Sitting as the unspoken accelerator of the “OsteoNeural Pandemic”.

Staggering fresh data and evidence in (Dutch) youth in the light of classic Orthopedics

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Authors

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- Orthopedic and spine surgeon since 1989
- Founder Dutch Spine Society
- Cofounder Posture Network
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Andre M Soeterbroek

- Chairman Posture Network. Analist and translator science to common sense

Modern youth: their spines at risk!

- "Production phase" of our spine takes about 16-20 years
- No "handbooks" anymore for educators
- No qualified workers (parents!)
- no-quality-checks left (schoolscreening)

So: No garantees on durability Health!

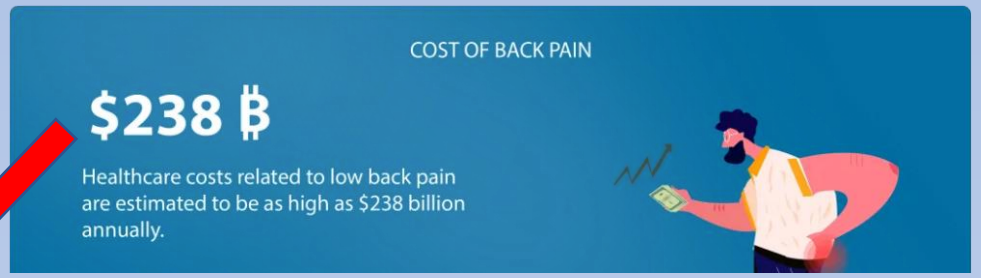
It's the chassis and its design that counts in the quality and durability of a car

Role growth Nervous System neglected

Osteoneural Pandemic?:

Backpain and arthrosis No.1 in socio-economic burden in Western societies (The Lancet) !! And neuro-degenerative conditions are No.2 !

Devastating consequences for
the Economy and Healthcaresystem



100,000 Americans died of drug overdoses in 12 months during the pandemic

The Washington Post

Other countries like NL follows

1/6 of Bidens
Infrastructure plan

The cause: No Prevention with posture-education in childhood!

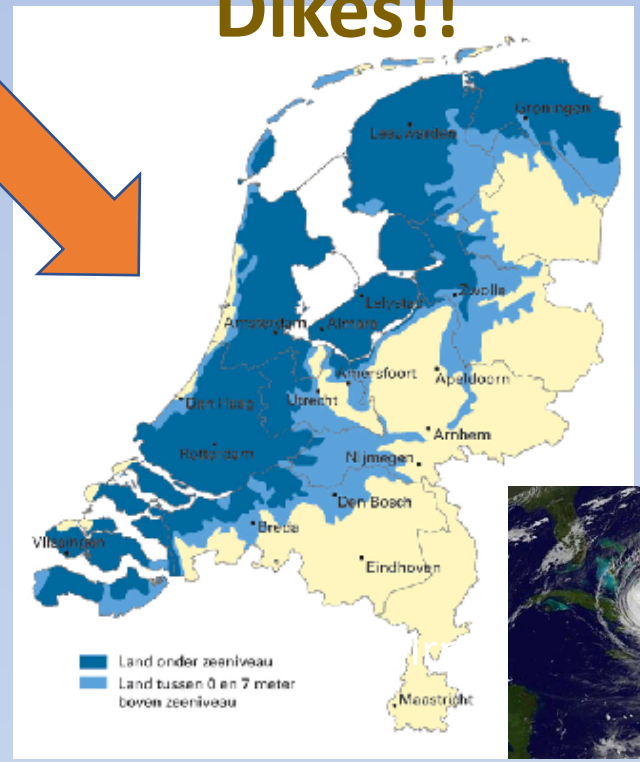
Flooding by posture related MC-conditions

- Backpain: 2 million people
- Costs: **1,3 billion euro in 2011**
- Backpain children: > 40%
- Arthrosis: 1.100.000 people (on 17 million)
- All injuries: 4.500.000
  - Acute: 3.200.000
  - Chronic: 1.300.000

No clear PREVENTION for Musculoskeletal Conditions and Low Back Pain

COVID works as extra accelerator

NL 50% under sealevel!
Prevention for flooding?
Dikes!!

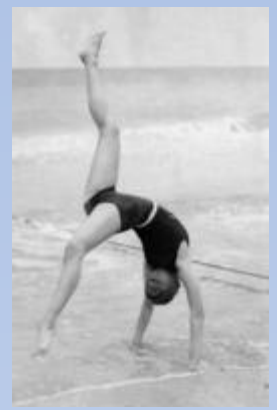


No “dikes” in Healthcare:

Real prevention only possible if you know the causative factors

Two main causes united:

- **Hypokinesia (Prof. Jana Parizkova)**
- **Sitting (classic orthopedics)!**



Both bring the basics of Orthopedics back in the center of education:

Don’t hinder a child in mobility!

Educate a child to a good posture and good locomotion patterns and you wil have a physical and mental healthy adult, without painfull conditions

