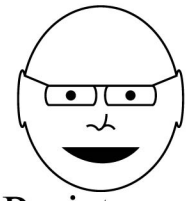


Peristence & Creativity

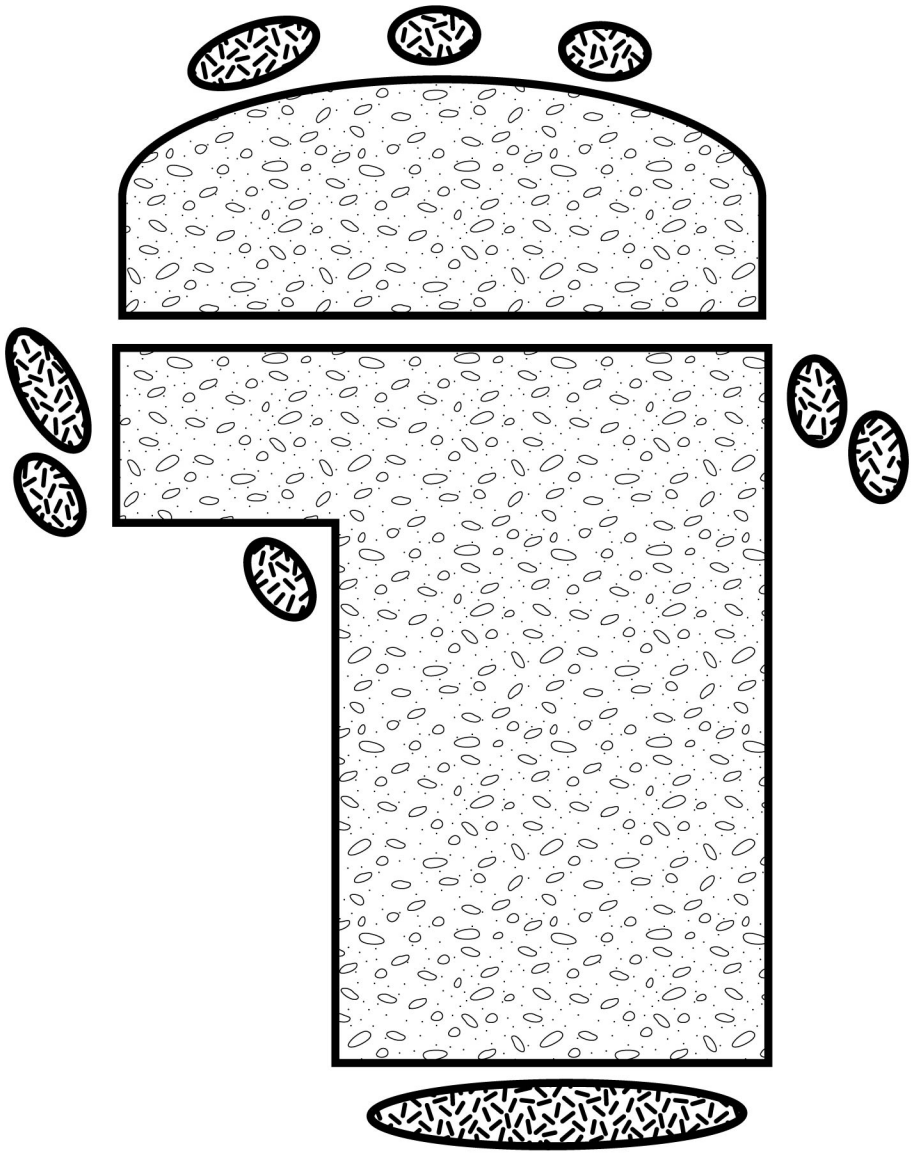
# Anatomy Comics, Objectives 3.2, 3.3 and 3.4

Simple Comix

3.2 Identify the muscles and nerves (cutaneous and motor) of the anterior and lateral fascial compartments of the leg and the intrinsic muscles of the dorsal aspect of the foot. Demonstrate the actions of the muscles. Be prepared to predict the cutaneous and motor deficits that may result from damage to any of the nerves innervating these regions.

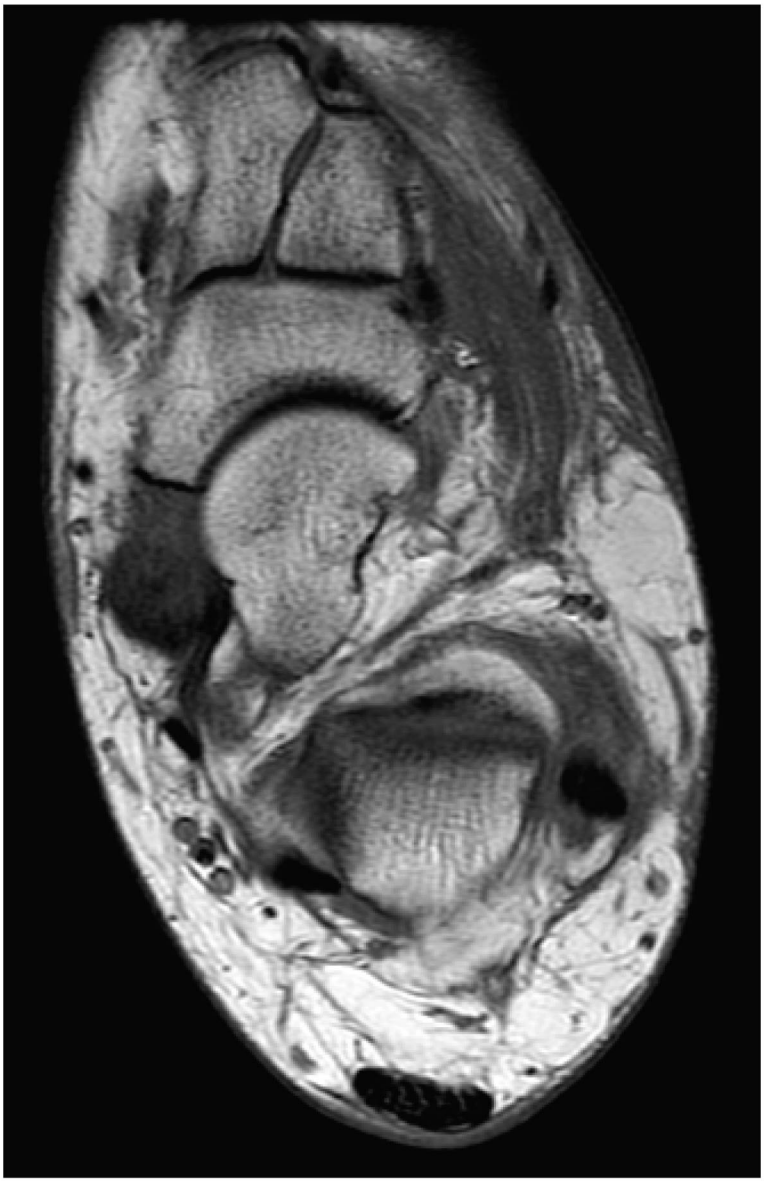
3.3 Identify the longitudinal and transverse arches of the foot, and their major sources of support (bony, ligamentous, and musculotendinous).

