

Anatomy

It is important to identify the bones, muscles, joints and tendons of the foot, as well as be familiar with common footwear components.

Bones

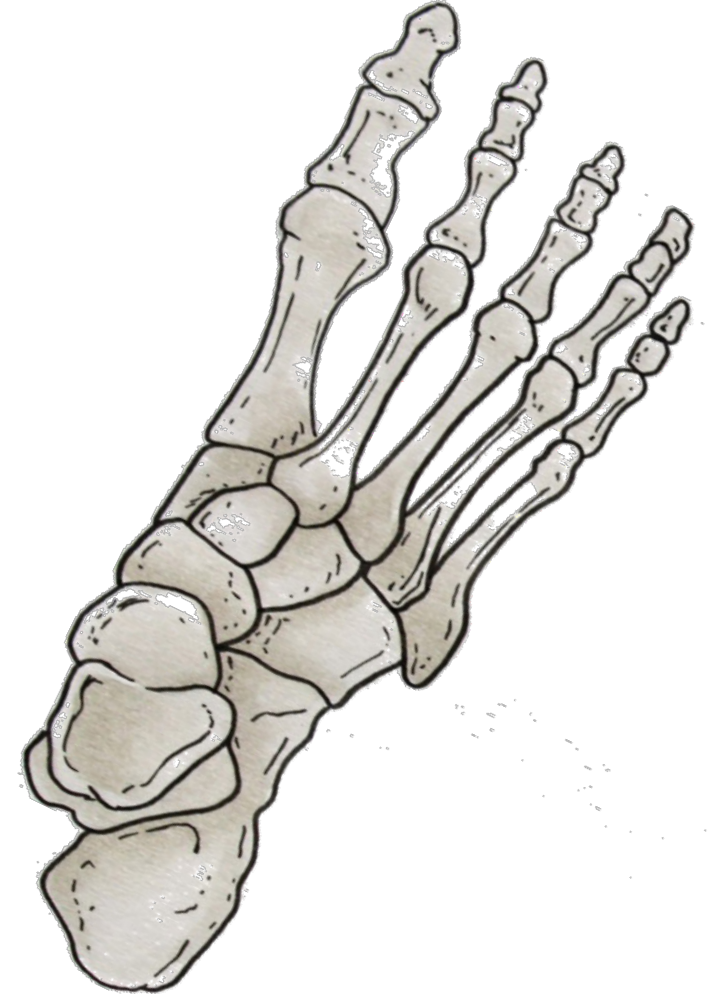
There are 26 bones in each human foot.
Makes up one quarter of the entire (206 bones) human body

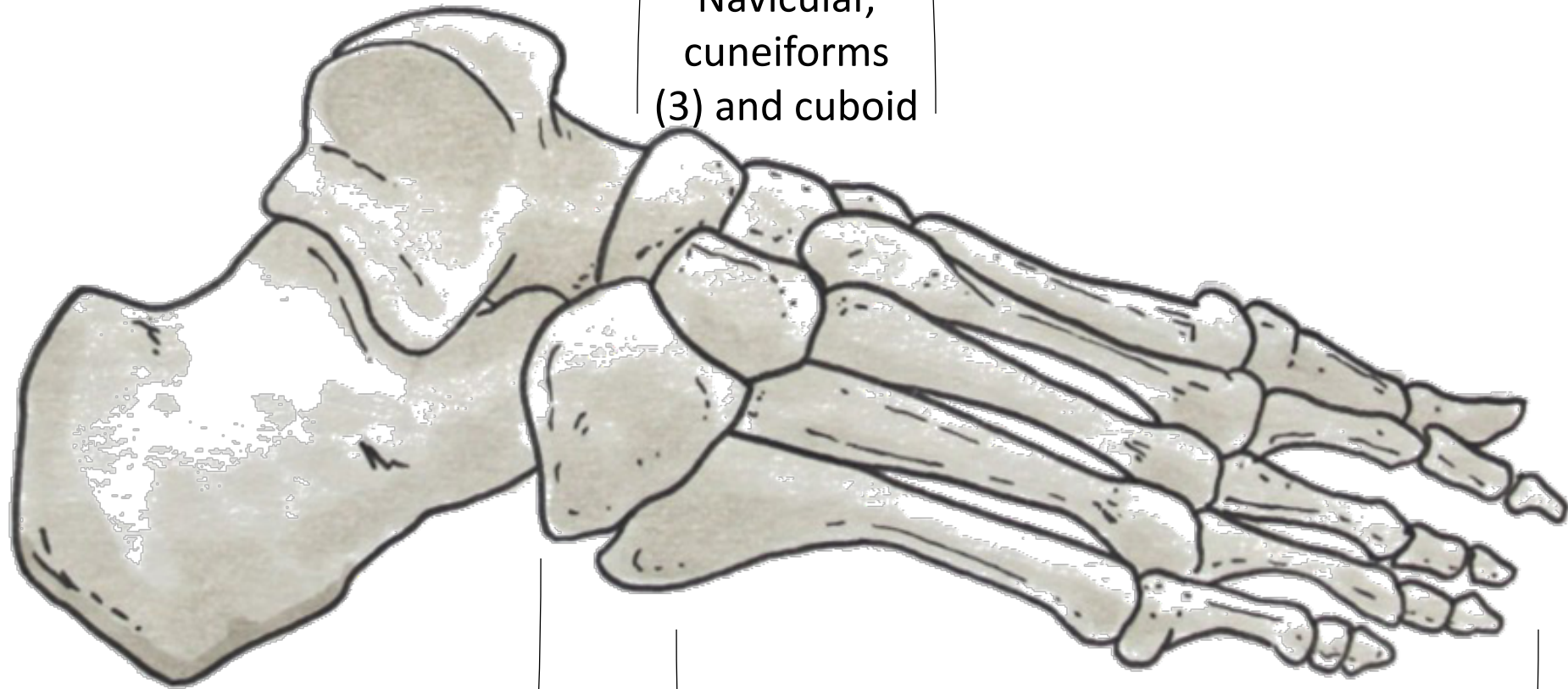
2 in the hind foot or rear foot

5 in the midfoot

19 in the forefoot

2 ancillary bones underneath the first metatarsal head





Rear foot/Hind foot
Talus and calcaneus

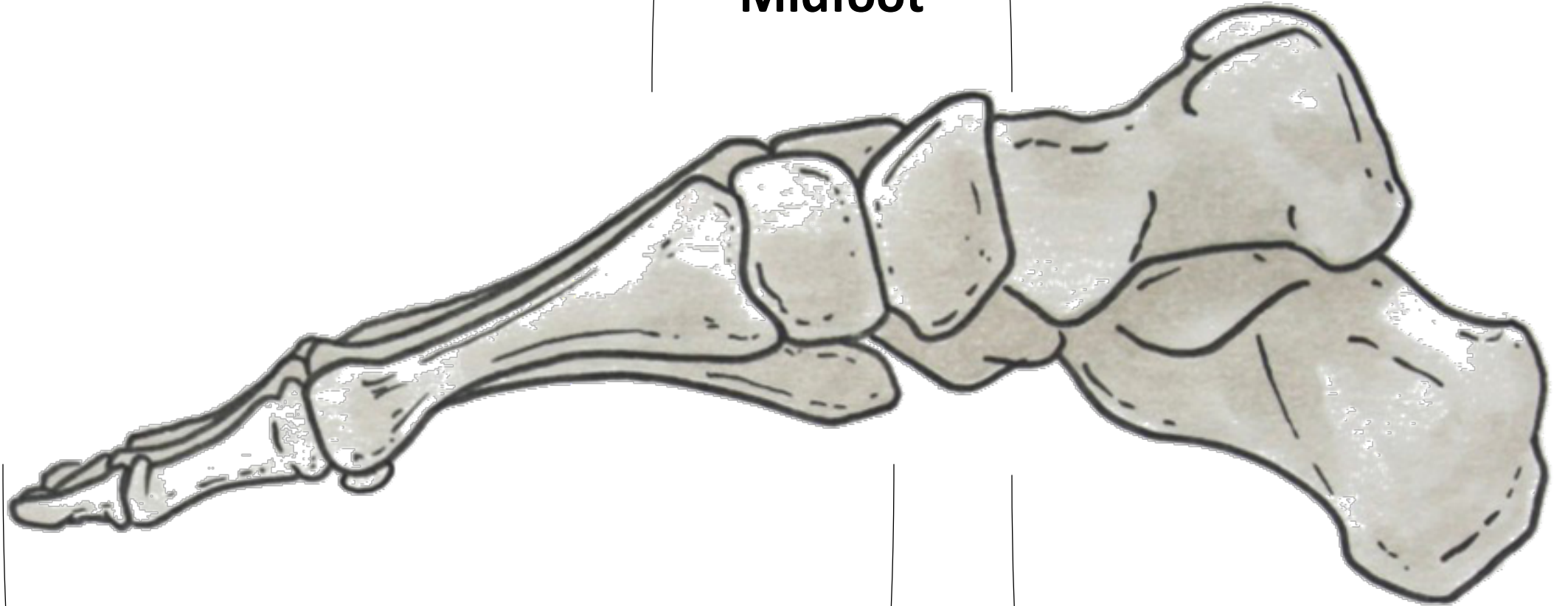
Midfoot
Navicular,
cuneiforms
(3) and cuboid