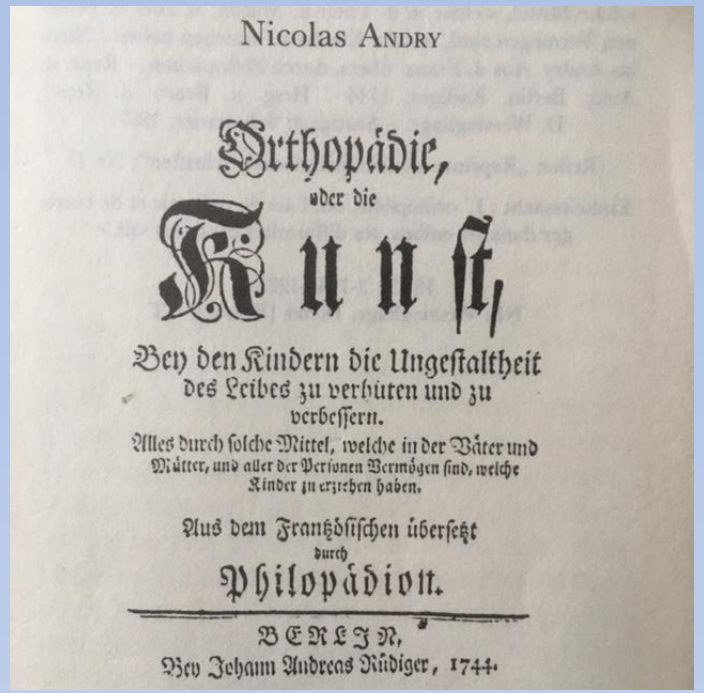
Gymnastics part of Preventive Medicine

What did /do we know?
Unhealthy Posture (and backpain) and sitting

- In **18th century**: in rich parts of societies : girls sitting on chairs as novelty in civilisation: many deformities (corsets!!)
- In **19th century** : (UK, NL, P, USA) childlabour, much sitting: backpain and many deformations
- In **19th century** : First countries Central Europe (D,Ch,S,Au) with schoolobligation: more deformities, pain no issue
- In **20th century** broad and effective prevention until the 60ties.
- **21th century:** youth in western countries into volontary and massive sedentation

USA
1920!!!

Did we forget causes and thus Prevention??


Nicolas Andry

Orthopädie,

oder die

Kunst,

Bey den Kindern die Ungestaltheit des Leibes zu verhüten und zu verbessern.

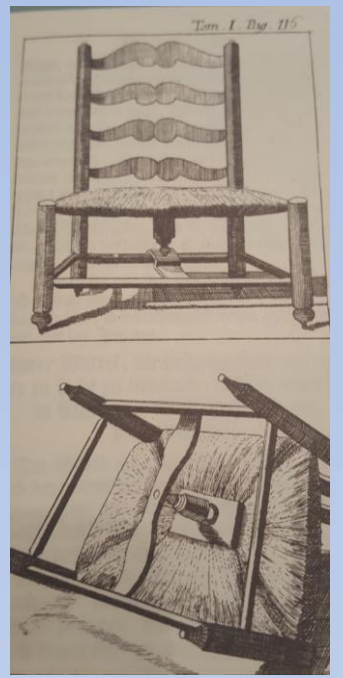
Alles durch solche Mittel, welche in der Väter und Mütter, und aller der Personen Vermögen sind, welche Kinder zu erziehen haben.

Aus dem Frantzösischen übersetzt durch

Philopädion.

BERLIN,

Bey Johann Andreas Rüdiger, 1744.



The founder of Orthopedics: Nicolas Andry 1741

Start of ergonomics, gymnastics AND bracing (as ladies corsets)

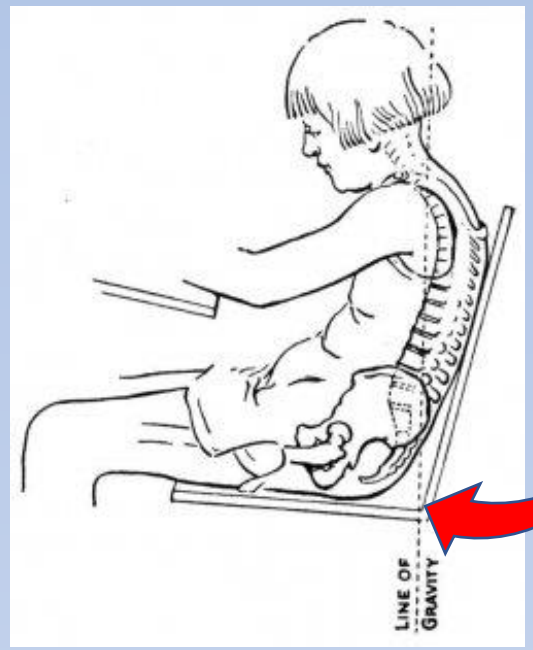
It is the flexed position of the spine in sitting of children and young women on chairs!!

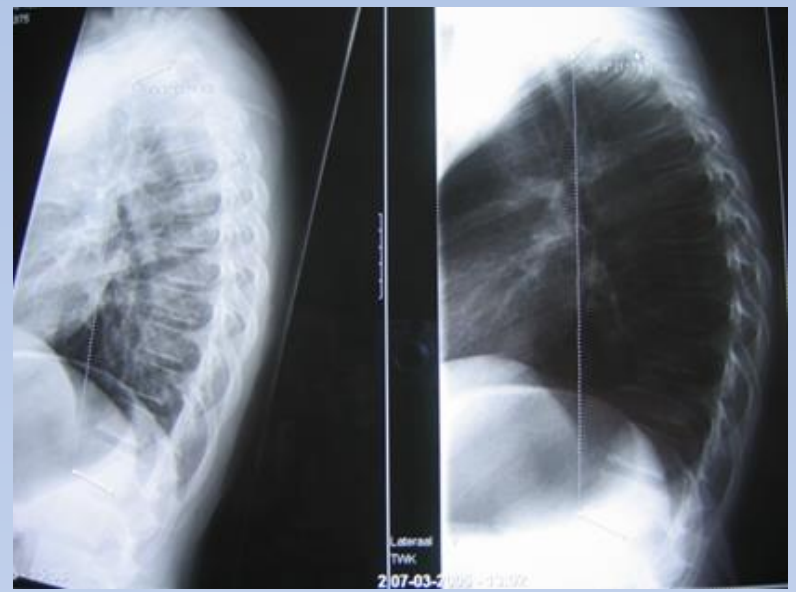
Negative impact of sitting (on chairs!) on healthy posture

Human anatomy of pelvis evolutioanary perfect for efficiënt standing and running but not adapted for sitting in 90 degrees flexion of hips:

- Between 120 and 90 degrees the pelvis cantilevers backward
- By that the healthy “protective lordosis” disappears

