



## Van Test naar Training O.E.

8

Opleiding fasciatherapie F.I.T.  
Onderste Extremititeit

Short description of content: Translate the findings of the fascia function assessment to techniques and exercises

Learning objectives: To be able to make a logical treatment plan starting from the findings of the fascia function assessment through clinical reasoning

<<The purpose of functional training is to increase the load-bearing capacity of the myofascial structures — well-trained muscles and elastic fascia are less easily overloaded.

- Thanks to the physiological demands of muscle tissue, functional training promotes perfusion and metabolism in the muscles and thus supports the regeneration process. A well-trained muscle exhibits increased capillarization.
- Functional training perpetuates and improves the intermobility of the tissue layers, thanks to the movements used in functional training.
- Functional training is essential not only for the regeneration of the contractile elements of muscle, but also for connective tissue remodeling. The change between diverse tensile forces functions as a necessary formative stimulus during the maturation phase of collagen tissue, which can last up to a year (van den Berg 2011).

- Functional training improves muscle coordination skills and dexterity, connective tissue elasticity, and muscle fascia interaction. Gautschi 2019>>



## Anamnese: kijk naar de hele mens

Type pijn:

VAS pijn: / \

VAS moe:

VAS stress:

VAS beperkingen

Provocatie:

Meest belemmerde activiteit:

Sociaal netwerk:

Doelen:

Sport:

Littekens:

Bloedingsziekte / bloedverduunners / zwangerschap / darmen / orgaanpathologie / medicatie / pacemaker

VAS voeding:

VAS slaap:

VAS beweging:

VAS lich/psych

Vermindering:

Symptomen

Stress / emoties

Levensstijl

Beperkingen

Verwachtingen/doelen



Kijk naar het hele plaatje: pijn

Pijn = Nociceptie × Gevoeligheid zenuwstelsel

Bron van de pijn

De intensiteit van de pijn



FFO: Fascia Functie Onderzoek

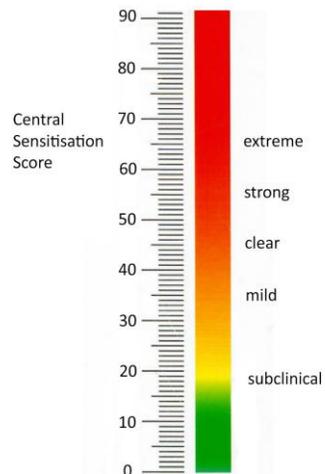
CSI: central sensitivity inventory



## Central Sensitivity Inventory (C.S.I.)

Naam: *Dhr. S* Datum: \_\_\_\_\_

	nooit	zelden	soms	vaak	altijd		
1) Ik voel me niet uitgeslapen als ik 's morgens wakker wordt				X			
2) Mijn spieren voelen stijf en pijnlijk			X				
3) Ik heb angstaanvallen			X				
4) Ik knars of kleem met mijn tanden		X	X				
5) Ik heb last van diarree of constipatie		X					
6) Ik heb hulp nodig bij het uitvoeren van dagelijkse activiteiten		X					
7) Ik ben gevoelig voor fel licht		X					
8) Ik ben snel moe bij fysieke activiteiten				X			
9) Ik heb pijn over mijn gehele lichaam					X		
10) Ik heb last van hoofdpijn				X			
11) Ik heb een ongemakkelijk gevoel in mijn blaas en/of een branderig gevoel bij het plassen		X					
12) Ik slaap niet goed					X		
13) Ik kan me moeilijk concentreren				X			
14) Ik heb huidproblemen zoals droge huid, jeuk of huiduitslag	X						
15) Stress verergert mijn lichamelijke klachten				X			
16) Ik voel me neerslachtig of depressief				X			
17) Ik heb weinig energie				X			
18) Ik heb spierspanning in mijn nek en schouders				X			
19) Ik heb pijn in mijn kaak	X						
20) Bepaalde geuren, zoals parfums, maken me duizelig en misselijk	X						
21) Ik moet vaak plassen					X		
22) Mijn benen voelen ongemakkelijk en rusteloos wanneer ik 's avonds wil gaan slapen				X			
23) Ik heb moeite dingen te onthouden				X			
24) Als kind heb ik traumatische gebeurtenissen meegemaakt	X						
25) Ik heb pijn in mijn bekkenregio		X					
Subtotalen (niet invullen)			5	6	2	7	16
Totaal			5	4			



4

A Receiver Operating Characteristic (ROC) analysis determined that a CSI score of 40 out of 100 best distinguished between the CSS patient group and a non-patient comparison sample (n = 129) (AUC= 0.86, Sensitivity = 81%, Specicity = 75%)

<<Conclusions: An assessment of the published measurement studies of the CSI suggest the tool generates reliable and valid data that quantify the severity of several symptoms of CS.

- This cutoff score of 40 was not described to be diagnostic, rather it was the score at which the CSI was able to best distinguish between subjects with CSS and a nonpatient population. Neblett et al.<sup>28</sup> expanded on this cutoff value by reporting on clinically relevant severity levels. Using the previously established 40-point cutoff as the boundary between “moderate” and “mild” symptom severity levels, Neblett and colleagues<sup>28</sup> chose to incorporate a 10-point interval for ease of interpretation. A score of 50 is the score one would receive if one selected “sometimes” on all 25 elements of the CSI, which is representative of the “severe” cutoff score.
- the CSI performs extremely well when its measurement properties are examined. The CSI appears to be a reliable, consistent, and valid measure. In addition, one recent study found that the CSI was a responsive treatment outcome measure.

- The high-quality evidence our included studies published was also present in the measurement properties of interpretability and construct validity, which are not scored quantitatively by COSMIN. We found that the CSI is an easily interpretable instrument that has a high degree of construct validity.

Thomas Scerbo, BS\*; Joseph Colasurdo, BA\*; Sally Dunn, BA\*; Jacob Unger, BS\*; Jo Nijs, PT, MT, PhD†; Chad Cook, Measurement Properties of the Central Sensitization Inventory: A Systematic Review World Institute of Pain, 1530-7085/16/\$15.00 Pain Practice, Volume , Issue , 2017>>

<<The CSI is a measure that is used to identify symptoms related to CS and to ascertain the degree of symptoms represented in a 100-point scale. The CSI is the first instrument developed to identify key symptom manifestations of CS, rather than focus on those found in each separate disorder (Mayer et al., 2011). There are 25 questions that ask about variables related to CS, each a Likert scale of 0–4, where 0 corresponds to the respondent experiencing the event “never” and 4 to “always.” A score equal to or N40/100 is consistent with a larger degree of CS symptomatology. The CSI has very acceptable internal consistency with Cronbach's alpha at 0.88 and stability with test-retest reliability of  $r = 0.82$  (Neblett et al., 2013). There are no published studies to date utilizing the CSI in children or adolescents. Bettine 2018>>



CSI > 25



- Pijneducatie
- Ademhaling
- Mindfulness
- Versterken immuun systeem
- Darmen / voeding
- Psychotherapie





## Pijneducatie



6



## Nijmeegse Vragenlijst

### Checklist

Naam:  
Datum: 7-12-18

Instructie:  
Kruis voor elke vraag aan of u deze klachten nooit, zelden, soms, vaak of zeer vaak hebt gehad.

	nooit	zelden	soms	vaak	heel vaak
1) pijnlijke steken in de boest				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2) angstomheest				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3) een waas voor de ogen				<input checked="" type="checkbox"/>	
4) duizeligheest				<input checked="" type="checkbox"/>	
5) in de voor-rijs, of het gevoel hebben het normale contact met de omgeving te verliezen				<input checked="" type="checkbox"/>	
6) een snellere of diepere ademhaling				<input checked="" type="checkbox"/>	
7) ademmoed				<input checked="" type="checkbox"/>	
8) benauwd voelen in of rond de boest				<input checked="" type="checkbox"/>	
9) opgeblazen gevoel in de buik				<input checked="" type="checkbox"/>	
10) tintelingen in de vingers				<input checked="" type="checkbox"/>	
11) niet voldoende diep kunnen doorademen				<input checked="" type="checkbox"/>	
12) stijfheid van vingers of armen				<input checked="" type="checkbox"/>	
13) stijfheid rond de mond				<input checked="" type="checkbox"/>	
14) koude handen of voeten				<input checked="" type="checkbox"/>	
15) bonzen van het hart				<input checked="" type="checkbox"/>	
16) angstig gevoel				<input checked="" type="checkbox"/>	

Subtotaal				08	0
Totaal				10	

Noem 3 situaties waarin deze symptomen vaak voorkomen:

- 1) Zoon & Wierman zingen
- 2) binnenin →
- 3)

Score > 18

Low, Slow & Less



7

Laat elke patiënt de Nijmeegse vragenlijst invullen. Bij een score >19 behandeling altijd beginnen met ademhaling

→ Zie les over ademhaling (basismodule)



## Bewegen: kijk naar het hele lichaam

Name:		Date:	
	Function	Sex	Remarks
cervical	flexion	3	P Neck dorsal
	extension	1	P Sternum, pulling vertebrae abd.
	R/rot	R 3	P Trapezius L
shoulder	L	-	-
	upper pattern	R 3	- ACJoints R
	L	1	T Deltoid L
	lower pattern	R 2	T biceps
	L	1	T Deltoid L
spine	anteflexion	R 1	-
	L	2	P Peri L
	extension	2	P ili R
	flexion	3	T Hamstrings, cals R/L
	rotation	R 3	P Between Scapulae
legs	L	-	-
	intereflexion	R	-
	L	-	-
	sway	3	S Moves shoulder girdle in stand of pelvis
	single leg stance	R 1	-
function	L	2	B
	on toes	2	B More weight on right leg
	lunge	R	-
	L	2	B
	deep squat	2	B
PSCI:	standing up	R 1	W Weakness, kneeling in
	L	2	W
	jumping	-	-
	lifting	3	F Fear
	walking	1	-
total			

Bovenste extremiteit: accent op mobiliteit

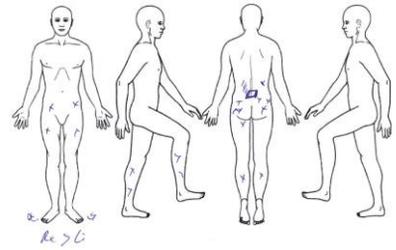
Onderste extremiteit: accent op stabiliteit

Maar natuurlijk ook mobiliteit en kracht





## Palpatie – hele keten



Noteer de bevindingen



## Fascia Functie Onderzoek – klinisch redeneren

FASCIA FUNCTIE ONDERZOEK			
Naam:		Datum:	
		Functie	Sens. opmerkingen
cwk	fl	3 P	Neck dorsaal
	ext	1 P	Sternum, rectus
	fl/rot	Re 3 P	Trap Li
		Li - -	
schouder	boven	Re 3 P	Rond AC Re
		Li 1 T	Delt Li
	onder	Re 2 T	Biceps
		Li 1 T	Delt Li
	af	Re 1 -	
	Li 2 P	Pect Li	
wk	ext	2 P	SI Re
	fl	3 T	Hamstrings kuit -
	rot	Re 3 P	Tussen Sc
		Li - -	
	lateroflexie	Re - -	
		Li - -	
	sway	3 S	Alleen schoudergordel
benen	op een been	Re 1 -	
		Li 2 E	
	op tenen	Re 2 E	Meer op Re
	lunge	Re - -	
		Li 2 E	Zakt door knie
	diep squat	2 E	Romp horizontaal, meer op Re
functie	opstaan	Re 1 F	
		Li 2 F	
	springen	1 -	
	tilen	4 A	Durft niet
	lopen	1 -	
	PSK1:		
	PSK2:		
	totaal		

### Waar moet je beginnen?

1

Hoe hoog is de CSI?

