

The best shoe? No shoe!

a hypothesis by
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Abstract

More than 20 years I have treated patients suffering from (low) back pain, foot- and ankle pain and other, posture related disorders. I did this by making them a pair of very thin insoles, on which, individually, 1 à 2 mm pieces of cork were glued. This therapy was based on the ideas of Dr. René Jacques Bourdiol, a French neurologist (†). It is my hypothesis that primarily the **triggering** of the glabrous foot sole, through the a - afferent fibers, corrects the physiologic pronation by activating the intrinsic foot muscles, during stance and midfoot loading.

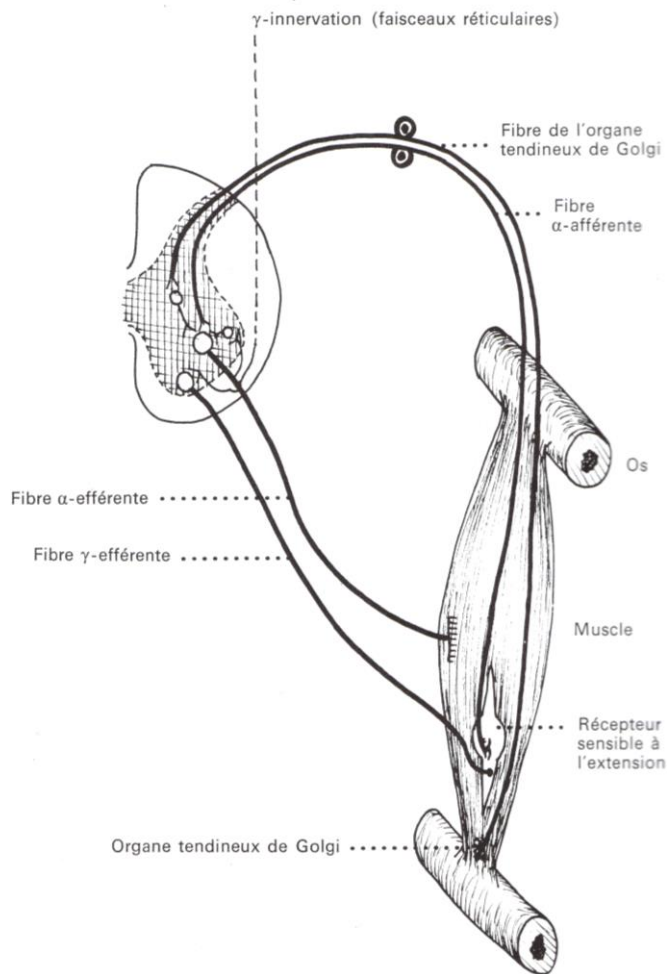
In 1995 I wrote in the Dutch journal for integral medicine (Nederlands Tijdschrift voor Integrale Geneeskunde, 1995; 11(2), 108-112) my hypothesis that in a loaded human foot, at least in the length, we find a so called 'force closure' of the foot joints, maintained in the first place by the intrinsic foot muscles, sustained by the strong plantar ligaments, such as the aponeurosis plantaris, lig. calcaneonaviculare, etc. These ligaments are not found with mammals as e.g. the bear, which also can walk and stand on flat feet. A hypothesis at that time, but more and more found realistic.

I have a small recreation chalet near the Dutch beach and walk endless along it. Looking at the sea and the birds, but especially at thousands of barefoot sand prints from adults and children. The more I looked at them the more I found it surprising that with a percentage of 12 % Dutch people having flat feet (pes planovalgus) I never have noticed it from their footprints. All sand imprints are the **less** deep where I expected them to be the deepest: **at the medial arch!**

I have tried to find an explanation for this phenomenon, the most probable may be that barefoot pronation is physiological and corrects itself.

Is there a difference between barefoot walking or with shoes? With or without orthotic devices?

Benno Nigg published in 1986 'Biomechanics of running shoes'. He concluded that medial arch supports, placed in the rear part of the arch, against the calcaneus, reduces the initial pronation, while placed more forward the effect became less. However compared to barefoot running he still found more pronation wearing shoes.



(d'après P.V. KARPOVICH et W.E. SINNING)

Fig. n° 14: Les voies proprioceptives, ou la boucle gamma.

Neurologic of the plantar foot

The glabrous foot sole has a great number and variety of neuroreceptors: Ruffini, Krause, Vater, Pacini, Meisner, free nerve endings, etc. All of them are specified to a certain function, but many of them are also sensitive to pressure, as cutaneous mechanoreceptors. A Total of 104 mechanoreceptors were identified in the glabrous skin of the foot sole. Kennedy at all found, with the foot in an unloaded position no discharge activity in any of the cutaneous receptors in absence of the intentionally applied stimulation. These findings suggest that skin receptors in the foot sole behave differently from those receptors found on the glabrous skin of the hand. This may reflect the role of foot sole skin receptors in standing balance and movement control.

Podopostural Therapy, based on the theory of Dr.R.J.Bourdiol, stimulates the foot sole to a postural correction with patients suffering from all kind of postural complaints as e.g. low back pain, but also with foot- and ankle disorders.

According to Bourdiol this stimulation is caused by very thin inserts of cork (1 à 3 mm), glued on a thin insole on an individual base.

It was Bourdiol's hypothesis that such an insert, placed under the medial arch, stimulates directly the nuclear chain- and bagspindle of the m. abductor hallucis which leads consequently to a contraction of this muscle, activated by the α - motorneuron..



Bourdiol (not covered)

therapy insole according to

Analyzing the local skin and the underlying tissues (together up to 5 mm) it is not very probable that a 1 mm cork element activates the γ -fiber within the muscle... The only sensors that can be activated consequently are the mechanoreceptors as mentioned before. Facilitation of the skin of the foot sole under the medial arch area, brings the m. abductor hallucis to a contraction. The role of the γ -system is presetting a basic tonus. In fact the α - and γ - fibers fire almost together and we therefore call it an α - γ co-activation.

Let's now theorize the function of the medial arch orthotic. The moment the foot tends to pronate, the inside of the foot becomes lower and longer, and the inside bones such as calcaneus, cuneiforme, metatarsals, etc are spread from each other. A medial arch support of course ends further pronation, but in fact pushes these bones even more from each other and makes it more difficult to the m.abductor hallucis to contract and restore the inside arch!! Probably the reason that wearing arch support seems to lead to an even increasing pes planovalgus.

The 'Bourdiol system', either proprioceptive and/or exteroceptive way, activates the m.abductor hallucis, instead of supporting this arch mechanically. Once the muscle chains (agonists) toward cranial, innervated from the same segment, are activated, the antagonists reciprocally will relax.

With this controllable, visual, measurable and repeatable system the patients posture can be influenced as can his related pains. Which I did for almost 20 years.

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