- Central Nervous System not “pleased” inside such a posture

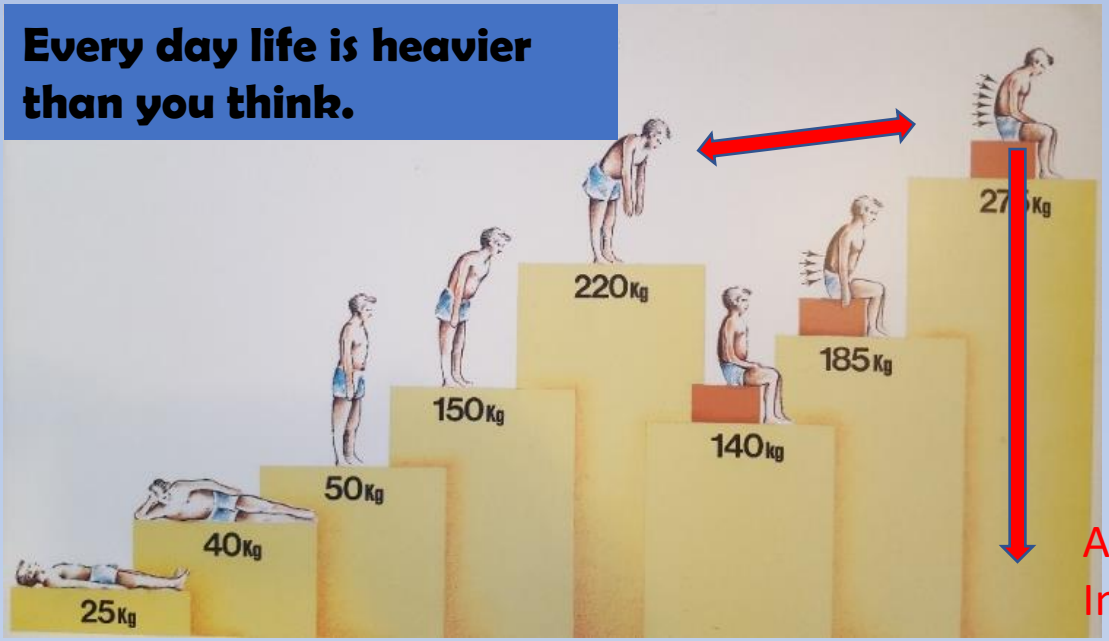




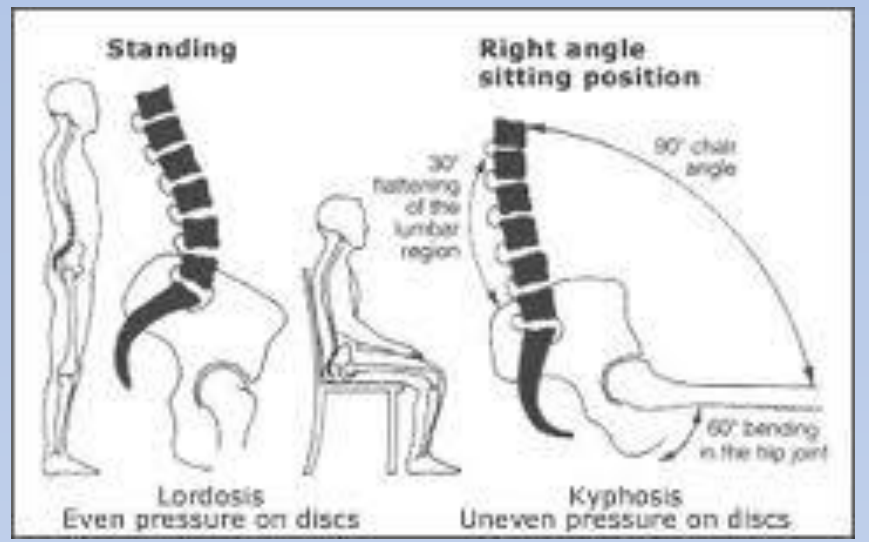
12 yr girl. X ray standing and sitting

Slumped **sitting gives more load on discs** than lifting upright in construction-workers!!!

Sitting in 90^{o} forces the pelvis and spine backwards!



All forces on the weak Intervertebral discs

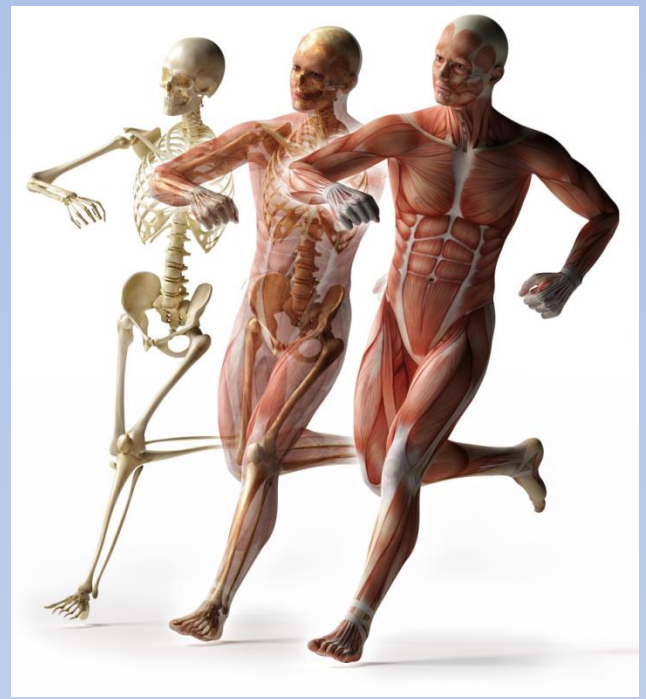


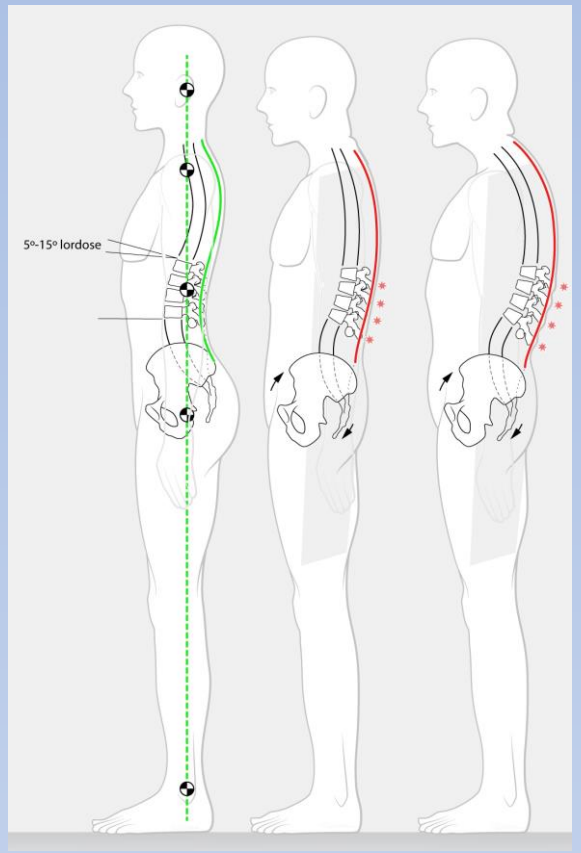
Sound Scandinavian science on discloading in different positions by intra-discal loadmeasuring (prof. Nachemson; Mandal etc.)