Hoe hoog is de Nijmeegse vragenlijst?

Hoe is de sway?

2

Kun je een logisch verhaal construeren?

Wat is het grootste probleem voor de patiënt?

Waar zit de grootste functiebeperking?

Welke functie denk je dat het makkelijkste te herstellen is?



Test – treat – retest – treat – retest etc



11



## Bij complex probleem – centrale test: de sway



Body awareness  
Ademhaling  
Emoties

		Li	2	P	Pect Li
wk	ext		2	P	SI Re
	fl		3	T	Hamstrings kult -
	rot	Re	3	P	Tussen Sc
		Li	-	-	-
	lateroflexie	Re	-	-	-
		Li	-	-	-
	sway		3	S	Alleen schoudergordel



Mechanisch probleem

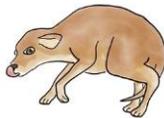


## Sway - emoties



Wat ervaart de patiënt?

Wat is daar de reden van?



*Some people are tremendously attached to their physical and mental tension. It seems essential to their identities.*

Franklin 2012

13

No matter how much I move myself around, my strongest tendency is to move in the same way that I have always moved, guided by the same deeply seated postural habits, sensory cues, and mental images of my body; But I can succeed in surrendering to the movements that another person imposes on my body, without my own system of cues and responses interfering, it is possible to treat my mind to a flood of sensations that are novel in important ways, sensations that may well be able to indicate what things that I have been doing that have produces my aches and pains at the same time that they have reinforced my normal sense of self. Juhan, 2003

The Greek verb kharassein, from which then word character is derived, means to scratch or engrave, that is, to make a distinctive mark on something. Life is a process of becoming more and more characterized. We become 'characters' as we acquire a history, and that history lives in our present behavior. (Pierce)

In essence, your posture is your approach to life. If you want to change your body, First change your mind

<< "The human being has a particularly deep attachment to his movement habits

since he created them himself " (Alon,R. 1996). In Elphinston 2008 H1>>

<< Generally speaking, people who have no pelvic pain have pelvic muscles that tighten up and then relax. But for people who do have pelvic pain, whose way of expressing their anxiety is to tighten up the pelvis strongly and for a long time, or for people who have had some kind of injury and pain that has caused the pelvic muscles to reflexively tighten against the pain, the pelvic muscles don't relax well after contraction. They stay in a tightened state or ongoing spasm, and when the pelvic muscles don't relax, all kinds of weird symptoms occur.

The reason that chronic pain and dysfunction resist a simple mechanical fix is that the irritated pelvic muscles not only require release from contraction, but an ongoing quiet nervous system environment to allow the sore and irritated tissue to heal. The pelvic floor muscles are unique in that they are engaged much of the time and participate centrally in the normal daily functions of life, including urination, defecation, support and balance of the body, lifting, walking, sitting, and sexual activity among other activities.

Problems can occur when the pelvic floor muscles are either weak or chronically tightened. Some practitioners confuse these two conditions and treat chronically tight pelvic muscles in the same way they would treat weak pelvic muscle.

Kegel exercises are generally not a good idea if you have muscle-based pelvic pain.

Now imagine you maintain this clenched fist for a day. Now imagine you maintain this fist for a week. Now imagine a month of tightening your fist constantly twenty-four hours a day. Now imagine doing it for a year. Now imagine doing it for several years. This is one way to understand the state of the pelvic floor in people with pelvic pain.

Imagine that, after several years, you stopped tightening your fist. Do you think the great discomfort and irritability of the tissues of your hand would immediately stop? Almost certainly not. It is not hard to imagine that you would want to rub your hand, massage it, and stretch out each finger to relieve it from the contracted state it had been in. Nor would it be hard to imagine that, even after you stopped tightening your fist, your fist would still be sore. It would take some time, some pampering, and most importantly, no chronic retightening of the fist before your hand felt normal again.

Many of our patients tend to be out of touch with what is going on in their pelvis.

We offer a method to open communication with the pelvis to help bring about a healing of the sore and irritated pelvic tissues. We also aim to change patients' attitude toward their pelvis.

Two hours plus of daily self-treatment is recommended until symptoms abate, while appearing daunting, it is necessary to reverse the condition of years of chronically contracted, sore pelvic muscles.

Strangely, relaxing a painfully contracted pelvis can create problems for the unconscious inner defenses. "How do I defend myself if I cannot guard my pelvis?" can be a major dilemma of the unconscious psychological defense system of the body. On the surface, this dilemma is irrational. Nevertheless, the unconscious defenses of the body are primitive, in our view often formed early in life, and not friendly to reason.

The muscles required to "pull in the tail" are typically painful or sore in those with discomfort related to sitting down.

Sitting pain is one of the last symptoms to resolve when our approach is successful in treating muscle-based pelvic pain.

### Sensing Pelvic Tension

Most people can feel tension in their pelvis and let go of this tension to some degree or another when they are aware of it. Others cannot. If you are one of those who cannot discern pelvic tension or how to relax pelvic tension, you can become sensitive to it in the following way. While you are sitting on a toilet, notice how your sphincter, rectum, and genitals slightly drop and relax when you begin to urinate. The sensation is very subtle and will occur out of awareness if you're not paying careful attention. These muscles naturally relax when you begin urination. These are the muscles that you want to learn to relax throughout the day, for these muscles are part of the guarding response that keeps the pelvic floor tight and tense

In the moment of deep relaxation, you are going nowhere, doing nothing, and not trying to achieve anything.

The chronically tight pelvis tends to be part of the habit of conditioned vigilance—a vigilance that says, "Beyond a certain point it's not safe for me to relax and take my

attention off the external world." It often is an expression of an early conditioning that says, "If I am not on my guard, I am in danger." Wise 2018>>



## Sway – body awareness

Low, slow,  
less

Ademhaling



Coregeous ball



(Thea Kramer)

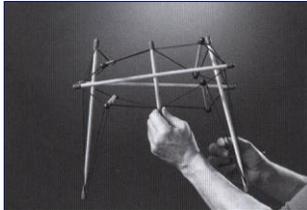
Reset oefening

The language of movement is written through feel.

14



# Sway mechanisch probleem

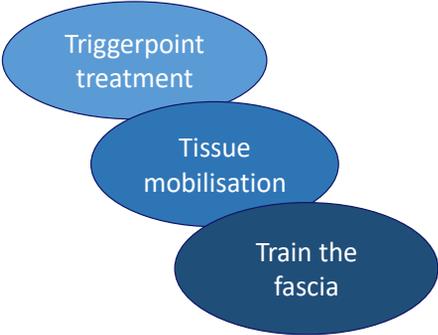


Uitgangspunt

MUSCLES OF THE NECK			
Code	Bevelling	Rechts	Links
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
48	48	48	48
49	49	49	49
50	50	50	50
51	51	51	51
52	52	52	52
53	53	53	53
54	54	54	54
55	55	55	55
56	56	56	56
57	57	57	57
58	58	58	58
59	59	59	59
60	60	60	60
61	61	61	61
62	62	62	62
63	63	63	63
64	64	64	64
65	65	65	65
66	66	66	66
67	67	67	67
68	68	68	68
69	69	69	69
70	70	70	70
71	71	71	71
72	72	72	72
73	73	73	73
74	74	74	74
75	75	75	75
76	76	76	76
77	77	77	77
78	78	78	78
79	79	79	79
80	80	80	80
81	81	81	81
82	82	82	82
83	83	83	83
84	84	84	84
85	85	85	85
86	86	86	86
87	87	87	87
88	88	88	88
89	89	89	89
90	90	90	90
91	91	91	91
92	92	92	92
93	93	93	93
94	94	94	94
95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100

Palpatie sequence

Onderzoek

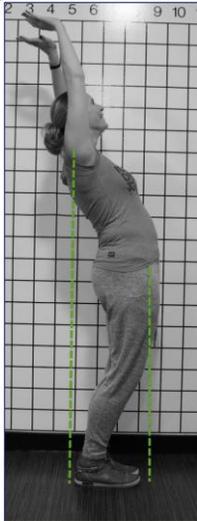


Behandeling



## WK – totale extensie

ext



Beperkt: waar denk je aan?



Waar voelt de patiënt pijn/rek?

Look at the whole picture.

Extension can also be limited when the patient feels/expects pain in the shoulder or neck



## WK – totale extensie

ext



Look at the whole picture.

