



Dr Heidi Haavik



BSc (chiropractic), PhD

VP Research, Dean Research, New Zealand College of Chiropractic

# The Future of Chiropractic

## A Brain-Based Paradigm



NEW ZEALAND  
COLLEGE of  
CHIROPRACTIC

TE KĀRETI  
KAIKOROHITI  
o AOTEAROA

1

Thank  
you!

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Dr Heidi Haavik



HeidiHaavik.com

The HANDOUT for today's Class (the slides)

Gift

Maintenance Care



Did you know that 90% of patients visit a chiropractor simply to maintain their health and well-being?





Gift



THE CEREBELLUM

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## Key References for today's talk



Haavik H, Niazi IK, Amjad I, Kumari N, Ghani U, Ashfaque M, Rashid U, Navid MS, Kamavuako EN, Pujari AN, Holt K. Neuroplastic Responses to Chiropractic Care: Broad Impacts on Pain, Mood, Sleep, and Quality of Life. *Brain Sciences*. 2024 Nov 7;14(11):1124. <https://www.mdpi.com/2076-3425/14/11/1124>

Heidi Haavik, Nitika Kumari, Kelly Holt, Imran Khan Niazi, Imran Amjad, Amit N. Pujari, Kemal Sitki Türker, Bernadette Murphy. (2021a) The contemporary model of vertebral column joint dysfunction and impact of high-velocity, low-amplitude controlled vertebral thrusts on neuromuscular function. *Invited Review. European Journal of Applied Physiology*. <https://doi.org/10.1007/s00421-021-04727-z>

Heidi Haavik, Imran Khan Niazi, Nitika Kumari, Imran Amjad, Jenna Duehr, Kelly Holt. (2021b) The potential mechanisms of High-Velocity, Low-Amplitude, Controlled Vertebral Thrusts on Neuroimmune Function: A narrative review. *Medicina* 2021, 57, 536. <https://doi.org/10.3390/medicina57060536>

Imran Khan Niazi, Muhammad Samran Navid, Christopher Merkle, Imran Amjad, Nitika Kumari, Robert J. Trager, Kelly Holt, Heidi Haavik. 2024 A randomized controlled trial comparing different sites of high-velocity low amplitude thrust on sensorimotor integration parameters. *Scientific Report*. 14(1), p.1159. <https://www.nature.com/articles/s41598-024-51201-9>

Imran Amjad, Imran Khan Niazi, Nitika Kumari, Usman Ghani, Usman Rashid, Felipe Duarte, Federico For-tuna, Diego Gonzalez, Alex Sumich, Bibiana Fabre, Kelly Holt, Heidi Haavik. The effects of 12 weeks of chiropractic spinal adjustments on Physiological biomarkers in adults: A pragmatic randomized controlled trial. *PLoS One*, 2025, 20(12), p.e0338730. <https://doi.org/10.1371/journal.pone.0338730>

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2008 PhD

NEW ZEALAND COLLEGE OF CHIROPRACTIC  
graduating hands, hearts & minds

1999 NZCC Graduate

THE UNIVERSITY OF AUCKLAND  
NEW ZEALAND  
Te Whare Wānanga o Tāmaki Makaurau

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Do you have a spine model in your practice?



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Do you have a brain model in your practice?

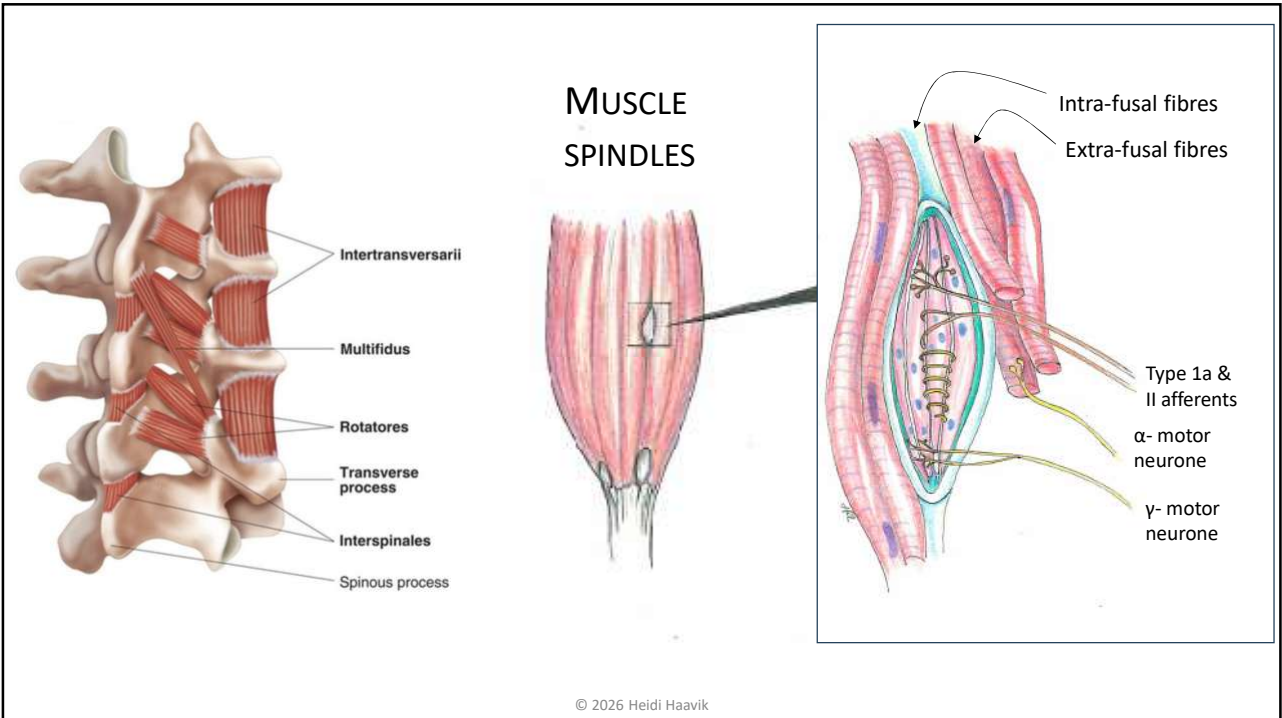


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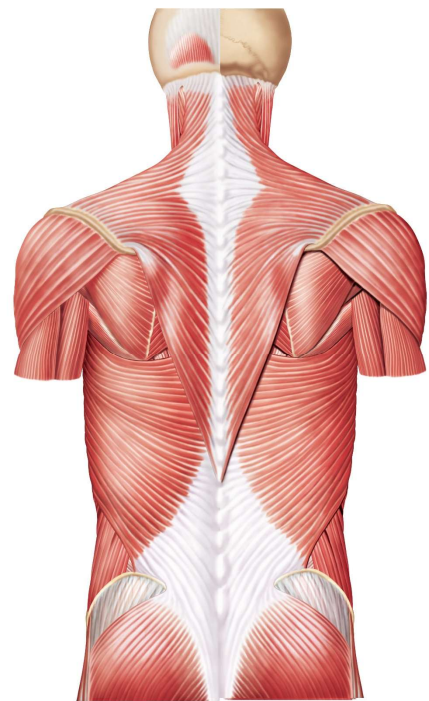


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A healthy spine moves!



