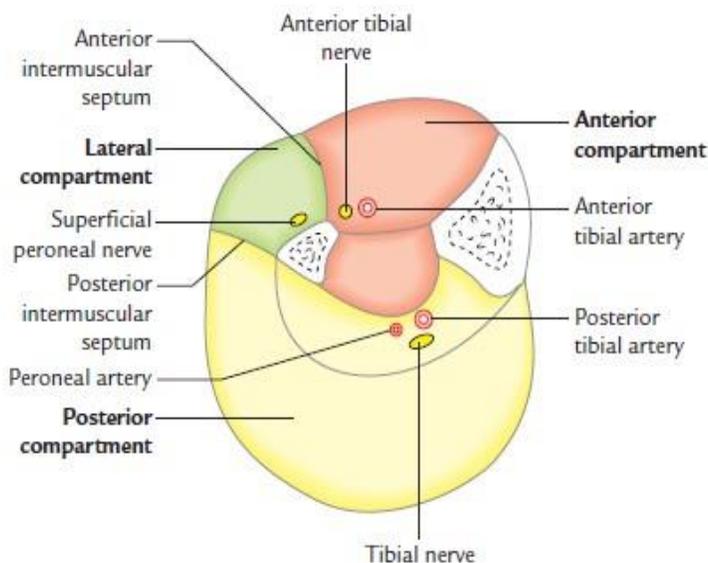


DEEP FASCIA OF THE LEG

The deep fascia of the leg is very strong and encloses the leg like a tight sleeve.

It does not cover the subcutaneous bony surfaces and is attached to their borders. In other words, it is fused with the periosteum where the bones are subcutaneous.

Two intermuscular septa, anterior and posterior, extend inward from the fascial sleeve and get attached to the anterior and posterior borders of the fibula. These together with interosseous membrane divide the leg into three fascial compartments each having its own muscles, arteries and nerves: anterior, lateral, and posterior. In the posterior compartment, the muscles are divided into three layers by the superficial and deep transverse



fascial septa. The deep fascia is thick in the upper and lower parts of the leg. In the upper part, it gives origin to the underlying muscles. Whereas in the lower part, it forms large thick fibrous bands called retinacula around the ankle.

ANTERIOR (EXTENSOR) COMPARTMENT OF THE LEG

BOUNDARIES

Anterior: Deep fascia of the leg.

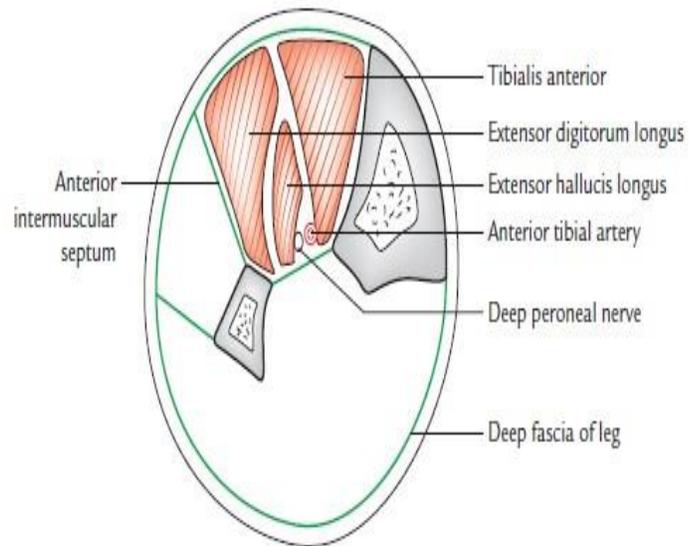
Medial: Lateral surface of the shaft of the tibia.

Lateral: Anterior intermuscular septum.

Posterior: Interosseous membrane.

CONTENTS

- **Muscles:** Four muscles (tibialis anterior, extensor hallucis longus, extensor digitorum longus, and peroneus tertius).
- **Artery:** Anterior tibial artery.
- **Nerve:** Deep peroneal nerve (anterior tibial nerve).



