

A close-up photograph of a person's legs and feet walking on a sandy beach. The person is wearing no shoes, and their feet are covered in sand. The background shows the ocean waves crashing onto the shore. The text is overlaid on the right side of the image.

## **When the Foot Hits the Ground from Toe to Heel**

**How to keep your feet  
healthy and prevent  
foot disorders**

**Series 2: Common Foot Ailments**





## Common Foot Ailments

**D**o you complain of foot pain? It is not surprising because your feet absorb the impact of your daily activities and wear as you age. Since most of us take five to ten thousand steps a day, the total impact quickly adds up. After age thirty, your bones and muscles in your feet may tend to weaken and the fat pad on the bottom of the feet begin to atrophy, resulting in less cushioning around the bones of the feet <sup>1</sup>.

From toe to heel, this series, Common Foot Ailments, reviews our normal gait cycle while walking or running, common types of feet, and associated symptoms and treatment options of common foot pain.

### Help us to help others

Help us make this book fun, relevant and current for everyone with aching feet. Feel free to submit studies, articles, photos, videos by email to [info@alphaorthotics.com](mailto:info@alphaorthotics.com).

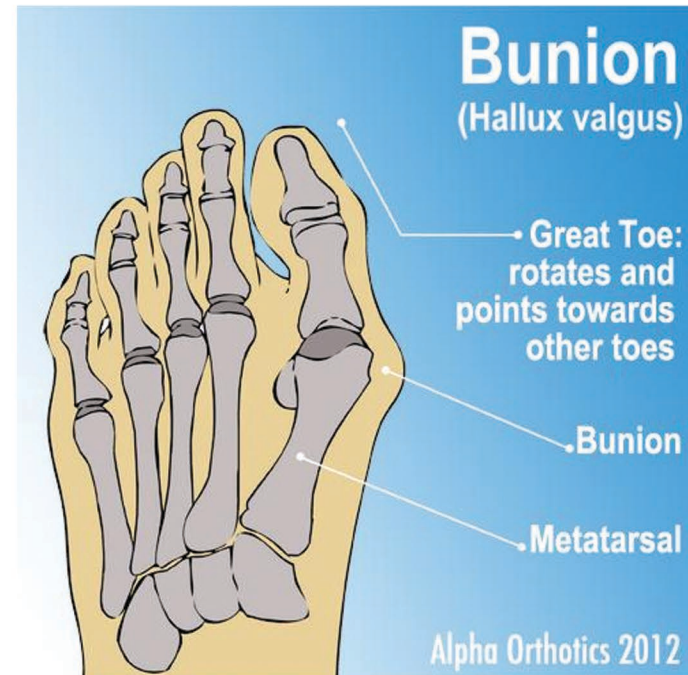
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## Biomechanics of the foot

The health of your feet depends on the normal interaction between your toes & forefoot, mid-foot, and your heel & ankle. Foot disorders are frequently caused by abnormal biomechanics of your entire foot and can lead to other painful conditions of the pelvic, hips, or back if not properly treated.

A normal gait cycle includes 'pronation' and 'supination'. Pronation occurs after the heel strikes the ground and continues as your weight transfers to the forefoot. The foot tends to roll inward and the arch flattens; it flexes in order to absorb the impact. Supination occurs when the heel starts to lift, a more rigid movement, propelling your body forward. Proper function of your feet and lower leg muscles and ligaments during pronation and supination facilitate a normal gait cycle and proper weight distribution while walking or running.

Link to YouTube video for normal gait  
[The Gait Cycle: A Breakdown of each Component](#)



*“It has been well documented that foot problems increase with age. A European study found less than 3 percent of those over sixty have ‘normal feet.’”<sup>2</sup>*





## Three types of feet to know about

An imprint of your feet (simply dipping your feet in water and walking on a smooth surface) reveals one of three common shapes that help define the type of feet that you might have:

1. An exaggerated curve shape between the heel and toes usually indicates a **high arch**. Feet with high arches tend to be more rigid and less efficient at absorbing impact resulting in repeated or severe ankle sprang.
2. A rather straight “filled in” area under the arch between the heel and toes indicates a **flat or collapsed arch**. Low arches need support to prevent pain from arthritis and tendonitis of the feet and knees.
3. A shape somewhere in between the high arch and flat arch is considered **neutral or normal**. About 90% of feet are considered normal and are most efficient in absorbing impact and transferring your weight from the heel to toes. <sup>3</sup>



