Spinal health and sitting:
A link to the 24-hour movement continuum

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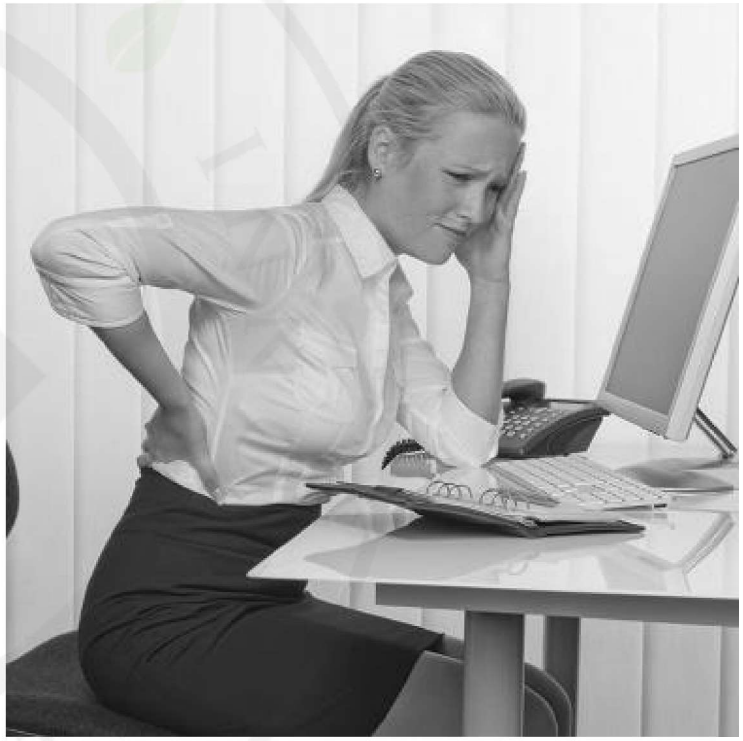
The Content

- Low back pain : low back disorders
- Sitting: Harmful mechanisms
- A link to the 24-hour movement continuum
- Where to go from here?



Low back pain (LBP)

- **Prevalent**:
  - Lifetime prevalence up to 84 % (Walker, 2000)
  - Often recur or become chronic (Dunn et al., 2013)

- **Costly & it affects quality of life**:
  - 0.8 – 2.1 % GDP (Hemmila, 2002)
  - Years lived with a disability (http://www.healthdata.org)

- **Etiology is complex & multi-factorial** (Marras, 2008)
  - Biomechanical factors may play a crucial role

Sitting as a risk factor

- **Disorders:** more cases of disc hernia (Kelsey, 1975) and disc degeneration in sedentary workers (Videman et al., 1990)

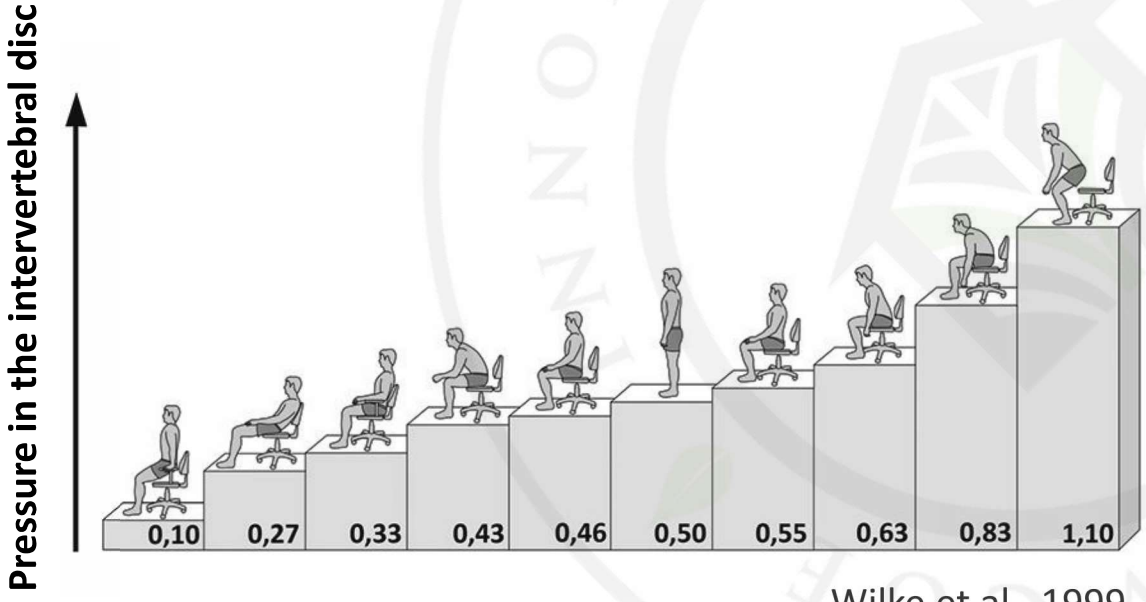
- **Pain** (Review studies):
  - no association between workplace sitting and LBP (Bakker et al., 2009; Hartvigsen et al., 2000; Hoogendoorn et al., 1999; Kwon et al., 2011; Lis et al., 2007; Roffey et al., 2010)
  - sedentary lifestyle is not associated with LBP (Chen et al., 2009)

