The Power of Vibration

In this paper we will review the basics of the gate control theory of pain. How for pain to be perceived "gates" particularly in the dorsal horn of the spinal cord, plus in more higher processing centres, must be passed through. Further, that there are preferential sensory pathways which can diminish the sensation of pain. In particular vibration offers a potential modality to assist in pain management, but at a higher level can offer more than merely temporary relief while the stimulus is in place. Then, we will expand the idea that combining the chiropractic premise of differentially diagnosing spinal levels to maximise therapeutic effect, may further supplement the positive effect of delivering vibration therapy (here referred to as Spinal Percussion Therapy – SPT).

Gate Control Theory

"The gate control theory of pain states that when a stimulus gets sent to the brain, it must first travel to three locations within the spinal cord. These include the cells within the substantia gelatinosa in the dorsal horn, the fibers in the dorsal column, and the transmission cells which are located in the dorsal horn as well. The substantia gelatinosa of the spinal cord's dorsal horn serves to modulate the signals that get through, acting similar to a "gate" for information traveling to the brain. The sensation of pain that an individual feels is the result of the complex interaction among these three components of the spinal cord. Simply stated, when the "gate" closes, the brain does not receive the information that is coming from the periphery to the spinal cord. However, when the signal traveling to the spinal cord reaches a certain level of intensity, the "gate" opens. Once the gate is open, the signal can travel to the brain where it is processed, and the individual proceeds to feel pain." [1]

Effect of low-magnitude, variable-frequency vibration therapy on pain threshold levels and mobility in adults with moderate knee osteoarthritis-randomized controlled trial.

An extension of the gate control theory is the discovery that other sensory inputs can have preferential pathway towards conscious sensation, and so it is possible to diminish the perception of pain by overriding pain transmission through the gateway system with less toxic inputs. And so, we know intuitively that rubbing or moving a sore area can diminish pain sensation. And therapeutically modalities such as TENS have existed for decades to assist with temporary relief of chronic or severe pain.

The purpose of one study was "to determine the impact of vibrations of variable frequency and low amplitude on pain perception and mobility in patients suffering from knee OA. Pain, range of motion, and functional disability were assessed through Visual Analog Scale (VAS), Laitinen questionnaire, goniometer (ROM – range of motion), timed up and go test (TUG) and Knee Injury and Osteoarthritis Outcome Score (KOOS). After 3 weeks (15 sessions) of vibration therapy, reduced sensation of pain and improved mobility was recorded. There was a more significant improvement in the vibration therapy group than the control group in pain alleviation on VAS scale ($p < 0.001$), on Laitinen scale ($p < 0.001$), knee ROMs flexions ($p < 0.001$) and TUG ($p < 0.001$) at the last session. KOOS score with pain indicator, symptoms, activities of daily living, function in sport and recreation and knee related quality of life improved more in the vibration therapy group than the control group. Effects maintained up to 4 weeks in vibration group. No adverse events were reported." [2]

The data demonstrated that "the use of vibrations of variable frequency and low amplitude in patients with the knee OA is a safe and effective therapy." It was recommended to increase the number of treatments performed. And so, we can see that localized delivery of vibration therapy had positive effects in terms of both pain and function. And, it is clear that the therapeutic effect of vibration extends beyond temporary pain relief.

Focal Vibration Stretches Muscle Fibers by Producing Muscle Waves.

Another study observed that "focal vibration is an effective intervention for the management of spasticity. However, its neuromechanical effects, particularly how tonic vibration reflex is induced explicitly, remain implicit." In this paper, they utilized a high-speed camera and a method of image processing to quantify the muscle vibration rigorously and disclose the neuromechanical mechanism of focal vibration. The results demonstrated "that focal vibration stretches muscle by producing muscle waves. Specifically, each point vibrates harmonically, and, given the linear phase modulation with transverse position, the muscle vibration propagates as traveling waves. The propagation of muscle waves is associated with muscle stretch, whose frequency is the same with the vibrator due to the curved baseline, and thus induces the tonic vibration reflex via spinal circuits." If you go to one of the original YouTube videos I produced on this topic [4] (a slow-motion video of the 3dEnergy Gun stimulating a quadriceps muscle) you will see these waveforms for yourself. This finding becomes important when we start to ask the question of how can vibration therapy have much more dramatic impacts on the central nervous system than just pain relief.