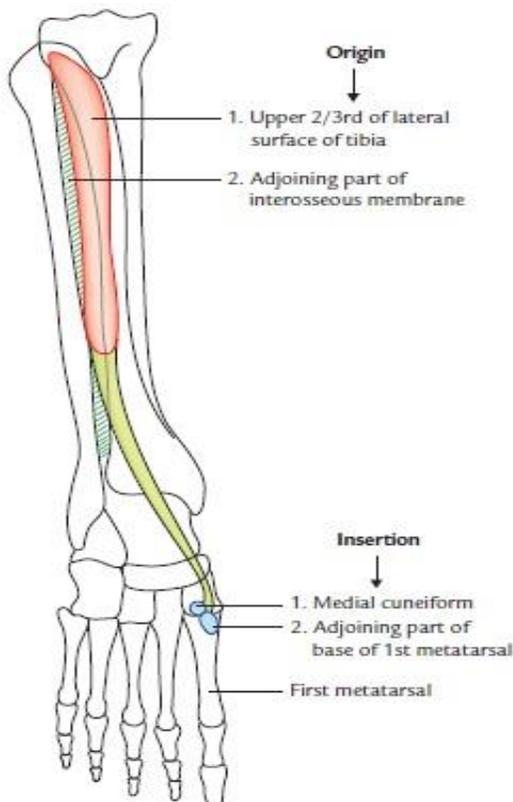
MUSCLES OF THE ANTERIOR COMPARTMENT OF THE LEG

All the muscles of the anterior compartment of the leg arise from the fibula except the tibialis anterior which arises from the tibia. All of them are supplied by the deep peroneal nerve and dorsiflex the foot at the ankle. The tibialis anterior being the chief muscle of the anterior compartment.

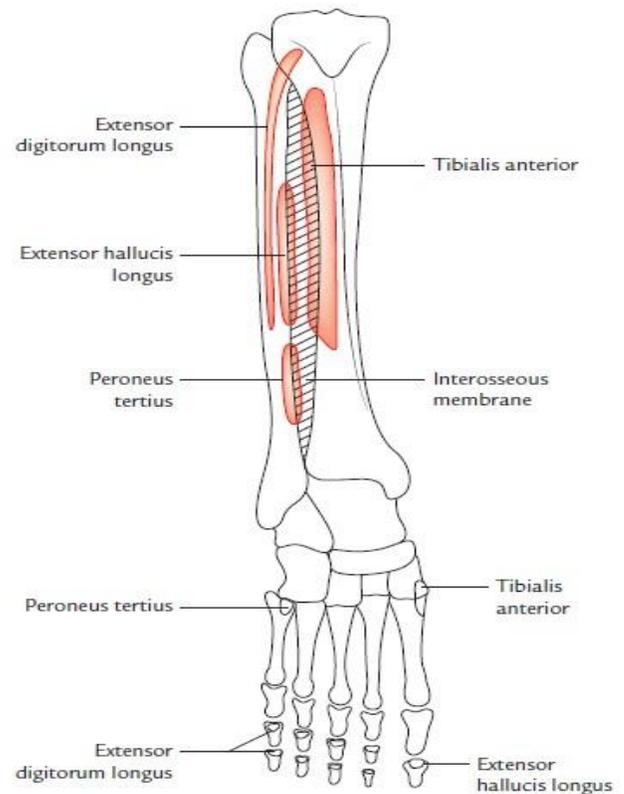
Clinical correlation.

Anterior tibial compartment syndrome/shin splints (Fresher's syndrome): It occurs due to overexertion of the muscles of the anterior compartment especially when the untrained persons who lead a sedentary life are asked to walk or run for long distances. Shin splints also occur in trained runners who do not warm-up.

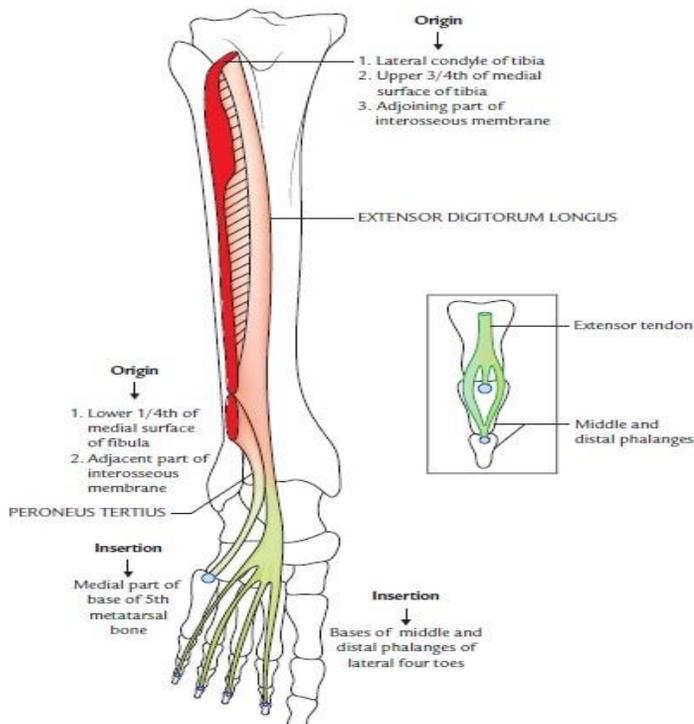
Muscles of the compartment swell within a tight compartment due to sudden overuse which reduce the blood supply to the muscles, leading to ischemia and pain. It is frequently seen in freshers (e.g., newly admitted medical students/newly recruited army personnel) who are made to run excessively. Hence, this condition is also referred to as army fresher's syndrome.