Self-reported sedentary/sitting time or having a sedentary occupation

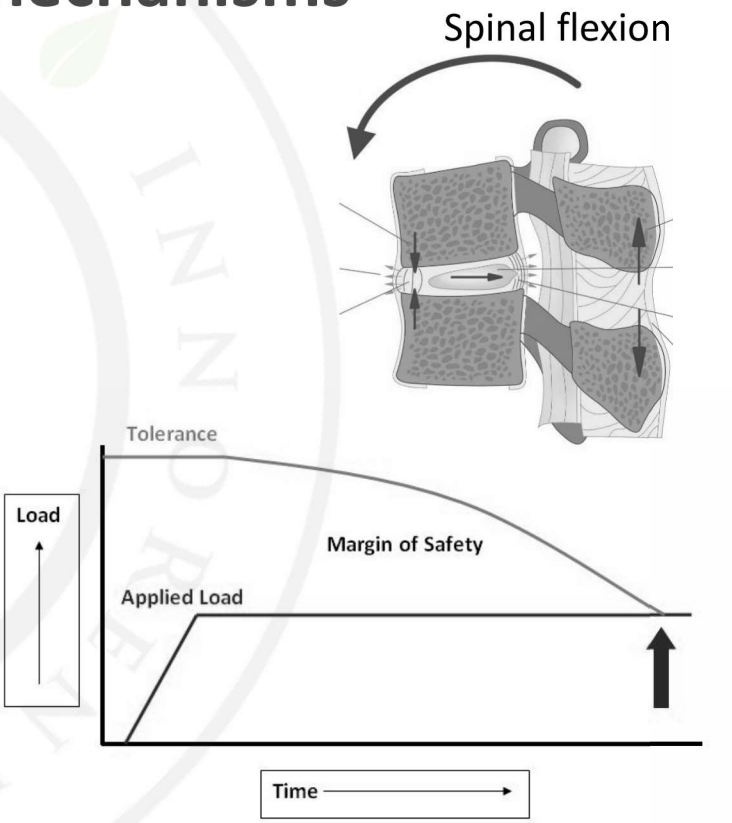
- LBP weakly correlates with low back disorders (Boden et al, 1990)
- 85 % of cases are non-specific: unknown source (Mense & Gerwin, 2010)

Sitting – commonly proposed harmful mechanisms

- **Importance of the posture and the duration**

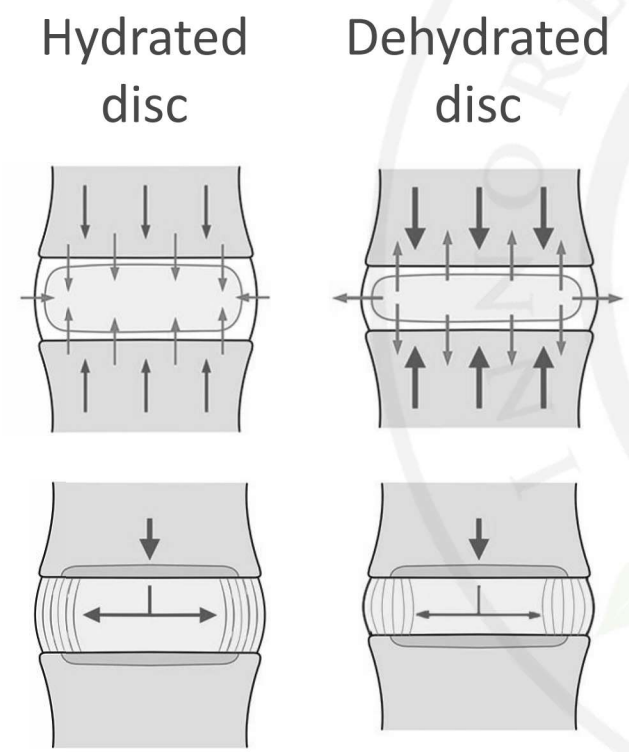


Wilke et al., 1999



McGill, 2008

Sitting & Intervertebral discs



Dehydrated disc:

- Nutrition is compromised (Soukane et al., 2007)
- Decreased pressure in the nucleus, increased pressure on the annulus (Adams et al., 1996)
- Delamination – degeneration (Adams & Dolan, 1995)

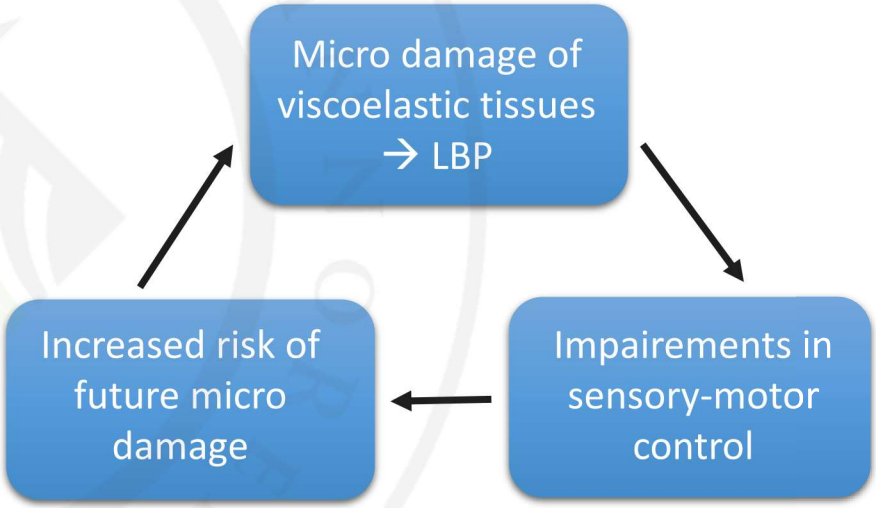
Mechanical stimulus is needed

- To preserve the proteoglycan matrix of the disc
- Better disc hydration and glycosaminoglycan content in high volume road cyclists (Belavy et al., 2019)

Sitting & Posterior ligaments

- Streached ligaments → Mechanical & sensory-motor changes

- Delays in postural reflex reactions:
  - For a 14ms - increases the risk for future LBP (Cholewicki et al., 2005)
  - Acute delays (~30 ms) in ES muscles after one hour of 70 % flexion (Sanchez-Zuriaga et al., 2010)
  - Acute delays (10 – 22ms) after eight-hour office work (Kastelic et al., 2018)



Spinal stability might be compromised → Avoid heavy labor immediately after prolonged sitting

Sitting & Skeletal muscles

- Low and relatively static muscle activity

- Muscle fatigue (van Dieen et al., 2009) & trigger points (Liu & Palmer, 2012)
- If there is also a lack of physical exercise:
  - Muscle weakness
  - Muscle asymmetries