Localized 100 Hz vibration improves function and reduces upper limb spasticity: a double-blind controlled study.

Let's look at this idea that vibration therapy has central impact above and beyond peripheral effects. "Physical modalities such as vibration have been suggested as possible non-pharmacological way to control spasticity. The hypotheses tested were: 1) can a selective vibration of the upper limb flexor antagonist, triceps brachii, reduce the spasticity of the flexor biceps brachii muscle; 2) is its association with physiotherapy better than physiotherapy alone in reducing spasticity and improving function, 3) can this possible effect last for longer than the stimulation period." [5] The study concluded that "1) 100 Hz vibration applied to the triceps brachii of a spastic upper limb in association with physiotherapy is able to reduce the spasticity of the flexor agonist, biceps brachii; 2) this association is better than physiotherapy alone in controlling spasticity and improving function; 3) this clinically perceivable reduction of spasticity and function improvement extends (for at least 48 hours) beyond the period of application of the vibration, supporting its possible role in the rehabilitation of spastic hemiplegia." [5]

There are two points we need to take note of here, both pointing to the concept that vibration therapy is having its therapeutic effect in the central nervous system:

1) The therapy was applied to a muscle and the measurement was made of its antagonist, and so we cannot be talking about a direct localized effect.
2) Spasticity is a central problem, not a local or peripheral problem.

Short-term effect of local muscle vibration treatment versus sham therapy on upper limb in chronic post-stroke patients: a randomized controlled trial.

Similarly let's look at a study of stroke patients, who are also suffering from central nervous system dysfunction. "The aim of this study was to evaluate the effects of local muscle high frequency mechano-acoustic vibratory treatment on grip muscle strength, muscle tonus, disability and pain in post-stroke individuals with upper limb spasticity… Over 4 weeks, the values recorded in group A when compared to group B demonstrated statistically significant improvement in grip muscle strength, pain and quality of life and decrease of spasticity. Rehabilitation treatment with local muscle high frequency (300 Hz) vibration for 30 minutes, 3 times a week for 4 weeks, could significantly improve muscle strength and decrease muscle tonus, disability and pain in upper limb of hemiplegic post-stroke patients. [6] Further studies found similar beneficial results. [7, 8]

Proposing a model for taking this therapeutic effect to another level.

And so, we see that vibration therapy is having very positive effects in the central nervous system. Chiropractic for the entire length of its existence has paid particular attention to the role of specific spinal dysfunction (aka Subluxation) in producing negative functional impacts through the peripheral and central nervous system. Research found that "Chiropractic adjustments most likely act as a salient signal that is able to activate the Salience Network, so that the CNS focuses attention on the vertebral column sensory inputs." [9]

Are neural gate dysfunction and spinal subluxation concurrent or even identical phenomena? Chiropractic proposes that vertebral subluxation includes sensory and motor dysfunction at specific spinal levels. Neural gate theory proposes that pain sensation is accepted or denied at the gateways in the dorsal horns of the spinal column – perhaps these two scenarios are synonymous but expressed in different language?

The author has worked with a manufacturer of percussion massage guns to produce an instrument which can apply percussion vibration therapy to specific spinal segments and includes a feature regarded as important for the correction of vertebral subluxation – torque. The hypothesis is that this percussion vibration when applied to a vertebral segment, especially if that segment is in a state of biomechanical and neurological dysfunction, will have direct inflow to the dorsal horns, potentially producing significant therapeutic effects within the neural gateway system.

Bibliography

1. Gate Control Theory

Pain Theory. Lindsay A. Trachsel; Sunil Munakomi; Marco Cascella.