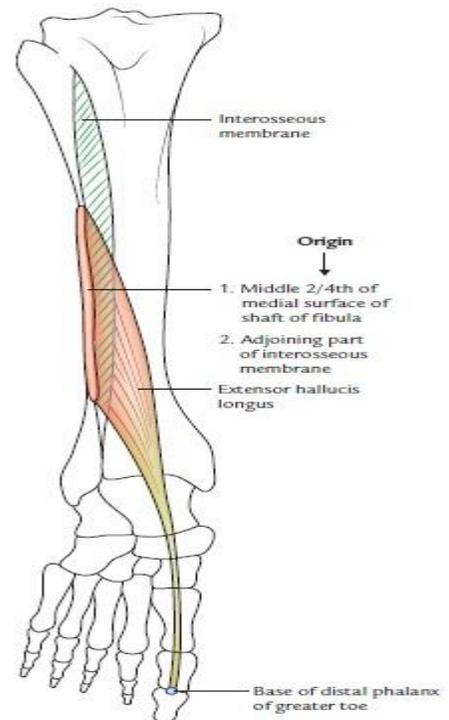
Origin and insertion of the tibialis anterior



Origin (red color) and insertion (blue color) of the muscles of the anterior compartment of leg.



Origin and insertion of the extensor digitorum longus and peroneus tertius muscles. Figure in the inset shows the detailed mode of insertion of extensor tendon.



Origin and insertion of the extensor hallucis longus.

MUSCLES OF THE ANTERIOR (EXTENSOR) COMPARTMENT OF THE LEG			
Muscle	Origin	Insertion	Action
Tibialis anterior	Upper ½ of the lateral surface of the tibia & the interosseous membrane	Medial cuneiform & the first metatarsal base	Ankle dorsiflexion Subtalar inversion Suspends the medial longitudinal arch of the foot
Extensor hallucis longus	Middle 2/4 of the fibular shaft	Base of the distal phalanx of the big toe	Ankle dorsiflexion Subtalar inversion Big toe extension
Extensor digitorum longus	Upper 3/4 of the fibular shaft	Extensor expansion of the lateral 4 toes	Ankle dorsiflexion Extension of the lateral 4 toes
Peroneus tertius	Distal 1/4 of the fibular shaft	5th metatarsal base	Ankle dorsiflexion Subtalar eversion
Extensor digitorum brevis	Anterior part of the upper surface of the calcaneum & the inferior extensor retinaculum	Extensor expansions of the medial 4 toes	Extension of the medial 4 toes

□ All the muscles of the anterior compartment of the leg are supplied by the **deep peroneal nerve**.

□ In addition to being a dorsal flexor and inverter of the foot, the tibialis anterior helps to balance the tibia and the talus on other tarsal bones so that the leg is kept vertical when walking on uneven ground.

□ As the tendons of extensor hallucis longus and extensor digitorum longus approach the metatarsophalangeal joints, each joins an **extensor expansion** on the dorsal surface of the phalanges. The central part continues on the dorsal surface of the proximal phalanx where it is joined by the greater part of the tendons of extensor digitorum brevis to be both inserted to the base of the middle phalanx. The peripheral parts of the expansion extend to be inserted to the base of the distal phalanx and usually receive delicate strands from the lumbricals and interossei.

□ **Extensor digitorum brevis** lies on the dorsum of the foot and causes the fleshy bulge at that area. Its most medial tendon, inserted to the big toe, is sometimes referred to as an individual muscle called **extensor hallucis brevis**.

ANTERIOR TIBIAL ARTERY

The anterior tibial artery is the main artery of the anterior compartment of the leg. It corresponds to the posterior interosseous artery of the forearm. The blood supply to the anterior compartment of the leg is reinforced by the perforating branch of peroneal artery. Therefore, the size of peroneal artery is inversely proportional to that of the anterior tibial artery.

The anterior tibial artery is accompanied by two venae comitantes.

Origin

Anterior tibial artery is the smaller terminal branch of popliteal artery given at the lower border of popliteus muscle.

