



RESEARCH UPDATE

Cervical spine manipulation alters sensorimotor integration: A somatosensory evoked potential study

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OBJECTIVE: To study the immediate sensorimotor neurophysiological effects of cervical spine manipulation using somatosensory evoked potentials (SEPs).

METHODS: Twelve subjects with a history of reoccurring neck stiffness and/or neck pain, but no acute symptoms at the time of the study were invited to participate in the study.

An additional twelve subjects participated in a passive head movement control experiment.

Spinal brainstem and cortical SEPs to median nerve stimulation were recorded before and for 30min after a single session of cervical spine manipulation, or passive head movement.

RESULTS: There was a significant decrease in the amplitude of parietal and frontal SEP components following the single session of cervical spine manipulation compared to pre-manipulation baseline values.

These changes lasted on average 20 minutes following the manipulation intervention.

No changes were observed in the passive head movement control condition.

CONCLUSIONS: Spinal manipulation of dysfunctional cervical joints can lead to transient cortical plastic changes, as demonstrated by attenuation of cortical somatosensory evoked responses.

SIGNIFICANCE: This study suggests that cervical spine manipulation may alter cortical somatosensory processing and sensorimotor integration.

These findings may help to elucidate the mechanisms responsible for the effective relief of pain and restoration

of functional ability documented following spinal manipulation treatment.

THESE AUTHORS ALSO NOTE:

“Spinal manipulation is a commonly used conservative treatment for neck, back, and pelvic pain.”

“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.” **[Very Important]**

Evidence indicates that spinal manipulation does the following:

1. Alters spinal cord reflex excitability.
2. Alters sensory processing.
3. Alters motor excitability.

Spinal dysfunction effects central neural processing, as follows:

1. Spinal dysfunction will alter afferent input to the central nervous system.
2. Altered afferent input to the central nervous system leads to plastic changes.
3. “Neural plastic changes take place both following increased and decreased afferent input.” **[Extremely Important]**
4. Altered afferent input from joints leads to both inhibition and facilitation of neural input to related muscles.
5. Both painful and **painless** joint dysfunction will inhibit surround-

ing muscles. **[Very Important]**

Studies show that 15-30 minutes of altered joint afferent input to the spinal reflex pathways “increases neural excitability that persists for several hours.” **[Very Important]**

“Once these facilitated areas are established, there may be no need for ongoing afferent input to maintain the altered output [motor] patterns.”

Altered sensory input causes rapid central plastic changes, especially after injury. **[Important]**

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]**

Spinal dysfunction alters the “balance of afferent input to the central nervous system” and this altered afferent input may lead to “maladaptive neural plastic changes in the central nervous system,” and “spinal manipulation can effect this.” **[Very Important]**

The spinal manipulation in this study was applied to dysfunctional cervical joints, as determined by a “registered chiropractor.”

The clinical evidence for joint dysfunction includes:

1. Tenderness on joint palpation.
2. Restricted intersegmental range of motion.
3. Palpable asymmetry of interver-

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