In 1965, Patrick David Wall and Ronald Melzack announced the first theory that viewed pain through a mind-body perspective. This theory became known as the gate control theory. Melzack and Wall's new theory partially supported both of the two previous theories of pain but also presented more knowledge to advance the understanding of pain further. The gate control theory of pain states that when a stimulus gets sent to the brain, it must first travel to three locations within the spinal cord. These include the cells within the substantia gelatinosa in the dorsal horn, the fibers in the dorsal column, and the transmission cells which are located in the dorsal horn as well. The substantia gelatinosa of the spinal cord's dorsal horn serves to modulate the signals that get through, acting

similar to a “gate” for information traveling to the brain. The sensation of pain that an individual feels is the result of the complex interaction among these three components of the spinal cord. Simply stated, when the “gate” closes, the brain does not receive the information that is coming from the periphery to the spinal cord. However, when the signal traveling to the spinal cord reaches a certain level of intensity, the “gate” opens. Once the gate is open, the signal can travel to the brain where it is processed, and the individual proceeds to feel pain. The information mentioned above accounts for the physical component of pain, but as stated earlier, the Gate Control Theory was one of the first to acknowledge that psychological factors contributed to pain as well. In their original study, Melzack and Wall suggested that in addition to the control provided by the substantia gelatinosa, there was an additional control mechanism located in cortical regions of the brain. In more recent times, researchers have postulated that these cortical control centers are responsible for the effects of cognitive and emotional factors on the pain experienced. Current research has also suggested that a negative state of mind serves to amplify the intensity of the signals sent to the brain as well. For example, somebody who is depressed has a “gate” that is open more often, allowing more signals to get through, increasing the probability that an individual will experience pain from an otherwise normal stimulus. Also, there are reports that certain unhealthy lifestyle choices will also result in an “open gate,” which in turn leads to pain that is disproportionate to the stimulus. The gate control theory has proven to be one of the most significant contributions to the study of pain throughout history. The concepts that Melzack and Wall introduced to the study of pain are still utilized by researchers today. Even though this theory initiated the idea that pain wasn’t solely a result of physical injury but rather a complex experience, influenced by cognitive and emotional factors, there was still additional research necessary to comprehend the mechanisms and etiology of pain completely.

2. Effect of low-magnitude, variable-frequency vibration therapy on pain threshold levels and mobility in adults with moderate knee osteoarthritis-randomized controlled trial.

BMC Musculoskelet Disord. 2023 Apr 13;24(1):287. Alicja Pasterczyk-Szczurek, Joanna Golec, Edward Golec.

Background: Osteoarthritis (OA) is one of the most commonly recorded diseases in clinical practice. Vibration therapy has been suggested for the treatment of knee OA. The purpose of the study was to determine the impact of vibrations of variable frequency and low amplitude on pain perception and mobility in patients suffering from knee OA.

Methods: Thirty-two participants were allocated into two groups - Group 1 (oscillatory cycloidal vibrotherapy-OCV) and Group 2-control (sham therapy). The participants were diagnosed with moderate degenerative changes in the knee (grade II based on the Kellgren-Lawrence (KL) Grading Scale). Subjects received 15 sessions of vibration therapy and sham therapy respectively. Pain, range of motion, and functional disability were assessed through Visual Analog Scale (VAS), Laitinen questionnaire, goniometer (ROM - range of motion), timed up and go test (TUG) and Knee Injury and Osteoarthritis Outcome Score (KOOS). Measurements were taken at baseline, after the last session and four weeks after the last session (follow up). T-test and U-Mann Whitney test compare baseline characteristics. The Wilcoxon and ANOVA tests compared mean VAS, Laitinen, ROM, TUG and KOOS. The significant P-value was less than 0.05.