Radiologic studies by Keegan

Human body: still miracle of “Tensegrity”? What is the impact of sitting on this ?

- How does a child get its structural integrity optimal?
- By learning from the very start to do things right and play the game with gravity on a smart way to get masses and tension balanced.
- CNS and locomotor apparatus are ONE machine.





TENSION AND STRUCTURAL INTEGRITY

No recent (Biomechanic) research into the relationship between posture and motility

Tension!!

Missing link in biomedical science solved by Milan Roth:

How does the nervous system get its length?? By stretch!!

But what if stretch-growth is insufficiënt?

Prof. Milan Roth, 1923-2006 neuroscientist
University Brno did the most revealing and important research on

The Discongruent Osteoneural Growth Relations

He missed the era of today in which the sedentary lifestyle is causing (early) degeneration

In a sitting lifestyle a child has a great lack of extension and their spine will deform and the neuromuscular tension will increase

The significance of Roth's work in "Tensegrity":

Growth, motility and tensile forces main actors in Morphogenesis and Physiogenesis : the missing links in Biomechanics

If you have a bad posture from childhood not a single "chair" with less than 120 degree sit-angle will prevent further damage.

Mainly because a bad posture is always accompanied with a loss of flexibility (stiff spine, tight muscles like hamstrings)

Any child can become 'strong and straight' if flexibility and good posture are trained first

A simple fact: Men did grow in lenght, but chairs became lower!

Thonet 47cm

Sitting height industrial chairs

- 2 cm!

Mean bodylength Dutch men

+18 cm!