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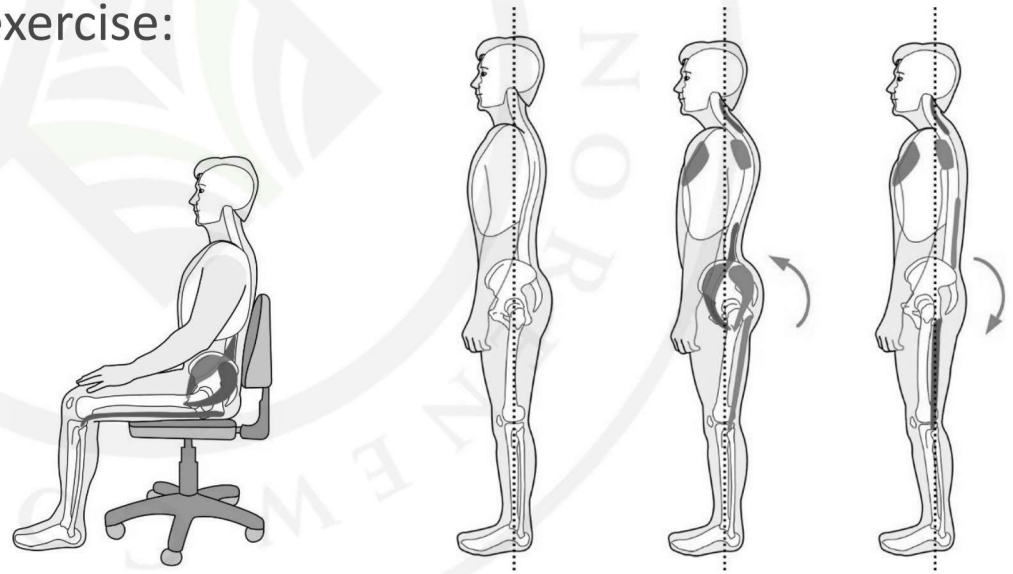
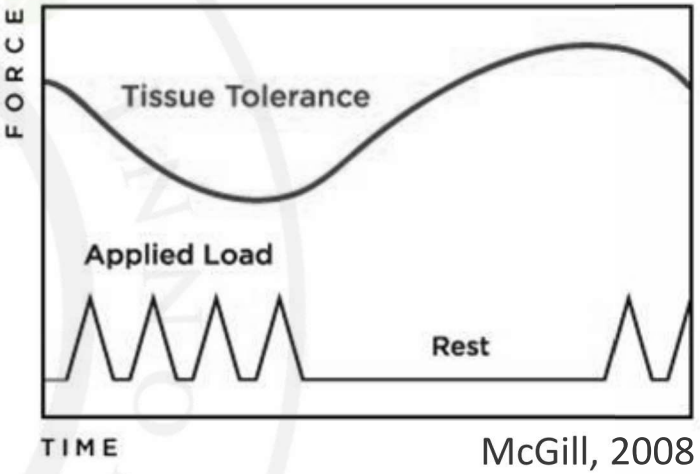
Risk factor for LBP
(Steelej et al, 2014; McGill et al., 2003)

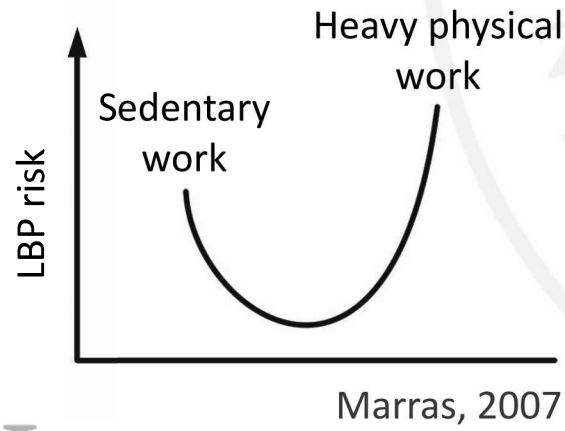


A link to the 24-hour movement continuum

- Tissues needs to be loaded and unloaded
- Physical activity → stimulus for positive adaptations
- Sleep / lie → tissue repair, disc hydrates
- Sitting → rest or (quasi)static loading



McGill, 2008



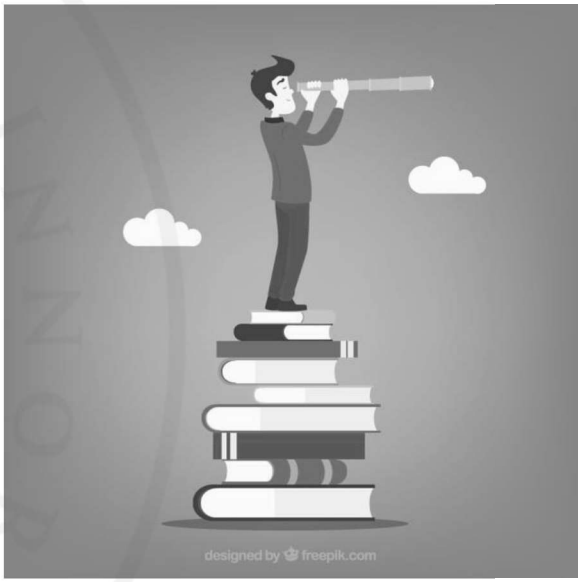
Marras, 2007

The Story of the Human Body (a book by Lieberman, 2013)

- Diversity of the movements, frequent changes
- We sleep less, move less and sit more than previous generations – explain high prevalence of LBP?

Where to go from here?

- **Explore the combined effect of all DAB on LBP & LBD**
  - Longitudinal studies on children and adolescents
  - Interventional in cLBP sufferers
- **Finding the optimum of DAB for spinal health:**
  - The amount of sleep, SB, MVPA
  - But also the quality and patterns are important
- **LBP – multifactorial origin**
  - single factor have low predictive value – DAB might be more explanatory



THANK YOU FOR YOUR ATTENTION!

Q & A

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