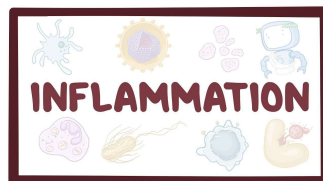
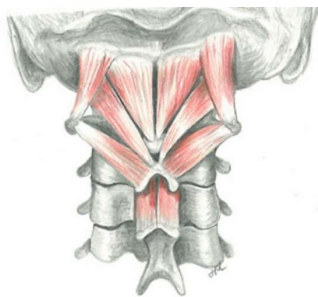
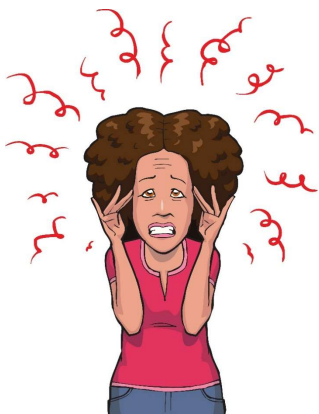
However, bones do not move themselves!



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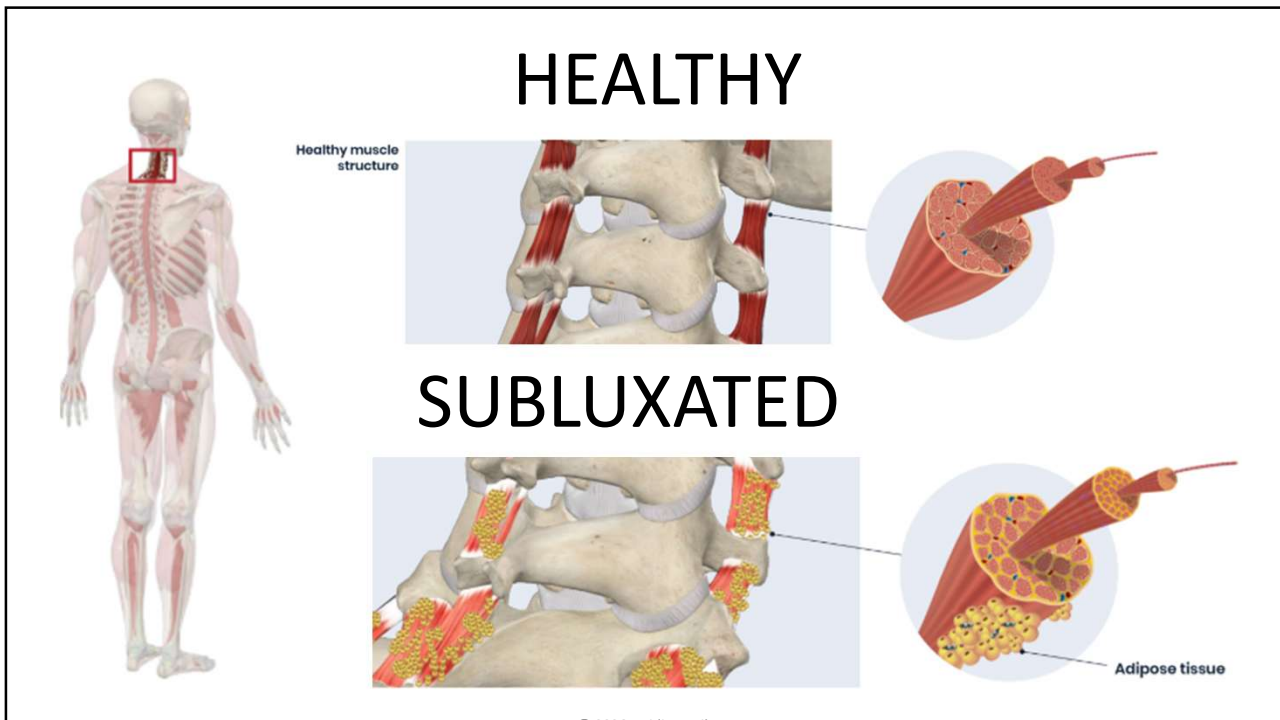
## What can causes vertebral subluxations?



Haavik et al 2021 EJAP

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## Deep paraspinal muscles

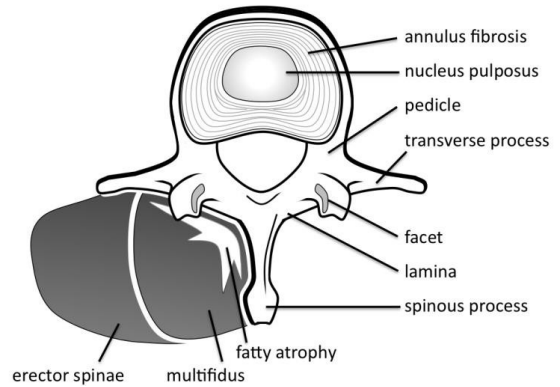
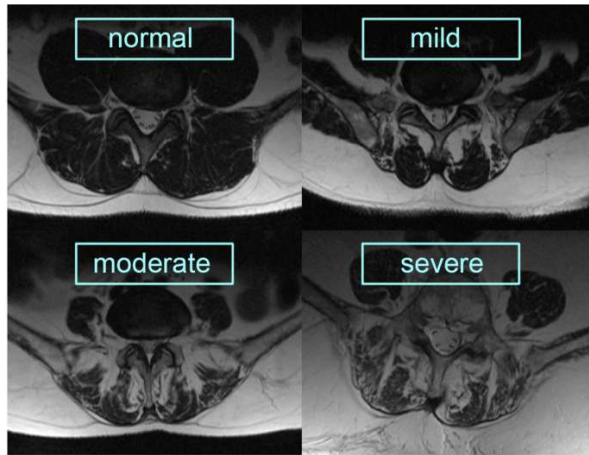
<h3>Healthy</h3> <ul style="list-style-type: none"> <li>• Larger in size</li> <li>• Slow-twitch fibre type</li> <li>• Minimal fatty infiltration</li> <li>• Move freely</li> <li>• Healthy stretch receptors (muscle spindles)</li> </ul> <p style="text-align: center;"><b>↑</b> <b>Good</b></p>	<h3>Dysfunction</h3> <p>over time become:</p> <ul style="list-style-type: none"> <li>• Stiff and Fibrotic</li> <li>• Atrophied (shrunk)</li> <li>• Fatty infiltration</li> <li>• Change fibre type</li> <li>• Stretch receptors dysfunction</li> </ul> <p style="text-align: center;"><b>↑</b> <b>NOT Good</b></p>
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(Hodges & Danneels, 2019. Changes in structure and function of the back muscles in low back pain: different time points, observations, and mechanisms *Journal of orthopaedic & sports physical therapy* 49(6): 464-476)

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# Physical Injury, Emotional overload, Inflammation turn off the deep paraspinal muscles (neurological inhibition)