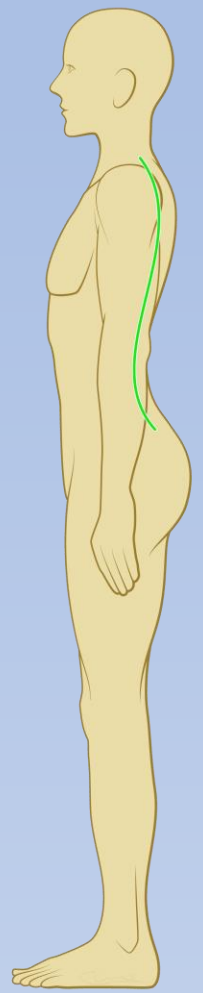
IKEA 43 cm

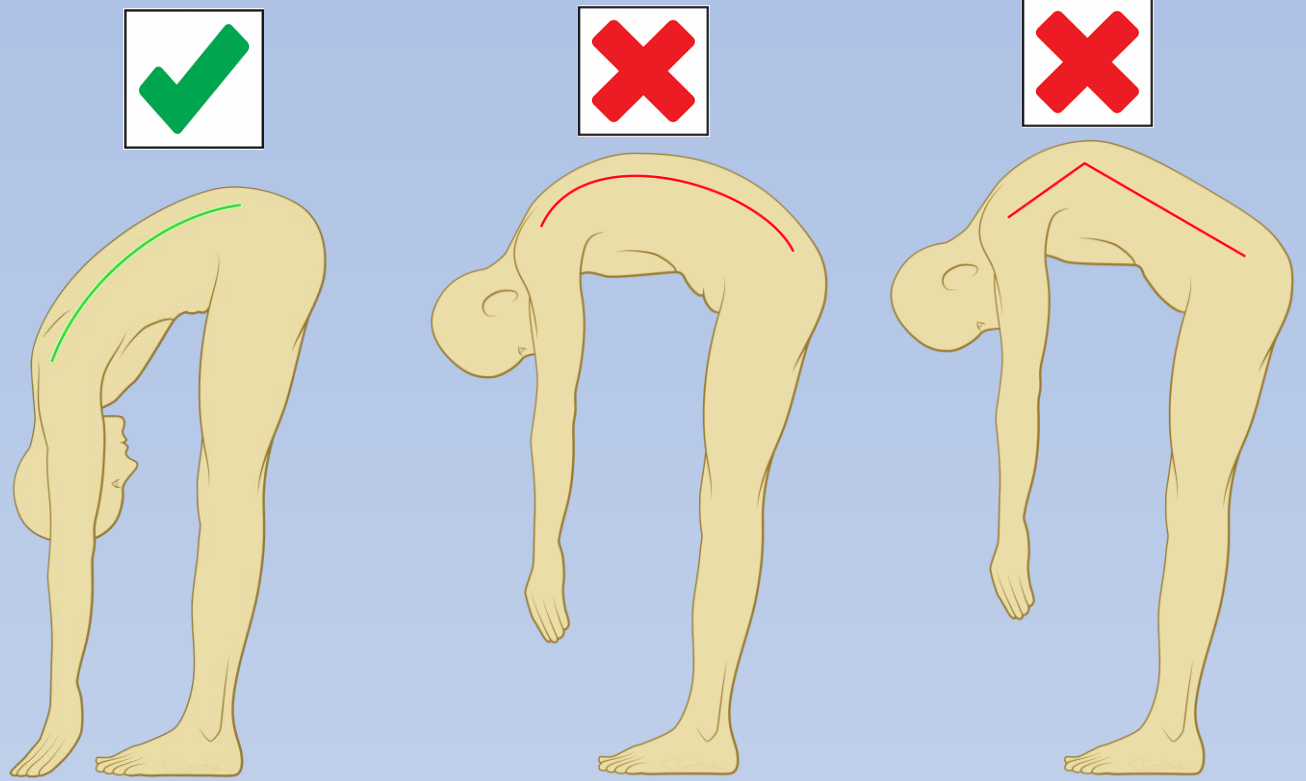
1864

2021

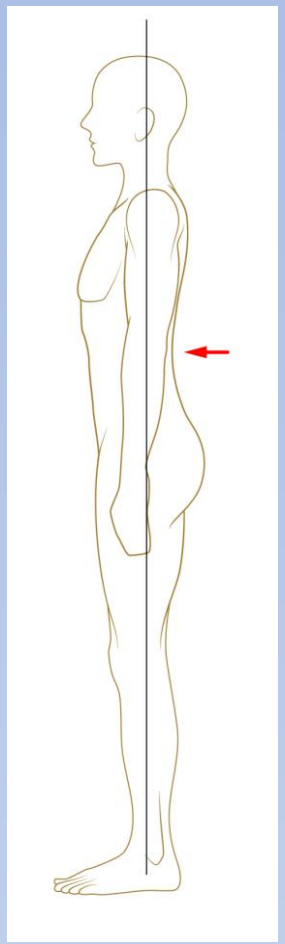
Average height man in NL vs seat height chairs mass production

The human posture





Use this quicktest (Finger Floor Test) to assess problems in posture and flexibility



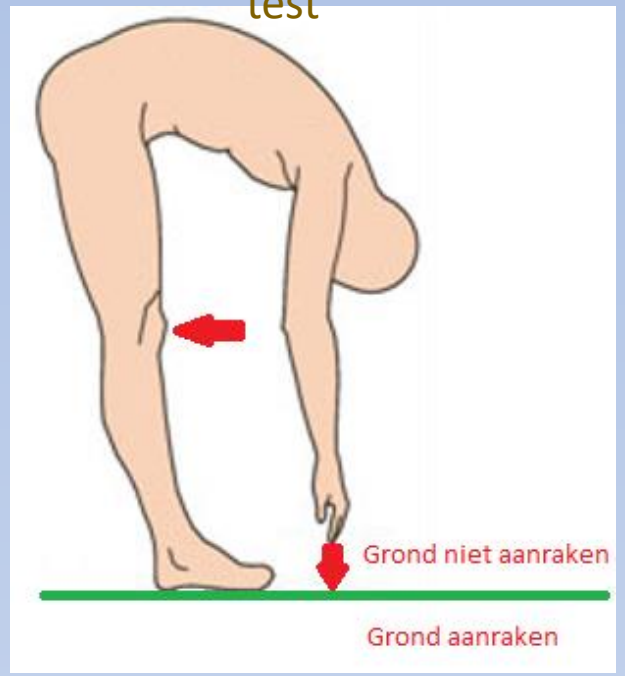
The centerbodyline should pass the conus in the canal at TH12-L1

Is quick validated clinical assessment possible?

Finger Floor Test

Knock out test: +or -

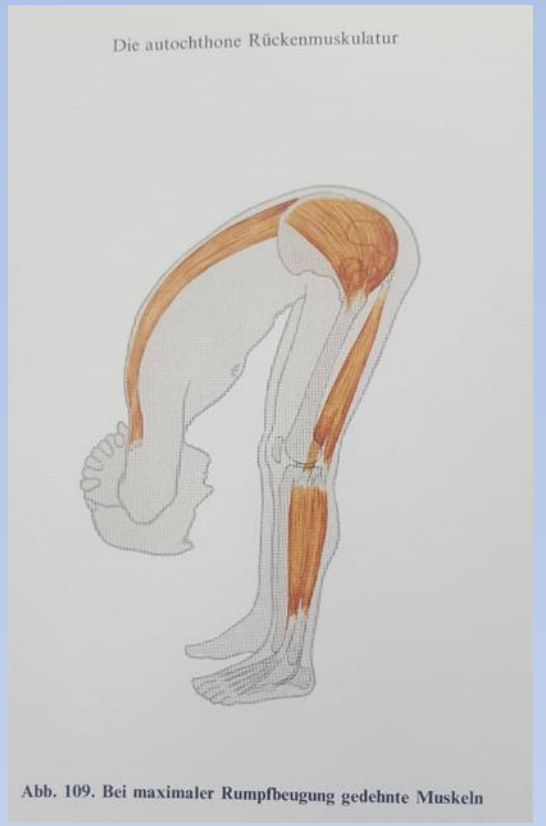
test



Muscles/fasciae involved

Tensegrity : two parts involved: hard and soft tissues

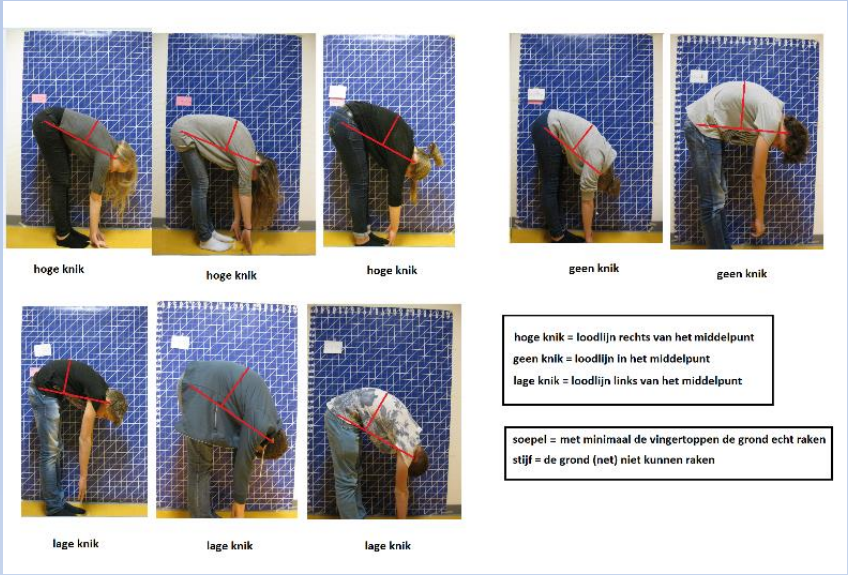
- On global posture : lateral aspect on type of kyphosis in bending
- On global flexibility : yes by the Finger Floor Test



Own pilot: evidence in a schoolcohort : 248 children 14-18 yr.

