



Lower Leg Anatomy

Description

Introduction

Related Information

Here we explore the anatomical structure of the knees, lower legs and feet.

- For teaching considerations related to issues of the foot or knee pain see [Foot Pain](#), and [Knees & Teaching Considerations](#).
- For hip and upper leg anatomy, see [Pelvis & Hips Intro](#) and [Hip Muscles](#), and [The Psoas](#).

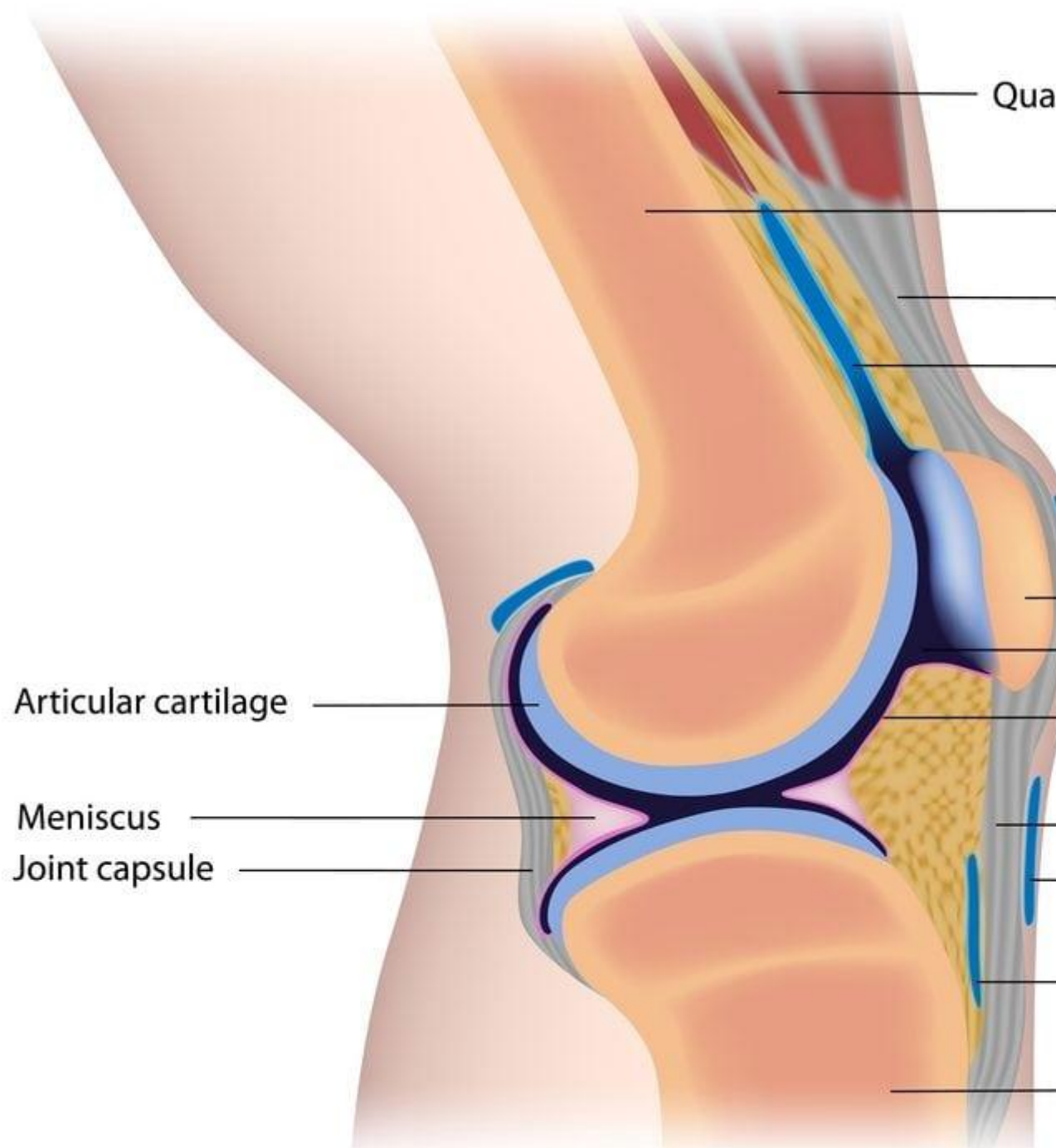
Overview

EVERYTHING IS SO CONNECTED!