Course

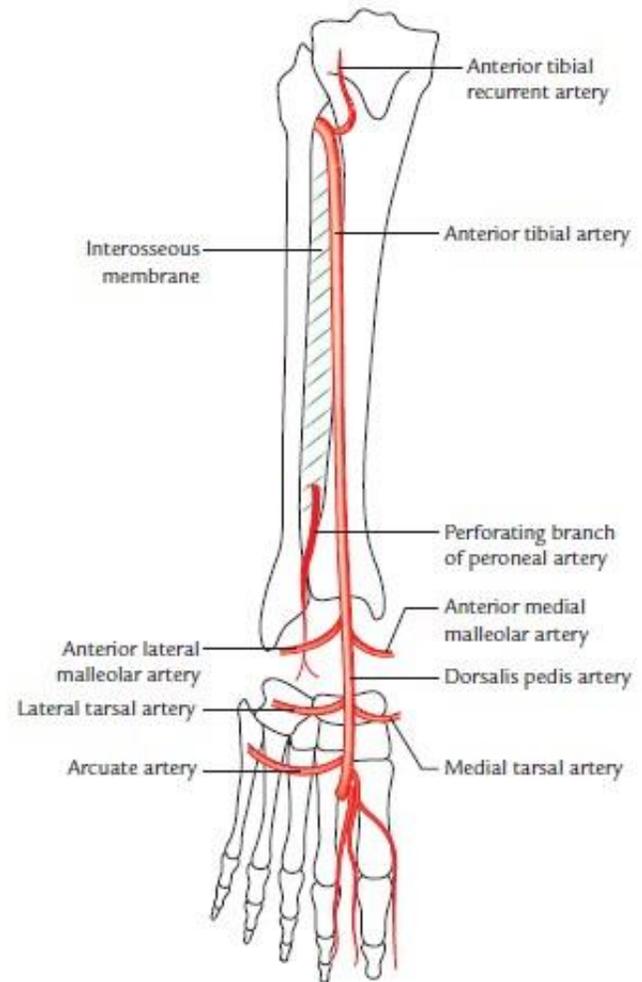
1. It begins in the back of the leg at the lower border of popliteus.
2. It enters the anterior compartment of the leg by passing forward between the two heads of the tibialis posterior, through an opening in the upper part of the interosseous membrane. In the anterior compartment, it runs vertically downward to a point midway between the medial and lateral malleoli, where it enters the foot and changing its name to **dorsalis pedis artery**, which ends near the web between the big and second toes.

Relations

- In the upper one-third of the leg it lies between the tibialis anterior and extensor digitorum longus.
- In the middle one-third of the leg it lies between the tibialis anterior and extensor hallucis longus.
- In the lower one-third of the leg it lies between extensor hallucis longus and extensor digitorum longus. It is crossed from the lateral to medial side by the tendon of extensor hallucis longus. As a result, the deep peroneal nerve lies lateral to it in its upper one-third and lower one-third, and anterior to it in its middle one-third.

Branches

1. Anterior and posterior tibial recurrent arteries. They take part in the arterial anastomosis around the knee joint.
2. Muscular branches to adjacent muscles.
3. Anterior medial and anterior lateral malleolar arteries. They take part in the anastomosis around the ankle joint.



The dorsalis pedis artery

Course and relations

This artery begins midway between the two malleoli as the continuation of the anterior tibial artery and runs anteroinferiorly with the deep peroneal nerve, deep to the inferior extensor retinaculum and the tendon of extensor hallucis brevis. At the proximal part of the first intermetatarsal space or just above it, it gives off the arcuate artery and continues as the first dorsal metatarsal artery.

In 10% of individuals, the anterior tibial artery fails to grow more than a short distance down the leg. In this case, the dorsalis pedis artery arises from the peroneal artery or its perforating branch.

The dorsalis pedis is crossed anteriorly by the inferior extensor retinaculum, tendon of extensor hallucis brevis and is covered with skin and fascia. Posteriorly, it is related by the tarsal bones against which it is palpated. Medially is the extensor hallucis longus tendon and laterally is the terminal part of the deep peroneal nerve and the tendon of extensor digitorum longus.