3.4 Identify the muscles and nerves (cutaneous and motor) of the posterior fascial compartments of the leg and intrinsic muscles of the plantar aspect of the foot. Demonstrate the actions of the muscles and be prepared to predict the cutaneous and motor deficits that may result from damage to any of the nerves innervating these regions.

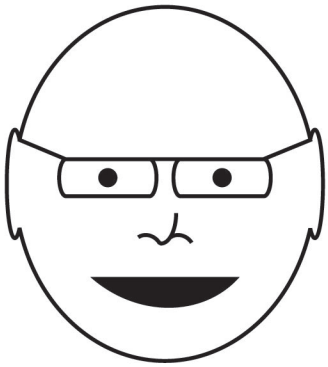


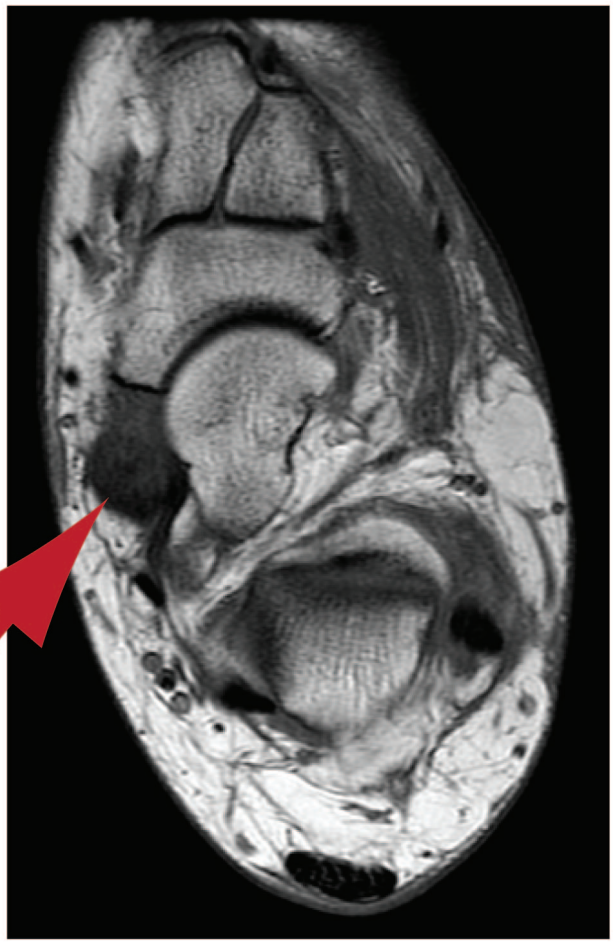
1. A 60 year old woman presents with chronic foot pain and the coronal ankle MRI shown below. Which tendon is abnormal?
A. Anterior tibial
B. Posterior tibial
C. Flexor digitorum longus
D. Extensor digitorum longus

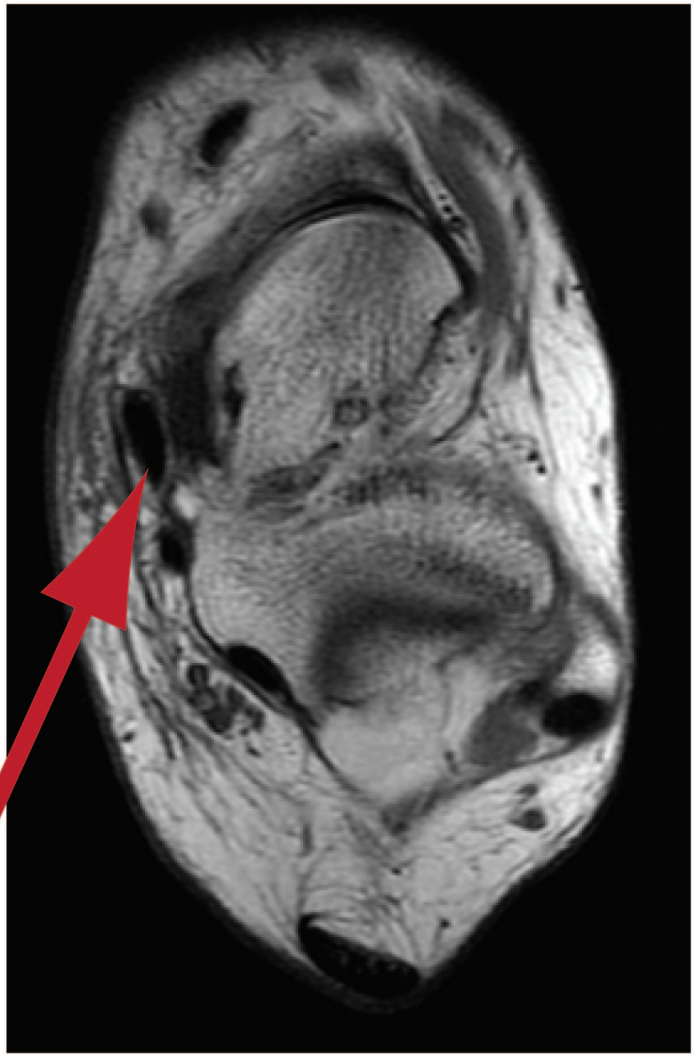
2. What type of foot deformity might be present?
A. Hallux valgus
B. Hallux varus
C. Elevated arch
D. Flat foot



The posterior tibial tendon is torn (arrow). Check out the visible human and the MRI image below for what a normal posterior tibial tendon looks like (arrows). On MRI images, normal tendons are black and well defined.







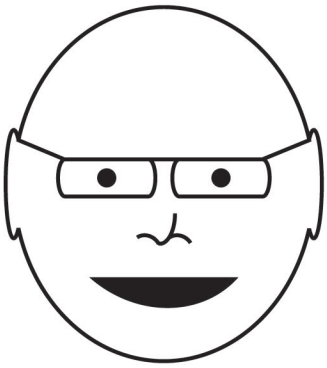
When the posterior tibial tendon tears, one of the supports for the arch of the foot is damaged, and a flat foot often results.

