

# STARTING LINE



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## *Biomechanics and Shoe Wear: Defense Against Injury*

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Take a look at your athletic shoes. Are they worn out at the inside front edge? Is one shoe wear pattern different than the other? If so, you are at an increased risk for attaining an overuse injury.

Examining the shoes should be the first thing to look at when suspecting a structural imbalance. Patients commonly complain of knee aches, hip pain and low back pain. This may be due to a lower extremity structural alignment problem such as one leg being longer than the other. This causes the longer leg's foot to collapse and in doing so, wears this shoe out excessively and sets up potential problems elsewhere.

Some athletic patients have kneecaps that face in an inward direction upon which there is an associated rolling-in of the arches. Actually, it may be the poor foot structure that allows the foot to collapse, turning kneecaps inward. All this twisting movement causes pain around the knee especially in pivoting sports like tennis, racquetball, basketball, dance and running routines that involve turns and sprints.

Quite often there is a structural flaw within the ball of the foot area in relation to the heel portion of the

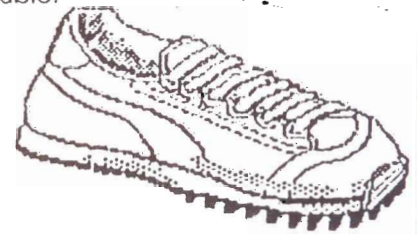
foot. Here, the foot joints are out of alignment and the toe portion of the foot must twist downward for the foot to sit firmly flat on the ground. This is seen as a collapsing or rolling-in of the arch and is termed "pronation." This tends to excessively wear out the shoe under the big toe. Besides affecting shock absorption, this stretches out the inside edge of the leg muscles and inside of the knees, causing tendon and ligament pulls and strains. It also compresses the outside portion of the knee causing excessive cartilage wear. In addition, pronation causes the pelvis to drop forward and increases the curvature of the lower back, all leading to injury and pain after excessive and repeated activity.

In people with high arched feet it is common to see excessive shoe wear at the outside edge of the heel and if severely high arched, also along the outside edge at the toe end of the shoe. If the individual cannot get the foot totally flat on the ground and there is more weight bearing on the outside edge of the entire foot, this is termed "supination." This causes stress to the muscles on the outer edge of the ankle, leg, knee and hip that leads to vari-

ous injuries over longer periods of time.

In order to correct these overuse problems, I use muscle strengthening and stretching exercises that balance muscle power and attempt to hold the foot in proper alignment. I also use many different taping techniques in combination with orthopedic felts to hold the foot joints in proper position. This takes strain off injured tendons and ligaments and allows muscles to work more efficiently. This also enables the injured participant to continue activity during the rehabilitation process. If there is a structural flaw present, I fabricate specific temporary or permanent in-shoe devices (orthotics) to prevent compensations within the foot, knee or hip that are the culprits of most overuse stresses and strains.

In summary, be sure to look at your shoes; uneven wear can indicate structural discrepancies leading to potential injuries. There should be shoe wear at the center and outside edge of the heel and wear that is even across the entire ball of the foot. Any difference in shoe wear patterns, right versus left, indicates trouble.



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