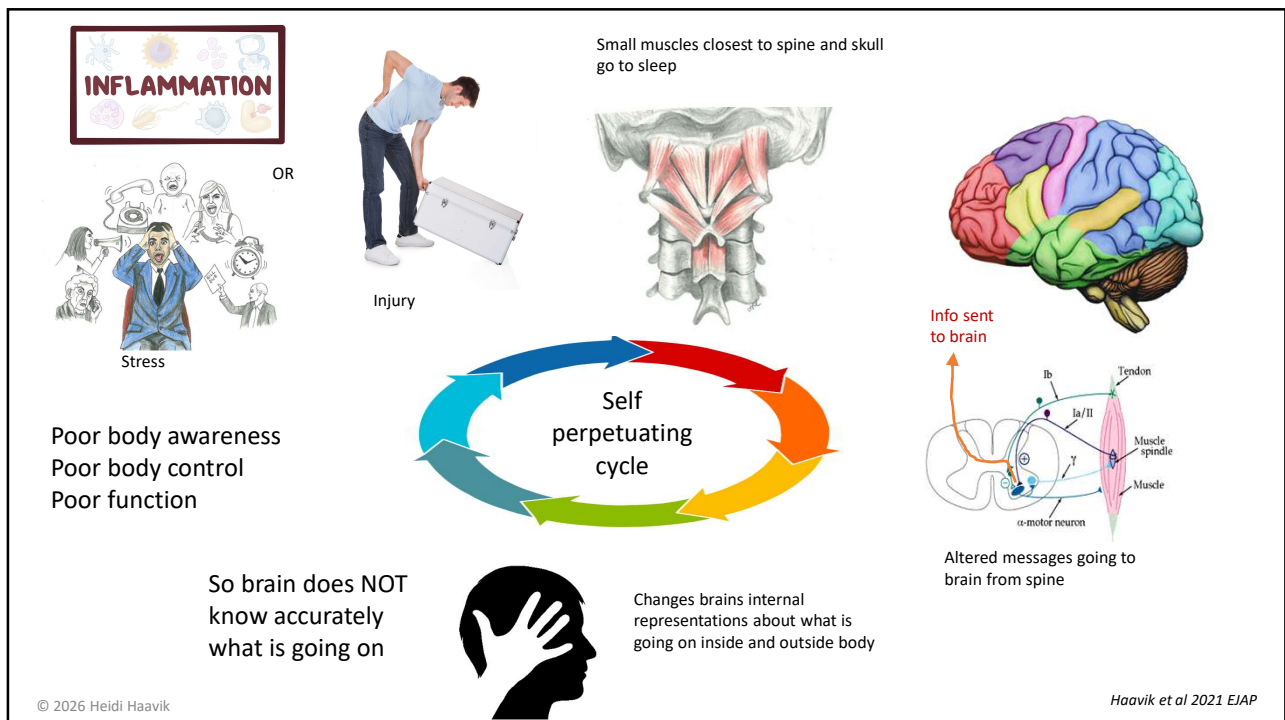
Haavik et al 2021 EJAP



Faur, C., Patrascu, J.M., Haragus, H. and Anglitoiu, B., 2019. Correlation between multifidus fatty atrophy and lumbar disc degeneration in low back pain. BMC musculoskeletal disorders, 20(1), pp.1-6.

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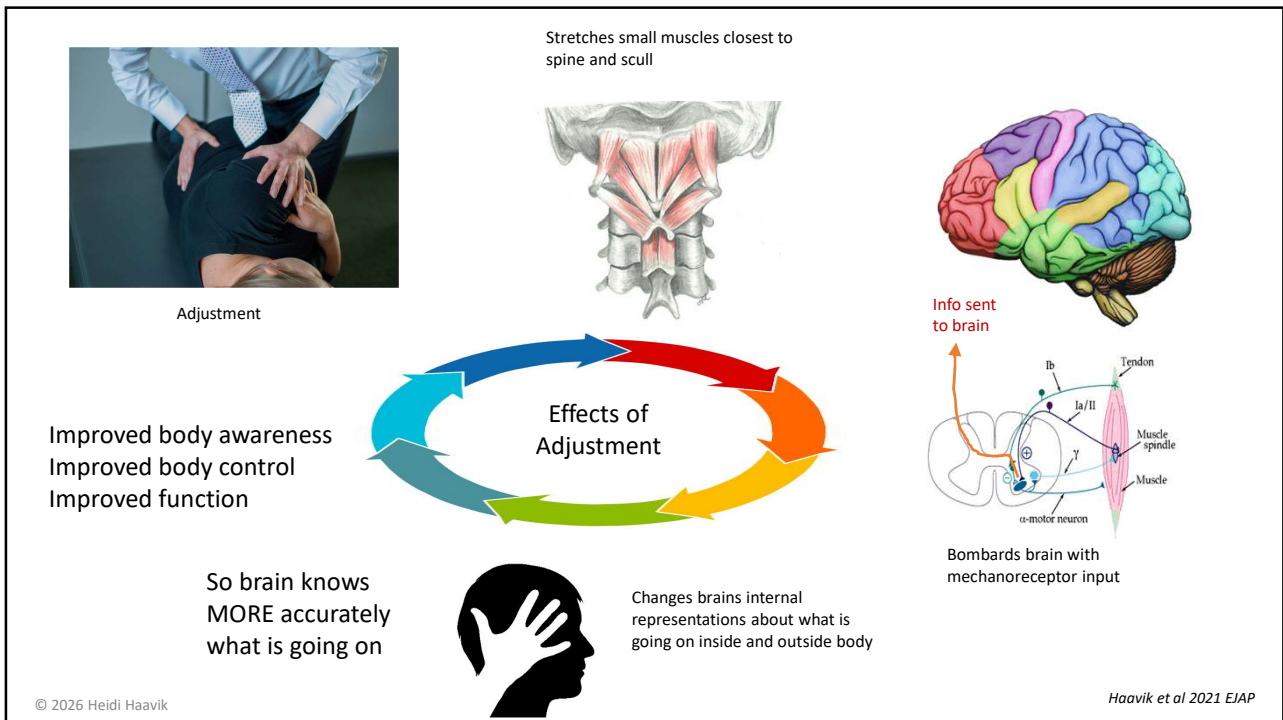
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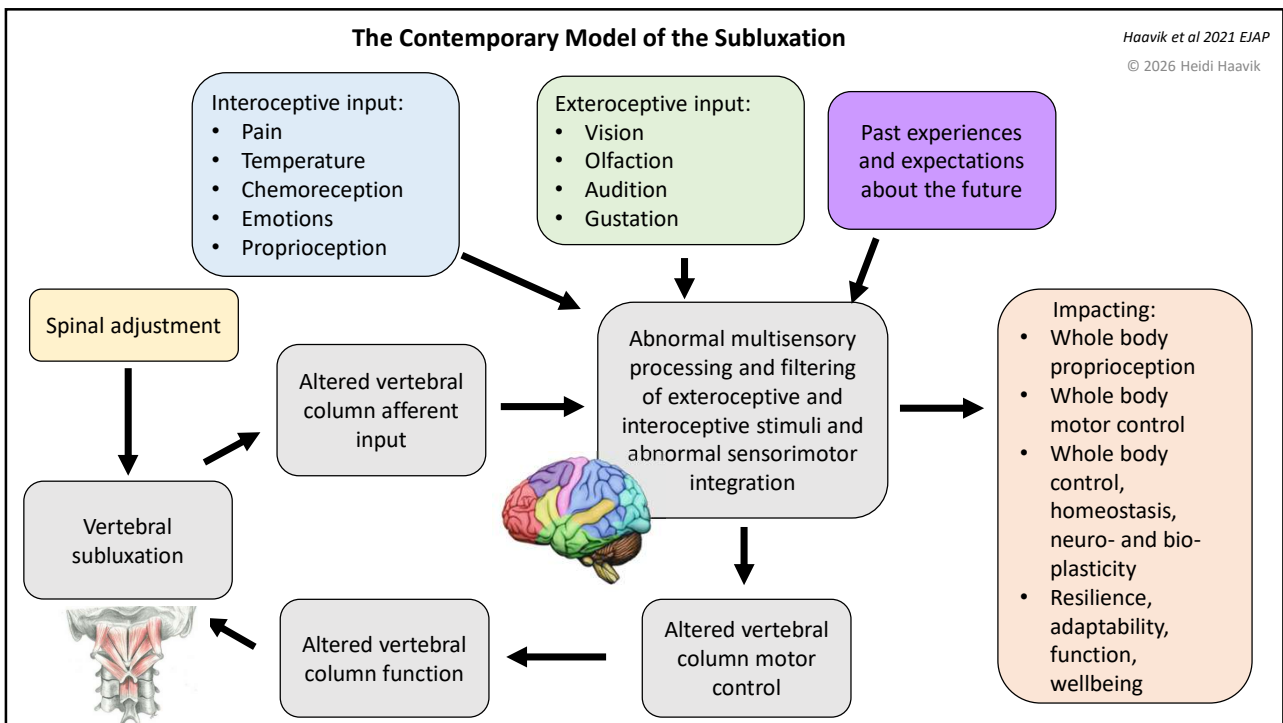
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## Chiropractic care can improve accurate perception and function