Results: After 3 weeks (15 sessions) of vibration therapy, reduced the sensation of pain and improved mobility was recorded. There was a more significant improvement in the vibration therapy group than the control group in pain alleviation on VAS scale ($p < 0.001$), on Laitinen scale ($p < 0.001$), knee ROMs flexions ($p < 0.001$) and TUG ($p < 0.001$) at the last session. KOOS score with pain indicator, symptoms, activities of daily living, function in sport and recreation and knee related quality of life improved more in the vibration therapy group than the control group. Effects maintained up to 4 weeks in vibration group. No adverse events were reported.

Conclusions: Our data demonstrated that the use of vibrations of variable frequency and low amplitude in patients with the knee OA is a safe and effective therapy. It is recommended to increase the number of treatments performed, primarily in patients with degeneration II° according to the KL classification.

3. Focal Vibration Stretches Muscle Fibers by Producing Muscle Waves.

IEEE Trans Neural Syst Rehabil Eng. 2018 Apr;26(4):839-846. Hui Guang, Linhong Ji, Yingying Shi.

Focal vibration is an effective intervention for the management of spasticity. However, its neuromechanical effects, particularly how tonic vibration reflex is induced explicitly, remain implicit. In this paper, we utilize a high-speed camera and a method of image processing to quantify the muscle vibration rigorously and disclose the neuromechanical mechanism of focal vibration. The vibration of 75 Hz is applied on the muscle belly of the biceps brachii and muscle responses are captured by a high-speed camera in profile. The muscle silhouettes are identified by the Canny edge detector to represent the stretch of muscle fibers, and the consistency between the muscle stretch

and profile deformation has been confirmed by the magnetic resonance imaging in advance. Oscillations of muscle points discretized by pixels are identified by the fast Fourier transformation, respectively, and results demonstrate that focal vibration stretches muscle by producing muscle waves. Specifically, each point vibrates harmonically, and, given the linear phase modulation with transverse position, the muscle vibration propagates as traveling waves. The propagation of muscle waves is associated with muscle stretch, whose frequency is the same with the vibrator due to the curved baseline, and thus induces the tonic vibration reflex via spinal circuits.

4. The world's first and only cordless electronic impulse gun with torque (rotating head)

https://youtube.com/shorts/vdfGtnRWrQI?si=7gbI1tpI9e9BB80Q

5. Localized 100 Hz vibration improves function and reduces upper limb spasticity: a double-blind controlled study.

Eur J Phys Rehabil Med. 2014 Oct;50(5):495-504. R Casale, C Damiani, R Maestri, C Fundarò, P Chimento, C Foti.

Background: Physical modalities such as vibration has been suggested as possible non-pharmacological way to control spasticity.

Aims: The hypotheses tested were: 1) can a selective vibration of the upper limb flexor antagonist, triceps brachii, reduce the spasticity of the flexor biceps brachii muscle; 2) is its association with physiotherapy better than physiotherapy alone in reducing spasticity and improving function, 3) can this possible effect last for longer than the stimulation period.

Design: Randomized double-blind study.

Setting: Rehabilitation Institute, inward patients.

Population: Thirty hemiplegic patients affected by upper limb spasticity.

Method: (VIB + PT) group received physiotherapy plus vibration by means of a pneumatic vibrator applied over the belly of the triceps brachii of the spastic side (contact surface 2 cm2; frequency 100 Hz; amplitude 2 mm; mean pressure 250 mBar). (SHAM + PT) group received physiotherapy and sham vibration. Both groups had 60 minutes of physiotherapy (Kabat techniques) for 5 days a week (from Monday to Friday) for 2 weeks.

Main outcome measure: Ashworth modified scale for spasticity and robot-aided motor tasks changes for functional modifications were evaluated before starting treatment (T0), 48 hours after the fifth session (T1) and 48 hours after the last session (T2).

Results: Fisher's exact test showed a statistically significant greater improvements in the (VIB + PT) group (P=0.0001) compared to in the (SHAM + PT) group after 1 week, as well as after 2 weeks of treatment (P=0.0078) at the Ashworth scale.