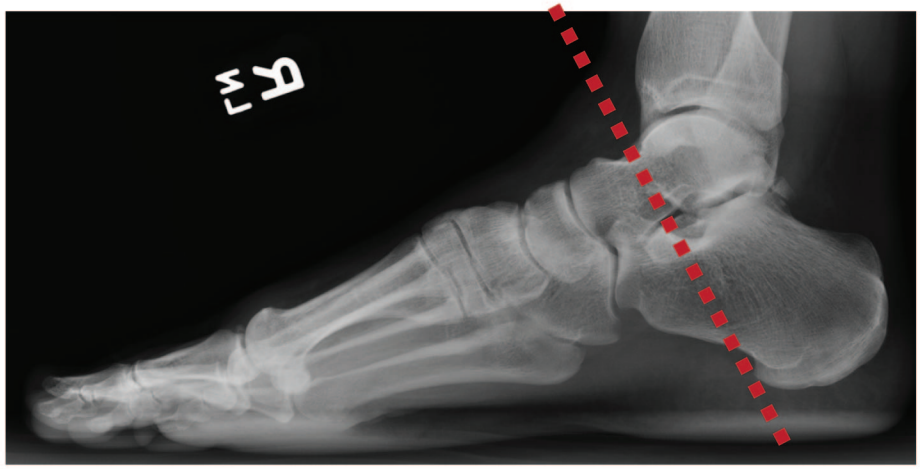
# Flat Foot

From Wikipedia: Drvgaikwad

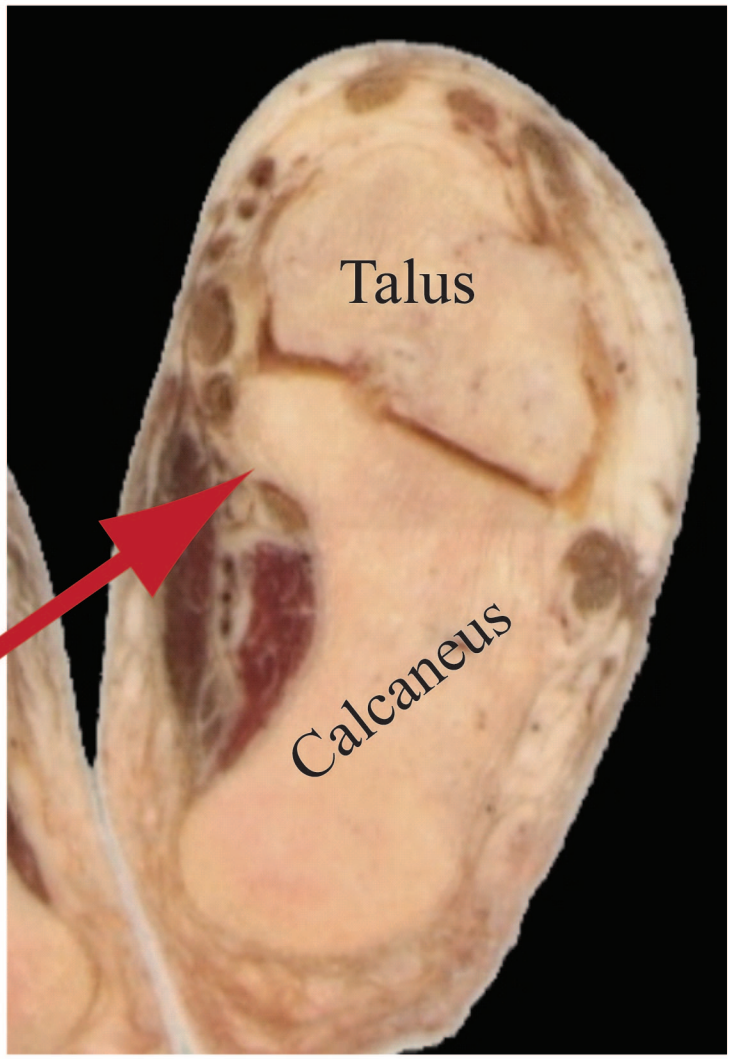
From Radiopaedia: Dr. Maulik Patel

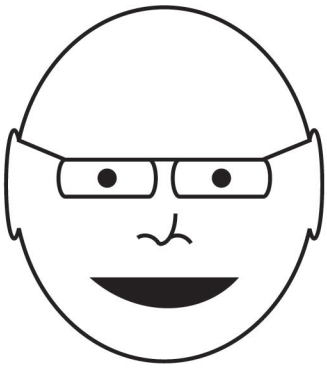
Let's draw the tendons around the ankle, that will help us learn them. While we are at it, we can also learn the arteries, nerves, actions and a whole bunch of other stuff. We'll start with two bones in cross section: the talus and calcaneus. To get us oriented, look at the image at right that shows the plane of section, using the dashed red line.





The resulting cross sectional image is shown here, I hope it looks familiar. I have labeled the talus and calcaneus. The arrow points to a shelf of bone arising from the medial calcaneus called the sustentaculum tali (ST). When you find the ST, you know that you are medial.





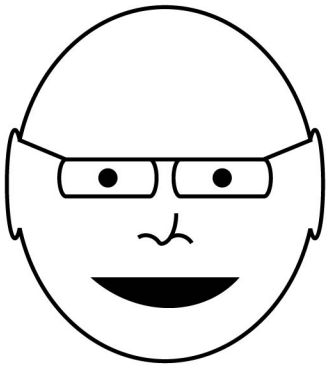
All right, let's start drawing, first the talus and calcaneus to give us a framework. Remember, that the talus is superior to the calcaneus and that the sustentaculum tali is located medially, so you should be able to get oriented.