Extension can also be limited when the patient feels/expects pain in the shoulder or neck



## Onderzoek

ext



Inspectie: belly gripper



Palpatie:  
superficiële fascia, diafragma,  
buikspieren, pyramidalis, psoas, Q-ceps



Bij pijn dorsaal

Vering wk



## Behandeling: Technieken

ext



D01 Sternale fascia



D02 Diafragma



D04 Rect. abd



F02 psoas



G03 Q-ceps



E02 erector

19

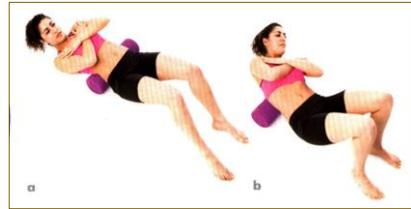


photo left: bring your crown to the ceiling

<<According to Callaghan and co-workers [11], disk deformation, ligament and spinal loading can be reduced if BE exercises are performed with neutral lordosis. Schellenberg 2017>>

<<Typical exercises that are used early in their rehabilitation involve relatively static tasks, such as the abdominal drawing in manoeuvre (Teyhen et al. 2005) and swelling of LM during sitting or lying (Van et al. 2006). However, these tasks often lack functional relevance to more dynamic activities that patients perform in daily life, and the importance of functional therapeutic exercise has been suggested by Hodges and Cholewicki (2007). Any such functional exercise must consider the need to promote tonic, low level activity (Richardson and Jull 1995). Winnard 2017>>



## Spine – total flexion

flex



Waar voelt de patient pijn/rek?



Palpatie sequence: dorsale keten

Waar zit de beperking?  
Waar hypermobiliteit?

21



## Technieken 1

flex

- D01 superficiale fascia
- E01 TLF
- E02 erector spinae
- E04 Gmax
- G01 TFL
- G02 hamstrings
- G06 triceps surae
- G07 diepe flexoren
- G11 fascia plantaris



E02 Smooth the groove



## Technieken 2

flex



E04 Gluteus max



G01 Tensor



G02 hamstrings



G06 triceps surae



G07 diepe flexoren

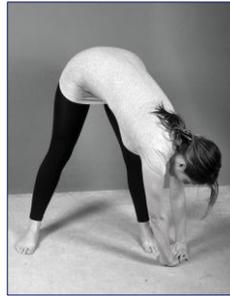


G11 fascia plantaris

23



Fascia plantaris



Mini yoga



## WK - rotatie

Rot

Check supinatie voet

Geen sup.: spanning bekken

Waar voelt de patient rek/pijn?

Vraag te patiënt meer te ontspannen en begeleidt eventueel de beweging

Palpatie!

D30 mobilisatie ribben  
D05 obliquus abd  
E03 QL  
D03 diafragma  
F02 psoas





## Technieken 1

Rot

Afhankelijk van bevindingen bij inspectie en palpatie:  
ribben (D30), obl. Abd (D05), QL (E03), psoas (F02), erector (E02)



D30 ribmobilisatie



D05 obliquus abd.



E03 QL



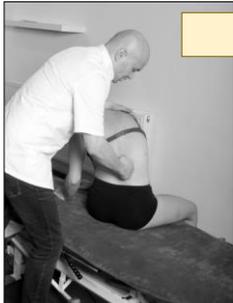
F02 psoas



E02 erector

26

<< As in the case of the deep stabilizers, a muscle chain is responsible for this movement. If trunk rotation is restricted, TrP's are found in thoracolumbar erector, QL en psoas. Release of one of these three muscles is sufficient to remove the TrP's in the other two, whereupon trunk rotation becomes symmetrical again. This function is so important that, in cases where rotation of the cervical spine is also restricted, the treatment of trunk rotation frequently has the effect of normalizing findings at the cervical spine. Lewit 2010>>



E01 Thoracolumbale fascia



E40  
integration





## Extensie/rotatie

Rot



Rotatie met stok



Mini yoga



Rotatie met sanctband

28

<< Calatayud et al. (2015) showed that postural manipulations with additional elastic resistance and/or unstable devices increase core muscle activity characterized by higher amplitudes. Mueller 2017>>



## WK – lateroflexie

LF



Waar voelt patient pijn/rek?



Palpatie!



E03 Quadratus lumborum  
D05 Obliquus abd  
D03 Diaphragm  
G01 Tensor fascia lata  
E06 Gmin



## Lateroflexie - technieken

LF



E03 QL



D05 obliquus abd.



D02 Diafragma



D06 intercostalis



G01 Tensor



E05 Gmin

30



## Klinische tips: check

Bij knieklachten:



G05 popliteus

Bij pijn bovenrand patella



G03 TrP rectus fem

Bij bursitis prepatellaris



G01 tractus  
iliotibioalis



E04 Gmax



## Klinische tips: check

G05 popliteus





## Klinische tips: check

G05 popliteus





## Pijn bij zitten D.D.

- Superficiale fascia
- TrP caudale vezels Gmax
- Obturatorius internus
- L5 multifidus
- N. pudendus

34

<<Symptoms of subcutaneous panniculosis ([Dicke 1953](#), [Ebner 1975](#))

- Hypersensitivity to touch (i.e. vestibulitis)
- Intolerance to tight-fit clothing such as underwear
- Pain during tissue compression (i.e. pain with sitting)
- Pain upon stretch (i.e. posterior thigh pain during a hamstring stretch)
- Cutaneous pain without provocation (i.e. unprovoked vulvodynia)
- Itching (i.e. vulvar itching in the absence of infection)
- Poor tissue integrity (i.e. skin tearing during intercourse)

(Chaitow 2012 H 12) >>



## Focus op Stabiliteit: 5 testen



Wat voelt de patiënt? Waar?

Palpatie!

TrP behandeling

Beperkte mobiliteit?

Palpatie!

Mobilisatie

Verminderde stabiliteit/kracht?

Training

35

Trigger points: most often

Weakness and instability show more often on the return movement



## Triggerpoints



Palpeer met name de extensie keten:

E04	gluteus max gluteus med/min tractus iliotibialis Q-ceps
G06	triceps surae
G07	deep flexors
G11	fascia plantaris

Maar ook aandacht voor:

- Psoas
- Bekkenbodem
- Obturatorius internus



## Mobiliteit



Hoe is de extensie van de heup?



Psoas

Bekkenbodem /Ob. Int  
Glutei



Hielen op de vloer?



Check DF enkel



Knie standbeen  
voldoende naar voren?



Hoe hoog komt de  
patiënt?

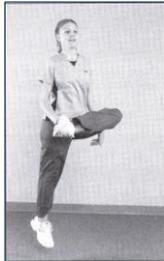


Probleem pijn, mobiliteit of kracht?

37



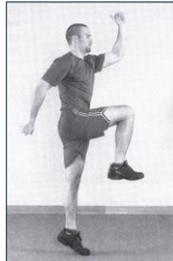
## Free hips – happy back/ veerkracht



Exo dance



Endo dance



Psoas-gluteus swing



The lost art of squatting



and kneeling

and cross-legged sitting

38

<<The psoas muscle is the underbelly link between your legs and upper body. When they're tight, they pull your thoracic spine and upper torso down, causing tension between the shoulder blades (T5-T7) and compress your waist, increasing those love handles on the side of your hips. Tight psoas muscles can also cause a burning sensation on the front of your thighs, during long walks or runs and when sitting down for prolonged periods in front of a computer. They'll even affect the free-flowing, pelvic rocking motion that's necessary during sex. When you strengthen the outer armor muscles at the expense of the deeper psoas, like with traditional sit-ups and crunches, you disrupt the healthy counterbalance that's necessary between the upper and lower body.

A tight psoas will also affect the internal organs that the nerves from the lumbar and solar plexus supply and when a tight psoas changes your lumbar curve, it bows the thoracic spine and depresses the ribcage, which inhibits your breathing capacity.

Walking is one of the first movement patterns to weaken. Here's an exercise to free your psoas muscles, stand with your inside hand resting on a wall, and swing, your outside leg in a pendulum manner, suspended from your hip. Free psoas muscles enable you to walk with a spring in your step for longer. Refer to chapter 5, for the

psoas stretch and check that your lower abdominal muscles are strong, to support your psoas. Parore 2002>>

<<“A guru once told me that the problem with the West is they don’t squat.”

. In much of the developed world, resting is synonymous with sitting. We sit in desk chairs, eat from dining chairs, commute seated in cars or on trains, and then come home to watch Netflix from comfy couches. With brief respites for walking from one chair to another, or short intervals for frenzied exercise, we spend our days mostly sitting.

To be clear, squatting isn’t just an artifact of our evolutionary history. A large swath of the planet’s population still does it on a daily basis, whether to rest, to pray, to cook, to share a meal, or to use the toilet. (Squat-style toilets are the norm in Asia, and pit latrines in rural areas all over the world require squatting.) As they learn to walk, toddlers from New Jersey to Papua New Guinea squat—and stand up from a squat—with grace and ease. In countries where hospitals are not widespread, squatting is also a position associated with that most fundamental part of life: birth.

But in Western countries, entire populations—rich and poor—have abandoned the posture. On the whole, squatting is seen as an undignified and uncomfortable posture—one we avoid entirely. At best, we might undertake it during Crossfit, pilates or while lifting at the gym, but only partially and often with weights (a repetitive maneuver that’s hard to imagine being useful 2.5 million years ago). This ignores the fact that deep squatting as a form of active rest is built in to both our evolutionary and developmental past: It’s not that you can’t comfortably sit in a deep squat, it’s just that you’ve forgotten how.

“The game started with squatting,” says author and osteopath Phillip Beach. Beach is known for pioneering the idea of “archetypal postures.” These positions—which, in addition to a deep passive squat with the feet flat on the floor, include sitting cross legged and kneeling on one’s knees and heels—are not just good for us, but “deeply embedded into the way our bodies are built.” The whole way your physiology is built is around these postures

So why is squatting so good for us? And why did so many of us stop doing it?

It comes down to a simple matter of “use it or lose it,” says Dr. Bahram Jam, a physical therapist and founder of the Advanced Physical Therapy Education Institute (APTEI) in Ontario, Canada.

“Every joint in our body has synovial fluid in it. This is the oil in our body that provides nutrition to the cartilage,” Jam says. “Two things are required to produce that fluid: movement and compression. So if a joint doesn’t go through its full range—if the hips and knees never go past 90 degrees—the body says ‘I’m

not being used' and starts to degenerate and stops the production of synovial fluid."

1858, that fully flushable, seated toilets started to commonly appear in people's homes.

"The reason squatting is so uncomfortable because we don't do it," Jam says. "But if you go to the restroom once or twice a day for a bowel movement and five times a day for bladder function, that's five or six times a day you've squatted."

"It's considered primitive and of low social status to squat somewhere," says Jam.

"When we think of squatting we think of a peasant in India, or an African village tribesman, or an unhygienic city floor. We think we've evolved past that—but really we've devolved away from it."

birthing movements in the West.

"In a squatting birthing position, the muscles relax and you're allowing the sacrum to have free movement so the baby can push down, with gravity playing a role too," Trivedi says. "But the perception that this position was primitive is why women went from this active position to being on the bed, where they are less embodied and have less agency in the birthing process."

