The Low Back Pain Running Shoe Connection

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Low back pain at some point in time will inflict over 80% of the population. Proper footwear can potentially prevent, reduce and/or treat mechanical factors associated with low back pain.

Over-pronation results in internal rotation of the lower kinetic chain (thigh, leg and foot) and anterior pelvic rotation. Anterior pelvic rotation increases weight bearing on the lumbosacral facet joints (two joints posterior to the vertebral disk and spinal cord). When the loads become excessive facet joint inflammation and pain usually results. Typically those that over-pronate will have a flexible flatter style foot. On an over-pronator, a shoe that is too flexible or flexes at a point other than where the toes meet the foot (metatarsal phalangeal joints), and/or lacks any medial posting (an increased midsole density along the inner side of the shoes midsole) will lend the athlete more vulnerable to torsional injury to the lower back.

Under-pronation increases the transmission of ground contact force proximally into the spine. On an under-pronator, a shoe that is rigid in nature and lacks appropriate shock absorption will lend the athlete more vulnerable to the malities of force impact.

Shock absorption has a direct effect on low back pain in as much as the intervertebral disks act like hydraulic shock absorber and vertebral facet joints. When loads are excessive tissue damage can result. Shock absorption appears to have an effect on not only low back shock transmission but lumbar muscular response. An Austrian study, by Ogon, Aleksiev and Spratt, investigated the effects of shoes and insole materials on the rate of shock transmission to the spine, the response of spinal musculature to impact loading, and the time interval between peak lumbar acceleration and peak lumbar muscle response. Twelve subjects were tested while jogging barefoot and wearing identical athletic shoes. During barefoot conditions either no material, semi-rigid (34 Shore A), or soft (9.5 Shore A) insole material covered the force plate. In shod running, these materials were used as insoles. Ground reaction forces, acceleration at the third lumbar level, and erector spinae myoelectric activity were recorded simultaneously. The rate of shock transmission to the spine was greater unshod, than shod. The temporal response of spinal musculature following heel strike was significantly shorter unshod, than shod. The latency between acceleration peak (maximal external force) and muscle response peak (maximal internal force) was significantly shorter shod, than unshod. The authors suggest that one of the benefits of running shoes and insoles is improved temporal synchronization between potentially destabilizing external forces and stabilizing internal forces around the lumbar spine. (i) Most shoes loose 75% of their shock absorption after approximately 500 miles. This appears to be the critical point in which injuries tend to develop as a result of shoe wear. Thus it is important to have a rough idea how many miles are on your shoes and to replace them before soreness begins.

Thus, not only is a shoe sufficiently capable to absorb shock necessary, but the biomechanical control features of the shoe must match the biomechanical attributes of the host as torsional strain and impair shock absorption and alter joint loading.

[i] Ogon M, Aleksiev AR, Spratt KF, Pope MH, Saltzman. Footwear affects the behavior of low back muscles when jogging. Int J Sports Med 2001 Aug;22(6):414-9