Your legs technically start from your [12th ribs](#), which sit beside your [lumbar \(lower\) vertebrae](#). They include the [psaos](#) and [quadratus lumborum muscles](#) as well as the rest of the [pelvic muscles](#) that move or stabilize the hip joints.

The feet and legs are constructed as a series of [hinge joints](#), known as single-degree-of-freedom joints, alternating with rotational (multiple-degree- of-freedom) joints â?? Tom Myers

The Knee Joint



The tibiaofemoral joint is known as the knee. It connects:

1. The femur (thigh bone), and
2. The tibia (shin bone)

The knee is the largest synovial joint in the body. It is a modified hinge joint.

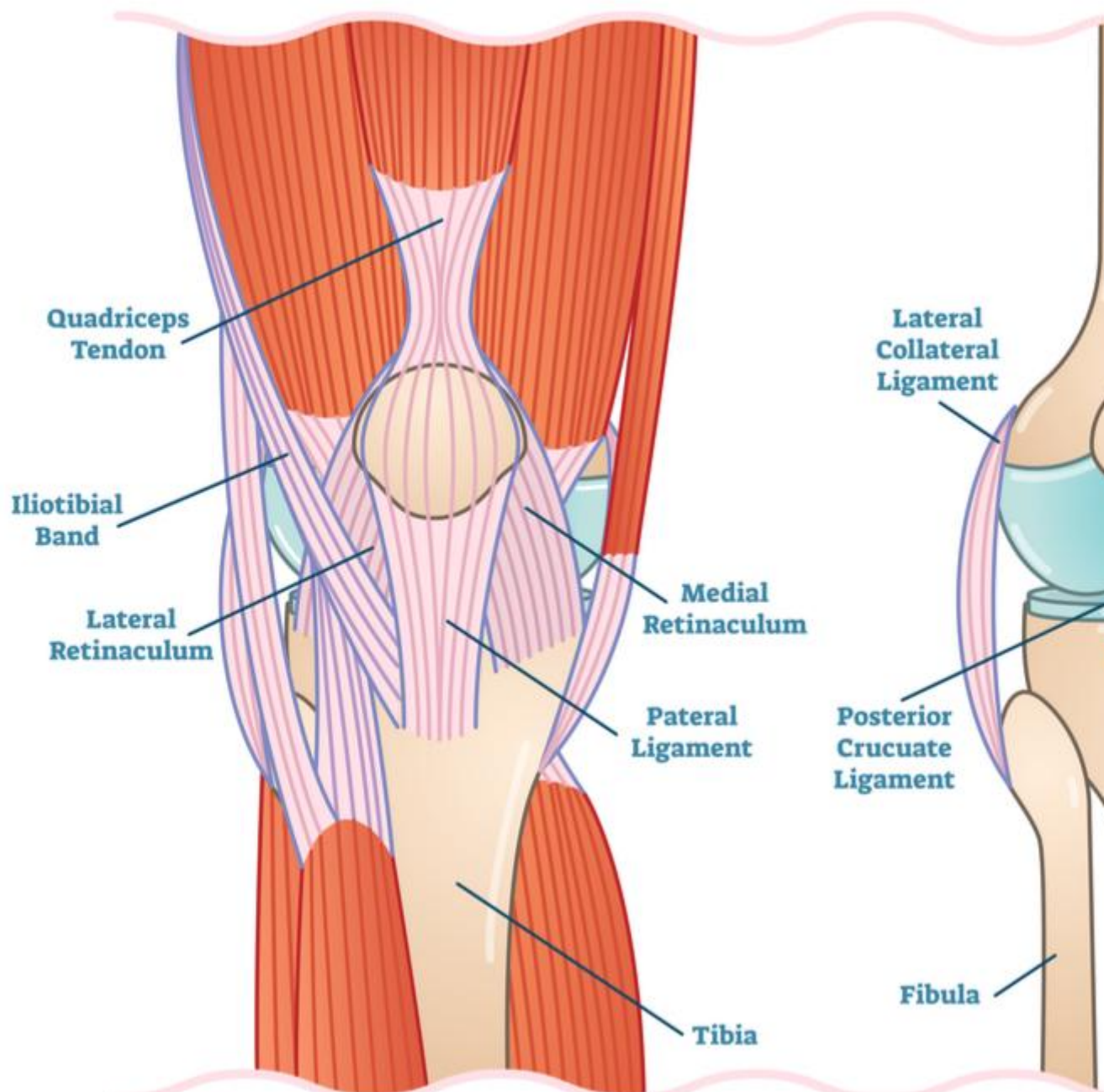
1. It flexes and extends.
2. When the knee is flexed, it can rotate.*