*There are over 250,000 sweat glands in your feet which excrete as much as a half-pint of moisture per day under the stress of taking 8,000 - 10,000 steps per day. <sup>4</sup>*

*“The skin on your feet is 20 times thicker than on any other part of your body!” <sup>5</sup>*





## Common foot ailments and treatments

Although most common foot ailments include many parts of the foot, for simplicity, refer to the part where the symptom appears: Forefoot (toes and ball of the foot), Mid-foot (top of the foot and arch), and Hind foot (heel and ankle).

Reviewing this video, [Introduction to lower limb biomechanics](#) will help you understand the anatomy of the foot.

### Forefoot Pain

**Metatarsalgia, also known as “ball of foot pain.”**

There are a number of reasons that the mid-foot collapses; one of the most common is the shortening of the Achilles tendon (or calf muscle) which pulls up the heel bone earlier than in a normal gait cycle. As it does, the ankle bone (talus) tilts downward causing the midfoot to collapse, forcing the 1st metatarsal (big toe joint) upward which transfers weight to lesser metatarsals joints that are not equipped to carry this weight.

Wearing rigid, supportive shoes and avoiding high heels helps reduce the pain in the ball of the foot. [Metatarsal pads](#) which are teardrop-shaped pads placed directly behind the ball of the foot help transfer pressure away from the ball of the foot.



*“Metatarsals are the long bones in the forefoot. There are five in each foot, one leading up to each toe and forming the metatarso-phalangeal (MTP) joints with the phalanges (toe bones) at the base of each toe. They also form the tarsal-metatarsal (TMT) joints with the tarsal bones towards the ankle.”<sup>6</sup>*



## Metatarsal Stress Fractures

A stress fracture usually starts as a small crack in the outer shell (the cortex), often invisible to an X-Ray, but over time can progress into the bone. Most common are stress fractures of the 2nd and 3rd metatarsal bones. The pain, and sometimes swelling, will occur on top of the foot.

Stress fractures are common among runners, dancers, military personnel and athletes. Stress fractures are usually caused by 'overuse' or too much pressure on the metatarsal due to a foot deformity such as bunions or abnormal foot structures. Initial treatment of a mild to moderate stress fracture should include an orthotic support or brace with a metatarsal pad which redistributes the weight away from the stressed metatarsal.



*Basketball is just one example of a popular sport that results in 'overuse' or 'acute' injuries - an estimate of over 1.5 million injuries per year. <sup>7</sup>*



## Redness, pain or swelling of the big toe joint

The symptom of redness, pain and swelling of your big toe joint is indicative of one of the following:

- **Arthritis (Hallux limitus or Hallux rigidus):** A common arthritic condition that forms a bump on top of the big toe joint. It can grow and cause much pain as it rubs against your shoe. Supporting the foot and decreasing the workload on your joint with a firm insole and arch support is the most common way to treat it. Also, shoes in which you rock in as you walk help relieve pressure.
- **Bunions:** This symptom provides an early warning of a mild to moderate bunion (Hallux valgus) which can be treated with a flexible [hinged splint](#), Bunion Aid®. Daily wear helps correct the malpositioning of your big toe through the range of motion, and in many cases, prevents further progression of the bunion. For more information about bunions, download [When the Foot Hits the Ground from Toe to Heel, Series 1: Bunions](#).
- **Gout:** The build-up of uric acid crystals in the bloodstream crystallize and deposit in the joints, especially those of the feet. Anti-inflammatory medication and a change in food diet are most commonly prescribed for this painful condition. <sup>8</sup>



*It is misleading to think you do not have a bunion unless you incur pain. In general, it can take many years for a bunion to develop, and especially to the point of pain.*

*Early signs of a bunion include:*

- *Early movement of the big toe towards the smaller toes*
- *Bump on the base joint of the big toe*
- *Deep dull “in the joint” pain*
- *Pain on top or side of the big toe from shoe pressure*



## Hammertoe, severely bent toe(s)

A hammertoe is a permanently bent toe, usually one of the four smaller toes. The fourth and fifth toes tend to rotate under slightly as well as bend. A more severe hammertoe will actually start to cross over the toe next to it. Because of the bent nature of hammertoes, painful calluses and corns form over time. Treatment includes wearing shoes that avoid pressure on your toes and using gel toe sleeves and hammertoe splint loops.

