

FACT SHEET

THE EFFECT OF CHIROPRACTIC CARE ON CEREBELLAR FUNCTION

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Research Project Summary

Project Complete

The overall objective of the proposed project is to investigate the role of the cerebellum in sensorimotor integration (SMI) following spinal adjustments in human participants who have pre-existing spinal dysfunction in the form of vertebral subluxations. The general hypothesis is that the cerebellum is the central integrator of proprioceptive input and that when the balance of afferent input is normalized by spinal adjustments, it helps to normalize sensorimotor integration and motor control via the cerebellar interactions with the basal ganglia, cortex and periphery.

Understanding the mechanisms of the changes in SMI will help clinicians understand who is most likely to benefit from chiropractic care, help identify patients with disordered SMI who may need adjustments to be combined with other approaches or who may need a longer course of care, potentially providing a rationale for treating people with recurrent neck and back pain as a way of normalizing sensorimotor integration to break the cycle of recurrence. This research has the potential to shift away from the "pain treatment" model into a "normalization of SMI" model to prevent the development of chronic pain, to enhance function, to decrease the risk of injury in occupational, domestic and recreational settings.

Impact of Research

Publications

- Daligadu, J., Haavik, H., Yelder, P., Baarbe, J., Murphy, B. (2013) Alterations in cortical and cerebellar motor processing in subclinical neck pain patients following spinal manipulation *Journal of manipulative and physiological therapeutics* 36:527-537.
- Haavik, H., Murphy, B. (2013) Selective changes in cerebellar-cortical processing following motor training. *Experimental Brain Research*. 231(4)397-403

- Baarbé, J., Yelder, P., Behbahani, H., Daligadu, J., Haavik, H., Murphy, B. (2014) A Novel Protocol to Investigate Motor Training-Induced Plasticity and Sensorimotor Integration in the Cerebellum and Motor Cortex. *Journal of Neurophysiology*. 111(4):715-2

Presentations

- Baarbé, J., Debison-Larabie, C., Haavik, H., Yelder, P., Murphy, B. Differences in effects of cerebellar inhibition following motor learning in Subclinical neck pain patients. Society for Neuroscience, San Diego, USA, November, 2013. Abstract Control Number: 16473
- Baarbé, J., Daligadu, J., Behbahani, H., Haavik, H., Yelder, P., Murphy, B. The effects of motor learning on the cerebellum and motor cortex. Accepted for presentation at "Progress in Motor Control IX", biennial conference of the International Society for Motor Control, Montreal, Canada, July 13-16, 2013, Abstract #169.
- Bossé, Passmore, S., Yelder, P., Haavik, H., Murphy, B. The effect of spinal manipulation on sensorimotor integration and cortical effects of motor training in a cohort of participants with subclinical neck pain. *Proceedings of the 12th World Federation of Chiropractic Biennial Congress*, Durban, South Africa, April 10-13, 2013, p. 170.
- Daligadu, J., Yelder, P., Baarbé, J., Haavik, H., Murphy, B. Alterations in Cortical and Cerebellar Motor Processing in Neck Pain Patients Following Chiropractic Manipulation. *Proceedings of the 12th World Federation of Chiropractic Biennial Congress*, Durban, South Africa, April 10-13, 2013, p. 142.
- Daligadu, J., Yelder, P., Behbahani, H., Holland, L., Murphy, B. "The feasibility of using cerebellar stimulus response curves to investigate changes in excitability of cerebellar projections to primary motor cortex" *International Society of Electromyography and Kinesiology (ISEK) Biannual Meeting*, Brisbane, Australia, July 17-21, 2012 (poster)