- Hamstring tightness in both legs was present in 62.1%.
- Unilateral tightness in 18.2%.
- Achilles tendon tightness in both legs was present 59.3%.
- Unilateral short calf muscle-tendon thightness in 19, 4%.
- The correlation of the Finger Floor Test with tight hamstring is 73.2%.
- So there is a link between the hamstring and the lack of flexibility at bending

- 1. Femoral tibial angle: hamstrings
- 2. Ankle dorsoflexion: Calf/Achilles tendon
- 3. Finger Floor test
- 4. Photo sagittal profile at FFT



Prague symposium 2021

Dutch youth: the longest in Europe. But now mean length is decreasing!

- Nature 2013: The world's tallest nation has stopped growing taller: the height of Dutch children from 1955 to 2009

Conclusion: *The world's tallest population has stopped growing taller after a period of 150 y, the cause of which is unclear. The Dutch may have reached the optimal height distribution. Alternatively, growth-promoting environmental factors may have stabilized in the past decade, preventing the population from attaining its full growth potential*.

2021: Dutch adolescents decreased in (mean) growth in lenght

- Fifth national Study on Growth (by TNO and VUmc and LUMC) .

No biomechanic or orthopedic explanation, BUT:

1. A curved spine is shorter than a straight spine!
2. Discongruent growth because of sedentary lifestyle

Fresh evidence from The Netherlands

Generation R Rotterdam study, one of the worlds biggest longitudinal studies on newborns

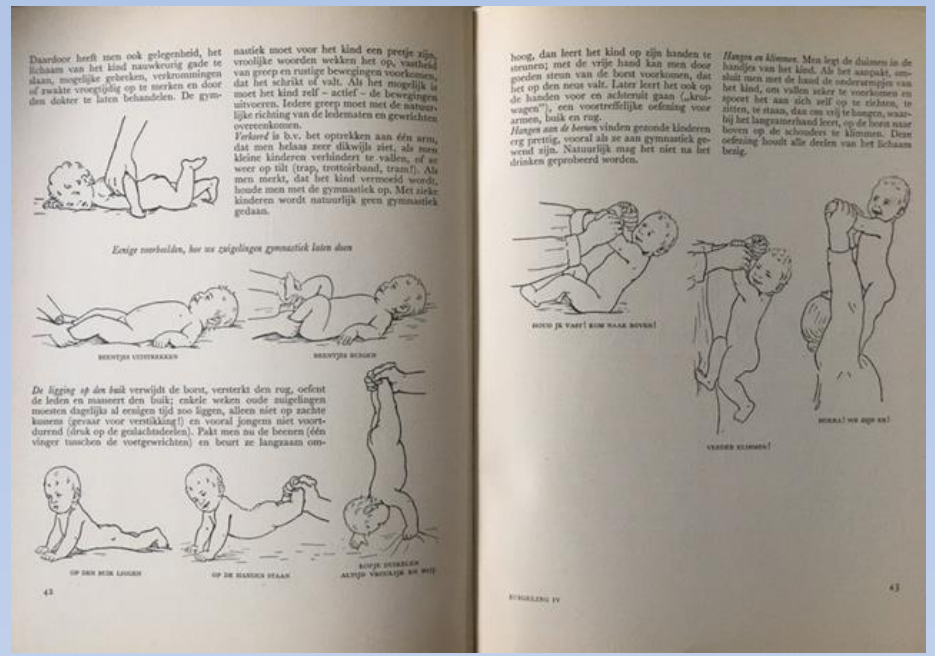
The put all children in the MRI!

- In 550 9-year old children extremely often abnormalities were found in the spine:
- the most striking: in 73% there exist already a bulging disc on at least one level!!!

- **Conclusions** Structural spinal abnormalities, especially disc bulging, endplate irregularities, and an abnormal disc height, are already present in children aged 9 years from a Dutch population-based cohort. Of those abnormalities, endplate irregularities are associated with various weight and body composition measurements. Further research with longitudinal designs are needed to investigate the association between present abnormalities and low back complaints later in life, and the role of weight and body composition on the long term.

- No classic orthopedic explanation whatsoever!
- No biomechanic knowledge used
- No mentioning of early sitting as causative factor

Prevention by proper “gymnastics” from the start



Daardoor heeft men ook gelegenheid, het lichaam van het kind nauwkeurig gade te slaan, mogelijke gebreken, verkrommingen of zwakte vroegtijdig op te merken en door den dokter te laten behandelen. De gymnastiek moet voor het kind een prettje zijn, vrolijke woorden wekken het op, vastheid van greep en rustige bewegingen voorkomen, dat het schrikt of valt. Als het mogelijk is moet het kind zelf – actief – de bewegingen uitvoeren. Iedere greep moet met de natuurlijke richting van de ledematen en gewrichten overeenkomen.

Verkeerd is b.v. het optrekken aan één arm, dat men helaas zeer dikwijls ziet, als men kleine kinderen verhindert te vallen, of se weer op tilt (trap, trottoirband, tram!). Als men merkt, dat het kind vermoeid wordt, houde men met de gymnastiek op. Met zieke kinderen wordt natuurlijk geen gymnastiek gedaan.

Eenige voorbeelden, hoe we zuigelingen gymnastiek laten doen

BEENTJES UITSTREKKEN

BEENTJES BUIGEN

De ligging op den buik verwijdt de borst, versterkt den rug, oefent de leden en masseert den buik; enkele weken oude zuigelingen moeten dagelijks al eenigen tijd zoo liggen, alleen niet op zachte kussens (gevaar voor verstikking!) en vooral jongens niet voortdurend (druk op de geslachtsdeelen). Pakt men nu de beenen (één vinger tusschen de voetgewrichten) en beurt ze langzaam om-

OP DEN BUIK LIGGEN

OP DE HANDEN STAAN

KOPJE DUIKELEN

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hoog, dan leert het kind op zijn handen te steunen; met de vrije hand kan men door goeden steun van de borst voorkomen, dat het op den neus valt. Later leert het ook op de handen voor en achteruit gaan („kruiwagen"), een voortreffelijke oefening voor armen, buik en rug.

