THE APPLICATION OF PLANTAR PRESSURE MEASURING SYSTEM ON DESIGNING THE INDIVIDUATION INSOLE

Xiangdong Wang[1], Xuezhen Liu[2]
[1]China Institute of Sport Science, Beijing, China
[2] Beijing Sport University, Beijing, China

KEY WORDS: insole, plantar pressure measuring

INTRODUCTION: The purpose of this study is to help the athlete prevent injuries and improve performance by devising the individual insoles according to the plantar pressure measuring data. To stipulate the different movements in the different regions of the foot, the Footscan software compares the pressures during certain periods in the foot roll off. The dynamic region system detects the different parts of the foot (hallux, other toes, the different metatarsals, the midfoot, the medial and lateral heel). For each area the pressures, the ground contact and the contact time will be calculated. When all these data are collected, the Footscan software will interpret the data and give a proposal for a dynamic three dimension (D3D) correction insole and the modules which have to be used.

METHODS: In this study we examine the walking-running analysis of a Chinese top athlete who has incurred a lot of injuries during the past years. She has a light form of Hallux Valgus, both left and right, and she's also suffering from blisters under the 1st metatarsal of both feet. Moreover she shows a pain medial under the left ankle (tibialis posterior under ankle). Footscan pressure measurements are made by the Footscan 2 meter plate in the test lab of RSscan China. First happens a barefoot gait analysis and directly afterwards measurements are carried out with their current sport shoes. If the sport shoes have a bad influence on the movement in the foot, it's appropriate to use a D3D correction insole. Finally a last gait analysis will follow, this time with shoes with the D3D corrections. A D3D orthosis exists from a basis layer, one top layer and 4 possible corrections. The basis ensures the support of the foot arc. The choice of this element is mainly made dependent on the altitude and the length of the foot arch. For the top layer one can use several materials dependent on the quantity of shock absorption and the support which one wishes. Finally the software will decide which corrections should be introduced. The proposal that is given, depends especially on the movement in the foot. The most important factor is the degree of pronation or supination during landing, during midstance phase and in propulsion.

RESULTS AND DISCUSSION:

Walking - barefoot:

The curves from barefoot walking show a quite normal character. At landing the heel comes down in light supination and turns gradually to pronation. The same applies to the forefoot, a light supination at the first forefoot contact and more pronation in propulsion phase. In general the curves remain within the limit of -20 degree (supination) and +20 degree (pronation).

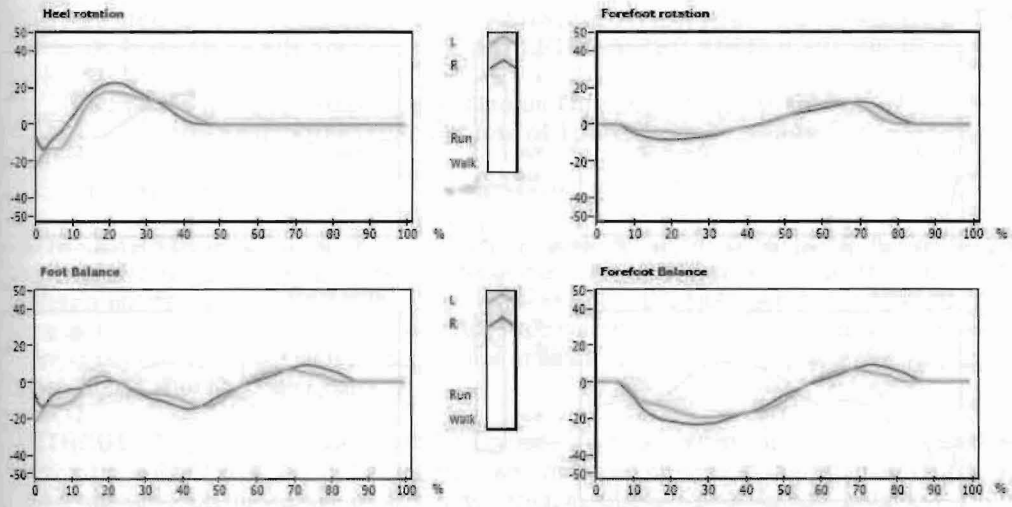

Figure1 The pronation and supination of the feet during barefoot walking testing.

Running - barefoot:
The curves from barefoot running display a high pronation in the forefoot during propulsion. Forefoot balance: There is a high pressure on metatarsal 1 & 2, more pronounced on the left foot compared to the right foot. Foot balance: In midstance there is a faster increasing pronation in the left foot than the right foot.