DEEP PERONEAL NERVE (ANTERIOR TIBIAL NERVE)

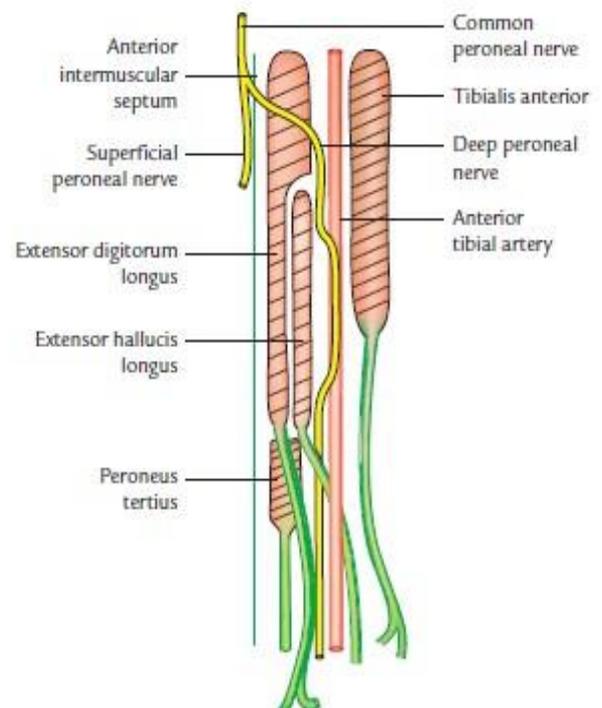
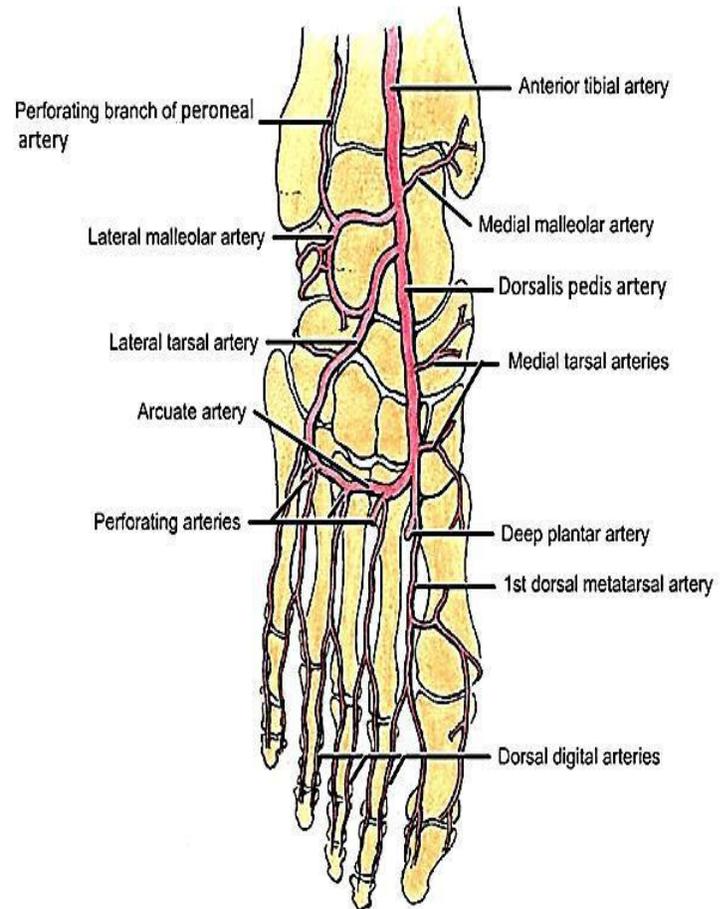
It is the nerve of anterior compartment of the leg and dorsum of the foot. It corresponds to the posterior interosseous nerve of the forearm.

Origin

It is one of the two terminal branches of the common peroneal nerve at the neck of the fibula.

Course and Relations

- It begins on the lateral side of the neck of fibula, under cover of the upper fibers of peroneus longus muscle.
- It enters the anterior compartment of the leg by piercing the anterior intermuscular septum. It pierces extensor digitorum longus and descends in this compartment with the anterior tibial artery.



In the leg, it accompanies the anterior tibial artery. The nerve lies lateral to artery in its upper one-third and lower one-third and anterior to artery in the middle one-third.

It is said that in the middle one-third the nerve hesitates to cross the artery from lateral to medial side, so it goes back to the lateral side of the artery. Hence, deep peroneal nerve is also referred to as **nervus hesitans**.

• The nerve ends in front of the ankle by dividing into the lateral and medial terminal branches.

The lateral terminal branch runs laterally and ends in a pseudoganglion deep to the extensor digitorum brevis. Branches from the pseudoganglion supply the extensor digitorum brevis and tarsal and metatarsal joints on the lateral side of the foot.

The medial terminal branch runs forward and ends by supplying the skin of the adjacent sides of big and second toes (first interdigital cleft) and the first dorsal interosseous muscle.

Branches

1. Muscular branch supplies all the four muscles of the anterior compartment of the leg. Muscle on the dorsum of the foot—the extensor digitorum brevis and first dorsal interosseous muscles of the sole of the foot.

2. Cutaneous branch supplies the skin of the first interdigital cleft.

N.B.