Children in the West squat with ease. Why can't their parents?

So should we replace sitting with squatting and say goodbye to our office chairs forever? Beach points out that "any posture held for too long causes problems" and there [are studies to suggest](#) that populations that spend excessive time in a deep squat (hours per day), do have a higher incidence of knee and osteoarthritis issues.

Beyond this kind of movement improving our joint health and flexibility, Trivedi points out that a growing interest in yoga worldwide is perhaps in part a recognition that "being on the ground helps you physically be grounded in yourself"—something that's largely missing from our screen-dominated, hyper-intellectualized lives.

Blog Rosie Spinks 2017>>



## Training - squat



Squat preparation



Wall squat

39

<<Use of the wall squat also aids in the control of common compensation patterns, such as pelvic rotations, dynamic valgus, and weight-bearing deviations in the feet observed in the training environment. Watanabe 2016>>

<<A child does not learn to squat from the top down—in other words, he does not suddenly make a conscious decision one day to squat. Actually, he is squatting one day and makes the conscious decision to stand. Squatting precedes standing in the developmental sequence. This is the way a child's brain learns to use the body as the child develops movement patterns. Therefore, a child is probably crawling, rocks back into a squatting position with the back completely relaxed and the hips completely flexed, and stands when he has enough hip strength. This approach makes a lot of sense and can be applied to relearning the deep squat movement if it is lost. Someone who doesn't perform well on the squat assessment test does not know what deep squatting feels like. It's like going on a journey without knowing the destination. By relaxing the lower back and doing the toe touch and deep squat progressions, the hips, knees, and ankles get into the squatting position and then set the spine when the hands are lifted off the raised platform. This allows the squatter to feel where she is going. She already knows what the top of the squat feels like—that's standing. Now she knows what the bottom of the squat feels like. Cook 2003>>

<<• The squat down is slow and deep, so take a slow count of six to get down by bending your knees. The reason we go slowly is so you do not allow gravity to take over and merely slump down. You also get a chance to see and feel how everything is moving through the six key areas.

The magic of this move is that you will be able to see and feel where your problem spots are and, even better, the test becomes the solution, as simply performing it regularly helps with your quality of movement. Stretch out any area that feels tight and aim to work any area that feels weak. Barrett 2014>>



## Kracht / stabiliteit



Wordt de 90° flexie gehaald?

Inhibitie psoas (TrP)?  
Zwakte extensieketen  
Eversie voet



Kneeing in?

Hypertonie adductoren?  
Zwakte extensieketen?  
Eversie voet?





## Kracht / stabiliteit

Kneeing in?

Hypertonie adductoren?  
Zwakte extensieketen?  
Eversie voet?



41



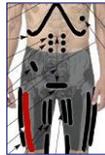
## Testen



extensie heup  
Extensie knie



abductie heup



Activatiepunten!



## Keten training



43

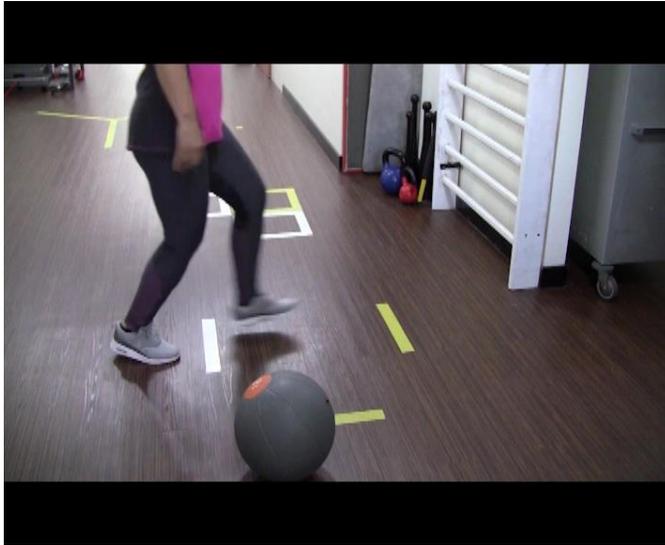
<<Als voorbeeld de samenwerking tussen rugspieren en hamstrings: beide hebben hun aanhechting aan het bekken. De rugspieren kunnen het bekken voorover kantelen. De hamstrings overspannen behalve het heupgewricht ook het kniegewricht en kunnen het bekken achterover kantelen. In veel bewegingspatronen spelen ze een belangrijke rol, doordat ze in een open keten bij een omkering van de beweging (bijvoorbeeld bij het lopen) worden geladen met elastische energie en die energie vervolgens weer omzetten in een (tegengestelde) beweging. In een gesloten keten hebben de hamstrings een retroflecterend moment ten opzichte van het heupgewricht. Dit retroflecterende moment kan behalve in het naar achteren bewegen van het been ook resulteren in het achterover kantelen van het bekken. De bekkenkanteling is in een gesloten keten meestal niet gewenst. Het is daarom belangrijk dat de rugspieren het achterover kantelen van het bekken tegengaan. De rugspieren werken enkel wanneer de rug lumbaal voldoende gestrekt is (voldoende lordose heeft). Is de rug te bol, dan heeft dit tot gevolg dat de rugspieren niet goed aangespannen zijn en het bekken dus makkelijk achterover kan kantelen. Daardoor zal de spanning op de hamstrings, die cruciaal is bij het lopen, verminderen. Bij bewegingen in een gesloten keten, waarbij de werking van de hamstrings belangrijk is, moeten de rugspieren dus actief zijn. Alle topsprinters lopen dan ook met een goed gestrekte rug. Krachtoefeningen als step ups en voorslaan zijn uitermate

geschikt om deze fundamentele samenwerking tussen hamstrings en rugspieren te standaardiseren en verbeteren (figuren 5.5 en 5.6). Bosch 2012>>

<<Door de passieve weefsels die tussen de spiervezels liggen, hebben rugspieren net als buikspieren een erg smal kracht-lengtebereik. In functionele hoog intensieve bewegingen blijven ze dan ook dicht bij de optimumlengte. Dit betekent dat er bij grote belastingen geen noemenswaardige ventraalflexie van de romp mag zijn. Wanneer die ventraalflexie er wel is, zoals bij het schaatsen, dan betekent dit dat de rugspieren een grote lengte hebben en dus de contractiekracht laag is (bij een afzet maximaal 40% van de MVC; Roelants & Van Kempen, 2003). De m. erector spinae is door zijn kracht-lengte karakteristiek geschikt voor maximaalkrachttraining. In krachttraining heeft dit vooral consequenties voor hoe squats uitgevoerd moeten worden. Vaak worden er aan diepe tweebeenige squats bijzonder gunstige krachtadaptaties toegeschreven en wordt geprobeerd de knieën verder dan negentig graden te buigen. Wanneer men echter vanuit rechtopstaande stand naar beneden zakt, zal op enig moment het bekken achterover beginnen te kantelen. Deze beweging veroorzaakt een standsverandering van de wervelkolom die te vergelijken is met ventraalflexie van de romp. Bij het achterover kantelen van het bekken verlengt de m. erector spinae en neemt de kracht snel af. Hierbij speelt de zogenaamde 'flexierelaxatie' een rol, waarbij het EMG-signaal bij vergaande flexie stopt. Onder andere hierdoor is de wervelkolom met langer goed beschermd. Het is daarom aan te raden om bij squats met halterlast niet dieper te gaan dan zonder bekkenkanteling achterover mogelijk is. Behalve dat men vraagtekens mag zetten bij de zin van diepe squats, mag men vraagtekens zetten bij de claim dat tweebeenige squats bij uitstek geschikt zijn om de kracht in de benen te verbeteren. Mogelijk is niet de kracht van de benen maar de kracht van de rugspieren de beperkende factor en zijn tweebeenige squats dus eerder een maximaalkracht oefening voor de rugspieren. Als men de rugspieren daadwerkelijk wil trainen met een maximale belasting is de zogenaamde 'goodmorningoefening' beter geschikt. Ook in deze oefening geldt dat er geen ventraalflexie mag optreden in de wervelkolom. Dit gebeurt als men erg ver voorover knikt. De beste garantie om dit te voorkomen, is te werken met een grote halterlast, waardoor de romp minder ver voorover kan bewegen (figuur 7.15). Bosch 2012>>



## Functional training



Nadruk lig op quadriceps/tensor-gluteaal-erector keten



Keten = extension + rotation





## Abduction



<<muscle activity with the band loop may suggest that a training aid may, over time, lead to an increase in barbell squat strength by increasing activation of agonist muscles more than traditional, un-banded squats. Greater maximal muscle activity in most muscles during band loop sessions may provide enhanced knee stability via increased activation of stabilizing muscles. Ryan 2017>>



## Abduction

Kneeing in: actually always the result of a collapse of the extension chain:  
Weakened re-supination and hip extension.





## Springen



Wat is de reden?

- Angst?

Begin met kleine hupjes

- Pijn?

Check TrP's extensieketen

- Zwakte?

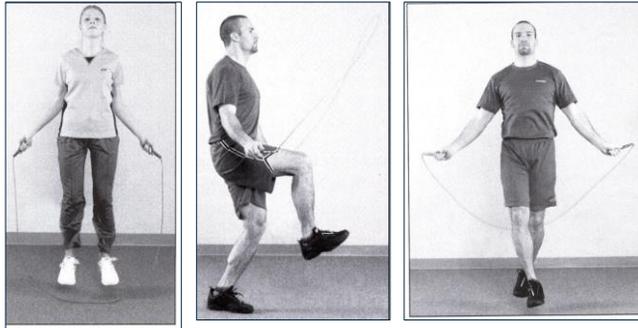
Train de extensieketen

48

Resilience, grace, fear. Hopping or jumping?



## Jump rope



Resilience!