Forefoot
Metatarsals (5) and phalanges (14)

Midfoot

Forefoot

Hindfoot/Rearfoot



First Metatarsal

Second Metatarsal

Third Metatarsal

Fourth Metatarsal

Fifth Metatarsal

Medial Cuneiform

Inter Cuneiform

Lateral Cuneiform

Navicular

Phalanges

Cuboid

Talus

Calcaneus



Head

Shaft

Base

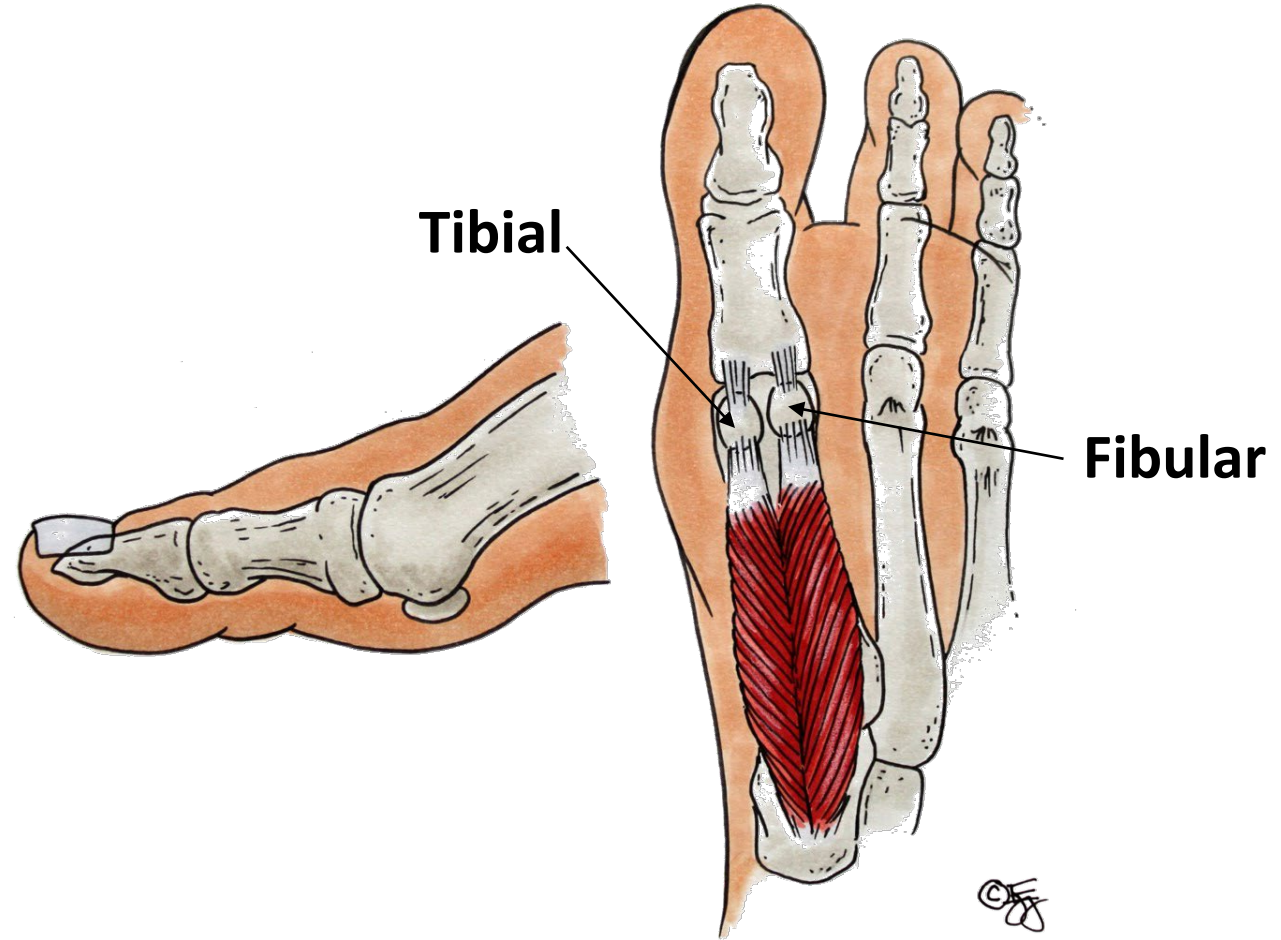


The 5 metatarsal bones are made up of three main parts—the base, the shaft and the head. The heads are the weight bearing portion of the foot.

Sesamoids

Located on the plantar side of the great toe (hallux).

Identified by the location on the foot—tibial (medial) and fibular (lateral) sesamoids.

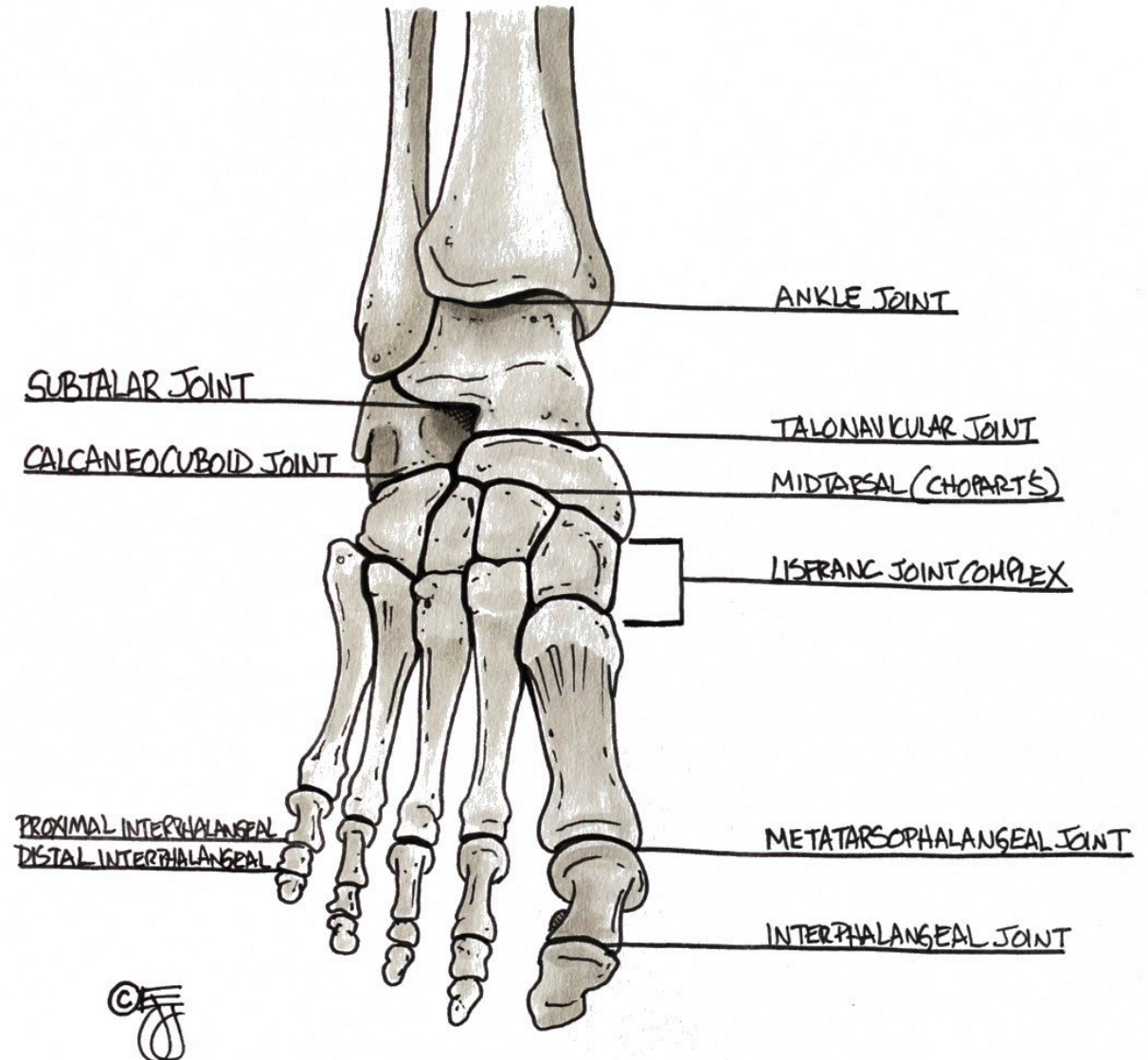


The sesamoids lie within the flexor hallucis longus tendon, and aid in the flexion of the great toe.