* The muscles that rotate the flexed knees are the hamstrings and a small muscle on the back of the knee joint, the politeus. (H. David Coulter)

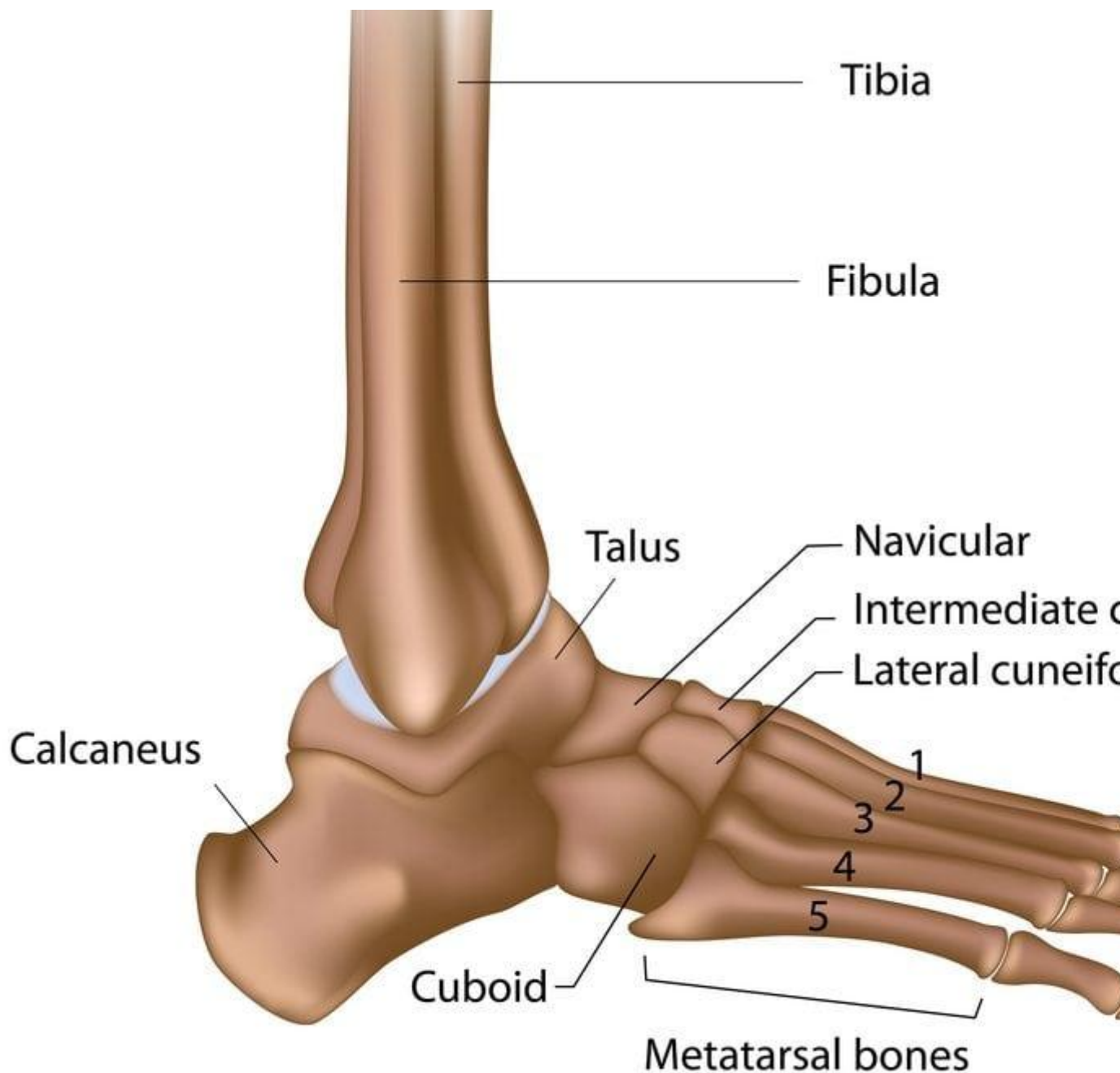
The patella is known as the kneecap.

1. It is a "sesamoid bone," meaning it is embedded in a tendon.
2. Its ability to move up and down is made possible by the bursa (lubricant-filled sack) beneath it.