Knees:  
Supple and ready to receive impact  
Made for flexion and extension (so check: hip rotation)

49

<<Jumping rope performance depends mostly on the gross motor coordination that is the ability to coordinate arms, legs, and torso movements when the whole body is in motion (Fransen et al., 2012). In addition, such combined movements have the task of maintaining balance (i.e. postural stability) throughout the exercise to prevent unsuitable displacements of the center of gravity. According to these considerations, it is reasonable assume that a training program based on jumping rope exercises may be effective in improving those aforementioned capabilities. Trecroci 2015.>>

<<In a previous study on pulmonary functions, Jang argued that the jump rope exercise had a great effect on enhancing endurance by developing the cardiopulmonary functions<sup>15</sup>). Kim and Kim showed that a 12-week music jump rope exercise program resulted in significant differences in lung capacity, which is a cardiopulmonary function<sup>16</sup>). Park et al. reported that their subjects' maximum oxygen uptake increased significantly after 12 weeks of aerobic training<sup>17</sup>). It contributed to the improvement of cardiopulmonary functions by injecting more oxygen into active muscles than respiratory muscles, thus increasing the ventilation and supplying the energy source. Furthermore, in a previous study on obesity, Choi reported significant decreases in body fat percentage and fat mass in obese middle school girls after they completed a jump rope exercise program. Seo 2017>>

<<Jumping rope is barely possible with poor form or poor technique. Everyone will make consistent mistakes and be interrupted by a rope that catches on a foot. The rope is the coach. Jumping rope is what I call a self-limiting exercise. Participants are limited in their ability to perform the exercise by lack of technique. In other words, truly poor technique will prevent the participant from performing the exercise, so bad movement patterns cannot be reinforced. This is the most important reason for jumping rope. It is possible to perform sprints, shuttles, and agility work with poor form as long as times are adequate. Other forms of popular endurance work such as jogging, cycling, and rowing can also allow poor form without supervision and coaching. Poor form can be reinforced without the athlete ever realizing it.

Jumping rope allows many athletes to self-train effectively, whereas self-training or training with a partner using running or sprints sometimes has too many uncontrollable variables. The jump rope is extremely portable and allows for position variations. Running, wind sprints, cycling, and rowing can provide a workout, burn calories, and improve stamina, but possibly by sacrificing technique, hurting reaction times, and altering ready position. Jumping rope, on the other hand, reinforces three basic movement patterns from the movement screen in chapter 5—the squat, hurdle step, and lunge—while providing a workout, burning calories, and improving stamina.

Variations can be performed to work on left-right differences. This is not possible in running or sprinting because both sides must work equally to propel the body forward. It is easy to focus on a weak side while skipping rope.

The three basic movement patterns used in a weight-training program will be used in a jump rope program:

1. Squat stance: Both feet placed side by side or slightly apart
2. Hurdle step stance: Single-leg stance in a stride position with one leg held at 90 degrees at both the hip and knee
3. Lunge stance: Also called the scissors stance; one foot in front and one foot behind, narrowing the base of support

These three key foot positions are used in most field and court sports. Regardless of skill level in any field or court sport, I recommend jumping rope as an excellent training tool that is both efficient and effective for reinforcing good movement patterns. Jumping rope will also help to develop great speed and agility and a power foundation for sports performance.

For swimmers and cyclists and other athletes who may feel jumping rope is not sport specific or functional, I still recommend rope work because it is an excellent way to cross-train. Athletes in sports such as ice hockey, cross-country running, Olympic-style weight lifting, and alpine skiing also benefit from the quick footwork involved in jumping rope. The stamina displayed by elite boxers and wrestlers has long stood as a

testament to the effectiveness of jumping rope.

Distance runners, dancers, martial artists, and athletes in paddle sports may feel that jumping rope is not the best choice for improving stamina, but I disagree. Although jumping rope may not seem sport specific, it is extremely posture specific. It improves the ability to maintain a long spine and actually has far less impact than sprinting or jogging. I encourage endurance athletes who are not involved in field or court sports to study the literature and continue to explore the added benefits of interval training to complement sport-specific training.

Only a prototypical runner with a lean frame and exceptional technique would be able to run enough to benefit the legs and cardiovascular system without exposing the body to greater risk from musculoskeletal breakdown. Jumping rope combats this by forcing the athlete to land on the toes and use the untapped power in the calves and the combined power of the quads, hamstrings, glutes, and core.

The agility and quick direction changes needed in many sports require quick reactions and excellent footwork. This is not possible if the heel is planted on the ground. Major knee injuries are often noncontact injuries, caused by a twisting of the knee without any outside force. This is a result of sloppy training, poor body awareness, or unnecessary fatigue during competition, which reduces body awareness and forces greater stress on the knees. Although the knee is often the victim of injury, it rarely is the culprit. If the foot is planted and the ankle and hip are stiff, there is only one place for rotation to occur—the knee. Unfortunately, the knee was not designed to rotate as primary motion. Jumping rope teaches the athlete to stay on the toes and keep the calf ready for action, increasing his chance of pivoting on a good strong foot with most of his weight on the toe.

Consider one last fact about jumping rope. It takes less training time to jump rope than to run for the same benefits. Because jumping rope requires greater technique, it incorporates more muscles, both the muscles that move and those that hold the body stable. Jumping rope requires a greater expenditure of energy. Turning the rope increases the level of intensity. Periodic rest breaks are incorporated into the routine. Total time jumping rope is far less than total time in a continuous running or jogging workout. This results in greater workout intensity and reduced mechanical stress from impact at the same time Cook 2003>>

<<Your hip is the joint in your body that accommodates gravity the most. It is the meeting place of your pelvis and leg and an index of a powerful body. When it is free to move through its full movement range, its capable of withstanding up to between 12-15 times your bodyweight. When you balance and strengthen the muscles around your hip joint, you can build a powerful body.

The psoas muscle is the underbelly link between your legs and upper body. When they're tight, they pull your thoracic spine and upper torso down, causing tension

between the shoulder blades (T5-T7) and compress your waist, increasing those love handles on the side of your hips. Tight psoas muscles can also cause a burning sensation on the front of your thighs, during long walks or runs and when sitting down for prolonged periods in front of a computer. They'll even affect the free-flowing, pelvic rocking motion that's necessary during sex. When you strengthen the outer armor muscles at the expense of the deeper psoas, like with traditional sit-ups and crunches, you disrupt the healthy counterbalance that's necessary between the upper and lower body.

A tight psoas will also affect the internal organs that the nerves from the lumbar and solar plexus supply and when a tight psoas changes your lumbar curve, it bows the thoracic spine and depresses the ribcage, which inhibits your breathing capacity.

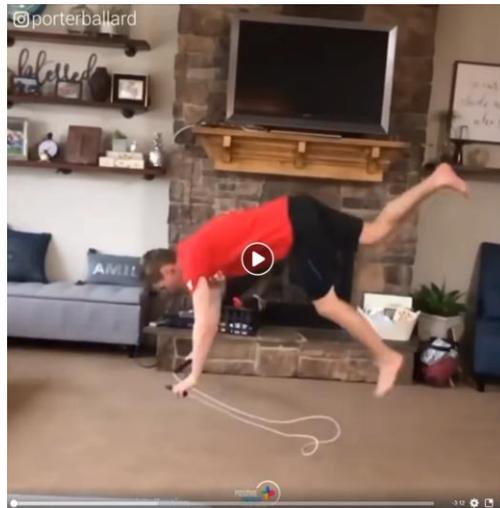
Walking is one of the first movement patterns to weaken. Here's an exercise to free your psoas muscles, stand with your inside hand resting on a wall, and swing, your outside leg in a pendulum manner, suspended from your hip. Free psoas muscles enable you to walk with a spring in your step for longer. Refer to chapter 5, for the psoas stretch and check that your lower abdominal muscles are strong, to support your psoas. Parore 2002>>

<<Rigidity anywhere in the body, especially the knees, leaves the body brittle and susceptible to injury. This principle applies when external forces are applied to the body, like in a football game or a wrestling match. The knees should bend and give. The nature of the knee (a hinge joint) means excessive twisting should be avoided. Like the hinges to a door, which work best, and last longer when they open and close without being twisted. Next time you're standing in a queue, remember to soften and bend your knees. This will free your pelvis and strengthen your back.

When the knees aren't working correctly, check the lumbar curve. The lumbar curve normally, but not always decreases with bowed legs and increases with knocked knees. The knee can also be thrown off alignment by a tight hip joint or a jammed up ankle. Parore 2002>>



Voor nog wat inspiratie



50



## Tillen

Voorkeurspatroon?

Wat voelt de patiënt?

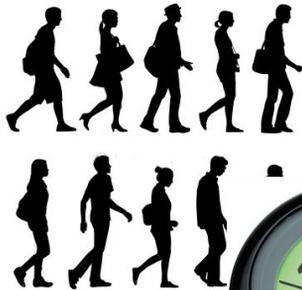
Angst?

Compensaties?





## Lopen



In modern life, moving appears to be optional.

52

<<We all stand and walk differently, but we all walk with an identical sense of 'normalcy' associated with our own way of doing it; and this sense of norm has for each of us an equal feeling of 'rightness' to it. Yet, some of us stand and walk with far more ease and efficiency than others, while some have accustomed themselves to doing it so poorly that their posture and manner of walking undermine the health of the whole system.

Juhan 2003>>

<<Mulder, T. (2001). The born adjuster: about movement, consciousness and behavior. Amsterdam: Publisher Contact

Gait pattern is determined by

- Age and gender
- Physique
- Shoes
- Living conditions
- Surroundings
- Psychological state
- Fashion

- Group togetherness
- Purpose of walking>>

<<Researchers and public health practitioners have recognized that participants in health promotion programs have varying levels of readiness to undertake potentially challenging lifestyle changes, such as increasing physical activity to a level of 10,000 steps per day. Consistent with the Transtheoretical Model, interventions can target various subgroups, based on level of readiness for health behavior change, and interventions can be tailored to differing needs or preferences of the participants. Studies have shown that such targeted approaches are effective, cost-effective and often lead to greater improvements in health outcomes compared to non-targeted or non-tailored approaches. 36 Weeks lost weight.

*Rosenkranz RR, Duncan MJ, Caperchione CM, Kolt GS, Vandelanotte C, Maeder AJ, Savage TN, Mummery WK. Validity of the Stages of Change in Steps instrument (SoC-Step) for achieving the physical activity goal of 10,000 steps per day. >>*

Today, unlike our ancestors, we may choose not to move. In modern life, moving appears to be optional. The less we move, the less we are capable of moving. One of the oldest reasons to move is an empty stomach (or a full bladder, red). That held in running, fighting, climbing, digging etc. From prehistoric times to about the 20th century, the world was physically a very stimulating place for human kind. (Egoscue)

It is possible that the ability to walk with optimal elasticity only truly develops if learned from early childhood and prompted by the environment. It is possible that the environment of Western industrial civilization simply does not require children to learn efficient, elastic walking. We suppose this lack of proper usage of elastic fascia contributes to the pandemic of lower back pain in the Western world.