As a hammertoe becomes progressively more bent, pressure on your joint between the toe and the ball of the foot increases resulting in a condition called capsulitis - an inflammation of the joint. Wearing metatarsal pads can help redistribute pressure away from your toes. <sup>9</sup>



*There are two types of hammertoes:*

1. **'flexible'** hammertoes can be straightened with the fingers and are usually easy to treat with metatarsal pads to alleviate pressure and splints to decrease the contraction of the toes.
2. **'rigid'** hammertoes cannot be straightened with the fingers and often require surgical treatment.





## Mid-foot Pain

Fallen and collapsed arches are the root of many foot problems

According to Northcoast Footcare, Inc. tight calves and overpronation cause a majority of foot problems. When the calf muscles (or Achilles tendon) are too tight, it pulls up the heel bone earlier than in a normal gait. As it does, the talus (ankle bone) tilts downward and rotates inward, forcing the mid-foot to collapse. Otherwise, known as overpronation. <sup>10</sup>

Although fallen arches can be hereditary, obesity, diabetes, arthritis and inappropriate shoes frequently contribute to the condition. Jonathan Cluett, M.D., About.com Guide, recommends arch supports, either “off the shelf” orthotics insoles or custom orthotics. A brace with an adjustable dual strapping support system that provides an inward and upward support to the metatarsal arch is a new way to provide support to a collapsed arch. Also, avoid wearing high heels because wearing high heels over time causes the Achilles tendon to tighten.

Those who have flat feet (pes planus) or collapsed arches may suffer from a syndrome known as Posterior Tibial Tendon Dysfunction (PTTD). The symptom is pain from behind the ankle bone to the arch of the foot. Flat-footed women ages 40 - 60 years of age and overweight are most common among those who are affected by PTTD. Seek advice from a podiatrist or orthopedist where they will most likely recommend rigid shoes or custom insoles. <sup>11</sup>



### ***The role of your mid-foot in walking and running***

*The mid-foot consists of five irregularly shaped tarsal bones that are connected to the forefoot and hind foot by muscles and the plantar fascia (arch ligament.) Your mid-foot helps transfer weight from your heel to toes through the motion of walking and running.*

*You place about 2-3 times your body weight in pressure on your feet when walking. When running, this pressure can increase to nearly 7 times your body weight! <sup>12</sup>*





## Foot Arthritis

**A**rthritis in the feet is most common among those who have flat feet because the mechanics of the foot have shifted in a way that places excessive stress on the joints. Over time, cartilage that protects your joints start to break down, creating friction in the joints. Symptoms include frequent aching and pain, bones spurs on top of the foot, and general bone stress.

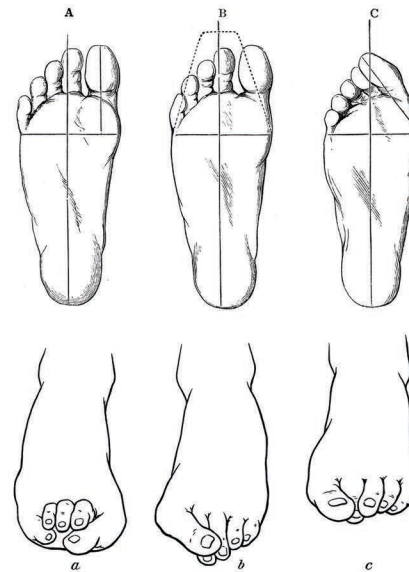
Using a strong adjustable arch support controls the flattening of the foot, reducing stress on arthritic joints. <sup>13</sup>

## Plantar fibroma

Plantar fibroma is a soft fibrous benign tumor that grows very slowly on the arch of the foot. Sometimes, it disappears without treatment or it can be treated with custom-molded orthotics that decreases pressure on the tumor site.