The following image shows the tendons and ligaments that surround the knee joint.



Lower Leg & Ankle



The tibia (shin bone) and fibula are the bones of the lower leg.

- The tibia runs from the knee to the ankle.
- The fibula is [lateral](#) to the tibia and is located deeper. Proportionally, it is the thinnest bone in the body and bears only ten percent of the body's weight. (Andrew Biel)

The ankle joint connects the foot and lower leg and is intimately involved in our ability to stand on two legs as well as our ability to walk and run effectively. (Baxter Bell)

The ankle joint is the connection of three bones:



1. The talus (ankle bone),
2. The tibia (shin bone), and
3. The fibula (small bone of lower leg)

MAJORITY OF PROPRIOCEPTORS IN ANKLE

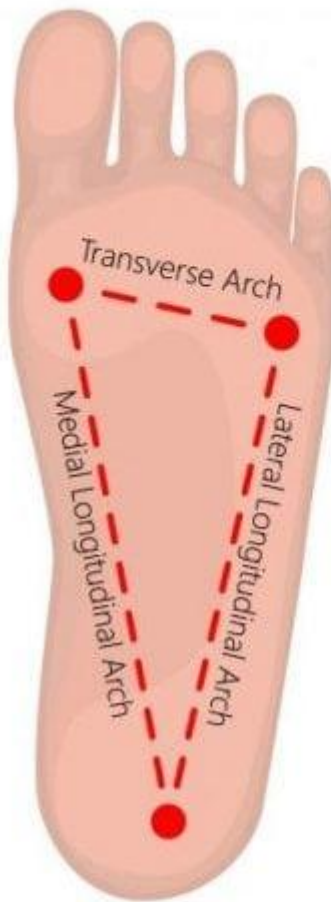
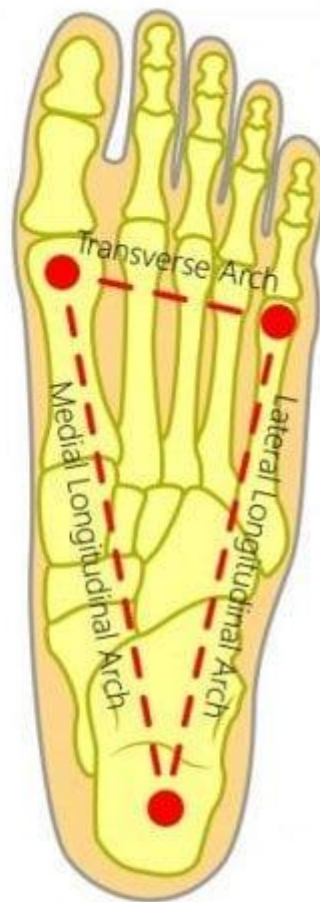
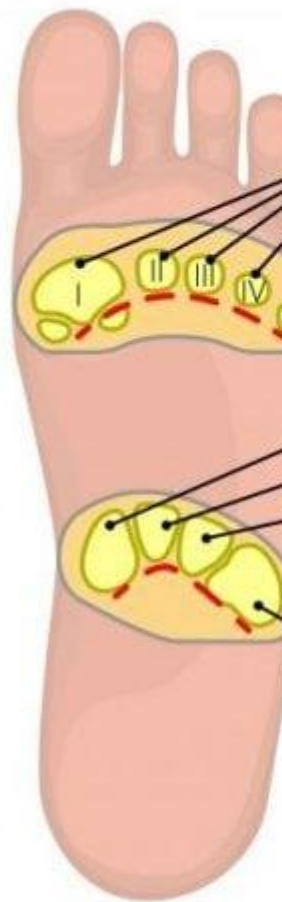
Nature in all of its wisdom has placed 75 to 85% of the body's proprioceptors in the region of the ankle. — Leslie Kaminoff