Talus

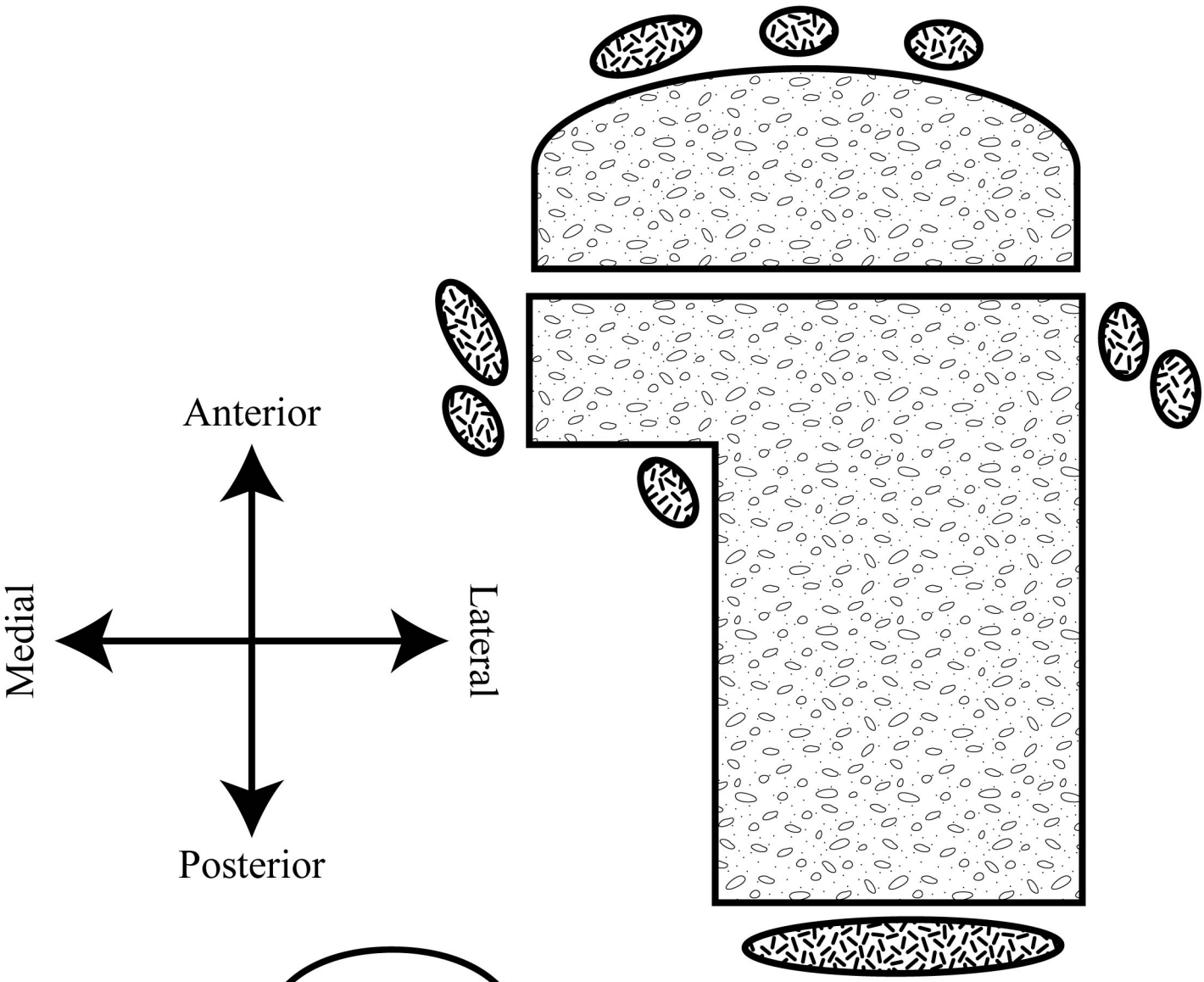
Calcaneus

Sustentaculum Tali

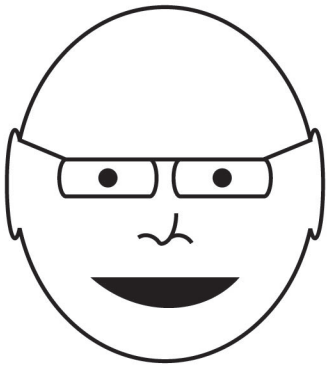
You heard the man, get busy drawing!!



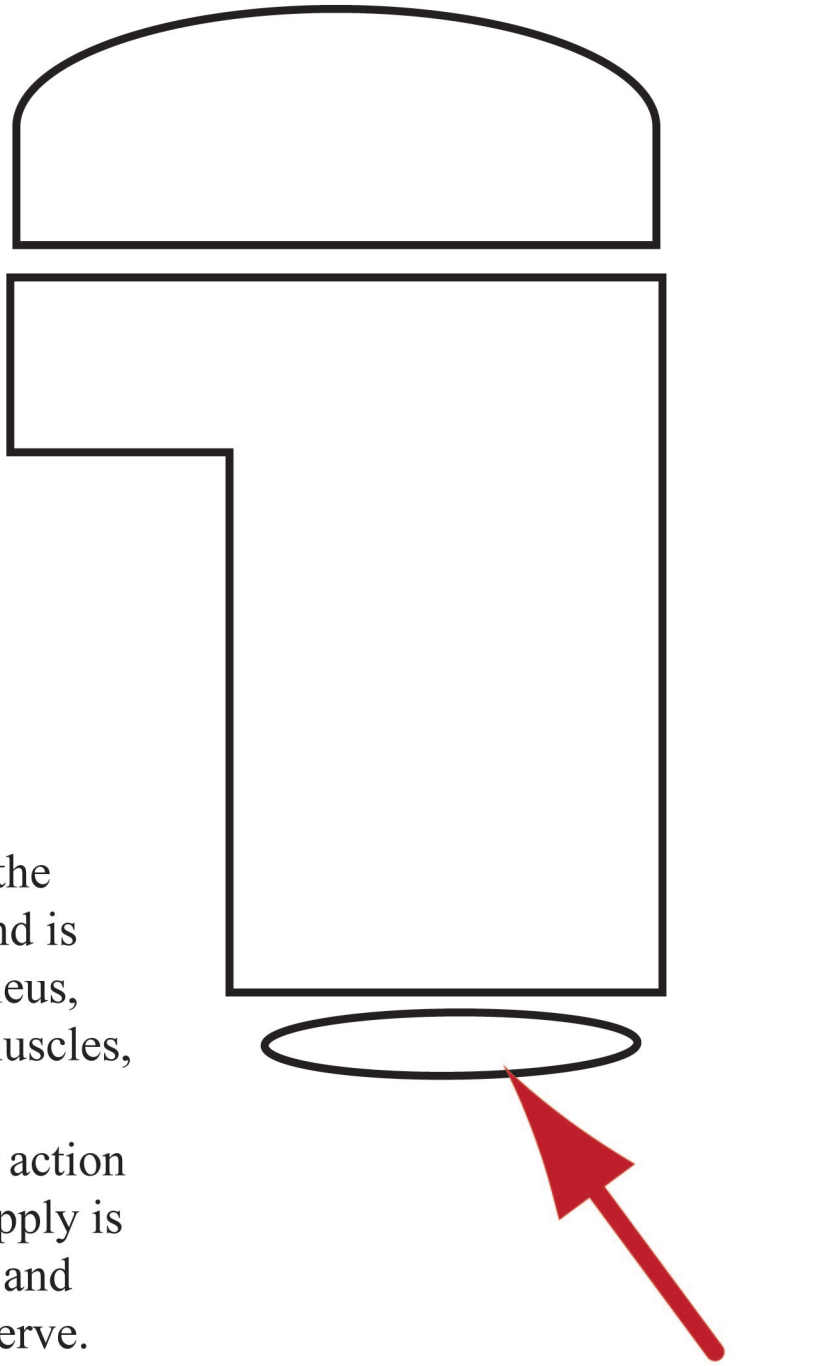
Before we go on, let's take a look at the final distribution of tendons around the ankle. How many groups are there?



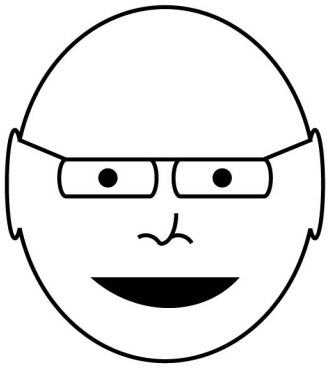

Looks like four; anterior, posterior, medial and lateral.