Turn it OVER TO ERICK joints,
muscles and tendons and I will be
back for ligaments

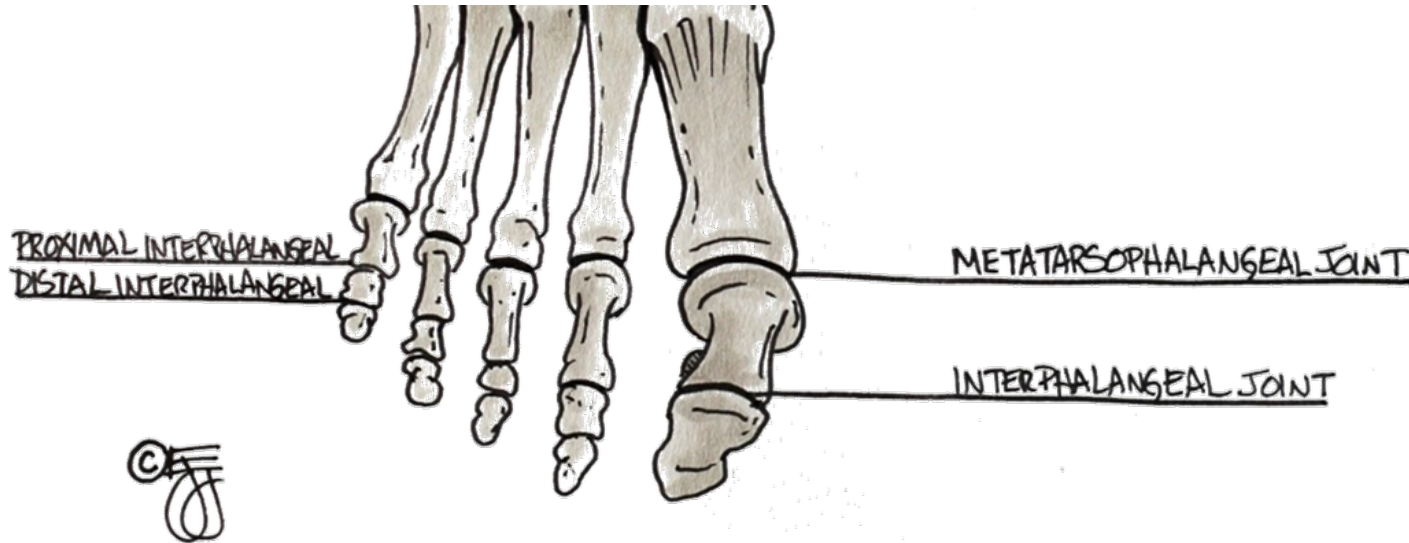
Joints

- The joints are shock absorbers.
- There are 33 joints in the human foot and they allow the foot to move in many directions and adapt to many surfaces.
- A joint is usually formed of fibrous connective tissue and cartilage.
- A joint is the area where two or more bones are attached for the purpose of motion of human body parts.



The *metatarsophalangeal joint (MTP or MTPJ)* is between the metatarsals and the phalanges

Hinge joints that allow mostly plantar and dorsiflexion and allow the toes to maintain contact with the ground during push off.

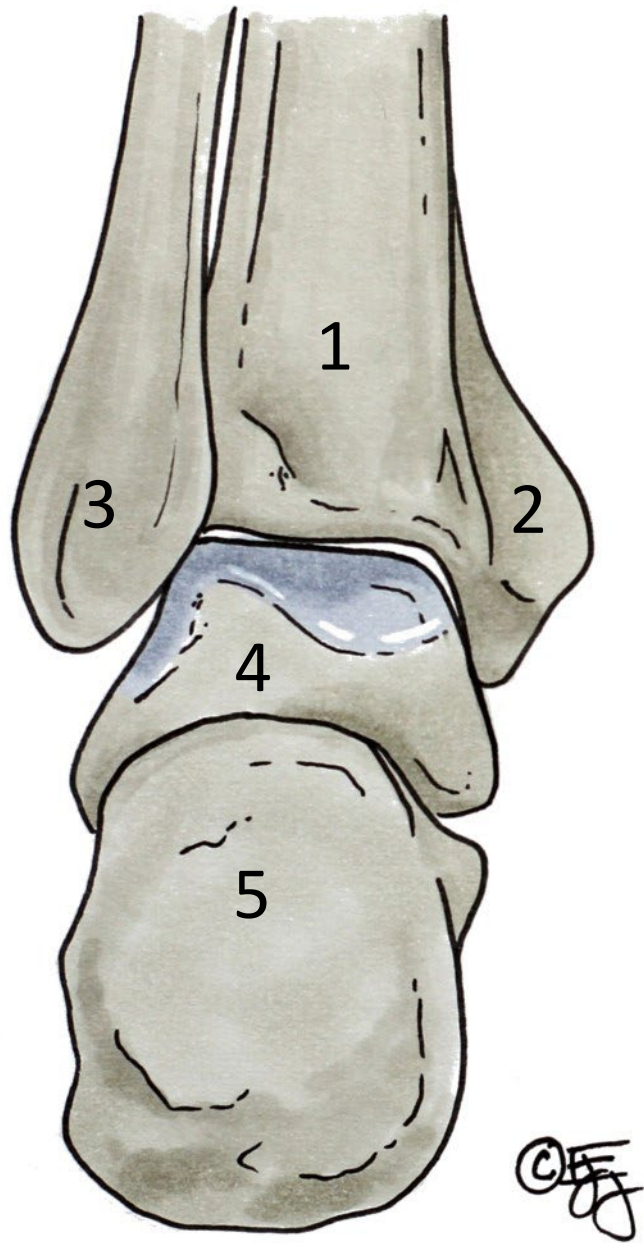


The *proximal interphalangeal joint (PIP)* is between the proximal and middle phalanges.

The distal interphalangeal joint (DIP) is found only on phalanges 2-5.

The *ankle joint* is composed of the fibula, tibia and talus.
A hinge joint that allows the foot to dorsiflex and plantarflex.





Posterior View (left foot)

1. Tibia

2. Medial malleolus (tibia)

3. Lateral malleolus (fibula)

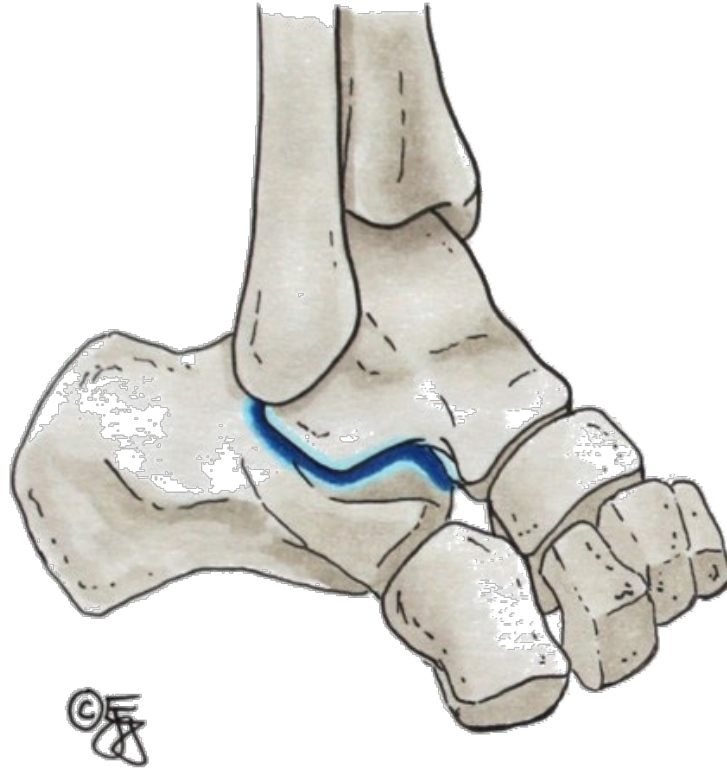
4. Talus

5. Calcaneus

The *subtalar joint* is between the talus and calcaneus.