MORE DETAILED DESCRIPTION

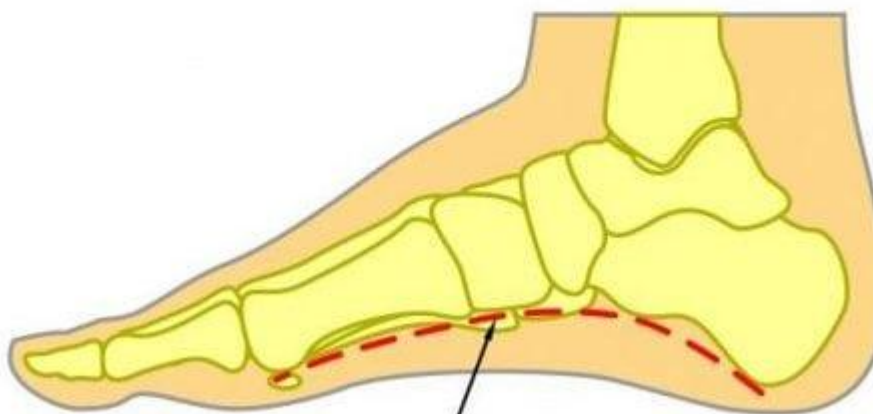
The bones involved in creating the ankle joint include your lower leg bones (tibia and fibula) meeting the two big bones at the back of your foot (talus and calcaneus). The tibia and fibula extend down and around the sides of the talus and calcaneus, and their distant ends become our inner and outer ankle bones, technically called the medial malleolus (on the inside of the ankle) and the lateral malleolus (on the outside of the ankle bone). If you look at how far down your two leg bones go, you may notice that the outer one extends farther down toward the foot than the medial one. This will come into play later when we talk about ankle sprains. The ankle joint is held in close proximity by lots of small, short ligaments that run between the 4 bones. The talus bone, which sits just atop the calcaneus bone (the heel bone), is unique in that it is only attached to the bones around it by ligaments. There are no muscles directly connected to it. Muscles from the lower and upper leg bones cross by the talus and connect onto the heel bone, such as with the famous Achilles' tendon, or head further down to connect to other bones in the foot. When these muscles contract, they create the movements of the ankle joint. One other tidbit about the flexion and extension of the ankle joint: the joint is more stable the more dorsiflexion there is, as in squats and Downward-Facing Dog pose, and less stable the closer the joint gets to plantar flexion, such as coming up onto our toes in Mountain pose. [Article includes pictures of all these points.] — Baxter Bell MD

The Foot

Sole

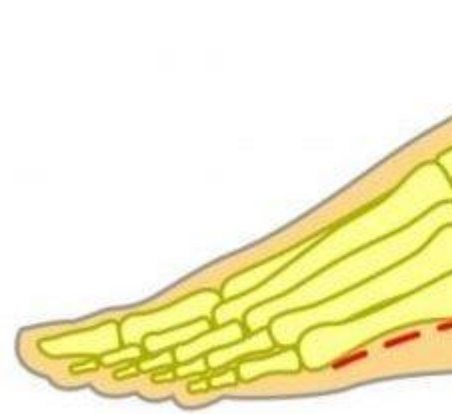
Foot
(bottom view)Transverse
(cross section)

Medial view of the foot



Medial Longitudinal Arch

Lateral view



Lateral Longitudinal Arch

Introduction



Human feet are unique in the animal kingdom, setting us apart from even our closest primate relatives. Although you might think your feet are pliable because you can point and flex them, relatively speaking, theyâ??re actually quite stiff. That stiffness is a function of the internal anatomy, and itâ??s the reason that we can walk upright and run long distances over land on two feetâ?|. Connective tissues support the arches and allow the foot to absorb and store mechanical energy when your foot hits the ground. The foot then acts like a spring, powered by that stored energy. In addition to bones, tendons, and ligaments, the feet also contain muscles called intrinsic foot muscles (IFM). The IFM, along with the fascia, help the foot maintain a proper shape, support the arch, absorb shock, and generate force during locomotion. Common foot problems can arise from issues related to the bones and joints (as with bunions), connective tissues (like plantar fasciitis), or the IFM. Many issues stem from weak arches that collapse. â?? Mark Sisson

Basics

Each foot has*

- 26 bones
- 19 muscles
- 33 joints
- 107 ligaments

[*Source](#)

THE BALLS OF THE FEET

The balls of your feet are five joints that together act as a hinge when you go on tiptoe. Above them is the rotational joint under your ankle: Rock your feet in and out from collapsed pronation (an exaggerated rolling in of the heel toward the midline) to locked-up supination (heels roll out) to feel this joint. â?? Tom Myers

PLANTAR FASCIA

The plantar fascia is a fibrous ligament-like structure that runs from the calcaneus [heel] to the base of the toes. Lifting (extending) the toes tightens the plantar fascia and deepens the arches. â?? Ray Long MD