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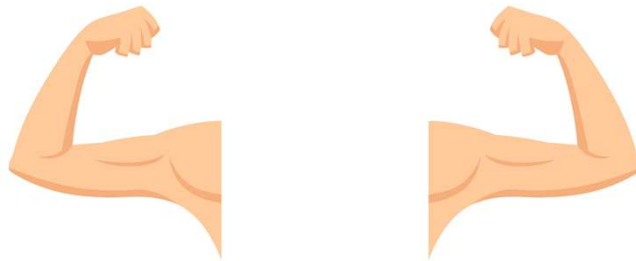
Chiropractic Care is all about exercising the small, deep paraspinal muscles back into proper function to enable the brain to more and more accurately perceive the internal and external environment so it can respond, adapt and heal better

*Heidi Haavik*

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It takes more than four weeks of exercise before you alter the morphology of the muscle



Implications for practice!

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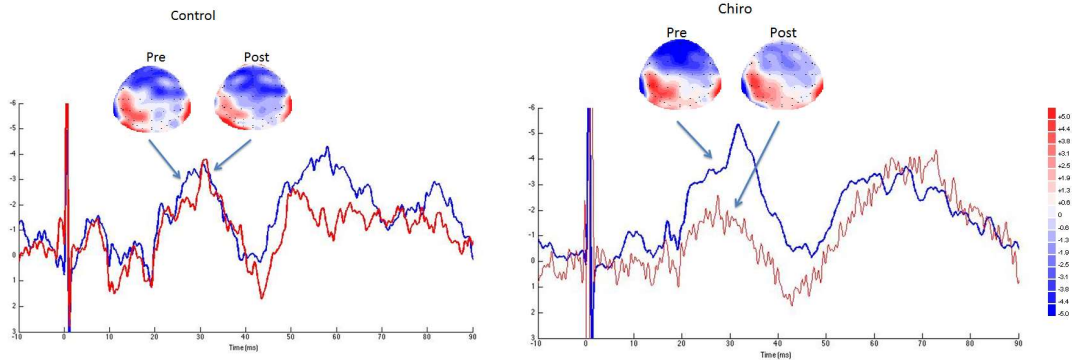


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# Chiropractic Adjustment changes Pre-Frontal Cortex Processing

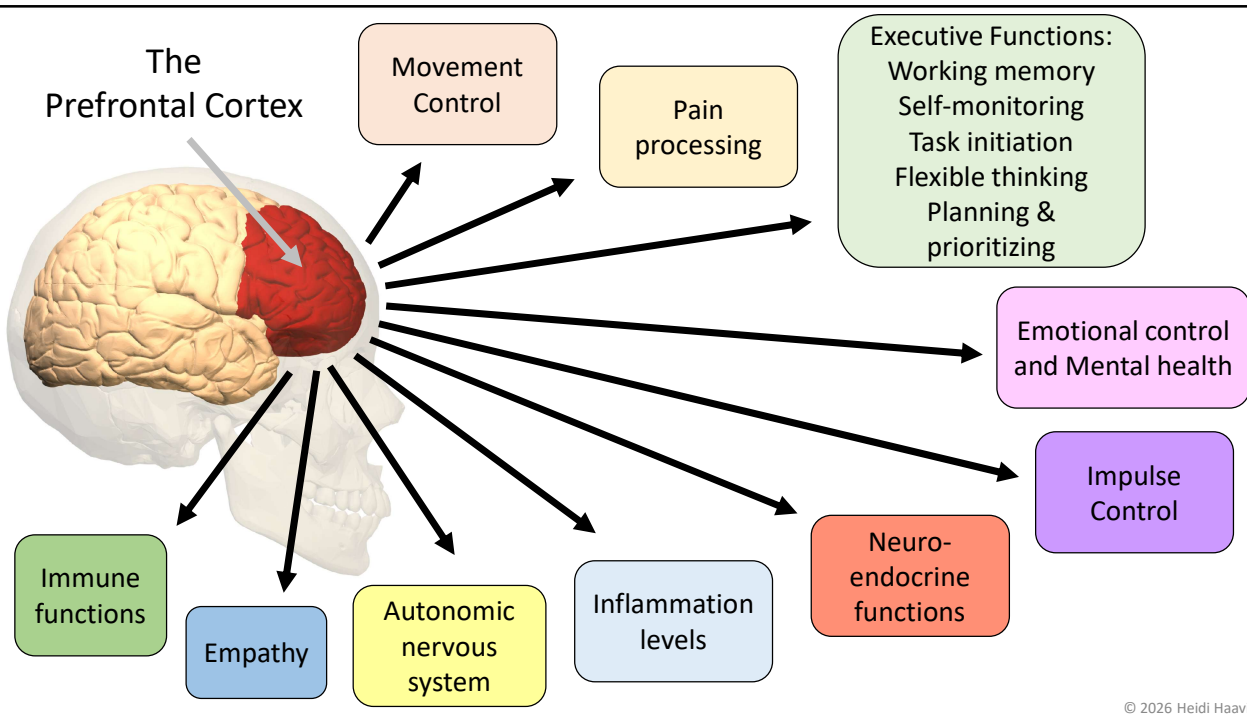
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Lelic, D., Niazi, I.K., Holt, K., Jochumsen, M., Dremstrup, K., Yelder, P., Murphy, B., Drewe, S.A. M., & Haavik, H. (2016). Manipulation of dysfunctional spinal joints affects sensorimotor integration in the prefrontal cortex: A brain source localization study. *Neural Plasticity*, 1. doi:10.1155/2016/3704964.

