



THE ROLE OF CIRCULATION IN FOOT HEALTH

Most working people have experienced tired, sore and aching feet. In recent years a great deal of attention has been focused on shock absorption in shoes or mats in respect to relieving fatigue and stress. In fact, the single largest foot, knee and back problems attributable to jobs requiring standing and walking on hard surfaces are the consequence of poor circulation in legs and feet which is a common cause of pain. A substantial hydrostatic pressure rests on the blood vessels in our feet and lower legs when we are in an upright posture. If we are not active in our day to day work this pressure can complicate the return flow of blood through the veins resulting in lower extremity pain and swollen legs and feet. The venous “pumping system” in the muscles of the feet and legs plays a major role in returning blood from the feet to the heart. The venous circulatory system is based on active muscle activity throughout the body. When we are standing in one place there is reduced muscle movement and reduced blood flow throughout the lower extremities which often results in swollen feet and legs. Swollen feet cause tired and aching feet and legs. In an attempt to alleviate pain we often find ourselves in awkward body postures that place stress on knees, hips and the back. Reduced blood flow also diminishes the supply of oxygen to the muscles of the feet. Tired foot muscles reduce flexibility and cause further stress to the foot.

Primary circulation to feet and legs is controlled from the heart which pumps oxygenated arterial blood into the major arteries throughout the body and in the legs under pressure. We also know that the pressure slowly dissipates as the arterial blood vessels become smaller and smaller until the blood reaches tiny capillaries. Once the blood passes through the capillaries it needs to get back to the heart via the venous system. The efficiency of returning lower extremity venous blood is greatly dependent on constant movement of muscles in feet, calf and thighs.

Veins contain one way valves. This allows blood to be pushed only in the direction of the heart. As shown in the illustration the veins are closely connected to the muscles in such a manner that when a muscle contracts the vein is compressed ejecting blood through the one way venous valves on it's way towards the heart. When the muscle is relaxed blood refills the veins. Consequently, all active movements of the foot and lower extremity muscles act to pump the blood up towards the heart.

The illustration shows schematically how a capillary in one of the muscles of the foot connects an artery and a vein. When the red blood cells are forced through the capillary, lymphatic fluid will ooze through the walls of the capillary. The seeping lymphatic fluid carries oxygen and nourishment to the living muscle cells. At the back of the capillary lymphatic fluid again seeps into the capillary. At this point, the fluid carries waste products from the cells.

When we are standing still without adequate muscle movements of the feet, we reduce the effect of the venous pumping system. Thus, not enough lymphatic fluid is drained

from the venous end of the capillary. At the same time, high blood pressure is still forcing lymphatic fluid out into the first part of the capillary, an excess of lymphatic fluid seepage occurs and the foot swells.

When the foot swells, the distance from the capillaries to the muscle cells increases. That means that the cells do not receive enough oxygen or nourishment nor can the cells get rid of the waste products.

When the oxygen / energy supply to the muscle cells is reduced, the strength of the muscles in the foot is decreased which is felt as tired muscles and “ischemic” pain caused by the lack of oxygen to the cells. The reduced muscle strength in the foot decreases the flexibility of the foot. This on the one hand leads to greater stress on the ankle, knee and back and increases stress on the foot and sole of the foot.

Dynamic fluid filled insoles such as shoe insoles aid significantly in increasing the circulation in feet and legs as they aid in improving the natural effect of the venous pumping system which is necessary to reduce fatigue, a tendency to swollen feet and legs and pain.