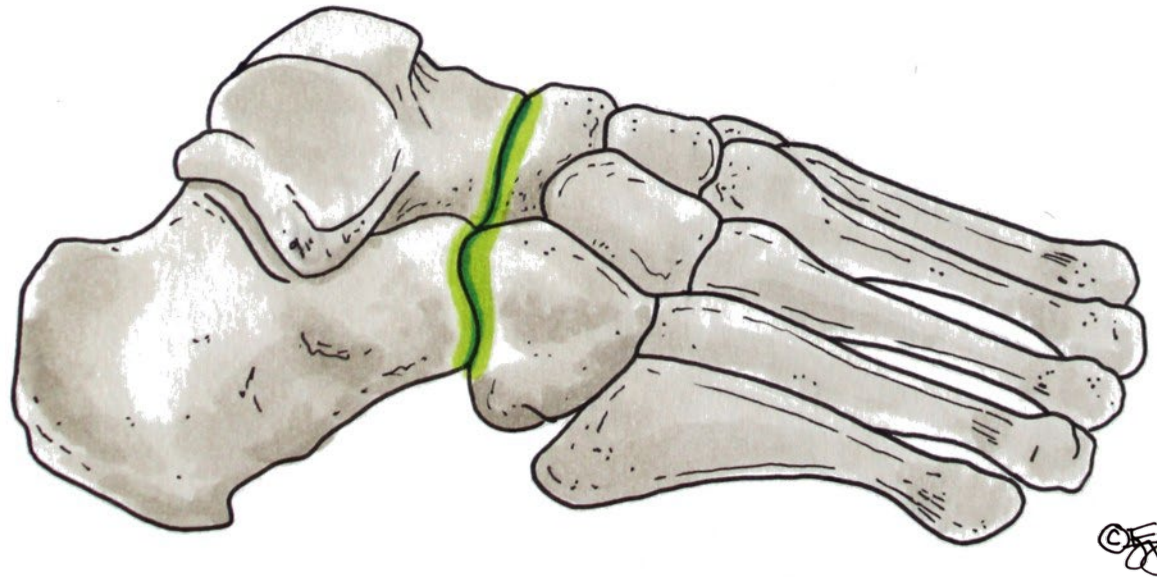
Also known as the talocalcaneal joint.

Acts as a screw-shaped joint and is the primary joint that allows the foot to invert or evert



The *transverse tarsal joint* is comprised of two joints—the talonavicular and calcaneocuboid (TNCC joint).

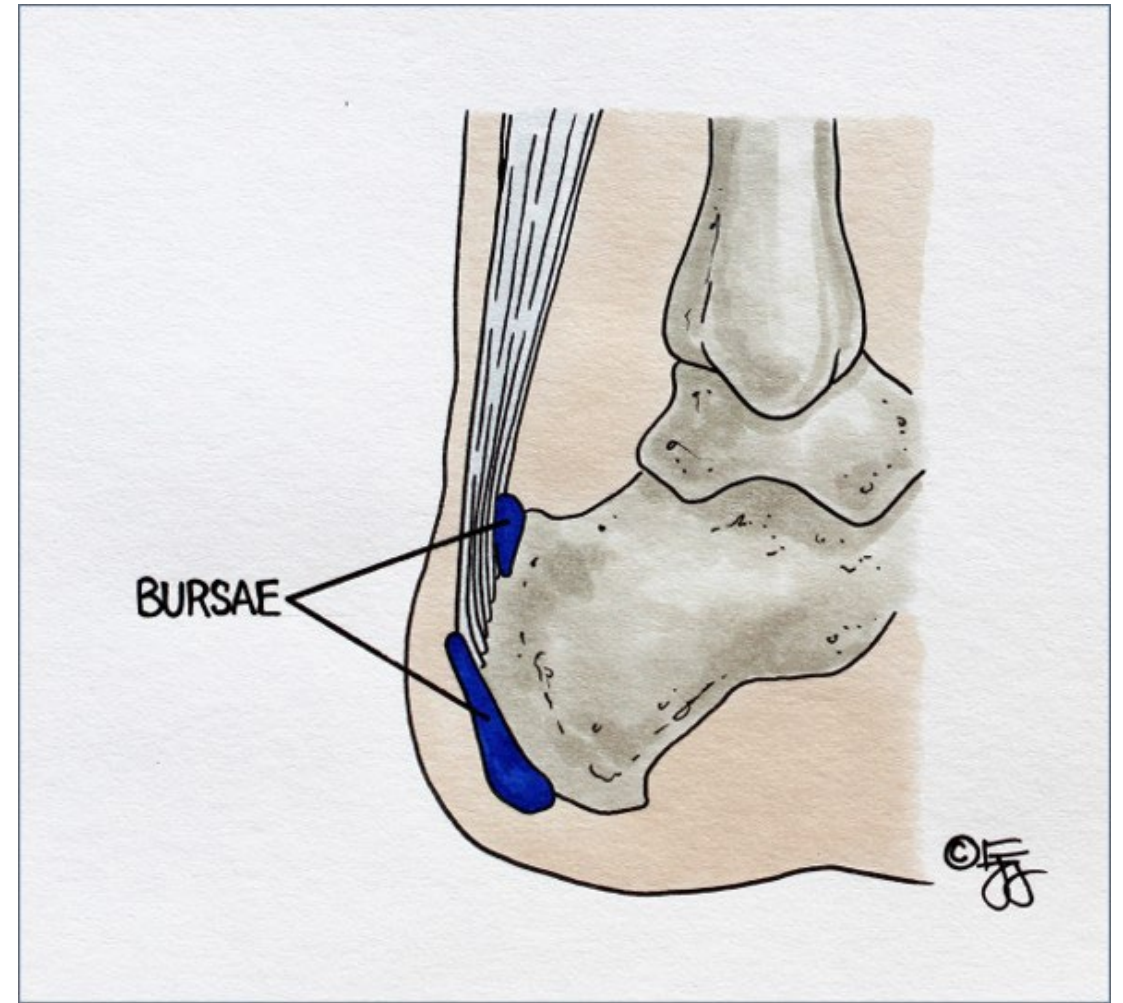
Also known as the midtarsal or Chopart's joint





The *tarsometatarsal joint* is made up of the tarsals and metatarsals. Also known as the Lisfranc Joint.