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## The Prefrontal Cortex

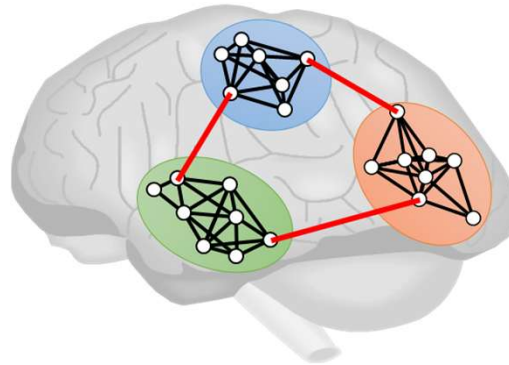


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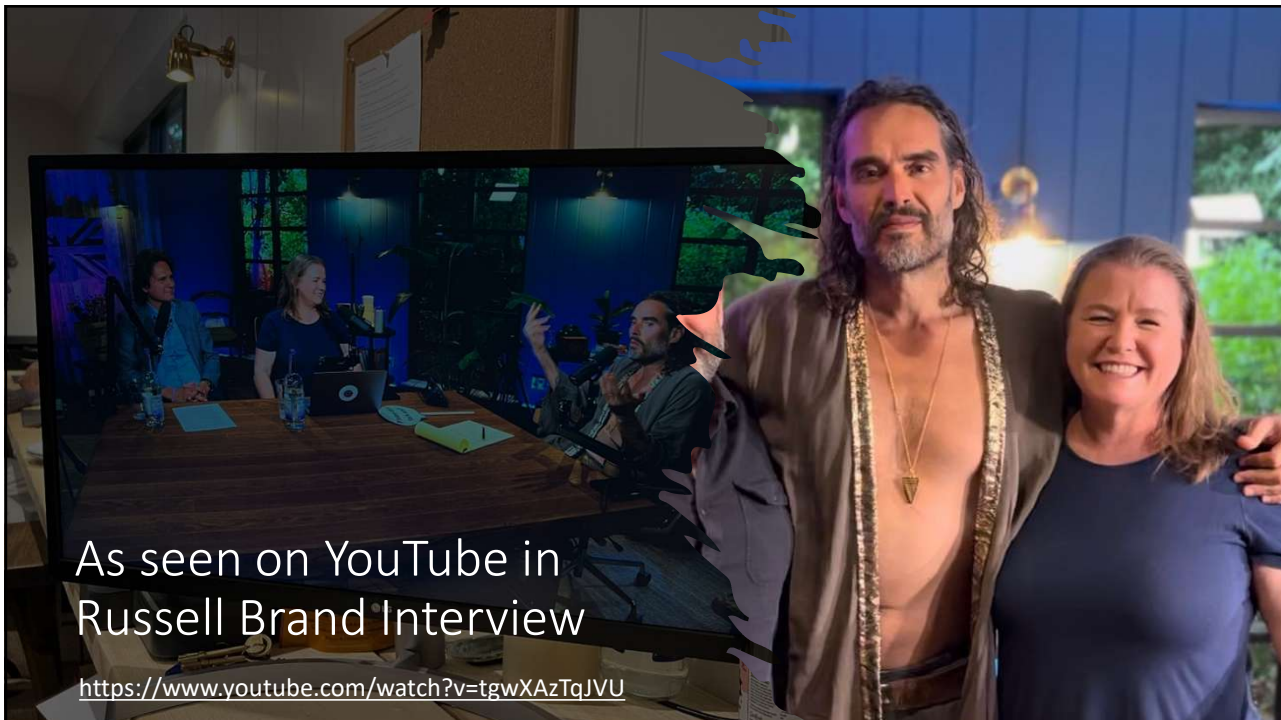
## Biological Networks in the Brain (and Hubs)

- A biological neural network in the brain is a complex network of neurons that are chemically connected by synapses.
- Neurons send and receive electrochemical signals to each other, and the brain uses these signals to process information.



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As seen on YouTube in  
Russell Brand Interview

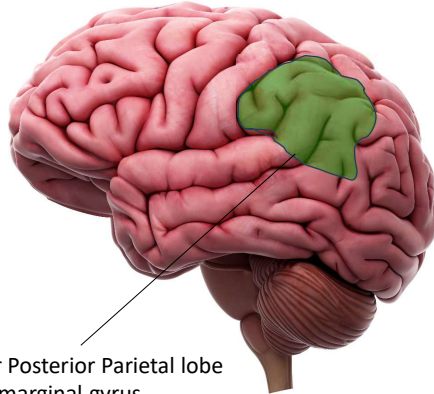
<https://www.youtube.com/watch?v=tgwXAZtqJVU>

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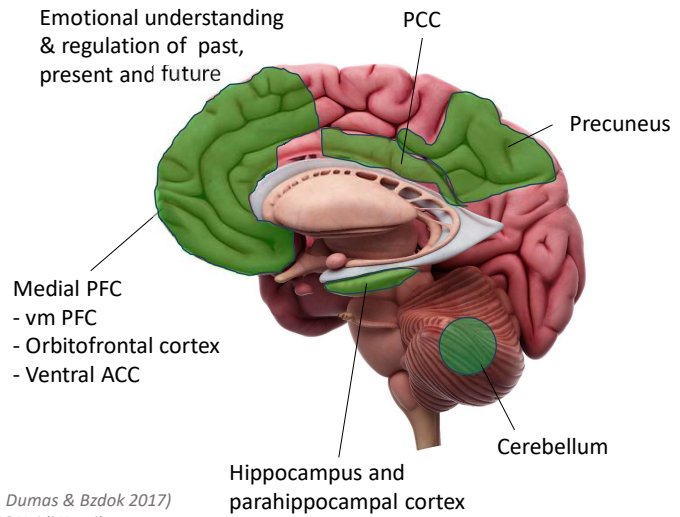
# Default Mode Network

Constructing sense of self

Understanding thoughts, intentions and feelings of others, and predicting behavior