<<Similarly, a study examining the gait of women of the African Luo and Kikuyu tribes carrying loads of up to 20% of their body weight on their heads, found that their oxygen consumption was largely independent of the weight, provided they were allowed to walk at a speed comfortable for them. When well-trained British soldiers were examined, carrying up to 20% of their body weight on their backpacks, their energy consumption increased in proportion to the weight carried. Interestingly, when the African women were asked to walk at an uncomfortably faster or slower pace, they exhibited the same weight dependent (and probably more muscular driven) pattern in their energy expenditure as the soldiers (Alexander, 1986; Zorn & Hodeck, 2011). Schleip in Schleip 2015 H10>>

<< Both approaches have made it clear that elastic walking entails very precise coordination, that is to say, it requires the right amount of force to be applied at precisely the right time, much like the force that is needed to keep a child's swing in

motion. Zorn in Schleip 2015 H17>>

<< Samuel (2001): Kenyan women routinely carry up to 70% of their body weight on their heads, yet they are not particularly fit by ordinary standards of physical fitness. This ability arises not through muscular strength but through the women's sensitive use of the inherent periodicity of walking, the pendular motion of their hips. Treadmill tests show that they can carry up to 20% of their bodyweight before breathing even becomes affected. Op het oog was het verschil in timing niet te onderscheiden van het marcheren van soldaten. Maar net zoals bij een schommel komt de timing heel precies. Smith 2005>>

<<It was observed that women of some African tribes are able to walk with loads on their heads without using more energy than if they were not loaded. British army recruits were not able to do this. Het verschil in gewicht tussen dikke en dunne mensen heeft geen invloed op energy expenditure. The involvement of elastic fascia, especially the gluteus max and psoas springs might provide a possible explanation as an energy-saving mechanism.

African pelvises rotate much more than European ones. This might be an indication of an extended stretching and recoiling usage of the lumbodorsal fascia. We also noted strong rotations of the pelvis, also in the transversal plane, suggesting a contribution from the spinal engine. Furthermore, a highly pronounced arm swing is common in the African style of walking.

In many people from our culture the lower back is a desert territory suffering from famine. Movement is needed to 'stir the soup'. This famine results in degenerating collagenous fibers – a syndrome we might call 'frozen lumbar'. The lumbodorsal fascia can seldom stretch itself, and the discs are buried alive. Egoscue>>



## Inverted pendulum

1960 - Giovanni Cavagna: in walking, energy is saved by the action of a rigid 'inverted pendulum' and elasticity is not involved.

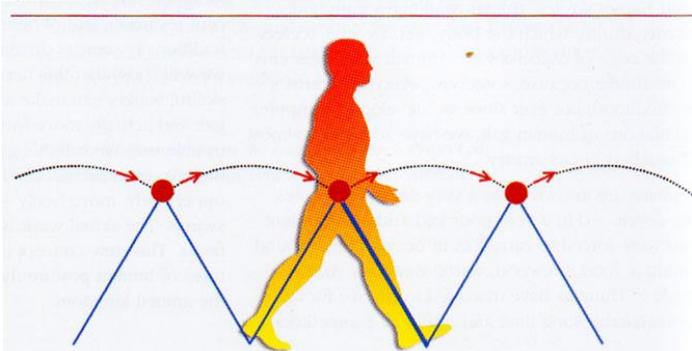


Figure 1: The stance leg as an inverted pendulum

(Zorn, 2012)

53

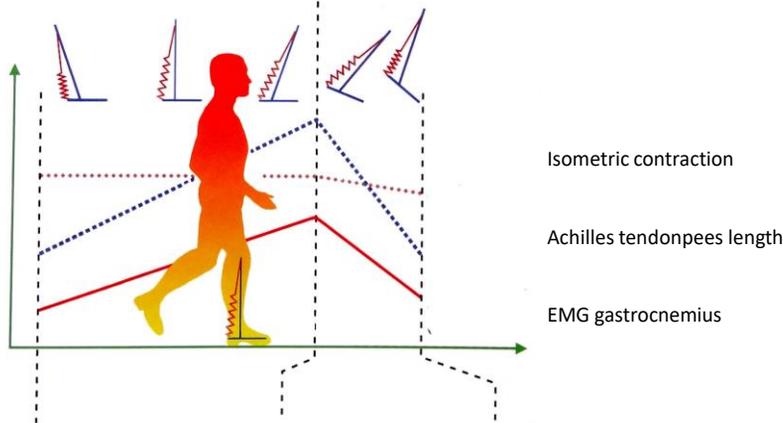
<<The fluctuation in the vertical center of mass (COM) during walking is a functional movement that converts potential energy into kinetic energy and vice versa (Cavagna & Margaria, 1966). The conservation of kinetic and potential energies aids in minimizing the metabolic energy cost. Recent studies showed that minimizing the vertical COM movement leads to an increase in the metabolic cost (Gordon, Ferris, & Kuo, 2009; Ortega & Farley, 2005).

1960 Giovanni Cavagna: In running, energy is saved by elastic storage, as in a bouncing ball, while in walking, energy is saved by the action of a rigid 'inverted pendulum' and elasticity is not involved. Zorn 2012>>>



## With elasticity

Reminder: collagen is very elastic



(Zorn, 2012)

54

<<Although this is a fixed-end contraction where the whole muscle-tendon unit length is kept constant, one can clearly observe changes in fascicle orientations by contraction: fascicles shorten with increasing angles. Contraction thus induces deformation of fascial organization of the muscle. Shortening of fascicles occurs at the expense of elongations of the tendinous structures [Griffiths 1991; Kawakami et al. 1998].

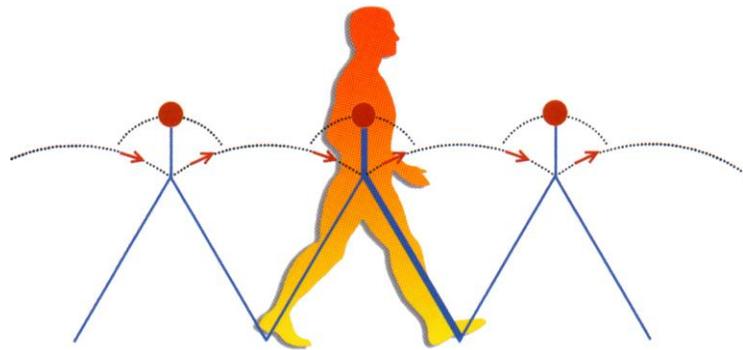
During dynamic human movements, this muscle-tendon interaction plays an extremely important role. Kawakami et al. (2002) used ultrasonography to track length changes of the gastrocnemius fascicles during ankle hopping preceded by a counter-movement, and showed that fascicles contract isometrically when the muscle-tendon unit is being lengthened. In this phase, tendinous structures are lengthened and store elastic energy which is released during the shortening phase that follows, to add to positive mechanical work. A similar mechanism has been found during human walking (Fukunaga et al. 2001). Stiff collagen can take a lot of force and store a lot of energy while changing its shape just a little.

In het verleden werden dierlijke materialen gebruikt als er grote stijfheid en elasticiteit nodig was: violsnaren, boogsnaren, catapulten etc

Through the help of the stance leg, the falling body weight is softly slowed down, and its energy is used to draw the Achilles tendon, like the string of a catapult. The gastrocnemius muscle is working strictly isometrically (that is only the muscle belly not the tendon) Isometric contraction can be done in a slow manner and therefore anaerobically. Isometric contraction has a high energy efficiency (maar niet heel veel onderzoek naar gedaan). With adequate gait style, the Achilles spring is stretching before and recoiling during each toe-off phase by about 7 mm. (Fukunaga 2002). With such a gait pattern, some African women are able to carry the equivalent of 20% of their body weight without any muscular effort (Hoglund 1995). Zorn 2012>>



## Walking with elasticity



Model of Adjo Zorn and Kai Hodeck

(Zorn, 2012)

55

<<Little is still known about the function of the psoas while walking. A few EMG measurements suggest that the psoas tightens at the end of the stance phase and the start of the swing phase, this supports the jumping hypothesis. The fascicles are of equal length, which fits in with the hypothesis that the psoas is primarily isometric. In walking, the psoas is stretched most when the hip is in internal rotation, the action of the psoas is enhanced, daardoor sterkere LF en rotation of the spinal components. This rotation between pelvis and spine supports the stretch of the PLF on the other side.

The addition of a spring to the inverted pendulum has important consequences: if the spring parameters are adjusted properly, this structure oscillates and has a natural frequency. In this sense, it's a true pendulum.

The bootstrap design actually needs a certain amount of mass as a counterweight, balancing high above the hip joint as is typical for the human species.

Computer model: interestingly, just by changing the resting length of the springs, and with them the natural frequencies of these pendulums, our model can adapt to various velocities, anatomical variations, and even to a certain amount of carried weight. And all of this completely passive, without any active engines (muscles) or any other expenditure of energy. Zorn 2012>>

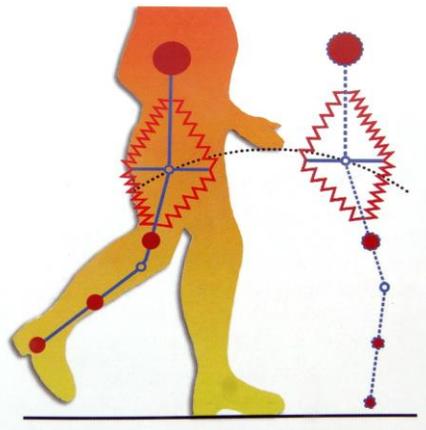


## Swing walker

F. thoracolumbalis

M. gluteus maximus

M. psoas



(Zorn 2012)

56

<<Having watched probably thousands of people walk, I estimate that more than nine out of 10 people fail to extend their hips and spine in gait. This is potentially due to the fact that the majority of people are either over-pronated or over-supinated and they tend to compensate by flexing the hip flexors to lift the leg forward, instead of lengthening them first to create free motion forwards. The latter is effortless, the former requires effort and whole-body adaptation or compensation. The inability to extend our spine further reduces our ability to extend or lengthen the abdominal muscles, so they, too, are operating in a suboptimal environment. Any wonder the 'six-pack abs' dream is so prevalent?

In a flexed-up world, we sit down all day walk around staring down at our phones, driving our cars, walking with flexed hips, flexed spine and pronated feet, and rarely get the opportunity to stand tall. Our natural response to this is the desire for a flatter tummy and a six-pack.