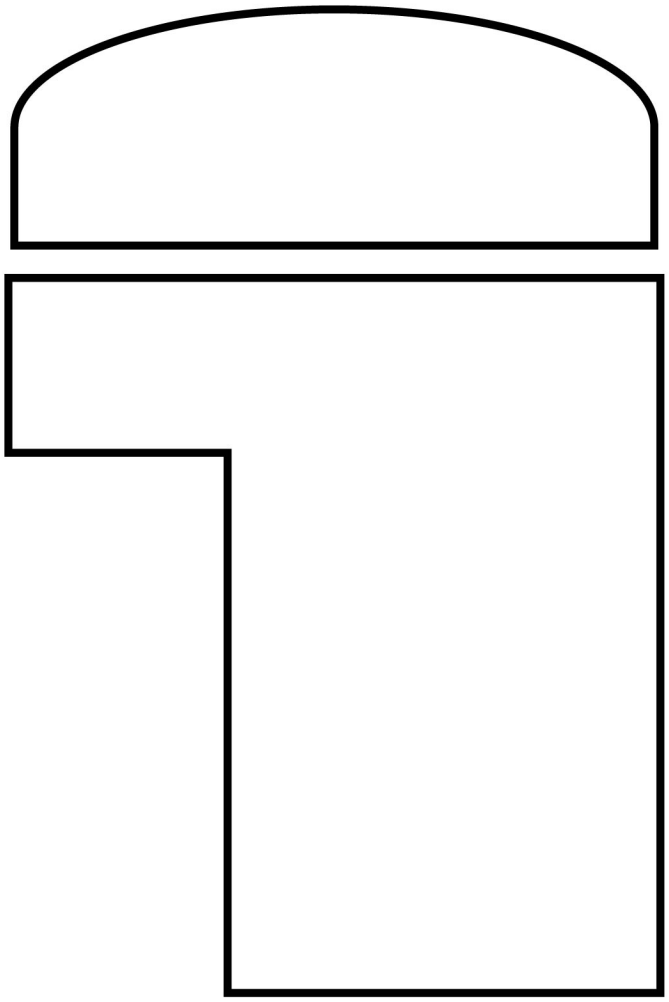
Alright, let's start with the posterior tendon group, go ahead and add it to the picture. Tell me the name of the tendon, the muscles that contribute to the tendon, where the muscles are located in the calf, their actions, innervation and vascular supply.




The posterior tendon is called the calcaneal or Achilles tendon and is the conjoined tendon of the soleus, gastrocnemeus and plantaris muscles, all in the superficial posterior compartment of the calf. Their action is plantar flexion, the blood supply is from the posterior tibial artery and innervation is from the tibial nerve.



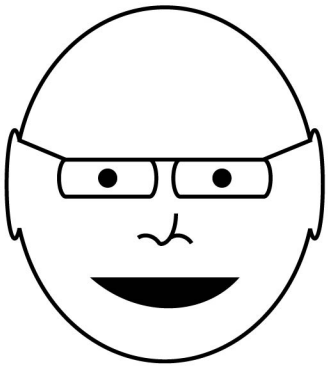
We are 1/4 of the way there! Now we'll look at the lateral tendon group, go ahead and add it to the picture. Tell me the names of the tendons/muscles, where the muscles are located in the calf, their actions, innervation and vascular supply.



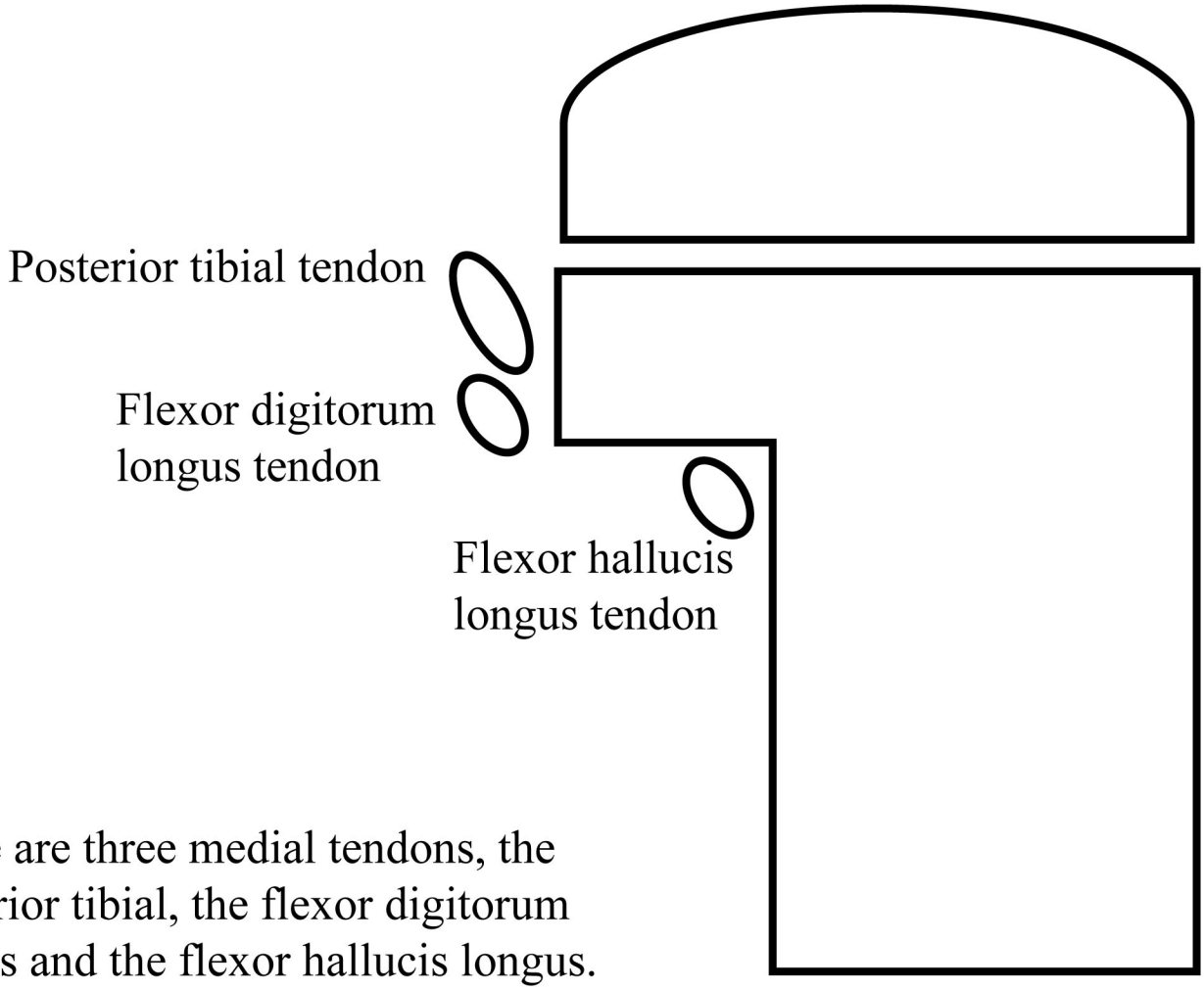
Fibularis brevis tendon

Fibularis longus tendon

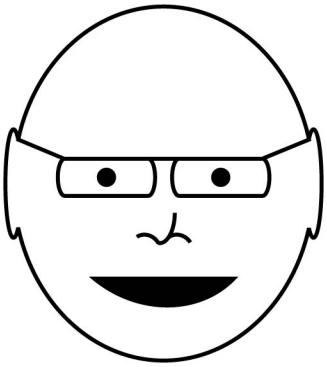
There are two lateral tendons, the fibularis brevis and longus. Both are in the lateral compartment of the calf. Their action is eversion, the blood supply is from the fibular artery and innervation is from the superficial fibular nerve.



