

RESEARCH – MURPHY

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"No changes occurred to any of the SEP components following passive head movement." **[Very Important]**

DISCUSSION:

"The major finding in this study was that a single session of spinal manipulation of dysfunctional joints resulted in attenuated cortical (parietal and frontal) evoked responses." **[Very Important]** These changes "most likely reflect central changes." **[Very Important]**

The length of time these central changes persisted varied between the subjects, [indicating different individuals respond differently to spinal adjusting]. **[Very Important]**

This study documents cortical brain changes as a consequence of spinal adjusting; the authors also note that sub-cortical brainstem changes may have also occurred but their study protocols were not sufficient to document them, and therefore sub-cortical brainstem changes from spinal adjusting "need further investigation." **[Important]**

The significantly decreased cortical SEPs occurred in **all** post-manipulation measurements, indicating "enhanced active inhibition" because the "cervical manipulations could have altered the afferent information originating from the cervical spine (from joints, muscles, etc.)"

"The passive head movement SEP experiment demonstrated that no significant changes occurred following a simple movement of the subject's head. Our results are therefore not simply due to altered input from vestibular, muscle or cutaneous afferents as a result of the chiropractor's touch or due to the actual movement of the subjects head. This therefore suggests that the results in this study are specific to the delivery of the high-velocity, low-amplitude thrust to dysfunctional joints." **[Extremely Important]**

The authors reiterate that the documented reduced cortical changes may be secondary to altered "subcortical loops linking the basal ganglia, thalamus, pre-motor areas and primary motor cortex" resulting from "altered afferent input following spinal manipulation."

"Muscle afferents (probably Ia) are the most likely mediators of the central neural effects of spinal manipulation."

The significant attenuation of the frontal SEP observed in this study suggests that spinal manipulation alters Ia afferent processing.

Studies indicate that "displacement of vertebrae is signaled to the central nervous system by afferent nerves arising from deep intervertebral muscles."

"Both the velocity and the relative position of the vertebral displacement appeared to be encoded by afferent nerve activity from intervertebral muscles."

"Joint dysfunction leads to bombardment of the central nervous system with Ia afferent signaling from surrounding intervertebral muscles."

Spinal manipulation reduces excessive afferent signals from adjacent intervertebral muscles which improves altered afferent input to the central nervous system. This changes the way the central nervous system "responds to any subsequent input." **[Very Important]**

Episodes of acute pain following injury induce plastic changes in the sensorimotor system, prolonging the episode of pain and playing a role in establishing chronic neck pain conditions. **[Very Important]** "The reduced cortical SEP amplitudes observed in this study following spinal manipulation may reflect a normalization of such injury/pain-induced central plastic changes, which may reflect one mechanism for the improvement of functional ability reported following spinal manipulation." **[Extremely Important]**

"Spinal manipulation of dysfunctional joints may modify transmission of neuronal circuitries not only at a spinal level but at a cortical level, and possibly also deeper brain structures such as the basal ganglia." **[Very Important]**

KEY POINTS FROM DAN MURPHY

1. "Spinal manipulation is a commonly used conservative treatment for neck, back, and pelvic pain."
2. "The effectiveness of spinal manipulation in the treatment of acute and chronic low back and neck pain has been well established by outcome-based research."
3. Spinal dysfunction will alter afferent input to the central nervous system.
4. Altered afferent input to the central nervous system leads to plastic changes in the central nervous system. **[Very Important]**
5. "Neural plastic changes take place both following increased and decreased afferent input." **[Extremely Important]**
6. Both painful and **painless** joint dysfunction will inhibit surrounding muscles.
7. Joint dysfunction causes afferent driven increases in neural excitability (facilitation) to muscles that can persist even after the initiating afferent abnormality is corrected. **[This suggests that a muscle afferent problem can persist even after the joint component of the subluxation is corrected. The chronic component of the subluxation may be plastic changes that cause long-term alteration of muscle afferentation.]** This article clearly supports that the joint component, the muscle component of the subluxation complex are influenced by traditional joint-cavitation spinal adjusting.
8. The altered neural processing that occurs as a consequence of joint dysfunction provides a "rationale for the effects of spinal manipulation on neural processing that have been described in the literature." **[Very Important]**
9. Spinal dysfunction alters the "balance of afferent input to the cen-

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