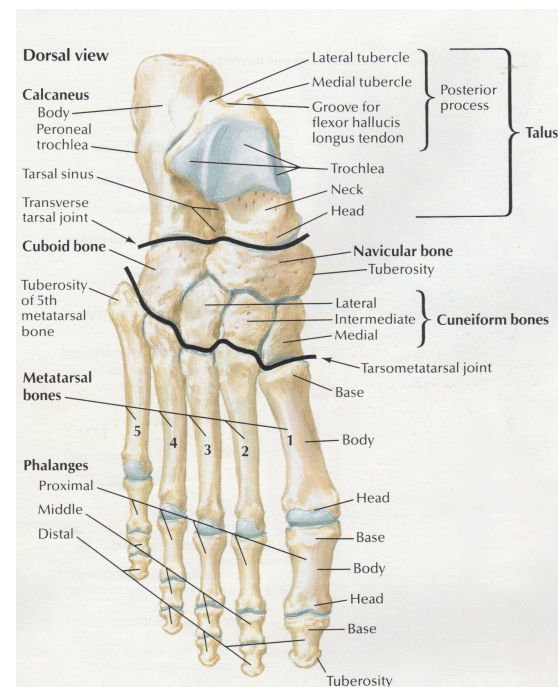


Applied Anatomy For The Foot and ankle

The lower leg and foot are a complex structure of muscles, tendons, ligaments and bones responsible for withstanding the stresses of walking, running or jumping. The lower leg and foot are the interface between the body and the ground. Every time the foot makes contact with the ground it transfers the forces of gravity, multiplying the individual's body weight downward by 2 with walking and 2-4 times with running. A understanding of lower extremity alignment and foot biomechanics can help understand common foot injuries and shed light on great diversity within the yoga community.

The foot and ankle form a complex system which consists of 28 bones, 33 joints and 112 Ligaments, controlled by 13 extrinsic and 21 intrinsic muscles.

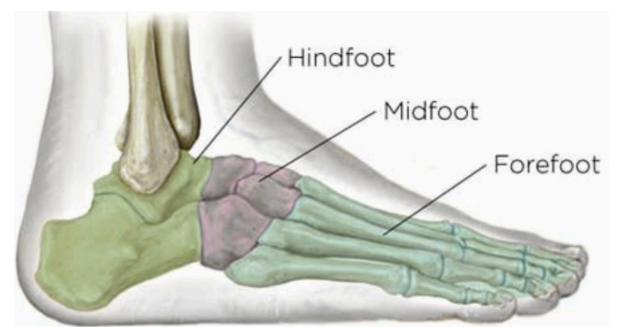
The ankle joint is made up of the lower leg bones tibia, fibula and talus which together forms the powerful joint (talocrural joint) that transmits the



entire weight of the body to the foot and acts as a hinge joint that allows for dorsiflexion (lifting toes up) and plantarflexion (pointing toes down).

The foot is subdivided into 3 regions the hindfoot, midfoot and forefoot and the bones of the foot are subdivided into Tarsals, metatarsals and phalanges. The tarsals are located within the hind and midfoot. The metatarsals and phalanges are in the forefoot. The

Hindfoot is comprised of the talus and the calcaneus (heel bone) and the joint that is formed between them is the talocrural (subtalar joint). This hind foot complex controls pronation and supination, shock absorption involved in

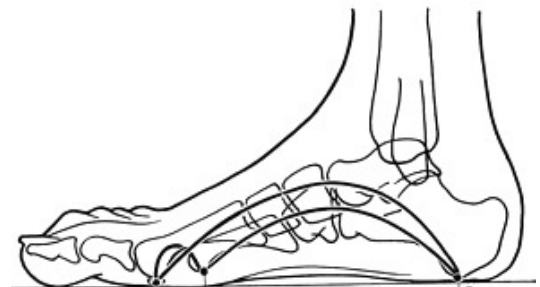


pivoting and side to side motions with gait. The midfoot is made up of tarsal bones: navicular, cuboid and medial, middle, and lateral cuneiforms. The junction between the hind and midfoot is termed the Chopart's joint, which includes the talonavicular and calcaneocuboid joints. The forefoot is the most anterior aspect of the foot. It includes

metatarsals, phalanges (toes), and sesmoid bones. The articulation of the midfoot and forefoot forms the Lisfranc joint.

The bones of the foot are formed into a powerful structure of three arches, that is not unlike a arch of a bridge. These bony arches are supported by ligaments that connect bone to bone and tendons that connect muscle to bone, together with the muscles of the foot and lower leg all work together act like cables or “the span of a bridge” to maintain and support these arches. This dynamic shape acts like a spring to absorb the weight and shock of

locomotion and provide stability and balance. Then during the push off phase of the gait cycle, the arches become a rigid



platform to spring forward in a step or run. The three arches create three points of contact with the ground creating a stable structure. The two longitudinal arches are the medial or inner and the lateral or outer arches. The medial arch is the largest, the longest and the most flexible. Therefore controlling shock absorption when lengthening and then

becoming more rigid with shortening. The medial arch also controls the dorsiflexion (bending up) of the great toe required for push off. The lateral arch is shorter and shallower and has less mobility. The transverse arch has an anterior portion that crosses from medial to lateral along the distal metatarsal heads and the posterior portion that crosses along the proximal cuneiform and cuboid bones.

Everything starts from the bottom up, in other words the mechanics of the foot effect the entire the entire body via the “kinetic chain” or the dynamic musculoskeletal systems of the body. Conversely the shape of our bones “normal variance” and body mechanics vary enormously between individuals and effect the mechanics of the feet and gait. Some examples we will cover:

- The shape of our pelvis wide or narrow
- angles of our joints, bowlegged, knock knees, femoral torsion
- Leg length differences, who is really symmetric ?

- foot pronation “rolling in” and supination “rolling out”
- biomechanics of Gait; phases of gait and foot mechanics “what is normal pronation and supination

Yoga is an ancient and comprehensive system of health and teaching yoga presents a great opportunity to apply your understanding of the body and effect real change with your students.

suggested Reading List:

The Key Muscles of Yoga by Ray Long MD	Bandhayoga
The Key Poses of Hatha Yoga by Ray Long MD.	Bandhayogq
Anatomy of Movement by Blandine Calais-Germain	Eastland Press
Atlas of Human Anatomy by Frank Netter	Novartis
The Physiology of the Joints by I.A. Kapandji	Churchill Livingstone
Anatomy of Yoga by Paul Grilley	Pranamaya