Emotional understanding & regulation of past, present and future

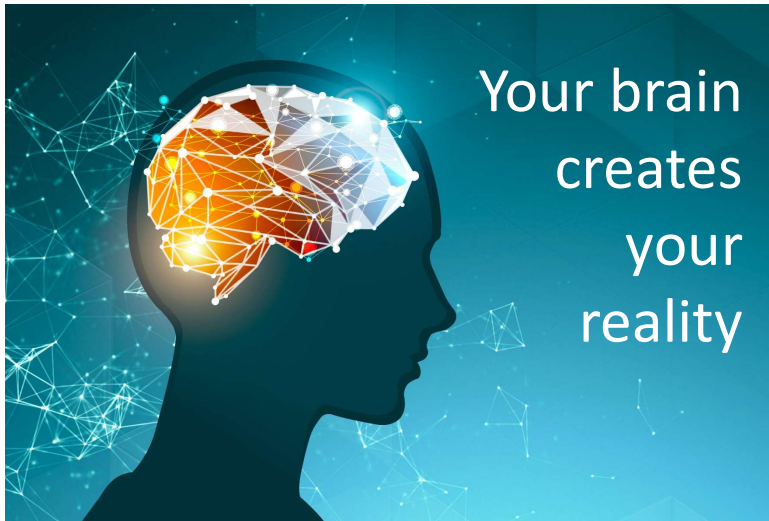


(Dohmatob, Dumas & Bzdok 2017)  
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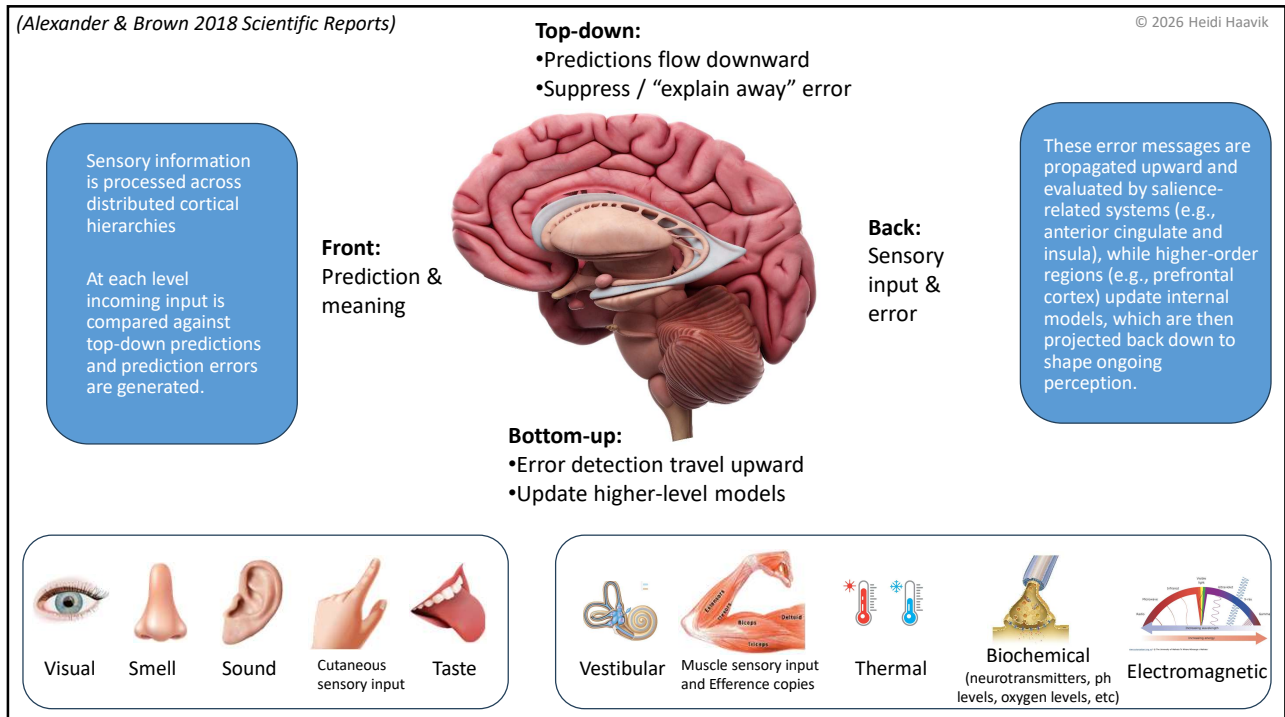
Your brain  
creates  
your  
reality

The predictive brain theory (or predictive processing) posits that the brain is an active prediction machine, not a passive receiver of sensory input. It continuously generates top-down models of the world to anticipate sensory data and minimize "prediction errors" (differences between expectation and reality), driving perception, action, and learning.

(Friston, 2010, Nat.Rev.Neurosci.)

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## Questionnaire Results

### Control Group

NO significant changes at all

### Chiropractic Group

- Improved QOL overall
- Improved Physical function
- Less Depression
- Less anxiety
- Less Fatigue
- Less pain interference
- Less pain intensity

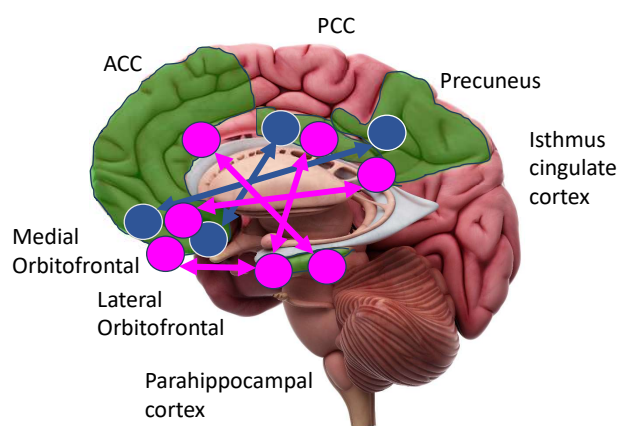


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## Default Mode Network changes after Chiro Care

Pre and Post first session

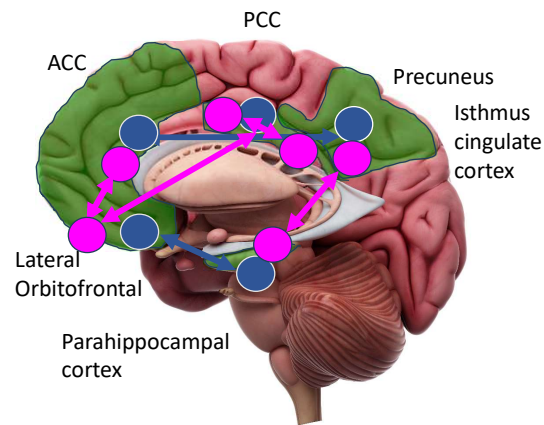


(Haavik et al 2024, Brain Sciences)

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## Default Mode Network changes after Chiro Care Pre and Post 4 weeks



(Haavik et al 2024, Brain Sciences)

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Unmedicated depressed people have significantly increased functional connectivity between the **Precuneus** and the **prefrontal cortex**

Increased functional connectivity of the **posterior cingulate cortex** with the **lateral orbitofrontal cortex** in depression (Cheng, Rolls et al. 2018B)

