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## Prevention and Treatment of Injuries

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Houston, TX

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## The Foot – The anatomy

- The foot consists of 26 bones:
  - 14 phalangeal
  - 5 metatarsals
  - 7 tarsal

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## Toes

- Serve to give a wider base both for balance and for propelling the body forward
- Two sesamoid bones are located beneath the first metatarsophalangeal joint – act to reduce pressure in weight bearing and to increase advantage of the flexor tendons of the Great Toe

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**Metatarsals**



- Five bones that lie between and connect the tarsals and phalanges.
- The first metatarsal is the largest and functions as the main weight bearing support during walking and running.
- Little movement, but they do widen during weight bearing

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**Tarsal Bones**



- Seven tarsal bones, located between the bones of the lower leg and the metatarsals.
- They are important for support of the body and its locomotion.
- Calcaneus, talus, cuboid, navicular, and 3 cuniform bones.

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**Bones of the Foot**



- Calcaneus: Largest tarsal bone, supports the talus and shapes the heel. Main functions are to convey the body weight to the ground and the serve as an attachment for both the Achilles tendon and several structures on the plantar surface of the foot.

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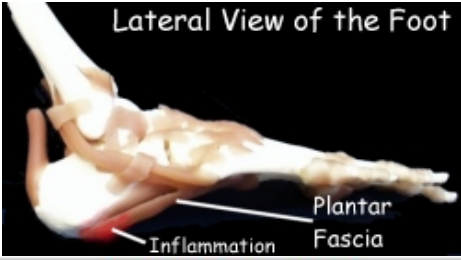
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## Calcaneus

Lateral View of the Foot

Inflammation      Plantar Fascia

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## Talus



- Irregularly shaped bone that is most superior of the tarsal bones. Situated above the calcaneus. Consist of a body, neck and head. The uppermost part of the talus is the trochlea, which articulates with the medial and lateral malleoli to form the ankle joint. The talus is broader anteriorly to prevent forward slipping by the tibia during locomotion.

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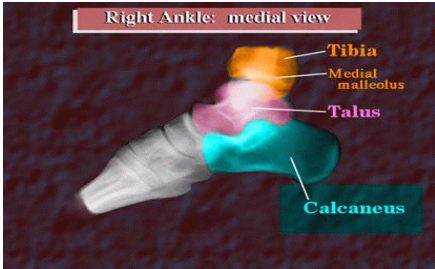
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## Talus

Right Ankle: medial view

Tibia  
Medial malleolus  
Talus  
Calcaneus

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**Navicular / Cuboid /  
Cuneiforms**



- Navicular: Positioned anterior of the talus on the medial aspect of the foot. Anteriorly articulate with three cuneiform bones.
- Cuboid: Lateral aspect of foot; articulates posteriorly with calcaneus and anteriorly with the fourth and fifth metatarsal.
- Cuneiforms: Three bones located between the navicular and the base of the three medial metatarsals

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**Arches of the Foot**



- Medial Longitudinal Arch: from the medial border of the calcaneus and extends forward to the distal head of the first metatarsal.
- Lateral Longitudinal Arch: Is on the outer aspect of the foot, follows the same path of the Med. Long. Arch, formed by the calcaneus, cuboid and fifth metatarsal bones.

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**Arches of the Foot**



- Anterior Metatarsal Arch: is shaped by the distal heads of the metatarsals.
- Transverse Arch: extends across the transverse tarsal bones, primarily the cuboid and the internal cuneiform, and form a half dome.

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## Plantar Fascia



- A thick white band of fibrous tissue originating from the medial tuberosity of the calcaneus and ending at the proximal heads of the metatarsals. Supports the foot against downward forces.

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## Joints



- Interphalangeal Joints
- Metatarsophalangeal Joint
- Intermetatarsal Joint
- Tarsometatarsal Joint
- Subtalar Joint

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## Subtalar Joint



- The articulations between the talus and the calcaneus. Inversion, eversion, pronation and supination are normal movements that occur at the subtalar joint.

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## Prevention to Foot Injuries



- Selecting Proper Footwear
  - Think of Sport Specifics
  - Is there any structural deformities
  - Slip-last shoe – moccasin, sewn together
  - Board-last shoe – Fiberboard attached to upper
  - Combination-lasted shoe is boarded in the back and slip lasted in the front
  - Heel counter in heel of shoe

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## Orthotic



- Using orthotics can prevent many injuries associated with biomechanical problems. Plastic, rubber or leather support that is placed in the shoe as a replacement for the existing insert. You can buy ready made orthotics at a shoe or sporting goods store, and custom made orthotics by an athletic trainer or physical therapist.

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## Shoe Wear Patterns



- One can learn a lot of information by looking at the shoes and athlete wears either during the day or in training.
- The key to inspection of wear patterns on shoes is observation of the heel counter and the forefoot. The heel strike can give a little added insight.

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## Foot Patterns



- Look at the bottom of the foot for callus patterns
- Where the foot has a callus is where the person is weight bearing
- You can learn a person's gait pattern and weight transfer by looking at callus patterns.

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## Calcaneal Apophysitis



- Also known as Sever's Disease
- Comparable with Osgood-Schlatter's
- Pain over posterior heel below that attachment of the Achilles tendon insertion of the child or adolescent athlete
- Best treated with ice, rest, stretching, and anti-inflammatory medications.

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## Heel Contusion



- Caused most likely by sudden start and stop sports or jumping
- Severe pain in the heel, and unable to withstand the stress of weight bearing
- Non-weight bearing for 24 hours, RICE applied, NSAIDs, protection with heel cup or doughnut pad.

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## Longitudinal Arch Strain



- Caused by subjecting the musculature of the foot to increased stress produces by repetitive contact with hard surfaces.
- As a rule, pain is experienced only during running and jumping.
- Immediate care, consisting of RICE, followed by appropriate therapy and reduction of weight bearing. Tape arch.

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## Jones Fractures



- May occur to any of the metatarsals and can be caused by inversion and plantar flexion of the foot; by direct force, such as being stepped on by another player, or by repetitive stress.
- By far the most common acute fracture is to the diaphysis at the base the fifth metatarsal.

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## Jones Fractures



- Characterized by immediate swelling and pain over the fifth metatarsal. Healing is slow and frustrating. Injury has a high nonunion rate, and the course of healing is unpredictable

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## Jones Fracture

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## Jones Fractures

- Controversial treatment, it appears that the use of crutches with no immobilization, gradually progressing to full weight bearing as pain subsides, may allow the athlete to return to activity in about 6 weeks. If nonunion occurs, the internal fixation will be needed.

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## Sesamoiditis

- Caused by repetitive hyperextension of the great toe that eventually results in inflammation. Most common in dancing and basketball.
- Complains of pain under the great toe, especially during push off...Tenderness is palpable under the first metatarsal.

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**Sesamoiditis**



- Treat with a variety of orthotic devices, including metatarsal pads, arch supports, and most often, a metatarsal bar.
- A piece of felt can be cut out to relieve pressure from the sesamoid.

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**Turf Toe**



- A hyperextension injury resulting in a sprain of the metatarsophalangeal joint of the great toe. Most often on synthetic turf, but can occur on grass as well. Often because turf shoes are more flexible and allow more dorsiflexion of the great toe.

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**Turf Toe**



- Significant pain and swelling in and around the metatarsophalangeal joint of the great toe. Pain is felt when the athlete tries to push off the foot in walking and certainly in running and jumping.

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## Turf Toe



- Steel toes inserts, shoes with steel toes built into the fronts.....
- Taping the great toe to limit dorsiflexion can be done with the help of the steel toe inserts, or by itself.

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