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THE ROLE OF THE FOOT IN STANDING AND WALKING

The foot has a number of important functions relating to standing and walking positions. The foot functions as a shock absorber. It ensures good contact with the floor surface. It also registers pressure distribution on the foot partly for the sake of balance and partly to ensure that the central nervous system receives vital information about the character and gradient of the floor.

The sole of the foot has a certain capacity to perform the necessary shock absorption in natural, soft surroundings. However, modern man stands and walks more than 95% of the time on hard surfaces including floors, pavement and tiles. This results in an increased biodynamic load that increases the long term risk of injury due to constant jarring and jolting to the heel, knees, hips and back. In many work environments there is a definite need for added shock absorption.

SHOCK ABSORPTION AND PRESSURE DISTRIBUTION

We are very sensitive to concentrated pressures. To avoid concentrating pressure on the heel bone it is necessary that the heel has the largest possible support surface area to redistribute force over the largest possible surface. In the case of a heel the tissue layer supporting the heel bone is approximately 15 mm thick. This heel pad is the most important shock absorber in the foot. The heel pad tissue is made up of large closed compartments filled with liquid fat into which the heel bone settles when loaded. When walking or running the heel bone moves into the heel pad achieving powerful shock absorption. At the same time hydraulic pressure absorption takes place within from the closed, fat-filled compartments surrounding the heel bone which redistribute the impact pressure forces over a large surface. When the heel is relieved, blood pressure immediately inflates the heel pad making it ready to receive a new load.

Shock absorption in shoes and in static shoe insoles is usually designed from a springy material, which is compressed vertically in the area of the heel in the shoe. The fluid filled shoe inserts such as insoles the shock absorption is dynamic in all directions.

The heel bone is subject to impact forces of up to 4 to 5 times body weight during running and walking. Heel pad thickness is critical as a tissue reduction of just a few millimeters can cause a great deal of pain however an overabundance of tissue can cause reduced walking stability. The thin (1.5mm) design of the shoe insole combined with the size and location of unique fluid channels permit improved shock absorption in shoes without reducing stability.

When walking, the fluid initially provides the heel pad with from one to two extra millimeters of shock absorption. The insole significantly reduces the load on the heel bone as it slows the impact of the heel strike on the heel pad which reduces the amount that a heel pad will flatten. When the heel strike occurs it takes a short time for the fluid to move through the heel compartment due to uniquely configured longitudinal channels

with built-in flow barriers. As a result the impact redistribution time is increased and this is when shock absorption in fluid filled shoe insoles starts. With each heel strike fluid pressures build up and then subside around the heel pad effectively providing shock absorption. The fluid then quickly flows away in a massaging “compression wave” under the sole of the foot to the forefoot giving the heel unobstructed and stable contact with the shoe.

The thickness of the design assures stability and makes shoe insoles versatile enough to be installed in every type of shoe.