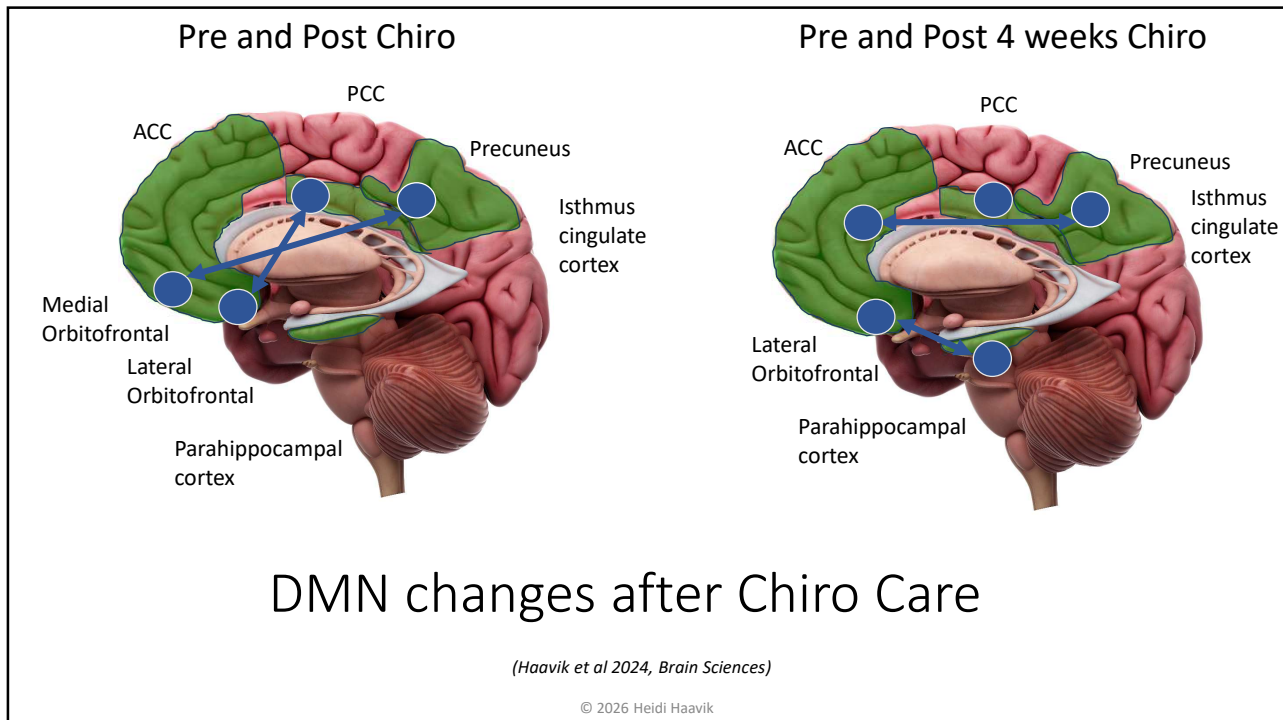


"The increased connectivity of the precuneus and/or PCC with the prefrontal cortex short-term memory system may contribute to the rumination about low self-esteem in depression."

(Cheng, et al 2018A; Cheng, Rolls et al. 2018B)

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**In depression there is asymmetry in the thickness of Posterior Cingulate Cortex**

- PCC deals with internally focused, self-referential processing
- I.e. Construction of the narrative sense of self, including autobiographical memories
- Implicated in depression:  $\uparrow$  cortical thickness in left vs right PCC
- Depressed individuals with higher somatic symptoms (e.g. sleep disturbance, appetite disturbance, and fatigue or loss of energy) have greater asymmetry in PCC thickness

**SEPs Alpha  $\uparrow$  L isthmus-cingulate- R PCC**

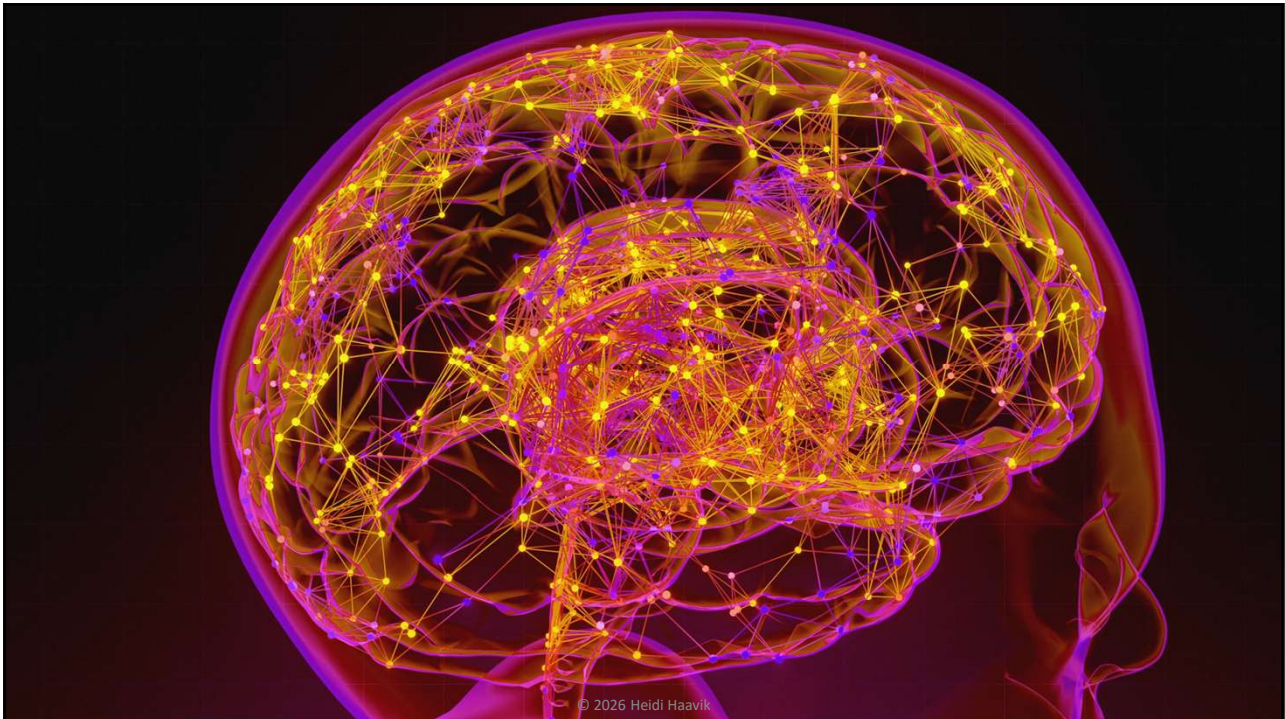
*“Thus, this change may reflect altered narrative sense of self in a manner that is reducing symptoms of depression and improvements in fatigue”*

*(Haavik et al 2024, Brain Sciences)*

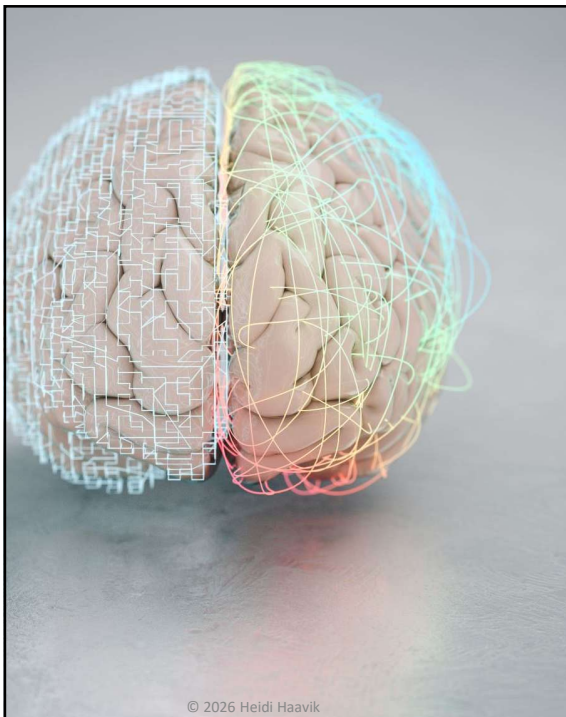
*(Dotson et al. 2021; van Eijndhoven et al. 2013)*

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## Chiropractic Care

“Research indicates that chiropractic care, that includes the adjustment of vertebral subluxations, enhances brain-body communication, allowing your brain to more accurately interpret internal and external signals. This improved perception of what is happening inside you and around you enables your brain to optimize bodily functions and adapt more effectively to your environment.”

*Heidi Haavik*

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Do you now think it would be a good idea to get yourself a brain model for your practice?



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## Basic Science

LEVEL 1

For junior chiropractic students or chiropractic assistants who have not yet gained any in-depth knowledge about anatomy, physiology, or pathology.

Learn the facts about why good spinal function is so important, what happens when we adjust the spine, the detrimental impacts of stress and trauma, the important role of brain mal-adaptations in chronic pain, and how chiropractic care can improve strength and alter the prefrontal cortex and cerebellum function.

