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Foot Anatomy and Physiology

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[h2]Foot Anatomy Overview

The foot is an incredibly complex mechanism. This introduction to the anatomy of the foot and ankle will not be exhaustive, but rather try and highlight the structures that will be discussed in the sections below.

Foot Structure

The forefoot includes the five metatarsal bones, and the

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phalanges (the toes).

The first metatarsal bone bears the most weight and plays the most important role in propulsion. It is the shortest and thickest.

It also provides attachment for several tendons. The second, third, and fourth metatarsal bones are the most stable of the metatarsals. They are well protected and have only minor tendon attachments and are not subjected to strong pulling forces.

Near the head of the first metatarsal, on the plantar surface of the foot, are two sesamoid bones (a small, oval-shaped bone which develops inside

a tendon, where the tendon passes over a bony prominence) They are held in place by their tendons, and are also supported by ligaments.

The midfoot includes five of the seven tarsal bones (the navicular, cuboid, and three cuneiform). The distal row contains the three cuneiforms and the cuboid. The midfoot meets the forefoot at the five tarsometatarsal (TMT) joints. There are multiple joints within the midfoot itself. Proximally, the three cuneiforms articulate with the navicular bone.

The talus and the calcaneus make up the hindfoot. The calcaneus is the largest tarsal bone, and forms the heel. The talus rests on top of it, and forms the pivot of the ankle.

Foot and Toe Movement

Toe movements take place at the joints. These joints are capable of motion in two directions: [plantar flexion](#) or [dorsiflexion](#). In addition, the joints permit [abduction](#) and [adduction](#) of the toes.

The foot as a whole (excluding the toes) has two movements: [inversion](#) and [eversion](#). All the joints of the hindfoot and midfoot from the subtalar contribute to these movements, which are complex and consist of several components. In addition, foot movements ordinarily are combined with ankle movements.

The Foot Arches

[The foot has two important functions: weight bearing and propulsion. These functions require a high degree of stability. In addition, the foot must be flexible, so it can adapt to uneven surfaces. The multiple bones and joints of the foot give it flexibility, but these multiple bones must form an arch to support any weight.](#)

[The foot has three arches. The medial longitudinal arch is the highest and most important of the three arches. It is composed of the calcaneus, talus, navicular, cuneiforms, and the first three metatarsals. The lateral longitudinal arch is lower and flatter than the medial arch. It is composed of the calcaneus, cuboid, and the fourth and fifth metatarsals. The transverse arch is composed of the cuneiforms, the cuboid, and the five metatarsal bases.](#)

[The arches of the foot are maintained not only by the shapes of the bones as well as by ligaments. In addition, muscles and tendons play an important role in supporting the arches.](#)

Muscles of the Foot

[The muscles of the foot are classified as either intrinsic or extrinsic. The intrinsic muscles are located within the foot and cause movement of the toes. These muscles are flexors \(plantar flexors\), extensors \(dorsiflexors\), abductors, and adductors of the](#)

[toes. Several intrinsic muscles also help support the arches of the foot.](#)

[The extrinsic muscles are located outside the foot, in the lower leg. The powerful gastrocnemius muscle \(calf\) is among them. They have long tendons that cross the ankle, to attach on the bones of the foot and assist in movement. The talus, however, has no tendon attachments.](#)

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