Bursae, or singular bursa, fluid filled sacs (synovial fluid) commonly located just proximal to insertion of tendon into bone; reduce friction that would otherwise occur as tendon moves against bone

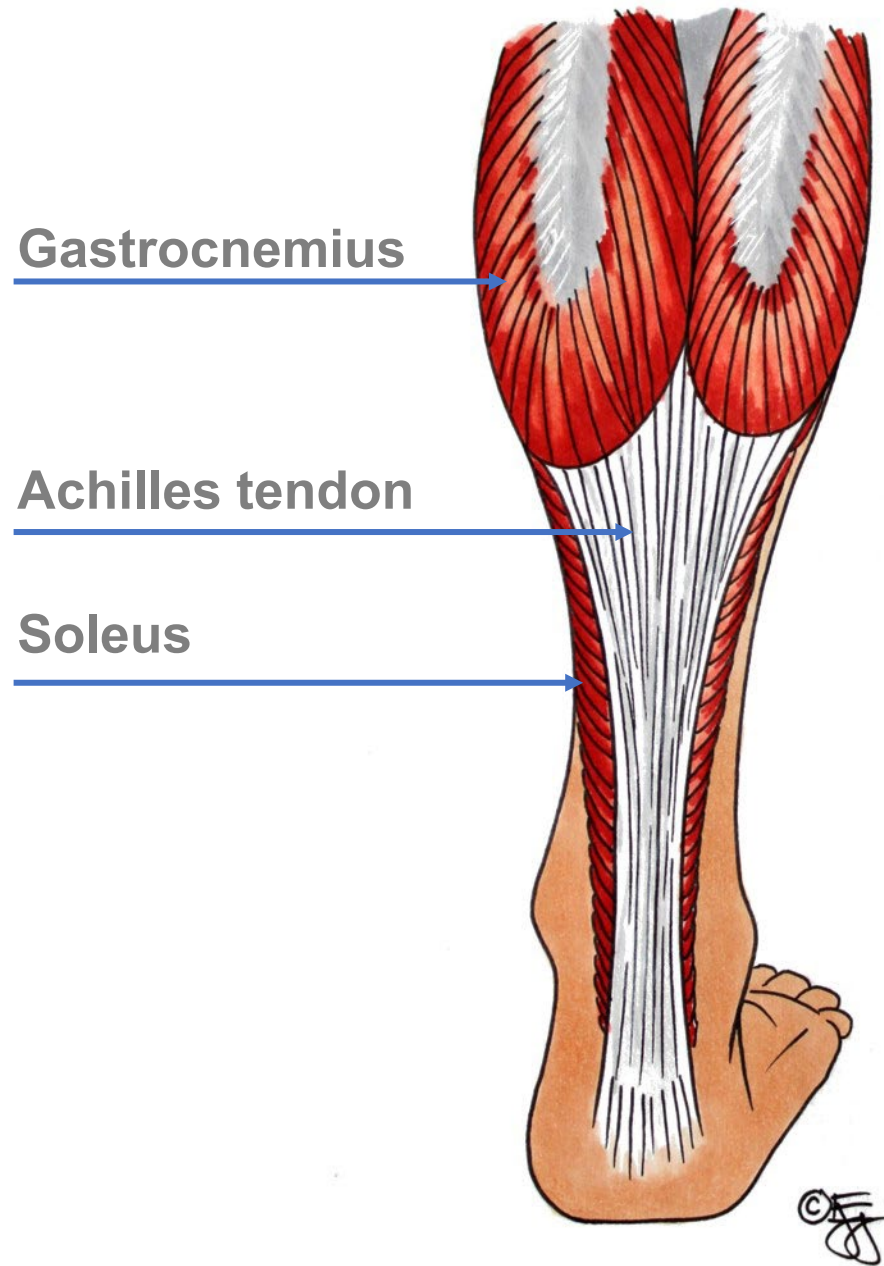




Muscles

Muscles are attached by tendons to bones.

Most muscles that move the foot originate from the calf (posterior) or shin (anterior) area.



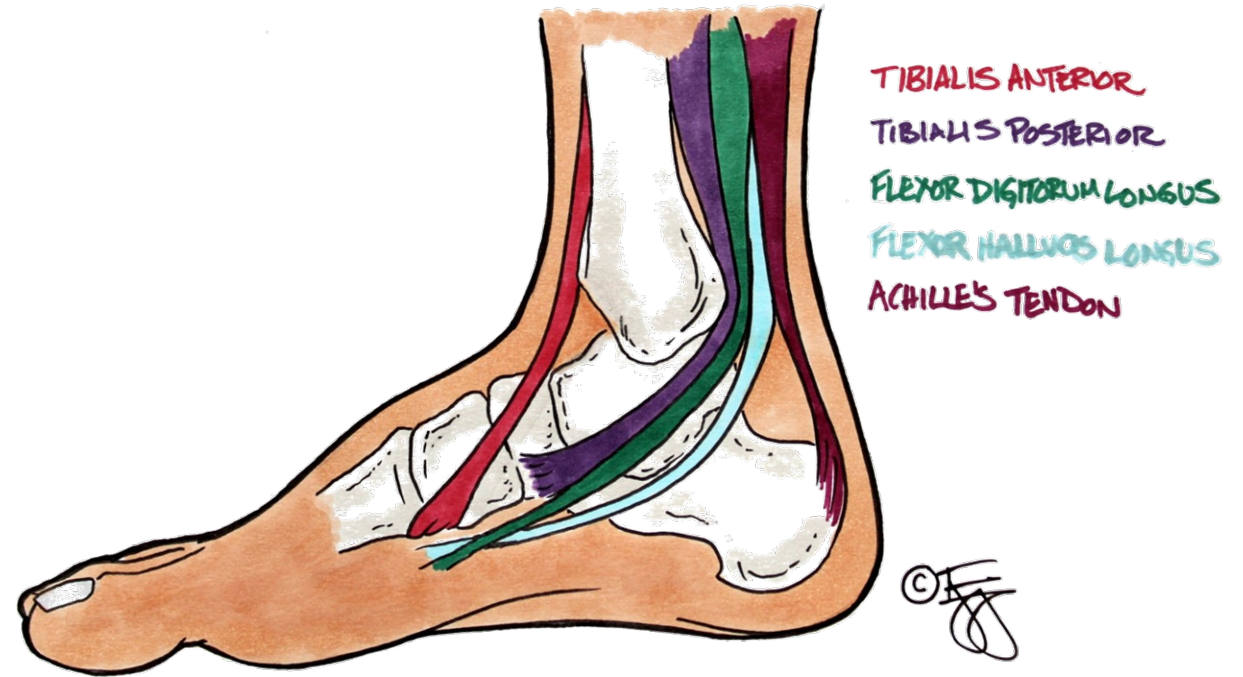
The gastrocnemius and soleus muscle combine to form the Achilles tendon. This allows the ankle and foot to plantarflex.

Tendons

Tendons are a band of fibrous tissue that attach muscles to the bones.

When a muscle contracts, it pulls on the tendon.

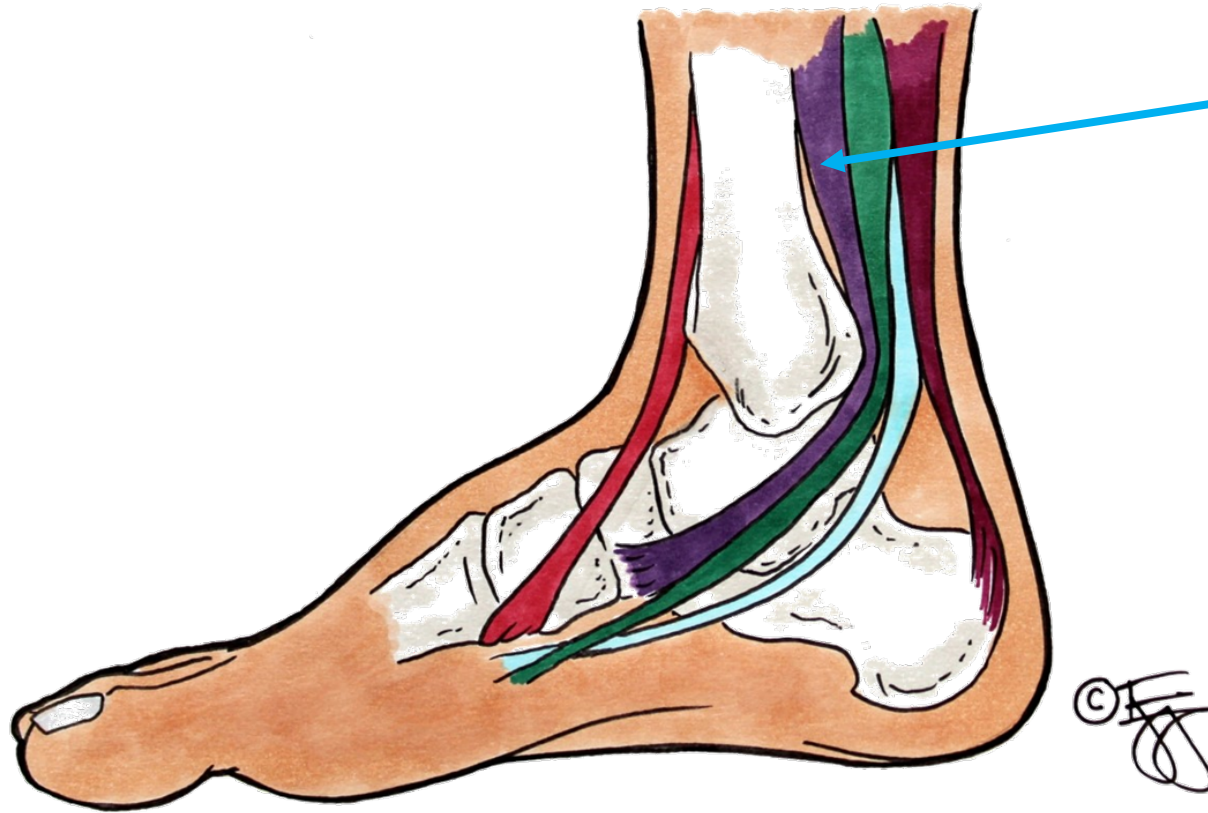
Tendons can be torn or ruptured, and inflammation is the most prevalent.