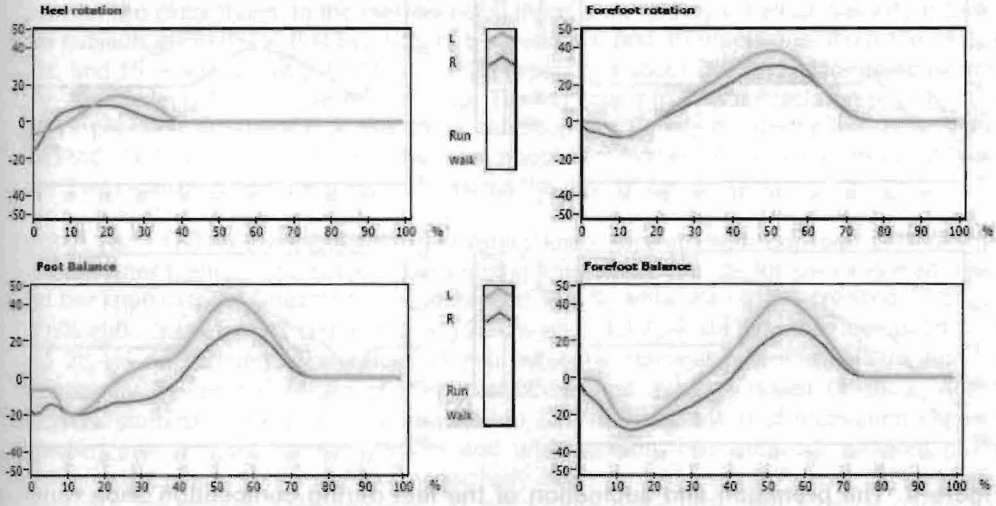

Figure 2 The pronation and supination of the feet during barefoot running testing.

Running – Training shoe:
The behaviour of the graphs is similar with those of barefoot running. The pronation in the forefoot with the training shoe is almost identical as in the barefoot graphs.

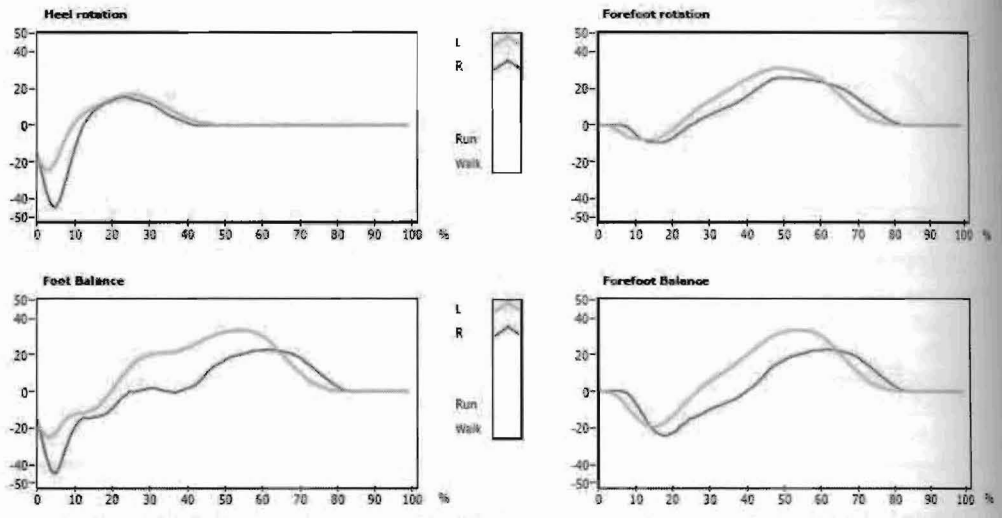

Figure 3 The pronation and supination of the feet during training shoe running testing.

Running – Competition shoe:
Here we can also notice a very strong pronation in the forefoot. It is clear that the competition shoe and the training shoe do not positively correct the movement of the foot.

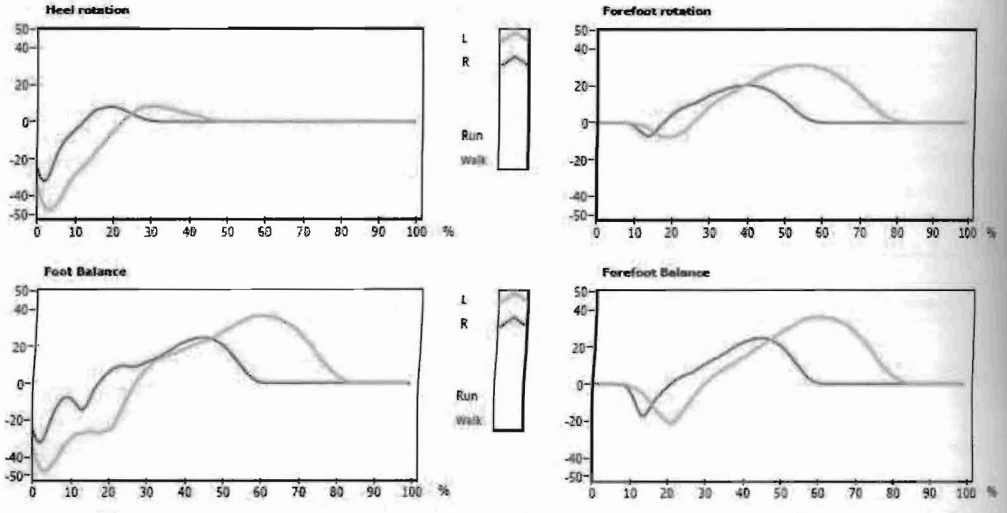

Figure 4 The pronation and supination of the feet during competition shoe running testing.

CONCLUSION: On the basis of all collected information for this athlete a D3D correction insole was made. For both feet a basic element N and a green top layer of 25 shore are used because of the low body weight of the athlete. On the insole for the left foot an extra correction has been introduced, the element A, that reduces pronation in the forefoot. The use of the D3D corrections reduces the risks on complaints and injuries. By this way the athletes can increase both the duration and the intensity of their trainings. The better performances on training have certainly a large impact and lead thus to better results in competition.