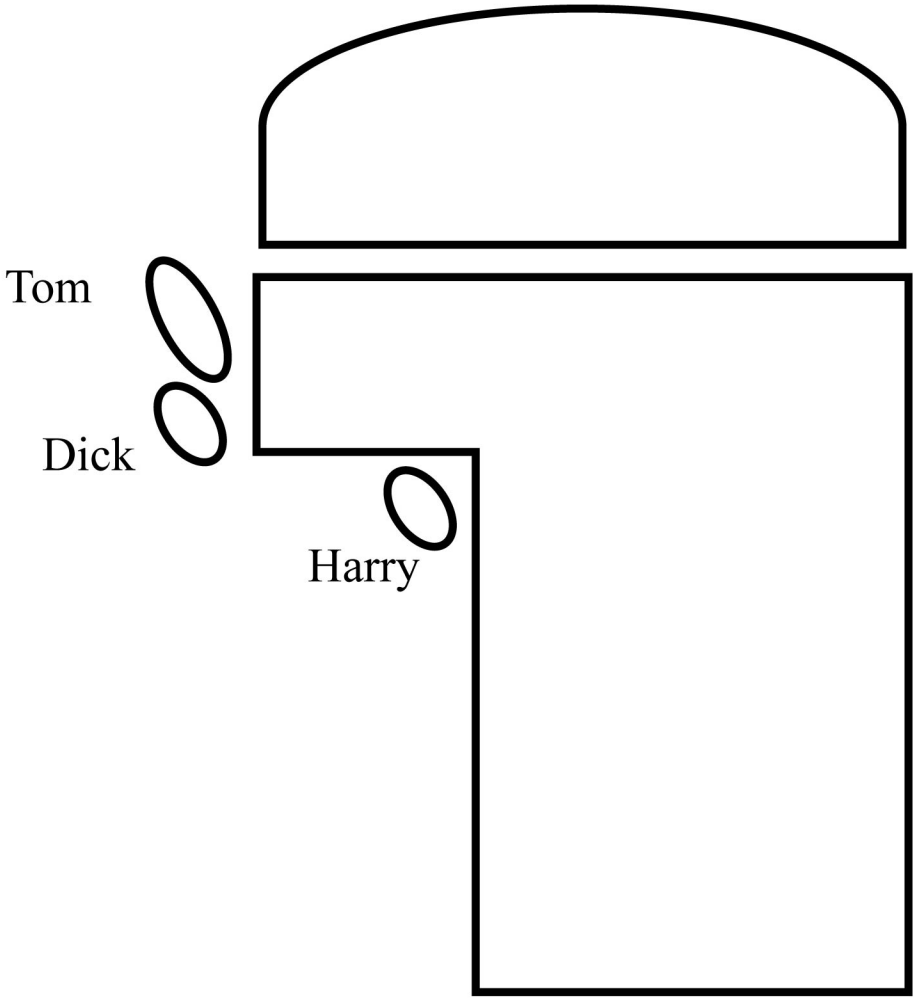
We are 1/2 way there! Now we'll look at the medial tendon group, go ahead and add it to the picture. Tell me the names of the tendons/muscles, where the muscles are located in the calf, their actions, innervation and vascular supply.



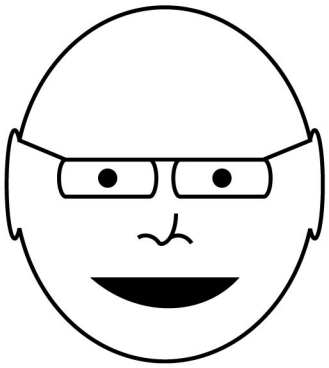

There are three medial tendons, the posterior tibial, the flexor digitorum longus and the flexor hallucis longus. All three are in the deep posterior compartment of the calf. Their action is inversion, two of them also flex, I'll let you guess which ones do that. The blood supply is from the posterior tibial artery and innervation is from the tibial nerve.



OK, now things are getting complex, let's see if we can make things a little easier by coming up with some nicknames for posterior tib, flexor dig and flexor hal. We'll go with the following: posterior tib=Tom, flexor dig=Dick and flexor hal=Harry, so we have from top to bottom, Tom, Dick and Harry!




Look where Harry (flexor hal) lives, beneath the sustentaculum tali. If you recognize that, you can quickly identify flexor hal. Remember that the sustentaculum tali is a medial structure, so you can quickly orient yourself.



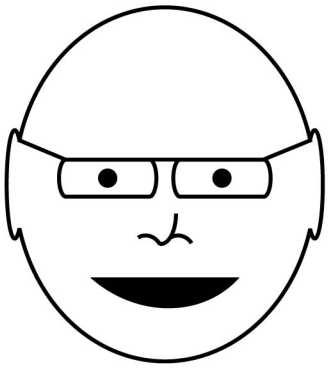
All right, 3/4 of the way there! Now we'll look at the anterior tendon group, go ahead and add those to the picture. Tell me the names of the tendons/muscles, where the muscles are located in the calf, their actions, innervation and vascular supply.