Achilles Tendon

- Most important tendon for walking, running and jumping.
- Attached the calf muscle to the calcaneus.
- The strongest and thickest tendon



Posterior tibial tendon:

Attaches the calf muscle to the bones on the inside of the foot.

The main function of the tendon is to hold up the arch and support the foot when walking.

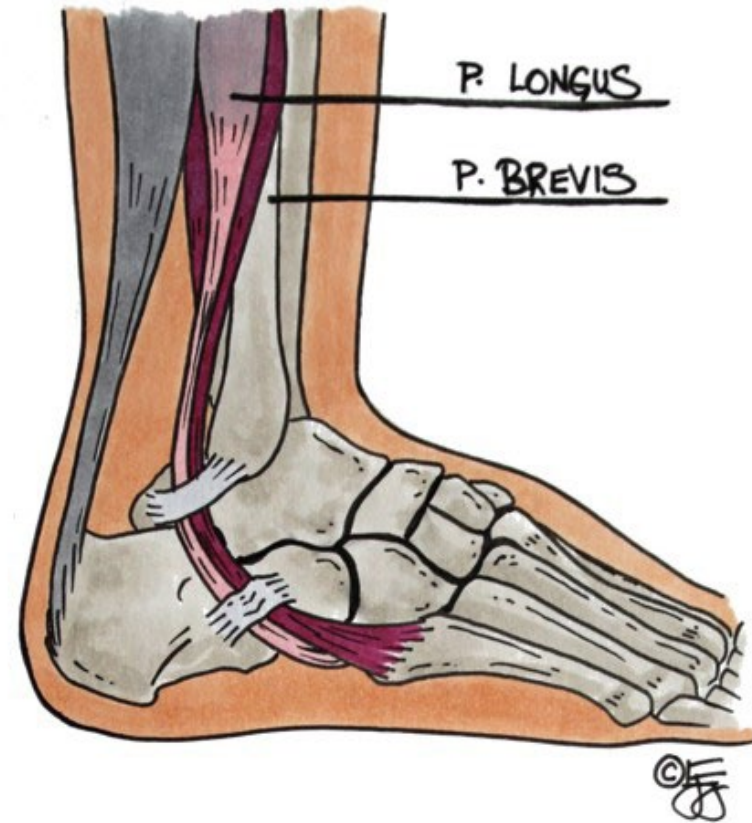
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Peroneal Tendons

The main function of the peroneal tendons is to stabilize the foot and ankle and protect them from sprains.

Both tendons are plantar flexors of the ankle and evertors of the subtalar and midtarsal joints.

Opposed by the posterior tibial tendon.

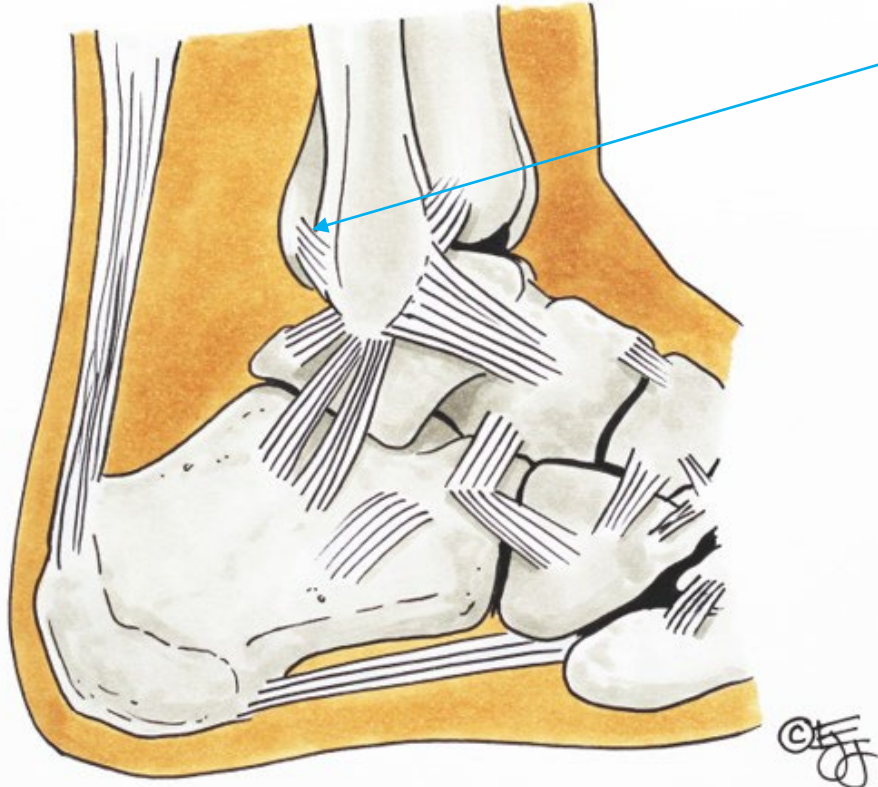


BACK TO BRIAN



Ligaments

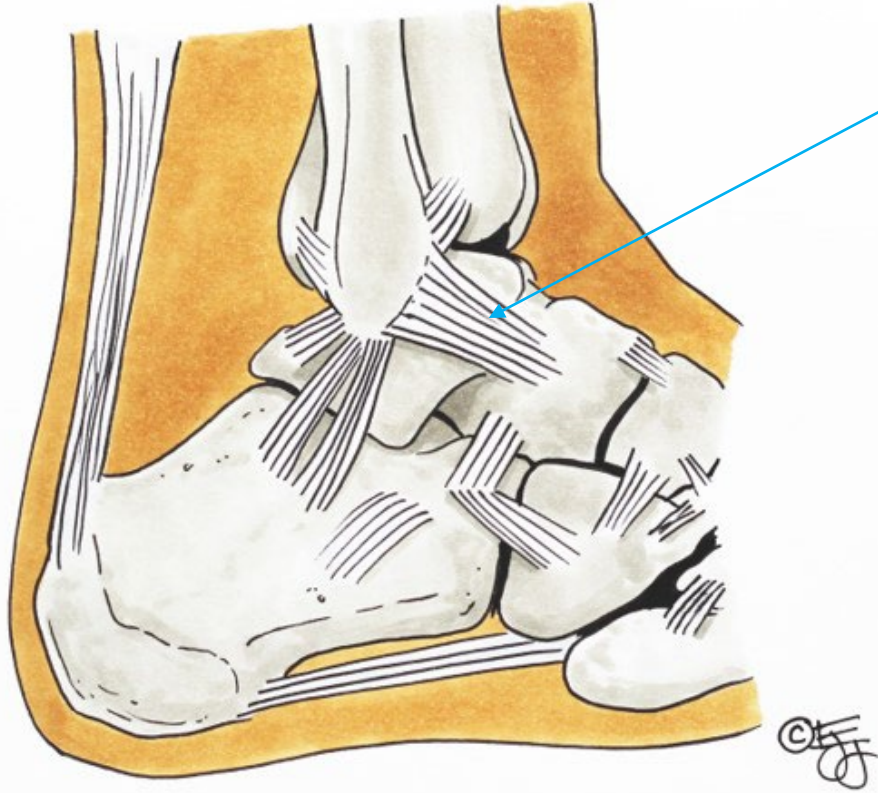
A short band of tough, flexible fibrous tissue which connects two bones or holds a joint together



Posterior inferior tibiofibular ligament:

Fibrous band of connective tissue which is a meeting area of the fibula (calf bone) and the tibia (shinbone). It is part of the lateral malleolus, which is one of the fibula bone's sharp and bony lower extremities near the ankles.