Sit-ups never have and never will be effective in an environment where you spend your day in flexion.

Sit-ups flex your spine towards maximum flexion from a neutral(ish) position, thus

encouraging strength in a shortened range whilst not allowing for any extension in the spine and thus limits lengthening in the abdominals.

The only role the abdominals have in motion is to flex the spine from a long, extended position - so please create exercises to do just that and then do the same for all muscles in the body.

Flexing your abs over a Swiss ball is better (more length), BUT anything that lengthens your abs whilst on your feet and incorporates your foot function as well is an awesome way of going about flattening the stomach and opening up the 'eight-pack', baby! Yes, why settle for just six when you can have all eight? Ward 2013>>

<<The hip flexors are not responsible for pulling/flexing the swing leg forward in gait or running. The psoas is a mere swing phase perpetuator, not an initiator.

For about 2 decades we have been saying in our lectures, posts and podcasts that it is the reduction of the obliquity of the pelvis during gait from various other tissues and biomechanical events that causes leg swing, meaning the trail leg is brought forward in swing largely by the abdominal muscle linkage to the pelvis (and other loaded tissues) that is responsible for forward swing of the leg. It is not the hip flexor group that does this hip flexion action. Thus it could be considered foolish to train the hip flexors to be the primary swing drivers. Here is another supporting piece of research. "These experiments also showed that the trailing leg is brought forward during the swing phase without activity in the flexor muscles about the hip joint. This was verified by the absence of EMG activity in the iliacus muscle measured by intramuscular wire electrodes. Instead the strong ligaments restricting hip joint extension are stretched during the first half of the swing phase thereby storing elastic energy, which is released during the last half of the stance phase and accelerating the leg into the swing phase. This is considered an important energy conserving feature of human walking. "

Dan B, Med J. 2014 Apr;61(4):B4823. Contributions to the understanding of gait control.>>



Spinal engine Model van Serge Gracovetsky



57

For walking, legs are practical but not necessarily necessary



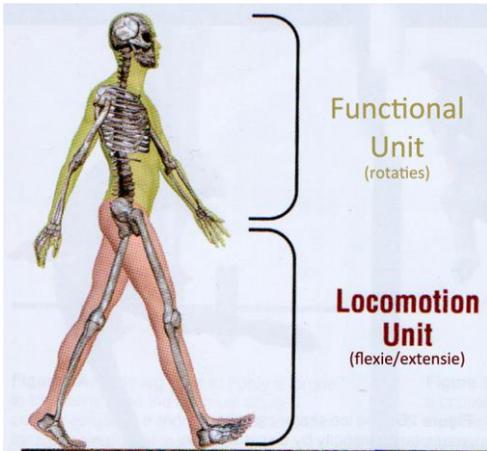
## Fascia Engine



For walking, legs are practical but not necessarily necessary



## Split design



Rotation

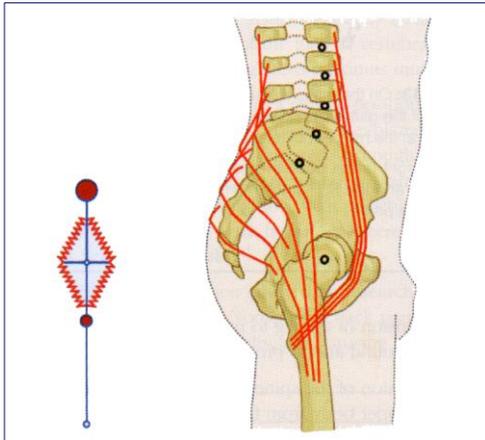
Flexion / ext



59



## At the hips



Reminder: collagen is very elastic!

Rotation



Flexion / ext

60



## Lopen met of zonder rotatie

*"In many people from our culture the lower back is a desert territory suffering famine."*

Egoscue



= functional abdominals training

61

<<Having watched probably thousands of people walk, I estimate that more than nine out of 10 people fail to extend their hips and spine in gait. This is potentially due to the fact that the majority of people are either over-pronated or over-supinated and they tend to compensate by flexing the hip flexors to lift the leg forward, instead of lengthening them first to create free motion forwards. The latter is effortless, the former requires effort and whole-body adaptation or compensation. The inability to extend our spine further reduces our ability to extend or lengthen the abdominal muscles, so they, too, are operating in a suboptimal environment. Any wonder the 'six-pack abs' dream is so prevalent?

In a flexed-up world, we sit down all day walk around staring down at our phones, driving our cars, walking with flexed hips, flexed spine and pronated feet, and rarely get the opportunity to stand tall. Our natural response to this is the desire for a flatter tummy and a six-pack.

Sit-ups never have and never will be effective in an environment where you spend your day in flexion.

Sit-ups flex your spine towards maximum flexion from a neutral(ish) position, thus encouraging strength in a shortened range whilst not allowing for any extension in the spine and thus limits lengthening in the abdominals.

The only role the abdominals have in motion is to flex the spine from a long, extended position - so please create exercises to do just that and then do the same for all muscles in the body.

Flexing your abs over a Swiss ball is better (more length), BUT anything that lengthens your abs whilst on your feet and incorporates your foot function as well is an awesome way of going about flattening the stomach and opening up the 'eight-pack', baby! Yes, why settle for just six when you can have all eight? Ward 2013>>



## Pronatie - Supinatie voet?





## Voet beoordeling

### Inspectie

Eversie – Inversie - Neutraal (zwak - stijf)

### FFO

Op tenen staan: voet gewelf – passive/active

Op een been staan: balans

Lunge: Voet – heup connective

Squat – op tenen: eversie – inversie actief

Lopen: heel strike

Klinisch redeneren

Mobiliseren  
en/of  
Versterken

### Palpatie

TrP's en weefsel mobiliteit



## Pronation

### Pronatie triggert de extensieketen

voorwaarde: 60° extensie MTP I

Tensegrity heeft spanning nodig!



64

<< Optimal movement accesses both pronation and supination whilst passing through the centre point. Pronation occurs to absorb the shock of ground reaction; the foot becomes flexible and mobile so as to adapt to the earth below it, whether concrete, sand or rubble, and is thus known as a mobile adaptor. Pronation is also the moment where the muscles prepare for propulsion. The foot was designed to function on the earth and on uneven surfaces: shoes, flat level ground and concrete are its worst enemy it gets lazy and subsequently downgrades its function, with the true role of the foot no longer needed in the flat world we have created.

Pronation has a direct impact on the centre of mass. It drives it away, pushing it towards the other foot where, hopefully, a pronation in response will knock it back like a simple game of 'centre of mass tennis'.

A static pronation (flat foot) is not an ideal scenario since movement is either removed or extremely limited. A dynamic pronation is healthy as it creates a lengthening of muscles, which in turn can pull the body out of the position and back towards a centred state.

When the foot pronates, virtually all of the muscles of the foot lengthen and if big

rule »1 stands true, as 1 believe, then that makes virtually all of the muscles 'resupinators' of the foot. Ward 2013>>

Extension chain:

You also see the contra and ipsilateral deviation in the loading phase.

You must test Gluteii functionally: see your test sit up at FFA or see the same deviation.

- Zwakke gluteii (minimus, medius) afzakking van bekken contralateraal of latroflexie romp ipsilateral zien.
- Wk pathologie kan een relatie hebben met slechte schokabsorptie (Bojsen\_Moller F 1979)

<< People are dying from the feet up. I watch people walk, and find the less spring in their step, the unhealthier they are in the body above. They are shuffling to a quicker death. Gravity makes toxicity settle to the bottom. In orde to pump toxicity out of the body we need healthy feet hinges Karrash 2012>>

<<The thing about over-pronated feet is that they simply cannot allow the body to perform optimally as it appears to have been designed, thus it must settle for generating maximum functionality possible, given the parameters it has to deal with today.

So it responds in a variety of ways - all of which j are possible:

- Feet turned out
- Knees hyper-extended
- Pelvis tilted foriwards or backwards
- Spinal kyphosis
- Deactivated glutes
- Forward head posture
- Slumped ribcage/protracted shoulder girdle

Ward 2013>>



## Barefoot exercise



Walking on toes



### Barefoot exercises:

- Increase proprioceptive input
- Alleviate back pain

65

<< Barefoot exercise: Barefoot exercise increases proprioceptive input and helps alleviate back pain. Bullock-Saxton JE, Spine 1993 May>>

<<Examining muscle activity patterns can reveal fundamental differences between FFS and RFS running patterns and expose potential injury risks. With greater medial and lateral gastrocnemius activity, FFS running demands more from these muscles. Although sagittal plane kinematics can be replicated by a RFS runner running with a FFS pattern, natural RFS runners running with a FFS pattern have longer stride lengths compared to natural FFS runners, a reduced peak ankle plantarflexion moment and increased peak ankle external rotation moment during stance. Jennifer 2015>>

Activation foot muscles: powerful foot movement from plantar flexion with extension toes to dorsal flexion toes with flexion toes

<< Your feet and ankle joints are some of the most powerfully built structures in your body. They're the foundation of your power base, from where you organize and

transmit weight. To stay grounded and to move with spring, you should start from your base and work up; build strong, mobile ankles and balanced arches in your feet.

People with a strong power base are grounded. They stand and walk with their feet pointing straight ahead, knees over second toes, they move lightly and quickly, with spring. People with a weak power base, stand with their feet pointing out, like Charlie Chaplin and have difficulty moving with their knees aligned over their second toes, their movement is heavy and sluggish, with little spring. When your bodyweight is evenly distributed over your legs and feet; your base of support, it gives your mind a sense of balanced movement from a grounded body.