Variations of the anterior tibial artery. The anterior tibial artery may fail to grow more than a short way down the leg. In such cases, the dorsalis pedis artery arises from the perforating branch of the peroneal artery or perforating branch of the posterior tibial artery.

◆ LATERAL SIDE OF THE LEG ◆

INTRODUCTION

The lateral side of the leg deals with the lateral fascial compartment of the leg and its contents.

LATERAL COMPARTMENT OF THE LEG

BOUNDARIES

The lateral compartment of the leg is bounded.

Anteriorly: By the anterior intermuscular septum.

Posteriorly: By the posterior intermuscular septum.

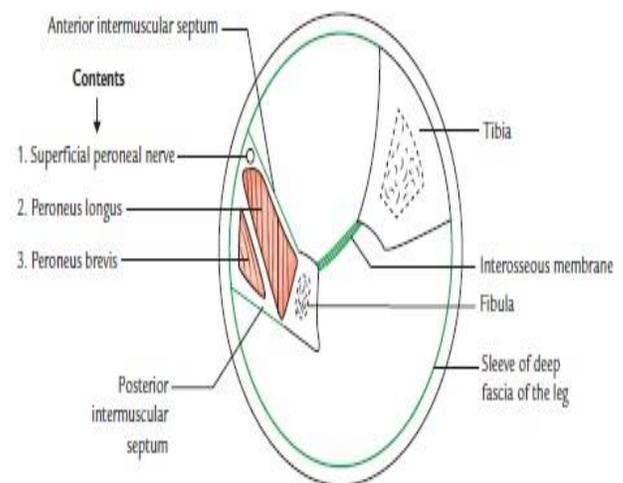
Medially: By the lateral surface of the fibula.

Laterally: By the deep fascia of the leg.

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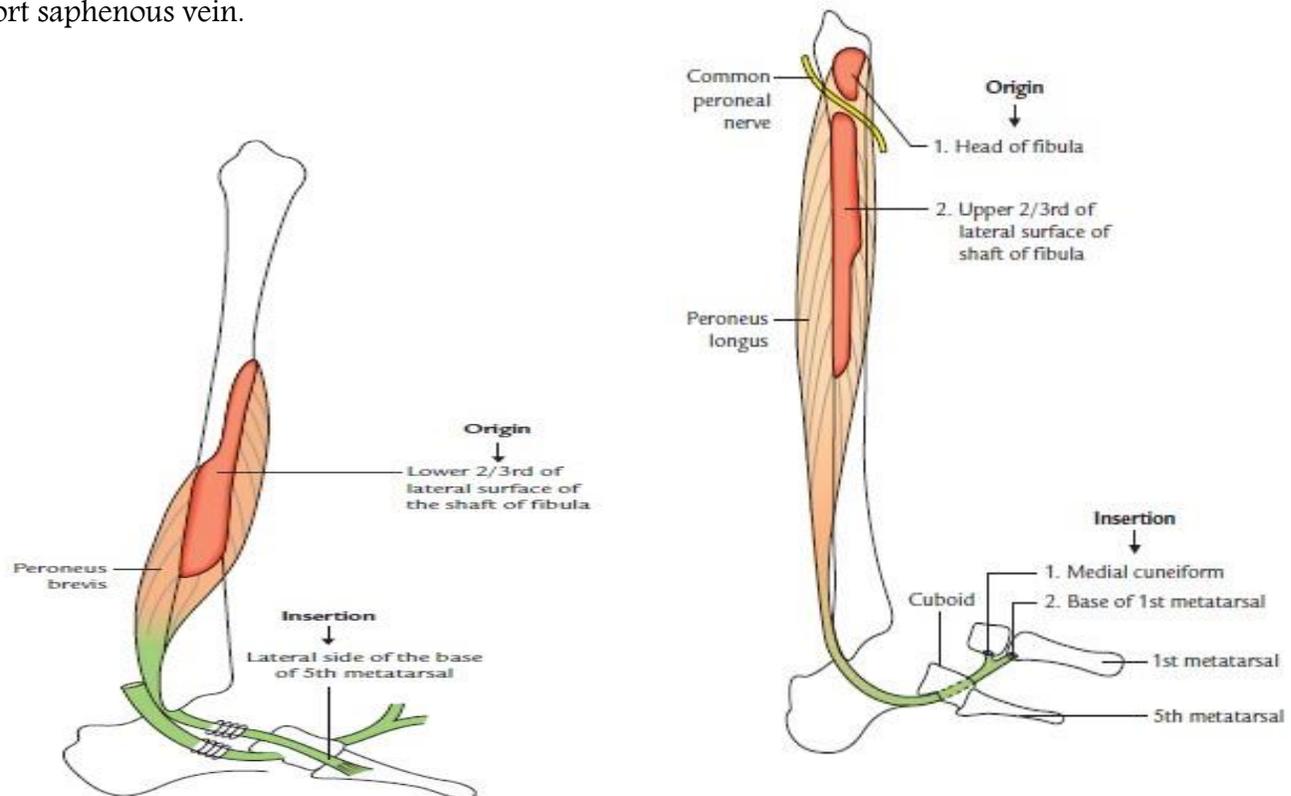
The contents of the lateral compartment are as follows:

1. **Muscles.** Peroneus longus and peroneus brevis.
2. **Nerve.** Superficial peroneal nerve.



3. **Artery.** The lateral compartment of the leg does not have its own artery. Its contents are supplied by the **peroneal branch of the posterior tibial artery**

4. **Veins.** The small unnamed veins mostly drain into the short saphenous vein.



MUSCLES OF THE LATERAL (PERONEAL) COMPARTMENT OF THE LEG

Muscle	Origin	Insertion	Action
Peroneus longus	Upper 2/3 of the lateral surface of the fibular shaft	Plantar surface of the medial cuneiform & the first metatarsal base	Ankle plantar flexion Subtalar eversion Suspends the transverse arch of the foot
Peroneus brevis	Lower 2/3 of the lateral surface of the fibular shaft	5th metatarsal base	Ankle plantar flexion Subtalar eversion

□ Both muscles are supplied by the **superficial peroneal nerve**.

□ The tendon of peroneus longus crosses inferior to the tendon of peroneus brevis on the lateral surface of the calcaneum and cuboid to reach the 5th metatarsal base where it grooves and curves below the cuboid and runs obliquely across the sole to reach its point of insertion.

SUPERFICIAL PERONEAL NERVE (MUSCULOCUTANEOUS NERVE OF THE LEG)

It is the nerve of the lateral compartment of the leg.

ORIGIN

It is one of the two terminal branches of the common peroneal nerve given at the neck of the fibula. It arises in the substance of peroneus longus on the lateral side of the neck of fibula.

COURSE AND RELATIONS

It begins on the lateral side of the neck of fibula descends for a short distance between the peroneus longus and peroneus brevis, and then in a groove between the peroneus brevis and extensor digitorum longus. At the junction of the upper two-third and lower one-third of the leg, it pierces deep fascia, and soon divides into a medial and a lateral terminal branches which reach the dorsum of the foot.

BRANCHES AND DISTRIBUTION

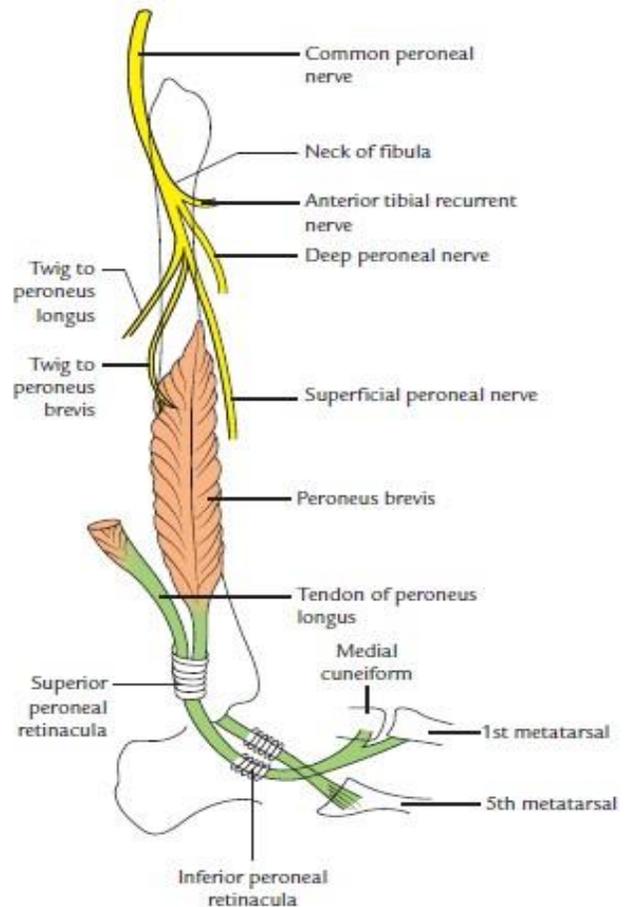
1. **Muscular branches** to peroneus longus and peroneus brevis.
2. **Cutaneous branches** supply the skin of the lower one third of the lateral side of the leg and dorsum of

the foot, except for the territories supplied by the saphenous, sural, and deep peroneal nerves. The medial terminal branch of the superficial peroneal nerve crosses the ankle and divides into two dorsal digital nerves, one for the medial side of the big toe and the other for the second interdigital cleft.