Another common name for the ligament is the posterior inferior ligament.



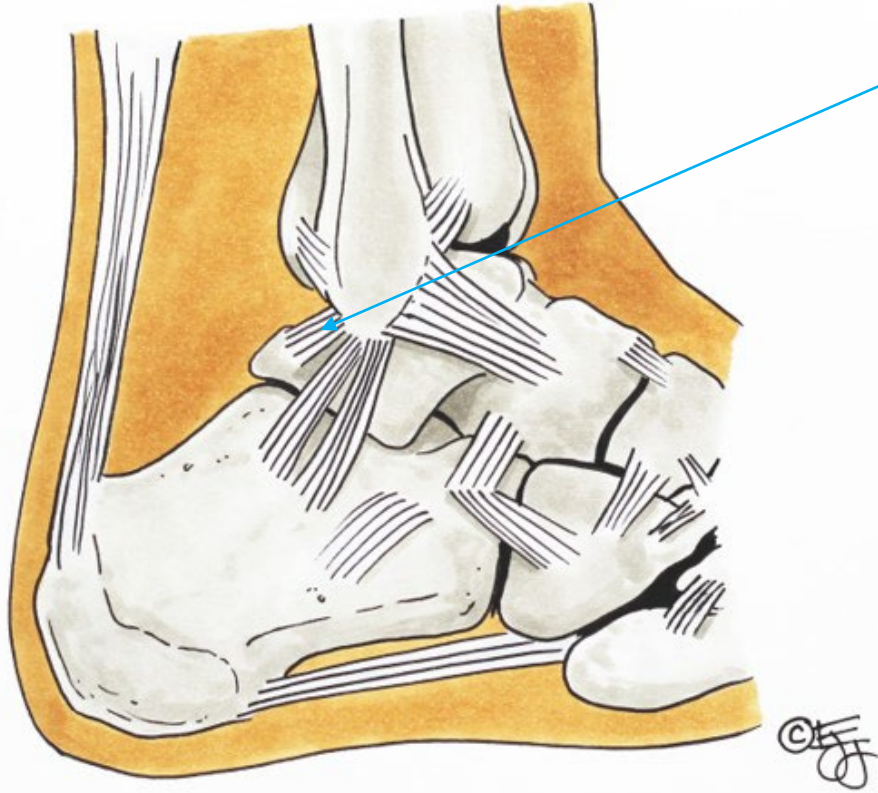
Anterior Talofibular Ligament:

Often known as the “***ankle sprain*** ligament”, because it is the one that is most often damaged when the ankle is rolled.

Functions to stabilize the ankle joint and keeps it from rotating inward too much, which is what happens in a common ankle sprain.

When it is sprained, it tends to tear part of the way rather than into two pieces.

It can also become stretched out in places, which makes the ankle joint looser than normal, potentially leading to symptomatic ***ankle instability***.



Posterior Talofibular Ligament:

Runs from the back lower part of the fibula and into the outer back portion of the calcaneus.

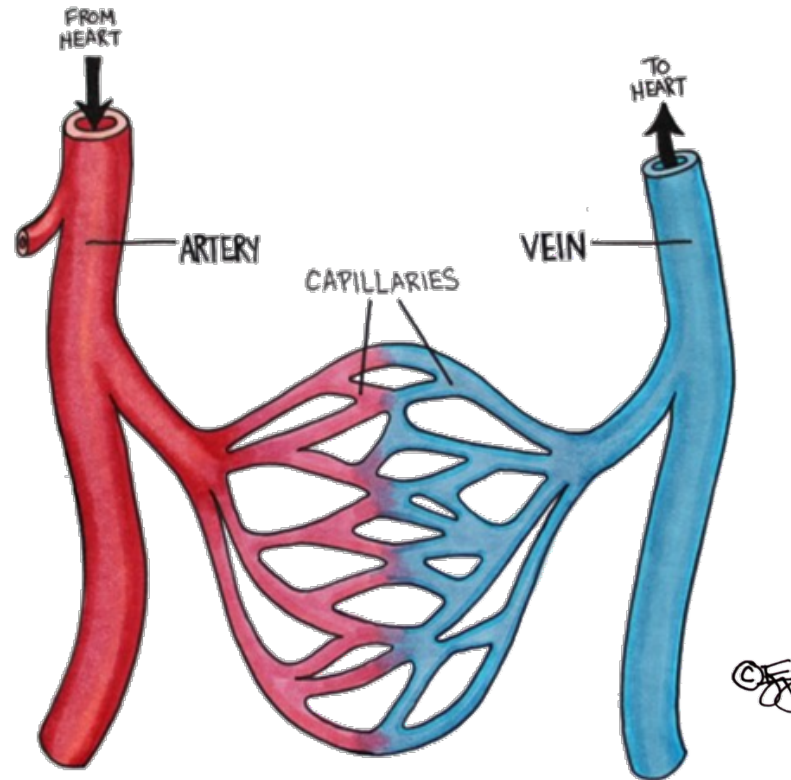
This ligament functions to stabilize the ankle joint and subtalar joint.

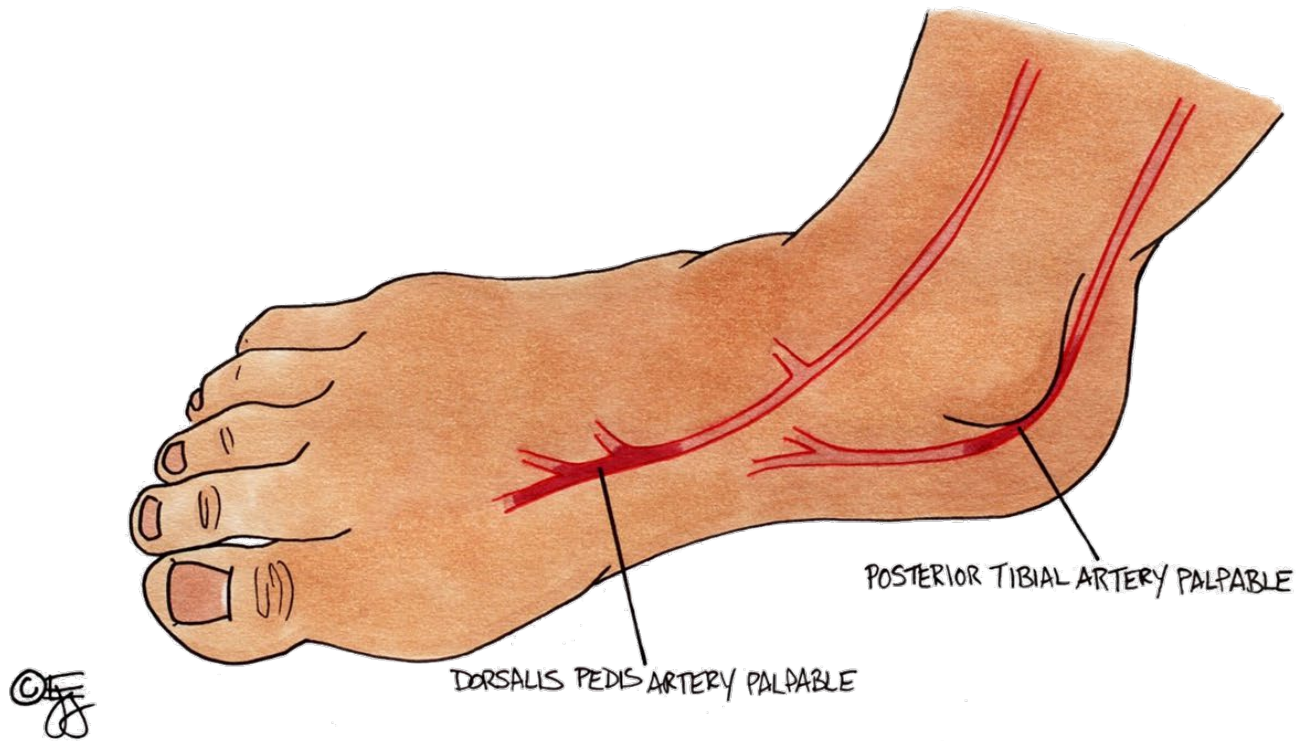
Injuries are rare to this ligament, unless there is an ankle dislocation or subluxation.