## Exterior tendonitis

Exterior tendonitis is an inflammation of tendons on top of the mid-foot usually caused by tight shoes or tightly laced shoes. Most common treatment is icing the site, taking an anti-inflammatory medication, and gently exercising the foot with stretching exercises. <sup>14</sup>



The human foot has been called the “mirror of health.” There are more than 300 different foot ailments. Some can be traced to heredity, but for an aging population, most of these ailments stem from the cumulative effect of years of neglect or abuse. Many foot problems can be treated successfully, and the pain of foot ailments relieved by visiting a Podiatrist, a doctor of podiatric medicine (DPM).

Source: [APMA.org](http://APMA.org)





## Hind foot (Ankle & Heel) Pain

### Plantar Fasciitis

**P**lantar fasciitis is the most frequently encountered cause of heel pain, according to Dr. Stephen M. Pribut, DPM. Plantar fascia is the fibrous tissue that connects the heel bone to the bottom of the toes, providing support throughout the bottom of your foot. The weakest point is where the plantar fascia attaches to the heel bone. Excessive pressure on this area may cause pain to shoot down into your toes. Also abnormal motion of the foot caused by overpronation frequently leads to Plantar fasciitis. Pain usually occurs during the first few steps after sitting or resting and usually subsides. However, prolonged standing, walking, or running can inflame the fibrous tissue.

### Posterior Heel Spurs

A heel spur (calcification of the Achilles tendon) causes pain to the back of the heel bone or up the tendon of the heel. Essentially, this hook of bone leads to inflammation, pain and swelling. Pressure from shoes and activity can sometimes make the symptom worse. Treatment usually includes physical therapy, anti-inflammatory medication, stretching, and wearing open-backed shoes such as clogs or sandals.<sup>18</sup>

### Achilles tendonitis

Inflammation of the Achilles tendon usually starts with stiffness in the back of your heel or ankle, and pain can shoot up your leg when pulling your toes forward. Stretching the tendon gently and wearing more supportive shoes and arch supports can help eliminate the pain.



*Lower Extremity Review publishes an informative discussion of the new guidelines for heel pain treatment and touches upon the controversy around various treatments of plantar fasciitis.<sup>16</sup>*

*Slight elevation of the heel by wearing heel cups or heel wedges in your shoes helps elevate your hind foot, reducing pressure on the plantar fascia. Also, rest, anti-inflammatory medicine and aggressive stretching exercises are often recommended.<sup>17</sup> Night splints that hold the foot at a 90° angle, stretching the calf muscle and plantar fascia are essential in treating severe cases of Plantar Fasciitis. Also Cortisone injections, physical therapy, and custom orthotics can help relieve pain.*

*Watch a [video on Plantar fasciitis](#)*





## Seriously consider the styles of your shoes

Now that you are aware of some of the foot conditions that are associated with certain types of foot pain, you should consult with your medical physician or professional for additional treatment options.

In the meantime, the most common advice is to wear proper-fitting shoes with appropriate support, stretch and exercise your feet, and lessen the impact on your feet by keeping your body weight down.



## Treat your Feet with Home Remedies for Foot Pain

*Vinegar: Alternate between a hot & cold water mixed with vinegar 'towel wrap' - five minutes each, three times.*

*Epsom salt: Soak your feet for at least fifteen minutes in a warm bath filled with Epsom salt.*

*Sage: Rub a couple of sage leaves and boil in 2/3 cup of apple cider vinegar. Soak a cloth in it apply to your feet.*

*Water: Good ole' H2O - Dip your feet in hot water for two minutes; dip in cold water for fifteen seconds. Alternate for up to fifteen minutes.*

*Food: Reduce bloating or foot swelling with foods that help keep fluid levels balanced: bananas, coffee, tea, poultry, fresh fish, and yogurt.<sup>19</sup>*





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## Disclaimer

*The content of this e-book, "When the Foot Hits the Ground from Toe to Heel", was carefully compiled from various publications, web sites, and other resources. Particular value was placed on providing an overview of the foot and common conditions in layman terms. We would like to point out that the information found in the e-book is of general nature and cannot cover every individual need.*

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At the beach, take off your shoes and walk in the sand. This not only massages your feet, but strengthens your toes and is good foot conditioning.