Arches

Medial Arch

- This is the one most commonly referred to
- Runs along the inner side of the foot
- Deeper than the lateral arch

Lateral Arch

- Runs along the outer side of the foot
- Shallower arch
- Main weight-bearing surface of the foot (Ray Long MD)

Transverse Arch

- Runs along the base of the toes

THE TRIANGLE FORMED BY CONNECTING THE ARCHES

If we were to connect the dots to create these arches, we would look at three points: one at the heel, a second at the base of the big toe, and a third at the base of the little toe. This triangle outlines the three arches. This is a pretty sophisticated structure, and we shouldn't be surprised. For thousands of years, arches have been a very strong and powerful way of building structures. — David Keil

GAINING AWARENESS OF ARCHES

Gain awareness of these important structures by gently inverting and everting the feet and flexing and extending the toes in various poses. — Ray Long MD

See much more in [Teaching Considerations to Promote Foot Health](#).

Videos

Anatomy of the Feet (4 min) [link](#)

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Anatomy of the Feet Part 2 (4 min) [link](#)

A picture containing text, sportDescription automatically generated

Anatomy of the Toes (4 min) [link](#)



Movements



Foot Movements

The muscles in the lower leg move the foot via the ankle (a hinge joint) in these ways:

1. Flex (also known as dorsiflexion)
2. Extend (also known as plantar flexion)
3. Evert
4. Invert

IT'S NOT THAT SIMPLE

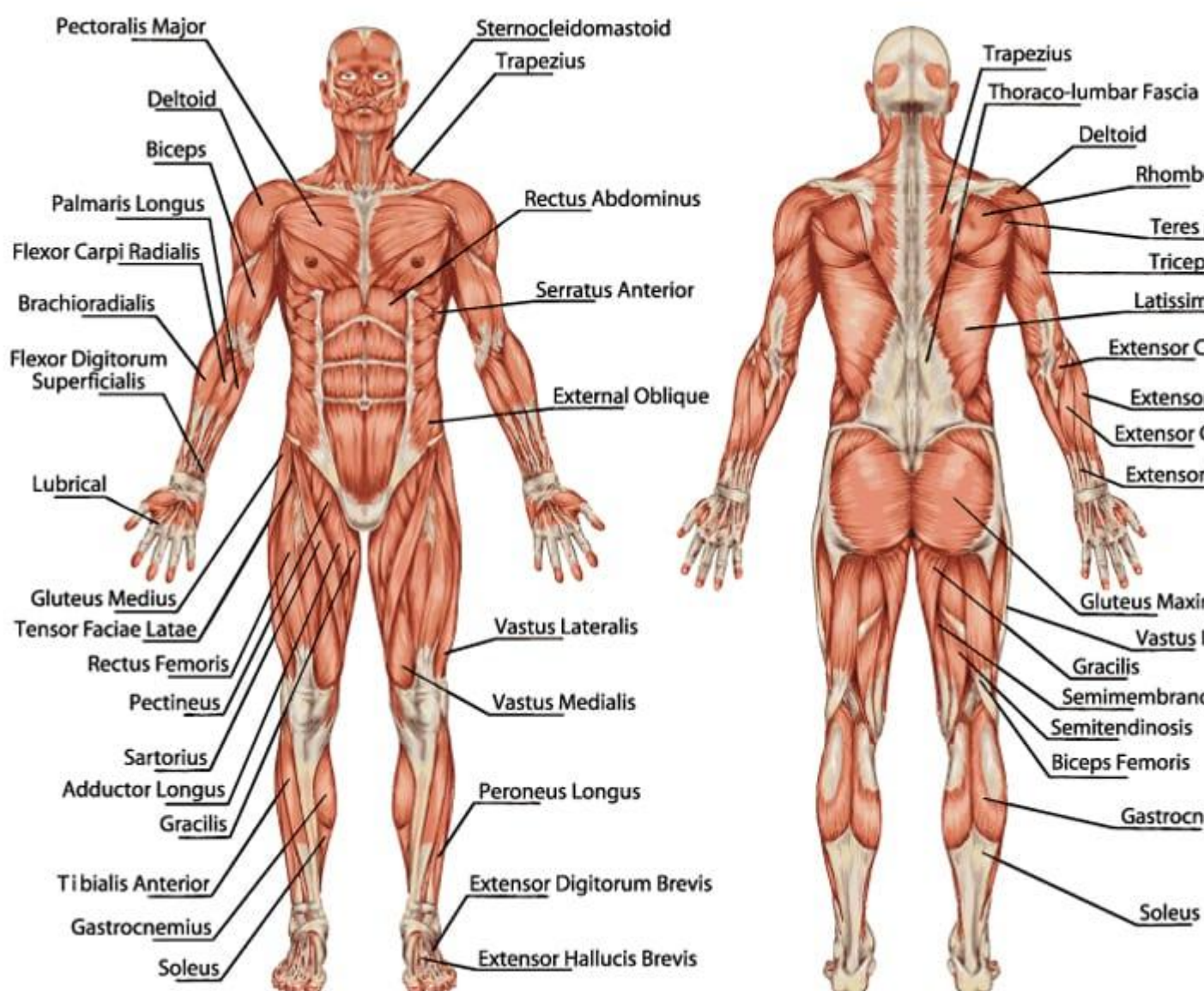
The ankle is often thought of as a "hinge" joint, which allows for *flexion* (like the ankle position in your Downward-Facing Dog pose) and *extension* (like the front leg ankle in your Triangle pose). There are other movements the joint enjoys, such as turning in and out a bit (adduction and abduction), as well a combination of plantar flexion and adduction known as *supination*, and a combination of dorsiflexion and abduction known as *pronation*. Folks who stand on the outer edge of their feet have a bit more supination going on, and those with "flat feet" do a bit more of the pronation action. And often when people come up onto the ball of the foot, the combination of plantar flexion, adduction and supination cause an *inversion* of the joint. In the opposite scenario, when the ankle is dorsiflexing, abducting and pronating, an *eversion* is produced. This will become more important when figuring out ankle sprains. — Baxter Bell MD

