"WHY DO I NEED REPLACEMENT ORTHOTIC INSOLES WHEN I'VE JUST BOUGHT STABILITY SHOES?"

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If not asked openly, the title of this article must be a question many runners ask themselves when the specialist in the running shoe store invites them to buy a Spenco® replacement insole for their brand new stability running shoes. "Okay, I know I've got bad flat feet, but I've just bought a pair of stability shoe so why do I need an insole?" In actual fact, there many reasons why a replacement insole should be used in a stability shoe for a runner with pronated feet. Here are just a few of them:

Lack of "control" in the motion control shoe

The primary design features (there are others) that make up a stability shoe— a firm midsole (especially on the inside of the heel and forefoot), a firm heel counter, and a rigid shank may not be stiff enough to offer adequate motion "control" for many runners with severely pronated feet. Put in more modern biomechanical terminology: A stability running shoe may not modulate ground reaction forces against the plantar surface (sole) of the foot in a manner that adequately reduces the magnitude of excessive pronation moments acting around the joints of the foot. The fact is, there is little to no consistency in the firmness of the midsole, the stiffness of the shank, and the stiffness of the heel counter across running shoe brands: one company's motion control shoe is another company's neutral shoe . . ."
those with dual density midsoles\textsuperscript{2}. \textit{What was the Shore A hardness of the midsole of your last pair of running shoes?} \textit{Exactly!} A heavy-weight runner, or a runner with high magnitudes of excessive pronation forces may "pronate through" the toughest stability shoe causing a lack of pronation control. Most runners with flat feet appear to trust implicitly that a stability running shoe will offer significant motion control, when in fact -- depending upon their individual biomechanics and the design features of the shoe (not least the stiffness of the midsole) they may not.

A replacement insole with a firm arch support and technology to increase the magnitude of ground reaction force beneath the inside of the heel, e.g., the Spenco\textsuperscript{®} 3-Pod\textsuperscript{™} ground reaction force modulation system (Fig 1), will reduce the magnitude of pronation forces, thereby supplementing the anti-pronation features of a stability shoe, and here's the evidence: In 2009, McClean and colleagues looked at the effect of running shoes with varying stiffness's on the degree of heel eversion and compared these finding to the effect of an orthotic device inside the shoe. The study concluded that "The results suggest that the major component influencing the rearfoot dynamics was the orthotic device and not the shoe composition. In addition, data suggest that the foot orthoses appear to compensate for the lesser shoe stability enabling it to function in a way similar to that of a shoe of greater stability."\textsuperscript{3} It clear from these findings that, in runners with markedly pronated feet, i.e., high magnitudes of excessive pronation forces, a replacement insole may be required to provide enhanced motion control even in a top-quality stability or motion control shoe.

To negate the risk of possible adverse effects caused by motion control shoes

There is strong research evidence to suggest that some design features may make stability running shoes mechanically disadvantageous: Nigg and Morlock (1987) showed that by nature of their flat sole and lateral heel flare (a feature of a number of motion control shoes), which act to cantilever the foot in the direction of pronation at heel strike, shoes with firm midsoles may actually increase the initial velocity of foot pronation, which may predispose a runner to a number of injuries including "shin splints".\textsuperscript{4} The use of a
good anti-pronation insole such as the Spenco® Total Support® Original may help to negate the anticipated increase in the velocity of contact phase pronation. In 2009, Kerringan, et. al measured higher joint forces at the ankle, knee (36% increase in flexion torque) and hip (54% increase in internal rotation torque) using modern-day running shoes compared to running barefoot. To be clear, I'm not advocating running distances barefoot or in a minimalist shoe, the point is that many runners do not appreciate that a firm shoe is likely to increase stress and strain at the knee and hip; that a replacement insole with a good combination of pronation control and shock attenuation may help to reduce the potentially harmful increase in knee flexion and hip internal rotation moments.

Not all foot and leg ailments suffered by runner are due to excessive foot pronation

Even if excess if foot pronation is obvious during gait analysis, it may not be the cause of a runner's injury or general discomfort. Therefore, a stability shoe alone is unlikely to provide optimal comfort. In fact, changing to a stability shoe with a much firmer midsole may actually make some of these conditions worse making a replacement insole essential:

Pain beneath the forefoot -- Metatarsalgia -- may be due to hammer toes leading to back pressure on the metatarsal heads, or a structural conditional called Forefoot Equinus when the forefoot is "dropped" relative to the heel causing high magnitudes of ground reaction force beneath the forefoot (Fig 2). Although a motion control shoe may be necessary to negate excessive pronation moments, an insole with a metatarsal dome and good cushioning beneath the forefoot will be required to ease the pain beneath the forefoot.

Plantar Calcaneal Bursitis-- often referred to as "Stone Bruise"-- may worsen with the firm midsole of a stability shoe due to an increase in the magnitude of ground reaction force beneath the heel at heel strike. If a runner requires a stability shoe for excessive foot pronation, an insole with good cushioning beneath the heel, e.g. a Spenco® ProForm Gel will reduce the likelihood of an exacerbation of heel pain.

Sesamoiditis-- pain beneath the big toe joint -- is often caused by a condition known as Plantar Flexed First Ray where the first metatarsal lies below the common plane of the forefoot. Controlling excessive foot pronation in a runner with Sesamoiditis is unlikely to reduce the ground reactive force
beneath the big toe joint. An insole with a metatarsal dome, a first ray cut out, and good cushioning beneath the big toe joint should be used to ensure relief of symptoms, and Spenco® has a number of insoles that incorporate these designs features.

Summary

Although research has shown that motion control or stability running shoes modestly reduce excessive foot pronation in runners,\(^6,7\) the degree of control is unpredictable and subject specific; probably due to the wearer's individual biomechanics, the wide variations in stability shoe design, and the quality and firmness (the Shore A hardness) of the midsole materials used in construction. Replacement anti-pronation insoles will enhance the motion control in runners with high magnitudes of pronation forces that rapidly break down the stability features of the shoe. Of course, any positive mechanical effect on a runner's abnormal biomechanics is likely to be compromised as the shoe ages and wears. In 2014, Chambon et al. investigated the effect of running shoe aging. They determined that as they wear out, shoes with softer midsoles cause changes in the function of some muscle groups. Some foot ailments suffered by runners with high magnitudes of pronation forces are not associated with excessive pronation. A replacement insole may be used to target the underlying mechanical causes of the discomfort, usually by offloading areas of the sole of the foot exposed to high magnitudes of ground reaction force, or to enhance shock attenuation. Adding back some shock absorption in a stability shoe with a rigid midsole may reduce the risk of 'bruising' beneath the forefoot and the heel.

References