Pes planovalgus

Intrinsic Foot Muscles (IFM) ór Rigid Orthotics, that is the question…

a hypothesis by
Peter W.B.Oomens

More than 20 years I treated patients suffering from low back pain, foot- and ankle pain and other, postural related, physical complaints with thin, individually prescribed insoles. These insoles were provided with 1 à 2 mm pieces of cork. This therapy was based on the ideas of Dr. René Jacques Bourdiol, a French neurologist from the twentieth century (†). It is my hypothesis that primarily the **exteroceptive facilitation** of the (bare) foot sole corrects pronation during stance and midfoot loading, more than the y - system. In fact they seem to be co-activated.

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 co 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, the birds, the clouds but especially at thousands of barefoot prints from adults and children. The more I studied them the more I found it surprising that with a percentage of 12 % Dutch people with flat feet (pes planovalgus) I have never 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.

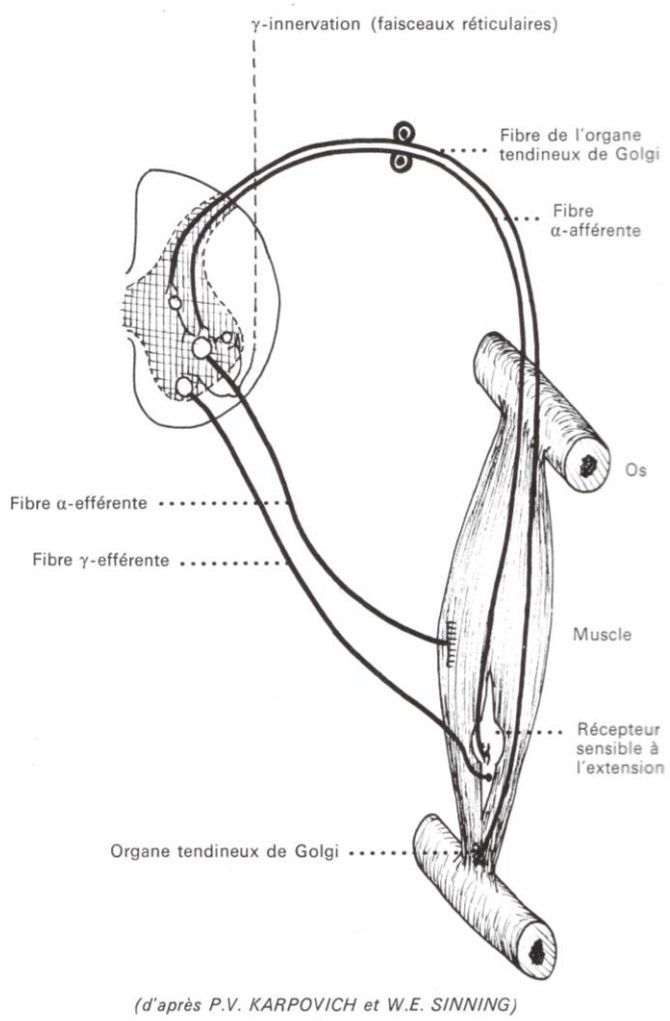


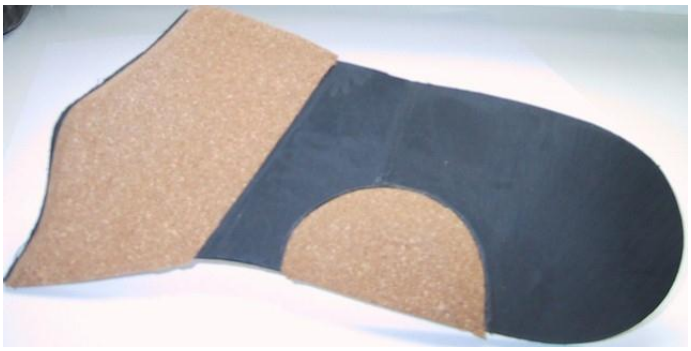
Fig. n° 14: Les voies proprioceptives, ou la boucle gamma.

Neurologic of the plantar foot

The foot sole has a great number and variety of neuroreceptors: Ruffini, Krause, Vater, Pacini, Meisner, free nerve endings, etc. All of them are specified for 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 recceptors 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 e.g. such an insert, placed under the medial arch, stimulates directly the nucleair chain- and bagspindle of the m. abductor hallucis which leads consequently to a contraction of this muscle, activated by the α – motorneuron..



therapy insole according to Bourdiol (not covered)

Studying 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 baroreceptors as mentioned before. Facilitating the skin of the foot sole under the medial arch area, forces the m. abdutor hallucis to a contraction. The role of the γ-system is presetting a basic tonus. In fact they 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 loaded and longer, and the inside bones such as calcaneus, cuneiforme, metatarsals, etc are teared from each other. A medial arch support will of course try to provide the foot from further pronation, but in fact tears these bones even more from each other and makes it more difficult to the m.abdutor 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, activates the m.abductor hallucis instead of supporting. 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.

Peter W.B.Oomens, January 2012
WbD, Netherlands

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