Toe Movements

The muscles of the foot move the toes in these ways:

1. Flex
2. Extend

Muscles of the Lower Leg & Foot Overview



One way to categorize the muscles of the lower leg and foot is:

1. Calf Muscles
2. Lateral Muscles
3. Foot Extensors
4. Foot Flexors

See below for details on each category.

Muscles Going Deeper

1) Calf Muscles



- These are on the lower leg, posterior (back) side.
- They include the gastrocnemius (a two-headed muscle) and soleus.
- The gastroc attaches to the back of the heel via the Achilles tendon.

The two heads of the gastrocnemius attach on the posterior surface of the femoral condyles (thigh bone) and the posterior surface of the calcaneus (heel bone), via the Achilles tendon. Every time you roll over the balls of your feet in your gait cycle or you flex your knee, you ignite the gastrocnemius. â?? Emilie Mikulla

2) Lateral Muscles

- These are on the lateral (outer) side of the lower leg.
- They include the peroneus longus and peroneus brevis.
- The peroneus longus, as its name implies, is a long muscle. It runs down the outside of the calf to the outer ankle. From there its tendon weaves under the sole of the foot and attaches in two places at the inner arch.
- The peroneus longus is the antagonist to the tibialis posterior and it works with the peroneus brevis to evert (pronate) the foot.
- The peroneus longus is a major contributor to stabilizing the foot and helps to â??maintain the transverse arch of the foot, as well lift the inner *and* outer arches. These actions, when combined in a mindful and balanced manner, allow the leg to steady itself on top of the foot, particularly in one-legged balancing poses.â??• (Jenni Tarma)

3) Foot Extensors

- These muscles layer together on the anterior (inner) leg and upper part of the foot.
- They include the tibialis anterior, extensor digitorum longus and extensor hallucis longus.

4) Foot Flexors

- These muscles are deeper than the gastroc and soleus on the posterior leg.
- They include the tibialis posterior, flexor digitorum longus and flexor hallucis longus.
- The primary action of the tibialis posterior is to invert (supinate) the foot. â??It is an important stabilizer of the midfoot during the â??heel offâ?? phase of walking.â??• (Ray Long, MD)

More on Stability & Mobility



ADAPTATION & STABILIZATION

Our feet are constantly adapting, stabilizing and giving us a sense of grounding in our bodies. That's not only happening during our asana class but every time we stand up, walk and move around on our feet. â Allison Schleck

ARCH OF THE FOOT: SPRING IN OUR STEP

Tension in the arch of the foot is what gives us speed, the spring in our step as we walk and run. This arch is also a shock absorber, however, and too much tension leads to instability: Think of a tennis racket that has been strung too tightly, creating an overly taut surface with no elasticity and give. â Jenni Tarma



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