Hangen aan de beenen vinden gezonde kinderen erg prettig, vooral als se aan gymnastiek gewend zijn. Natuurlijk mag het niet na het drinken geprobeerd worden.

Hangen en klimmen. Men legt de duimen in de handjes van het kind. Als het aanpakt, omsluit men met de hand de onderarmpjes van het kind, om vallen zeker te voorkomen en spoort het aan zich zelf op te richten, te zitten, te staan, dan om vrij te hangen, waarbij het langzamerhand leert, op de borst naar boven op de schouders te klimmen. Deze oefening houdt alle deelen van het lichaam bezig.

HOUD JE VAST! KOM MAAR BOVEN!

VERDER KLIMMEN!

HOERA! WE ZIJN ER!

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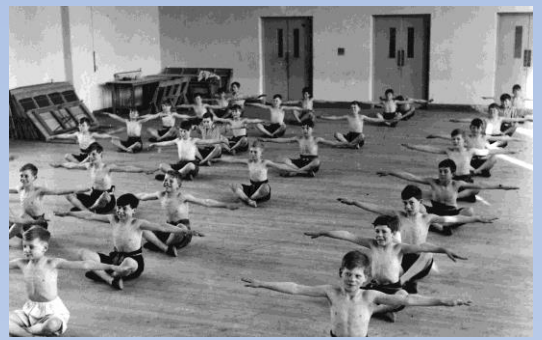
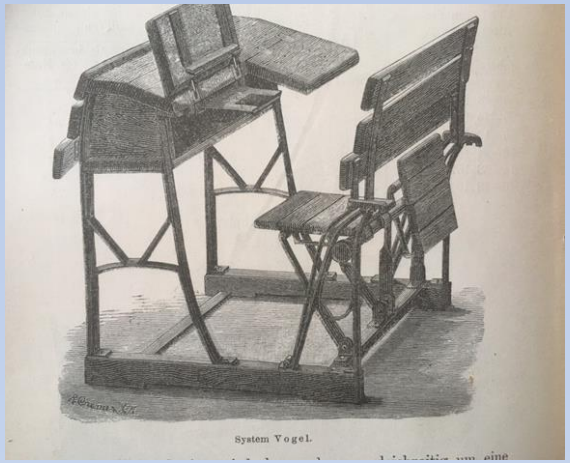
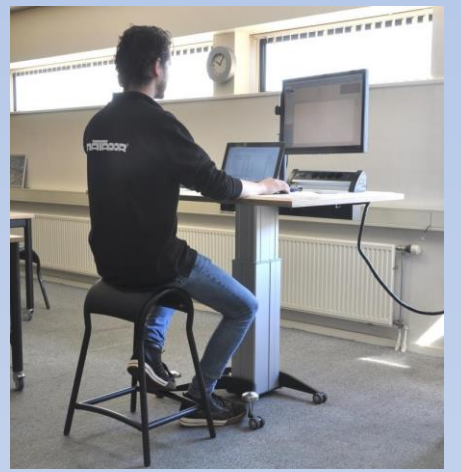




System Vogel.

Prevention by Ergonomics in houses, schools and offices

- Active sitting
- Active sitting solutions
- Standing
- Stand-sit solutions



Future: Ergonomic innovations in

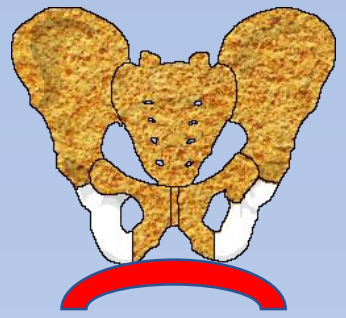
- rehab chairs (decubitus)
- car chairs
- train/ airplane chairs
- utility machines chairs

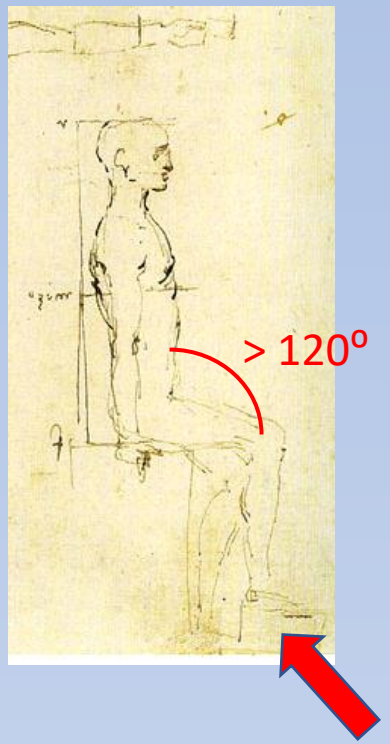
Sit on your sitting bones! That is what they are meant for!

- Position of spine in sitting should be same as in standing

(Leonardo da Vinci stated this)

