

## Orthotics Primer

Did you know that the average person walks about 250,000 miles in their lifetime? When a person weighing 165-170 pounds walks an average of 7.5 miles a day they will carry 500 tons a day on each foot! Your feet are remarkable pieces of equipment--they must act as rigid levers to propel the body forward and also act as shock absorbers during their initial contact with the ground. Their complex structure allows your feet to perform these functions very well; however, they are obviously subject to tremendous stresses, making them and the other body parts associated with walking the targets for many possible problems.

During improper foot and ankle movement, the wrong muscles contract or they contact out of their proper, critical sequence. Your muscles and tendons eventually fatigue and break down suffering microscopic tears. This triggers inflammation leading to swelling, pain, and scarring in these tissues. As well, your joints may suffer excess wear leading to inflammation and possibly degeneration. Consequently, pain and dysfunction may arise in your feet, ankles, legs, knees, thighs, hips, low back, and further "up the chain."

*Pronation* is the term used to describe the specific ankle bone movement which enables the foot to absorb the forces pushing back at the foot from the ground and the rotational forces from the lower limb, and allows the foot to adapt to variations in terrain. Similarly, *supination* is the term used to describe ankle movement enabling the foot to act as a rigid lever to help propel the body forward and provide a solid base of support.

*Overpronation* affects 90-95% of people with abnormal foot mechanics. It occurs when the foot pronates too much or for too long and does not return to its neutral position during the foot flat or mid-stance phase of gait (walking or running movements). Overpronation is often associated with flat feet or low arches.

Overpronators may suffer from a number of overuse syndromes:

- plantar fasciitis (inflammation of the tissues under the heel and arch, sometimes leading to heel spurs)
- Achilles tendonitis (inflammation behind the ankle and bottom of the calf muscles)
- shin splints (inflammation at the bone-tendon junction at the front or back of the shin bone or tibia)
- patellar (kneecap) tendonitis
- iliotibial band syndrome (tightness and inflammation of the tendinous sheet at the outside of the knee)
- patellofemoral syndrome (inflammation and abnormal wear between the knee joint and the covering kneecap)

*Oversupination* affects the other 5-10% of people with abnormal foot mechanics. It occurs when the joints in the ankle excessively supinate and prevent proper foot pronation, thus locking the ankle joints and preventing proper shock absorption. Oversupination is often associated with rigid, high arches.

Oversupinators suffer from problems related to poor shock absorption and are at greater risk for developing degenerative arthritis (osteoarthritis) at the major weight bearing joints. They may also experience low back, lateral knee, and hip pain.

In addition to treatment aimed at reducing inflammation, strengthening and stretching the muscles, and promoting proper joint mobility, custom made orthotics can play an integral role in the overall treatment of many problems caused by ankle and foot dysfunction. Custom orthotics can help increase mechanical efficiency at your ankle and foot to reduce abnormal mechanical stresses.

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