When you walk, the outer arch of your foot is more involved in receiving and supporting your bodyweight and the inner arch is more involved in the propulsion of your next step. When the inner arch becomes flat, you lose the de-accelerator-accelerator mechanism of your foot that healthy arches provide, along with the sling control system of the muscles on either side of your lower leg. When the arches of your feet and the muscles of your lower leg are balanced, it gives your feet the flexibility and power for a springy step. Parore 2002>>



## Barefoot shoes

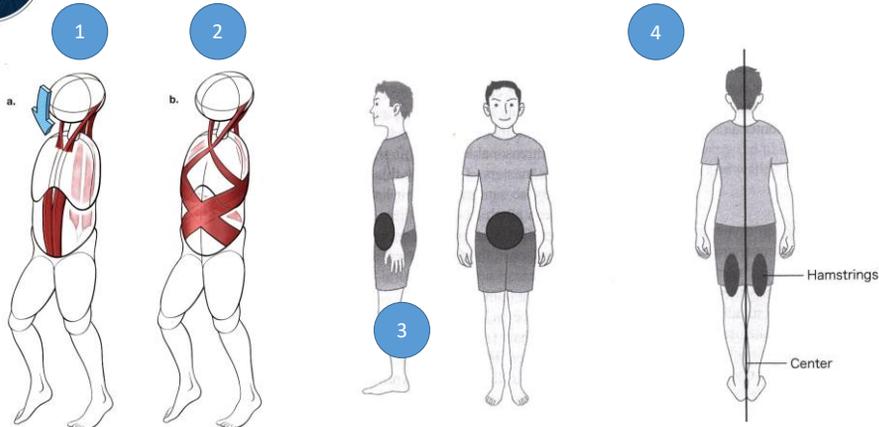


66

<<Switching from running in cushioned shoes to jogging barefoot is associated with the accumulation of greatest pressure in the forefoot and midfoot. The accumulation of the greatest pressure at the insertion of plantar aponeurosis can lead to the injuries of musculoskeletal system, in particular plantar aponeurosis. Even distribution of pressure among various parts of the foot in persons running in minimalistic shoes is associated with lower risk of injury than in the case of running barefoot. Szuluc P 2016>>



## Fascia walking



Awareness is key!

67

<< First, that line will work as a guideline. You can stand up straighten Imagine you are a marionette manipulated by a string. If you have an image that someone is pulling the strings from above, you can stand straighter and more beautifully as if your body is smoothly growing upward. This guideline allows you to spend less effort to keep balance. Your body will be correctly aligned without any problems such as your left shoulder is lower than the right shoulder, or your hip joints are leaning. As a matter of course, not just when standing but also when walking, by following this guideline you can keep your balance without using any extra energy. However, in order to walk straight, a vertical guideline is not enough. Walking means going forward. If you have a horizontal guide line as well, you can walk unswervingly. In fact, there is a body awareness of the horizontal straight line, too.

I call this line 'the laser.' For body awareness of the vertical line mentioned above, I call it 'the center.'

The body awareness of the vertical and horizontal lines can be guidelines. It will change your walking from ordinary movements to excellent movements. If these guidelines work at various times in your daily life or when you do sports, it will be obvious that your body quality will improve significantly compared to the situation

where you have no guidelines at all. Body awareness works like this. It will improve your body operations, performances, and the quality of your body itself. Takaoka 2014>>

Rhythmic movements promote the pumping action of the fascia (tensegrety pumping, tension goes with compression)

By automatic arm movements you stimulate the fascia in the entire body, if this goes automatically you have the right speed.

- Light arm rotation
- Stand up,
- Makes great strides (the more muscles contract throughout the body). With this technique, your weaknesses will emerge within 5-10 minutes.
- Keep your feet straight
- On 1000 passes, size 44 - 5 degrees 1.05 meters - 30 degrees, 36.85 meters loss.



## Body awareness

Stel je voordat je loopt met het idee van:

- Het heeft toch allemaal geen zin



Of....

- oh, wat is het leuk



68

Stel je voordat je loopt met het idee van:

- what's the use
- I'll never do enough
- I can do anything
- je door je partner wordt geobserveerd
- Je door opdringerige mannen wordt geobserveerd

<< Opening our hearts and letting down our guard in this way can be a scary proposition, because removing the shield leaves us vulnerable to many things—to being hurt, to letting others in, to feeling the pain against which we've worked so hard to protect ourselves, sometimes since a long-ago childhood. Yet this willingness to be vulnerable is the hallmark of an open heart. It requires an ability to trust in the face of fear, to feel safe in the middle of uncertainty, and to find strength within ourselves when we are feeling weak and insecure. Finding the natural, physical support that exists within us as an unending architectural underpinning empowers us with a bone deep strength all our own that helps us to feel safe enough to trust, even in difficult times.

Psychological and emotional states are often reflected in the way we inhabit the

body, as evidenced by many of the expressions we use to describe people. The words he is full of himself are likely to conjure up an image of someone with a puffed-up chest and whose energetic presence is directed into the front of the body (head and rib cage wheels rolled backward). This is a different image from the one seen by the mind's eye when hearing someone described as being spineless, having no backbone, or being weak-kneed (rib cage wheel forward and pelvic wheel back).

Consciously turning our attention inward and reestablishing our physical alignment along the central axis can bring about remarkable changes in our emotional and psychological state. Porter 2013>>



## Fascia walking

### Voordelen

- Voor elke leeftijd geschikt
- Low Cost training (Olivera, C.F. 2017)
- Predictor vermindering van cognitive functies (Kikkert, L.H.J. 2016)
- Activatie van het Brein (Lajoie, Y. 1993)



69

The results indicate that measures of walking ability could serve as additional markers to predict cognitive decline. However, gait speed alone might lack specificity. We recommend gait analysis, including dynamic gait parameters, in clinical evaluations of patients with suspected cognitive decline. Future studies should focus on examining the specificity and accuracy of various gait characteristics to predict future cognitive decline. Kikkert LHJ 2016.

Our findings revealed that old adults progressively changed their kinematics at hip and ankle during the task. Meanwhile, young adults showed incipient signs of fatigue at the ankle joint. Both age-groups changed their gait strategy by reducing cadence and increasing stride length and increased the variability of step-width. Olivera 2017

Lajoie et al. (1993) report that while walking is a “highly practiced and repetitive action ... balance control during walking is not automatic” requiring a portion of central processing. With aging, there is both a decrease in central processing capacity of the nervous system (Verhaeghen and Cerella 2002) and an increase in attentional demand for motor and cognitive tasks (Woollacott and Shumway-Cook 2002). Executive function (EF) refers to a set of cognitive skills that are necessary to plan, monitor, and execute a sequence of goal-directed, complex actions (Royall et al.

2002). Individuals with poor EF have been shown to have greater stride time variability while dual-task walking than those with normal EF. Linking cognitive performance and fall risk, Herman et al. (2010b) showed that a low level of EF was associated with a threefold risk of falling over a 2-year period.



## De knie

Kneeing in: eigenlijk altijd het gevolg van een collaps van de extensie keten:  
Verzwakte re-supinatie en heup extensie.



70

<<knee-over-toe that highlights how the foot, ankle and knee interact in movement, thus proving that to keep the knee over toe in lunge and squat patterns, not to mention keeping knee over toe as a sports-specific approach, makes absolutely no sense at all.

A safe knee is one that can freely move in accordance with the ankle, if the foot collapses the knee naturally moves towards the midline, if the foot supinates strongly the knee naturally moves away from the midline.

It's no different for the knee. When the knee is trained to be over the second toe, it generates its own comfort zone about that point - powerful and mighty! As the knee moves medially along with a pronation of the foot, it becomes exposed, at risk and unsure of itself. In the video above you will have noticed the range available to any knee in natural movement is so much bigger than this 'knee over toe' space. The comfort zone NEEDS to be as big as that whole range of movement, and not just down.

Imagine having newfound strength those dark, never before visited spaces (both medial and lateral to the knee) and imagine the increase in strength you would naturally have in the knee over toe' space. The midpoint will always be stronger than

the extreme ranges, and it is fair to say that the midpoint can only be as strong as its relative extremes.

Here now lies the problem with training knee over toe at high speed, in a high-performance non-linear 'Environment such as football, tennis or dancing, it is Impossible to keep the knee over second toe. In gait or walking, the knee is NEVER over second toe apart from a moment between pronation and supination. The good news is that muscles in the body are perfectly set up to allow, control and manage the medial position of the knee, AND all muscles need to frequently go there in the training, exercise and rehabilitation of the knee. The knee needs to visit its dark zone on a regular basis if you are to get strong in this position. And since virtually every step you take goes there anyway whether you are walking or playing football, it is a good idea to focus on NOT Keeping knee over toe when training for movement.

But ask any AIM practitioner now and to them the idea of stabilising the knee is a joke. Why? Because the fewer knees they attempt to stabilise, the fewer knee problems they see. Mobility equals more and more healthy knees,  
MECHANICAL ADVANTAGE

Once again, if you are squatting huge loads, it's not necessarily a good idea to let your knees and ankles roll in! The mechanical advantageous position is clearly knee over toe because it creates a column over a rigid foot structure where the strength at this midline of movement is strong relative to the strength at the extremes.

However, watch any heavy lifter and you'll notice that when they get to the bottom of the squat they naturally, subconsciously, flatten the feet and bring the knees inside second toe in order to generate sufficient power to return back up to the rest position. They naturally break the 'knee over second toe' rule - even though their coach is bawling at them not to! Why? Because that is how the body is set up to work.

No growth can occur within a comfort zone - your body cannot reach heights or opportunity beyond its imagination when governed by a comfort zone. Only by venturing out into the big wide world, challenging your comfort zone and entertaining dark spaces, facing your fears, can you recognise and face up to your present boundaries and restrictions. For once you go beyond them, you will make new boundaries, have new limitations and new fears, but you will have moved on and gained strength, rendering old boundaries part of your now comfortable territory,

Integration is the one thing that the brain understands and is the one thing that you need to understand to work with the body at the highest level possible. Ward 2013>>



## Activation extension chain



Top down: length cervical spine  
activates extension

Central: romproation

Central: elasticity psoas

Central: strong Gmax

Bottom up: valgus knee activates  
Gmax / ext chain

Bottom up: pronation activates  
resupination / ext chain





## Learn the skills



## Master the art

72

You can always keep improving your skills.

If performed without grace and compassion even the greatest strategies taught in advanced trainings can be, at best, ineffective and, at worst, counterproductive. (Art Riggs 2013)

Pleasure is one of the principle tools of the bodyworker, no matter what sort of manipulations he or she has been trained to do, because soothing pleasure is one of the most potent means available to us to defuse the exaggerated responses of the body's reflex defense systems. (Juhan 2003)

We see great form in professional athletes and performers; we admire their movements because they make it look easy. Why wouldn't form be just as important when performing bodywork? Often, we become achievement-oriented, rather than form-oriented, only to misguide our bodies away from balanced movement patterns.... Herein lies the artistry of the Connective Tissue Massage (CTM) body mechanics. Mastery of the CTM system demands an inner awareness of one's own body and core. (John Latz, 2001)