<p><b>BS1.05 How Stress affects your Health</b></p> <p>55 Minutes - What causes symptoms of stress and how chiropractic care...</p> <p>Dr Jenna Duehr</p> <p>0% Complete 0/0 Steps</p> <p>See more...</p> <p>\$24.00</p>	<p><b>BS1.07 Spinal Function Affects Brain Function</b></p> <p>54 Minutes - How spinal dysfunction can potentially send a confusing...</p> <p>Dr Jenna Duehr</p> <p>0% Complete 0/0 Steps</p> <p>See more...</p> <p>\$24.00</p>	<p><b>BS1.10 How to Explain Pain</b></p> <p>53 Minutes - How the brain effects pain perception and the benefits of...</p> <p>Dr Jenna Duehr</p> <p>0% Complete 0/0 Steps</p> <p>See more...</p> <p>\$24.00</p>	<p><b>BS1.11 Chiropractic and Pain</b></p> <p>50 Minutes - The effects of chiropractic on pain and the benefits...</p> <p>Dr Jenna Duehr</p> <p>0% Complete 0/0 Steps</p> <p>See more...</p> <p>\$24.00</p>	<p><b>BS1.08 Adjustments Improve Strength</b></p> <p>46 Minutes - The effect of chiropractic on muscle strength and the latest...</p> <p>Dr Jenna Duehr</p> <p>0% Complete 0/0 Steps</p> <p>See more...</p> <p>\$24.00</p>	<p><b>BS1.09 The Prefrontal Cortex and...</b></p> <p>66 Minutes - Chiropractic studies have shown adjustments can change...</p> <p>Dr Alice Cade</p> <p>0% Complete 0/0 Steps</p> <p>See more...</p> <p>\$24.00</p>
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## Neuroscience

LEVEL 1

**Major advances in neuroscience knowledge have come about over the past several decades, so maintaining an up-to-date knowledge base is essential.**

Study the origins of the nervous system, its structure and function, neurological disease, and cutting-edge approaches to improve outcomes from treatment.

3 Lessons  
**NS1.07 Sensory Processing and Integration**  
60 minutes - a deep dive into the realm of Sensory Processing Integration.  
Dr Heidi Haavik  
0% Complete  
0/0 Steps  
See more...  
\$24.00

5 Lessons  
**NS1.08 Neural Plasticity**  
49 minutes - the cellular mechanisms that underpin neural plasticity.  
Dr Heidi Haavik  
0% Complete  
0/0 Steps  
See more...  
\$24.00

5 Lessons  
**NS1.10 The Prefrontal Cortex**  
63 minutes - a nexus of neurological brilliance that shapes the very essence of our human experience.  
Dr Heidi Haavik  
0% Complete  
0/0 Steps  
See more...  
\$24.00

6 Lessons  
**NS1.14 The Muscle Fiber and Neuromuscular Junction**  
49 minutes - learn about the anatomy of skeletal muscles down to the individual muscle fibers.  
Dr Heidi Haavik  
0% Complete  
0/0 Steps  
See more...  
\$24.00

6 Lessons  
**NS1.30 The Neurobiology of Stress and Trauma**  
61 minutes - understand the impact of stress and trauma on the human brain and body.  
Dr Heidi Haavik  
0% Complete  
0/0 Steps  
See more...  
\$24.00

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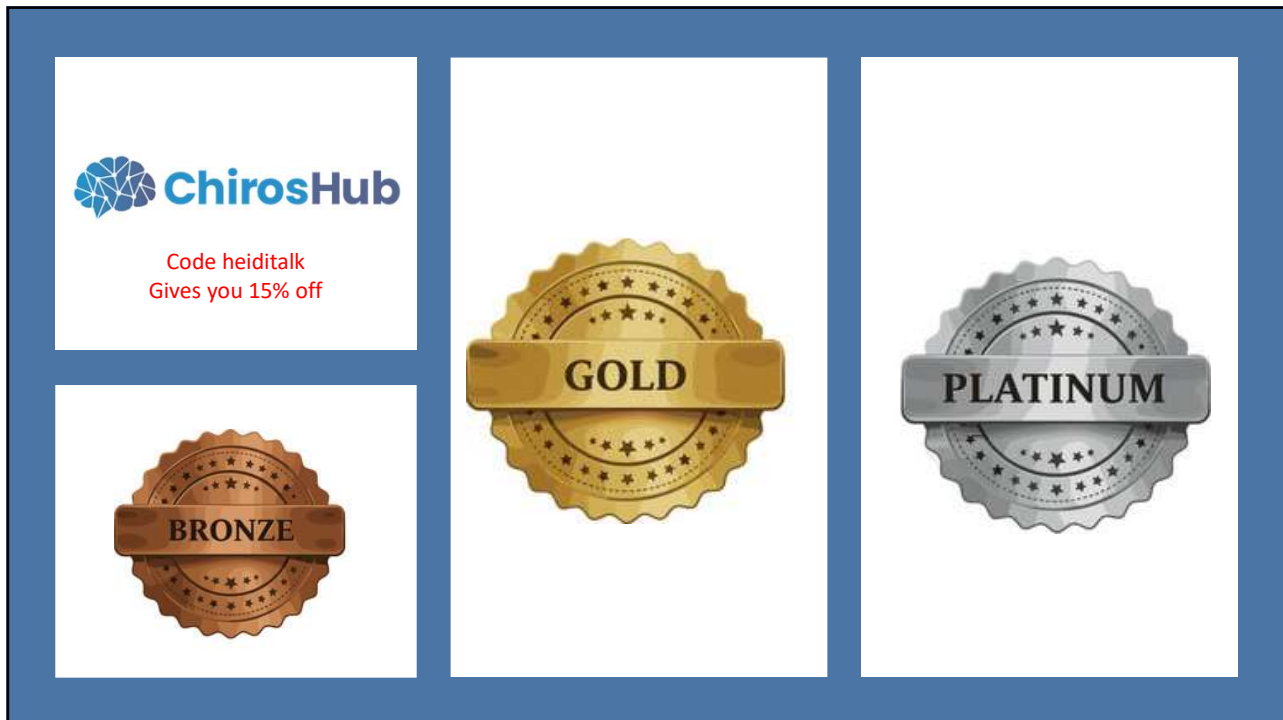
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Built to help you implement the brain model of chiropractic in practice

- 50+ videos to use on website / social channels
- Chiropractic research articles fully referenced
- Posters, screensavers and digital resources

**And much more for Gold & Platinum Members**

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## References

- Haavik H, Niazi IK, Amjad I, Kumari N, Ghani U, Ashfaq M, Rashid U, Navid MS, Kamavuko EN, Pujari AN, Holt K. Neuroplastic Responses to Chiropractic Care: Broad Impacts on Pain, Mood, Sleep, and Quality of Life. *Brain Sciences*. 2024 Nov 7;14(11):1124. <https://www.mdpi.com/2076-3425/14/11/1124>
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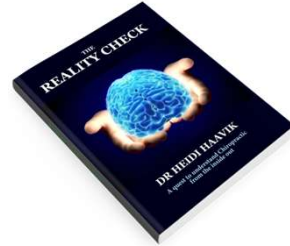
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Maintenance Care

### TODAY'S HANDOUT & GIFTS



## Enlightening the world about the Science of the Spine & Brain