Circulatory System

There are three types of blood vessels:

1. Arteries-carry blood away from the heart
2. Veins-transfer blood back to the heart from the capillaries
3. Capillaries-connect arteries to veins





The **dorsalis pedis artery** can be palpated on the dorsum of the foot between the first and second ray.

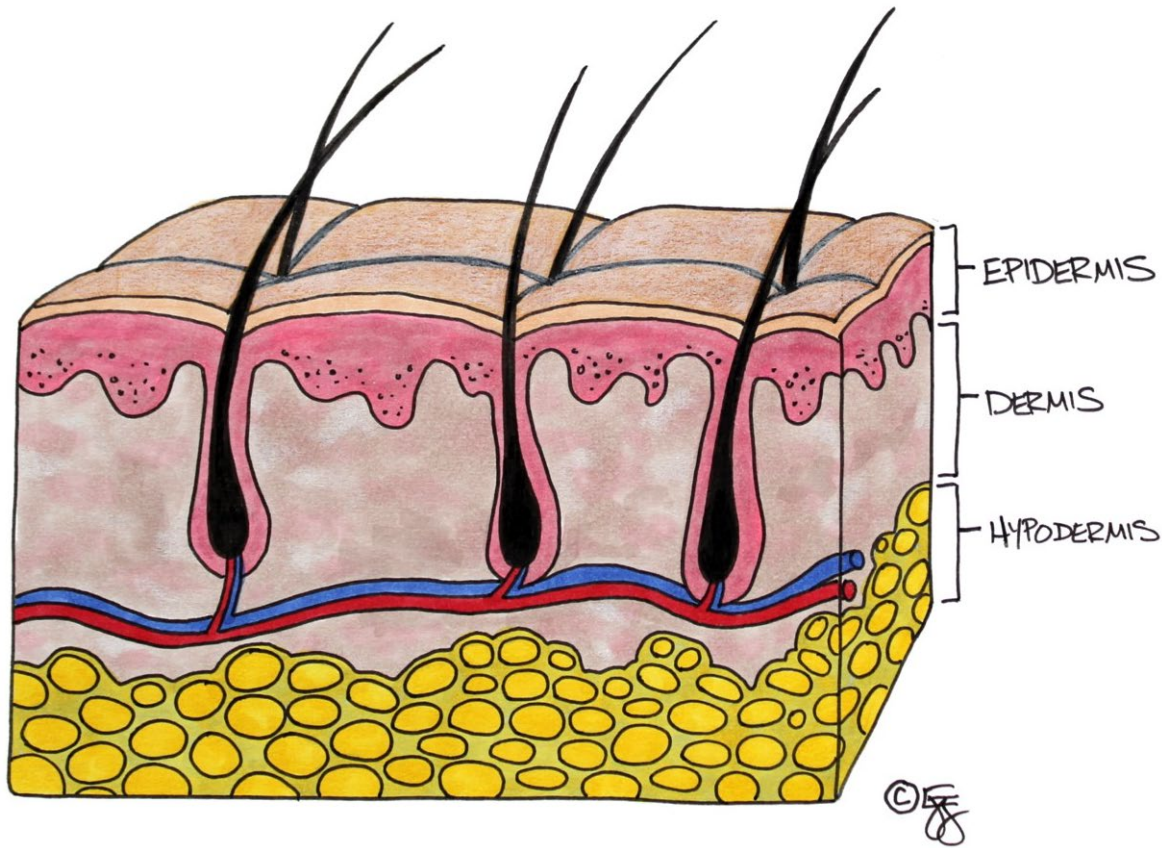
The **posterior tibial artery** is found on the medial side of the ankle and can be palpated.

Skin

The human skin plays a very important role in protecting the body against the environment.

Functions include insulation, temperature regulation and sensation.





3 Main Layers

Epidermis-outermost layer;
visible

Dermis-layer underneath
epidermis

Hypodermis- also called the
subcutaneous tissue, used
for fat storage.

The thickness of the skin at the soles is 1.5 mm at the epidermis layer.

Shoe Anatomy

Knowledge of the components of footwear is important to aid in the selection of the shoes to provide optimum therapeutic benefits to the patient.

What is a Diabetic Shoe?

PDAC (Pricing Data Analysis and Coding)

A5500 Long description: FOR DIABETICS ONLY, FITTING (INCLUDING FOLLOW-UP), CUSTOM PREPARATION AND SUPPLY OF OFF-THE-SHELF DEPTH-INLAY SHOE MANUFACTURED TO ACCOMMODATE MULTI-DENSITY INSERT(S), PER SHOE



PALMETTO GBA®

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What is a Diabetic Shoe?

4 main criteria

1. Has a full length, heel-to-toe filler that when removed provides a minimum of 3/16" of additional depth
 2. Made from leather or other suitable material of equal quality
 3. Closure system
 4. Available in full and half sizes with a minimum of three widths so that the sole is graded to the size and width of the upper portions of the shoe according to the American standard last sizing schedule or its equivalent.
- The shoe may or may not have an internally seamless toe.



Uppers

Portion of the shoe that covers the top of the foot; includes vamp, tongue, quarters, etc.; area that is seen



Vamp

Covers the toes and a portion of the instep; the front portion of the shoe; all closed toe shoes have a vamp



Quarters: The back portion of a shoe or boot; meets the vamp to form most of the uppers

Tongue

Several types of tongues; can protect from debris; sewn in shoe or as one with the vamp



Balmoral (Bal)

A type of shoe where the tongue is stitched at the throat of the vamp. Although sometimes more appealing and stylish, this opening does not offer much adjustability in fit or fluctuation for the foot.



Blucher

The quarters overlap the vamp and creates a wider opening shoe.

This style makes donning and doffing easier. It is often chosen for patients with limited dorsiflexion, high insteps, swelling, and/or internal braces



Lace to Toe

Accommodates internal braces and AFOs. Perfect for severe edema and hammertoes.





Achilles Notch

Accommodates for the
Achilles tendon



Heel Foxing

Covering the quarter and sometimes will have perforations or a different color creating a two-tone shoe.



Counter

Located in the back portion of the shoe used to reinforce the heel cup and increase support



Toe Box

Section of the shoe which surrounds the toes. They help to retain the shape of the shoe and provide protection for the toes.

Note: The shank can be made of wood, plastic, *nylon*, steel, carbon composite or other materials



Shankpiece

A long, thin piece of material between the insole and outsole intended to support the foot and provide structure.



Outsole

The exposed part of a shoe that contacts the ground. They can be made of various materials to help support during gait.



Midsole

Layer between the outsole and the insole, typically made for shock absorption

Insole/Inlay/Insert

The **insole** is glued, stapled or sewn into place in a shoe.

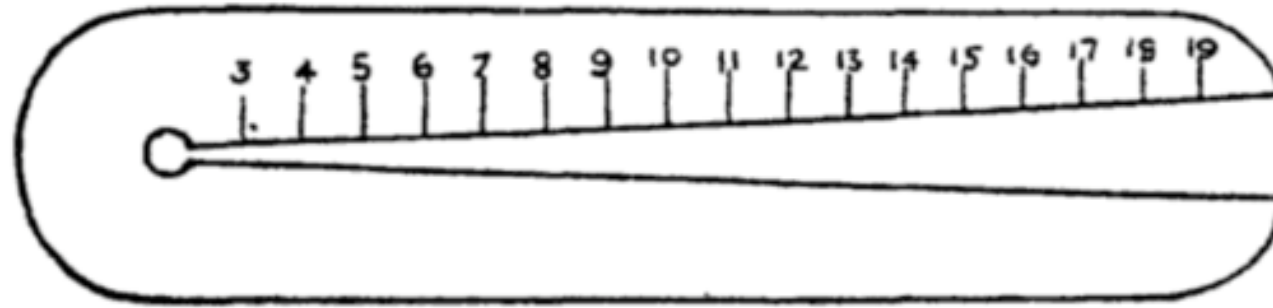


The **inlay, or footbed**, will be removed in a diabetic shoe and replaced with an insert. Typically offers no therapeutic value.



An **insert** can accommodate or assist during ambulation.





Irons

Unit of measure. One iron equals $1/48^{\text{th}}$ inch

Ex: A sole that measures 12 irons is $\frac{1}{4}$ inch thick



Rocker Sole

Most shoes have a mild rocker sole which promotes proper gait, assists during ambulation and provides offloading for the forefoot