

## **Evolution of the running shoe: evidence & opinion**

Forty years ago there was only one running shoe designed for long distance running. It was a black canvas shoe shaped like a track spike shoe with a gum rubber outsole and Converse was the manufacturer. Now there is a veritable plethora of running shoes to choose from.

Ten years ago I wrote an article highlighting the fact that despite the progression of research and development and improvements of the modern running shoe, there was no change in the frequency and type of running injuries between 1967 and 1997. In 2006, there continues to be a similar frequency and type of running injuries that there were in 1967. This observation suggests that the modern running shoe has little effect on preventing injury.

Many articles published by experts tout the belief that shoe selection is important component of preventing running injury. It should be noted the articles purporting this belief do not reference case studies or controlled clinical trials.

Retrospective case studies are available which demonstrate a running injury that was alleviated by switching to a different running shoe.

B.R. Wilk (2000) published a case study demonstrating that a triathlete developed plantar fasciitis as a result of running in a defective running shoe. The shoe construction defect was a heel counter that was glued into the shoe at an inward leaning angle resulting in a greater medial tilt of the heel counter compared to the other shoe.

A. Cunningham (2004) reported successfully treating two runners with lower leg pain by modifying their running style from a heel strike to a mid-foot strike. This was accomplished by training on a treadmill while running barefoot and when running outside, switching footwear from standard running shoe to a running shoe with thinner harder soles.

Michael Gross (2006) published a case study documenting that a running shoe designed with a heel flare contributed to shin pain. Using motion and force plate analysis, he was able to conclude that shoes with a heel flare lead to greater stress to the anterior shin muscles. When the patient switched to a shoe without a heel flare, she was able to alleviate the shin pain.

Retrospective studies are important but prospective studies are more convincing, and there are no prospective studies demonstrating that selecting a particular running shoe design decreases the incidence of developing an injury. .

### **Defective shoes:**

When shopping, examine the shoes closely looking for differences between the right and left shoe. The shoes should be symmetrical. Place the shoes on level surface and check orientation and alignment. Lightly tap each shoe to create a rocking motion. The tap

should result in a similar rocking motion. If the rocking motion is asymmetrical, it suggests that one shoe is deformed relative to the other. Push and poke the air bladders and mid soles. Look for extra bits of glue or stitching. Tug on the seam between the upper and the sole to see if it separates. Once purchased, this type of examination should be done periodically to determine if the shoes should be retired.

Recently I evaluated an injured runner's shoes. Both the right and left shoe were marked a size 9, but when the soles were matched up it was obvious one was at least a 1/8" longer than the other. Fortunately, one of the things that has changed in the last 40 years is that the quality control of shoe manufacturing has improved. However, there continues to be the infrequent "lemon" which passes through quality control and invariably this will contribute to an injury.

In the sixties, shoe manufacturers did not distinguish between male and female. Shoes came in various lengths but there was only a D width was available, except for New Balance which has consistently made various shoe widths available. After the first Women's Olympic marathon in 1984, shoe manufactures starting providing female shoes in a B width. Only recently have some shoe manufactures started providing 3 different widths. If you have a wide or narrow foot it is important to recognize that shoes of varying widths are available, and depending on where you shop for shoes, you may have to actually request shoes of an uncommon width.

Running shoes are rarely the sole cause of an injury and equally rarely are they a panacea. When selecting a running shoe, the factors a runner has the most control over are: choosing where to buy the shoe, choosing which sales person to ask for assistance, making sure to get the proper fit and size and avoiding defective shoes.