Extensor hallucis longus tendon

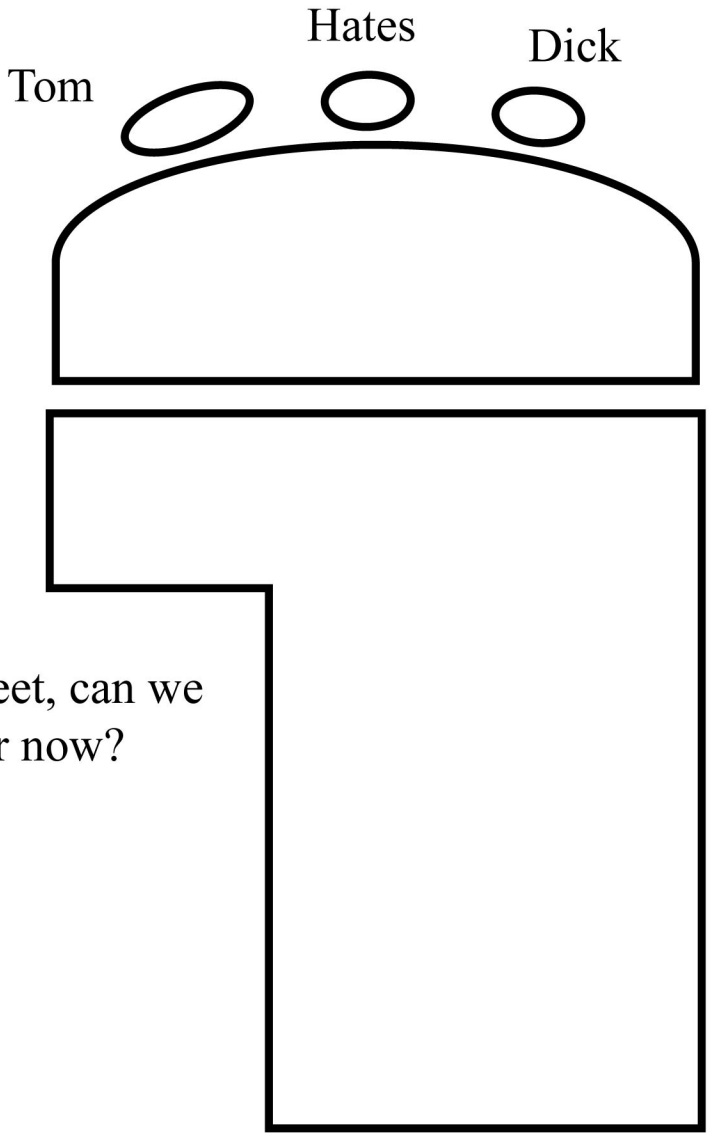
Extensor digitorum longus tendon

Anterior tibial tendon

There are three anterior tendons, the anterior tibial, the extensor hallucis longus and extensor digitorum longus. All three are in the anterior compartment of the calf. Their action is dorsiflexion, two of them also extend, again, I'll let you guess which ones do that.
The blood supply is from the anterior tibial artery and innervation is from the deep fibular nerve.



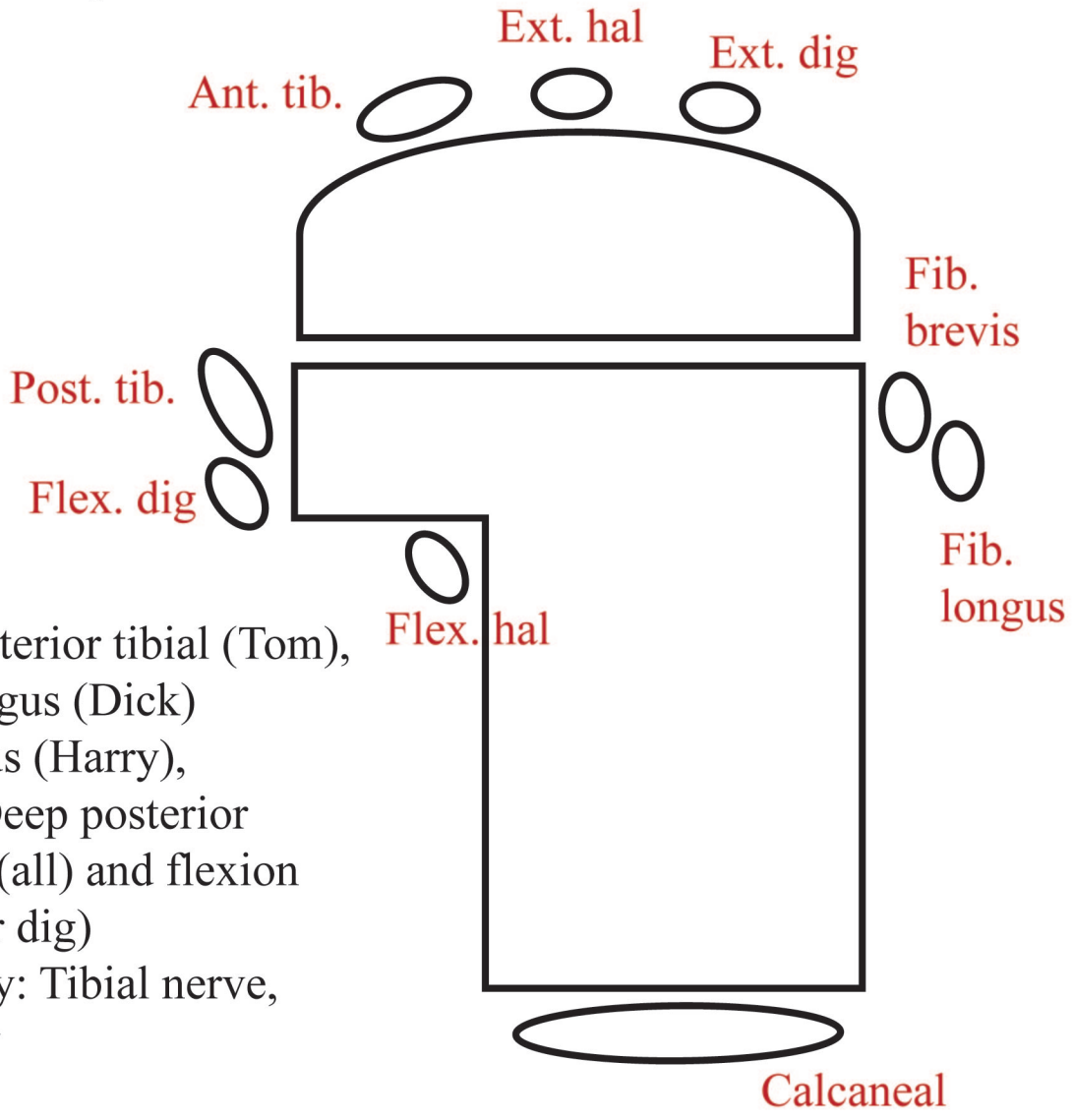
Whoa, things got complicated again! Let's see if we can make things a little easier by revisiting our tendon nicknames. This time we'll go with anterior tib=Tom, extensor hal=Hates and extensor dig= Dick, so from medial to lateral we have Tom Hates Dick!




That's pretty sweet, can we put it all together now?

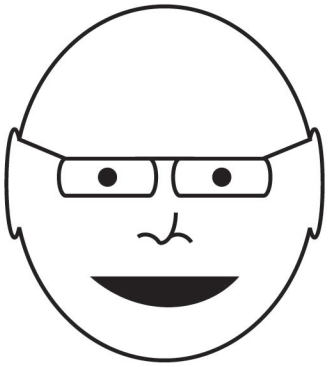
Anterior Tendons: Anterior tibial (Tom),
Extensor hallucis longus (Hates),
Extensor digitorum longus (Dick)
Calf compartment: Anterior
Action(s): Dorsiflexion (all) and extension (extensor hal and extensor dig) Neurovascular supply: Deep fibular nerve, anterior tibial artery

Lateral Tendons: Fibularis brevis and Fibularis longus
Calf compartment: Lateral
Action: Eversion
Neurovascular supply: Superficial fibular nerve, fibular artery

