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Asymmetry – Recurring Injury

A commonly held belief is, if there is a weakness or limitation on one side of the body, this asymmetrical structure can lead to irregular movement and injury. For example, when an ankle is sprained, the joint does not return to the previous level of stability. A frequent assumption is that the residual joint instability increases the risk of injury.

An assumption is something that is taken for granted or accepted as true without proof. Scientists have a desire to question assumptions and look for proof or evidence. For instance: Is there actual evidence that asymmetrical structure occurs more frequently in injured runners than in non injured runners? Is there evidence that injured runners demonstrate asymmetrical structure and/or movement?

Recently, a group of scientists from three different universities collaborated on an interesting research project that examined the issue of asymmetry in female distance runners (Zifchock RA 2006). They compared two groups of female runners; one group consisted of never-injured runners, and the other group, runners who had previously sustained unilateral stress fracture of the tibia bone. There were 25 runners in each group. To develop an asymmetry index, biomechanical data regarding forces that occur when running were measured. A symmetrical index is a quantitative indicator of the percent of difference between a quantity measure on the right and left sides. A value of zero indicates perfect symmetry, while increasing values indicate greater levels of asymmetry. The investigators did not measure structure, that is, joint limitation or weaknesses, but only measured function. They used force plates and accelerometers to measure the kinetic parameters.

The never injured runners had right to left differences ranging from a low of 3.1% for peak vertical ground reaction forces, and up to a high of 50% for peak lateral ground reaction forces. The results of this study showed that healthy, never injured runners have widely varying levels of symmetry.

A common assumption is that some asymmetry can be explained by handedness which is the preference of using one hand or leg over the other, and that a difference of 15% could be explained by handedness. Since this is an assumption, this study raises the question as to whether a 15% difference is an appropriate threshold of acceptable difference.

Surprisingly, the symmetry index was found to be comparable between the never injured and previously injured runners. The previously injured runners had bilaterally elevated forces compared to the never injured group. In the previously injured runners, the involved limb was likely to have elevated loading compared to the uninvolved limb. Peak shock was significantly higher by 16% in the involved limb as compared to the uninvolved limb. Although it was not statistically tested, the previously injured runners also had bilaterally elevated loading and forces as compared to the never injured runners. This suggests that runners may be predisposed to injury on the side of the body that exhibits higher impact loading. This suggests that previously injured runners may be closer to the injury threshold, and thus more susceptible. Asymmetry may simply influence the side on which the injury first occurs.

Intervention:
Irene Davis at the University of Delaware, who was involved in this research on asymmetry, has done some additional interesting research. Her findings show that that injured runners who were provided visual and auditory feedback of ground reaction forces and shock when running could alter their running form. High levels of ground reaction force can be decreased and injured runners who were provided visual and auditory feedback returned to symptom free running. Clinically, I have had similarly successful results with injured clients by providing visual feedback of faulty running form as a treatment intervention.

Identifying a structural or movement asymmetry is a relatively straightforward process. The challenge is determining whether or not the structural difference is one that is modifiable. If an individual is born with one foot that is toed inward (pigeoned toed) it is highly unlikely that exercises or gait training will alleviate the asymmetrical in toeing. Attempting to correct the in toeing will likely create additional injury. A personal example of this was my father, who fractured his little finger as a child. When it healed, it was deformed and pointed sideways. He always said “If you have to take me to the emergency room, don’t let them straighten my little finger. It’s supposed to be crooked, and if they straighten it out, it will mess up my golf game.”

Besides injury, asymmetrical alignment can occur because of adaptations resulting from habitual uneven posturing. I have had several clients who toe outward excessively on one side when running because of habitually sitting with legs crossed and wrapped around each other. An acquired asymmetry can occur because certain muscles have adapted in response to habitual asymmetrical posturing and physical stresses and become shorter or weaker on one side of the body. If there are anatomical asymmetries, it likely contributes to unbalanced movement. A logical approach to this problem is to first minimize or eliminate the habitual postures and physical stresses which contribute to acquired asymmetry, then stretch the short muscles and strengthen the weak muscles, followed up by practicing symmetrical movement and correcting faulty running form.