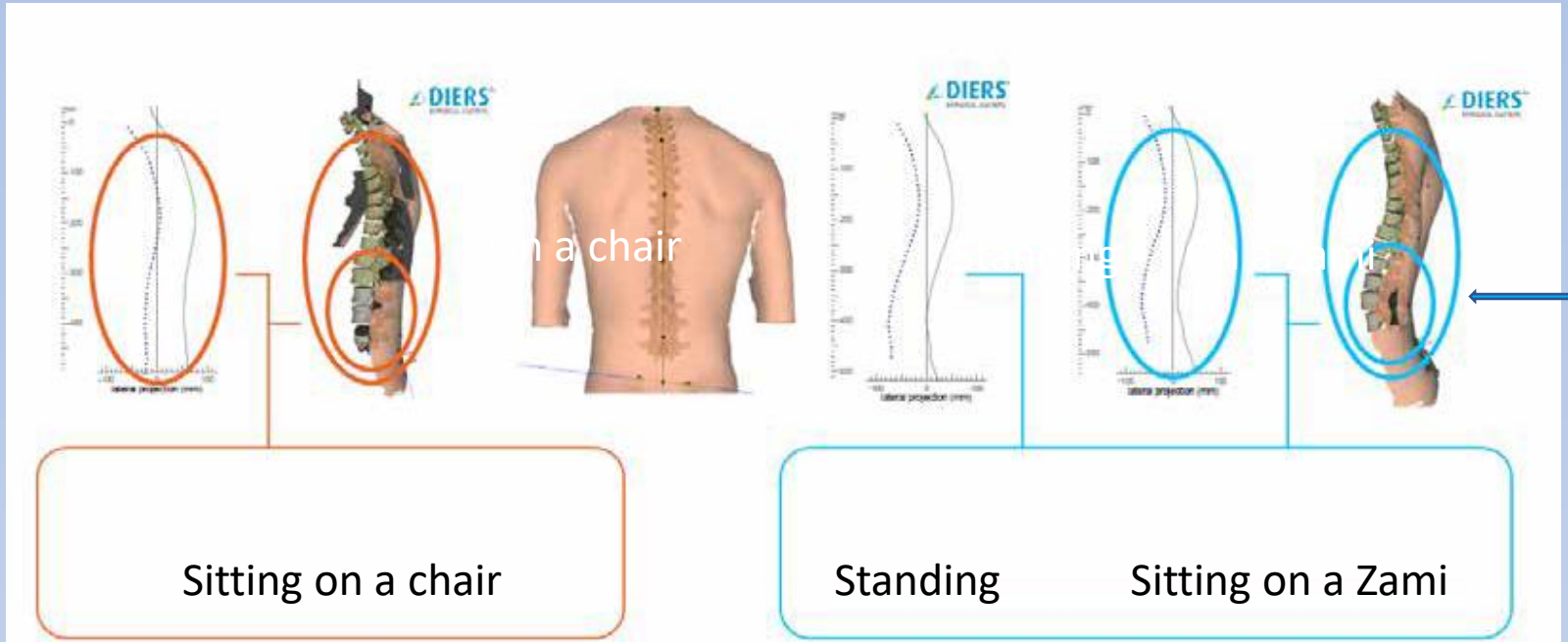
- No shearloading on discs if angle upperleg and torso is > 120
- The torso will be easily in balance with sitting bones on double curve
- Give legs the opportunity to variate in any direction indepently from each other
- No backrest: free to move!





Leonardo: one knee down!

THE PROOF by Surface Topography Posture Scan (Formetric Diers GmbH)



Restoration of protective lordosis

Effects on your body by sitting in an active way

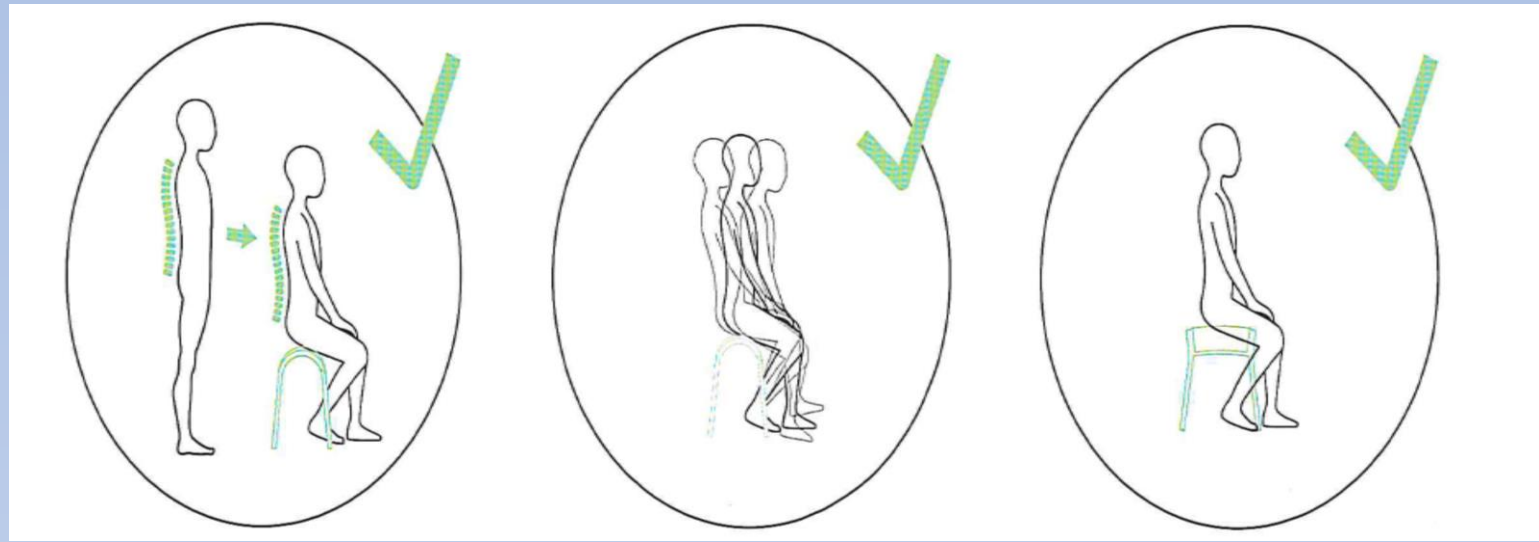
A. You reach automatically a good posture by stretching the torso

B. Creating balance by a natural S-curve: minimal amount of energy needed

C. Comfortable “grip” with both sitting bones in any direction on the double curved seat

D. Diaphragm will reach physiological position and will optimize support for better ventilation and gastro-intestinal function (less obstipation)

E. Arms and legs can be moved more freely . This will release tension or thightness in the total system



Conclusion

- Socio-economic Burdens of Disease: backpain and arthrosis are understandable in etiology: It's our sitting!
- Direct influence of "sitting" on the body is scarcely researched in present time
- Preventive Medicine only possible by lifestyle-change
- Basic biomechanic studies will be more supportive to Prevention than epidemiologic studies
- Epidemiologic studies without basic starting points out of Anatomy and Physiology/ Biomechanics will fail in bringing answers in the Osteoneural Pandemic

Thank you!

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Houding Netwerk Nederland