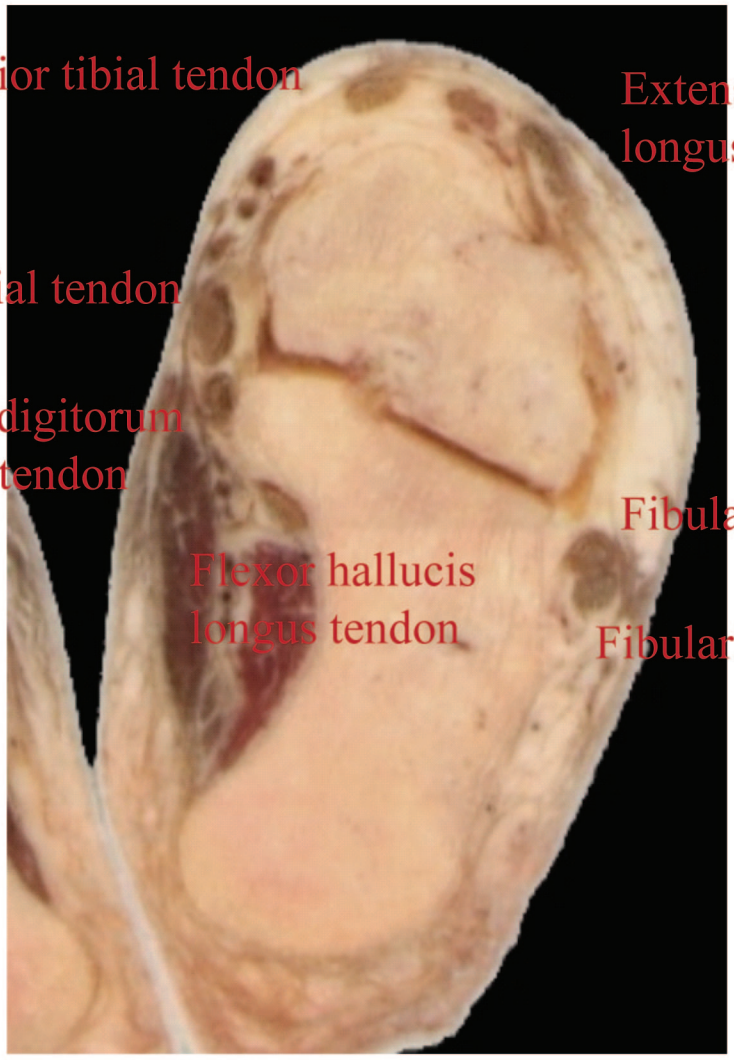



Medial Tendons: Posterior tibial (Tom),
Flexor digitorum longus (Dick)
Flexor hallucis longus (Harry),
Calf compartment: Deep posterior
Action(s): Inversion (all) and flexion (flexor hal and flexor dig)
Neurovascular supply: Tibial nerve, posterior tibial artery

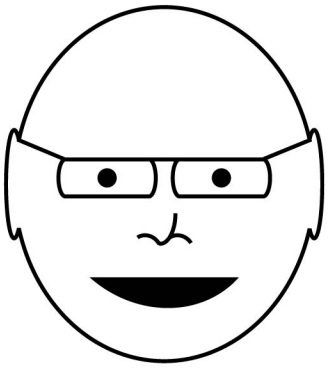
Posterior Tendon: Calcaneal (Achilles), cojoined tendon of Plantaris, Soleus and Gastrocnemeus muscles
Calf compartment: Superficial posterior
Action: Plantarflexion
Neurovascular supply: Tibial nerve, posterior tibial artery



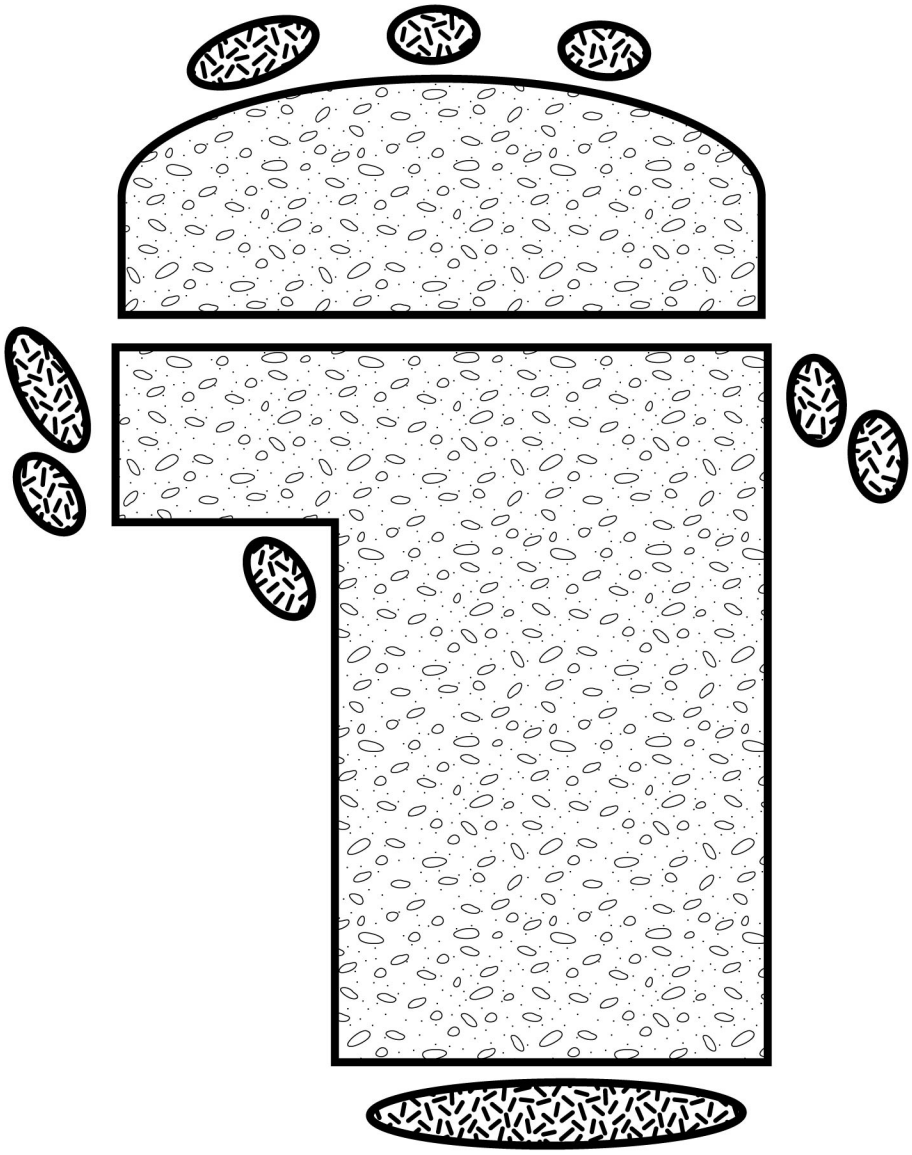
Let's go ahead and label the tendons on the visible human image.




Except the calcaneal tendon that got cut off on this image, but if you don't know where that is, medical school might not be for you.



That's all for now kids, see you again soon for another action packed edition of Anatomy Comics!



And remember, you will learn this material more effectively if you actually do the drawings and fill out all of the information regarding compartments, actions etc. yourself!