The lateral terminal branch of the superficial peroneal nerve also divides into two dorsal digital nerves for the third and fourth interdigital clefts.

N.B.

The distribution of the superficial peroneal nerve corresponds to the distribution of radial nerve in the forearm.



MEDIAL SIDE OF THE LEG

The medial side of the leg consists of the medial surface of the tibia. The greater part of this surface is subcutaneous except for a small upper part, which provides the attachment to tibial collateral ligament and tendons of sartorius, gracilis, and semitendinosus. All these structures covered by the deep fascia. The great saphenous vein and the saphenous nerve lie in the superficial fascia as they cross the lower one-third of this surface.

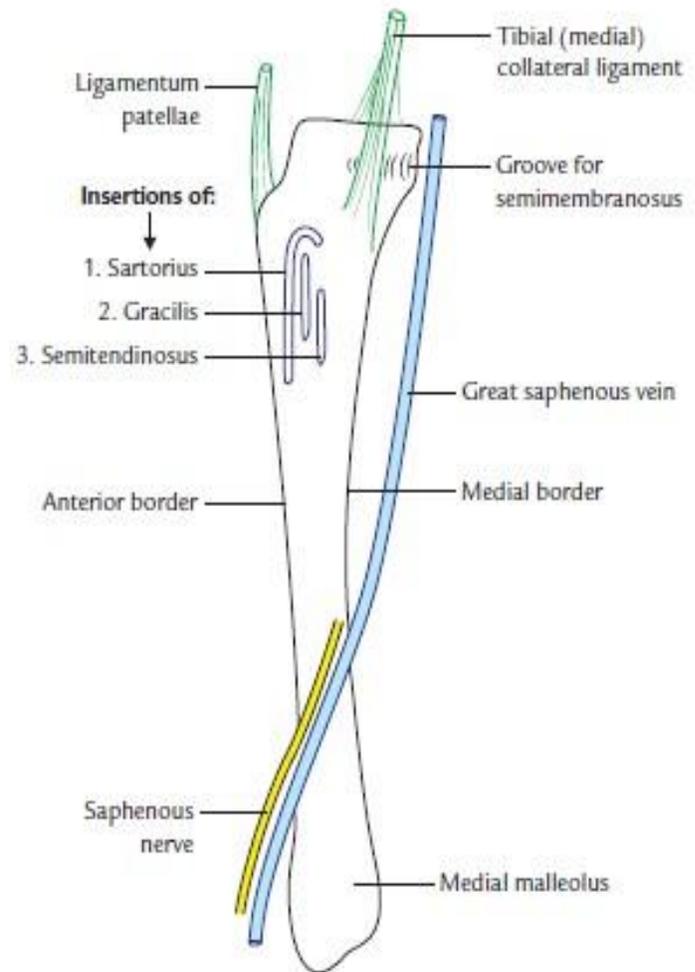
1. **Saphenous nerve.** It supplies the skin, fasciae, and periosteum on this surface.

2. **Tibial collateral ligament.** Morphologically, it represents degenerated part of the tendon of hamstring part of adductor magnus. It partly covers the insertion of semimembranosus and is itself crossed superficially by the tendons of sartorius, gracilis, and semitendinosus.

3. **Tendons of sartorius, gracilis, and semitendinosus.** The three muscles inserted into the upper part of the medial surface of the tibia represent one muscle from each of the three compartments of the thigh. Sartorius belongs to the anterior compartment of the thigh and is supplied by the nerve of that compartment—femoral nerve; gracilis belongs to the medial compartment of the thigh and is supplied by the nerve of that compartment—obturator nerve; and semitendinosus belongs to the posterior compartment of the thigh and is supplied by the nerve of that compartment—sciatic nerve.

4. **Bursa anserinus.** It is a large complicated synovial bursa with several diverticula present on the upper part of the medial surface of the tibia. It not only separates the tendons of sartorius, gracilis, and semitendinosus from each other near their insertion but also from the tibial collateral ligament.

5. **Great saphenous vein and saphenous nerve.** The great saphenous vein ascends in front of the medial malleolus and crosses lower one-third of the medial surface of the tibia obliquely with a backward inclination. The saphenous nerve runs downward immediately in front of the great saphenous vein.



Repeated trauma on the upper part of the medial aspect causes inflammation of bursa anserinus (**anserine bursitis**) which causes pain and swelling at this site.