Conclusion: 1) 100 Hz vibration applied to the triceps brachii of a spastic upper limb in association with physiotherapy is able to reduce the spasticity of the flexor agonist, biceps brachii; 2) this association is better than physiotherapy alone in controlling spasticity and improving function; 3) this clinically perceivable reduction of spasticity and function improvement extends (for at least 48 hours) beyond the period of application of the vibration, supporting its possible role in the rehabilitation of spastic hemiplegia.

Clinical rehabilitation impact: 100 Hz antagonist muscle vibration, a non-pharmacological treatment, can help physiotherapy to reduce flexors spasticity and improve functions in the rehabilitation of upper limb spasticity.

6. Short-term effect of local muscle vibration treatment versus sham therapy on upper limb in chronic post-stroke patients: a randomized controlled trial.

Eur J Phys Rehabil Med. 2017 Feb;53(1):32-40. Cosimo Costantino, Laura Galuppo, Davide Romiti.

Background: In recent years, local muscle vibration received considerable attention as a useful method for muscle stimulation in clinical therapy. Some studies described specific vibration training protocol, and few of them were conducted on post-stroke patients. Therefore there is a general uncertainty regarding the vibrations protocol.

Aim: The aim of this study was to evaluate the effects of local muscle high frequency mechano-acoustic vibratory treatment on grip muscle strength, muscle tonus, disability and pain in post-stroke individuals with upper limb spasticity.

Design: Single-blind randomized controlled trial.

Setting: Outpatient rehabilitation center.

Population: Thirty-two chronic poststroke patients with upper-limb spasticity: 21 males, 11 females, mean age 61.59 years ±15.50, time passed from stroke 37.78±17.72 months.

Methods: The protocol treatment consisted of the application of local muscle vibration, set to a frequency of 300 Hz, for 30 minutes 3 times per week, for 12 sessions, applied to the skin covering the venter of triceps brachii and extensor carpi radialis longus and brevis muscles during voluntary isometric contraction. All participants were randomized in two groups: group A treated with vibration protocol; group B with sham therapy. All participants were evaluated before and after 4-week treatment with Hand Grip Strength Test, Modified Ashworth Scale, QuickDASH score, FIM scale, Fugl-Meyer Assessment, Jebsen-Taylor Hand Function Test and Verbal Numerical Rating Scale of pain. Outcomes between groups was compared using a repeated-measures ANOVA.

Results: Over 4 weeks, the values recorded in group A when compared to group B demonstrated statistically significant improvement in grip muscle strength, pain and quality of life and decrease of spasticity; P-values were <0.05 in all tested parameters.

Conclusions: Rehabilitation treatment with local muscle high frequency (300 Hz) vibration for 30 minutes, 3 times a week for 4 weeks, could significantly improve muscle strength and decrease muscle tonus, disability and pain in upper limb of hemiplegic post-stroke patients.

Clinical rehabilitation impact: Local muscle vibration treatment might be an additional and safe tool in the management of chronic poststroke patients, granted its high therapeutic efficiency, limited cost and short and repeatable protocol of use.

7. Effects of segmental muscle vibration on flexor and extensor groups of the upper limb in enhancing functional recovery after stroke: A randomized trial.

J Bodyw Mov Ther. 2025 Dec:45:1-7. Muhammad Shahid Shabbir, Aruba Saeed, Sidra Tariq, Naqash Shabbir, Rida Nasir, Huma Riaz.

Background: Upper limb motor impairment is a common sequela of stroke, often leading to long-term functional limitations. Segmental vibration therapy (SVT) has been proposed to facilitate sensorimotor recovery by enhancing proprioceptive input and cortical excitability. However, its differential effects on upper limb flexor and extensor muscle groups remain underexplored.

Objective: The objective of this study was to determine the effects of segmental vibration on flexors and extensor muscle groups for upper limb functional ability, recovery, and spasticity in post-stroke patients.

Methodology: This two-arm, parallel-design, double-blinded randomized clinical trial was conducted at Zohra Institute of Health Sciences. A total of 62 patients were recruited using a non-probability convenience sampling technique and randomized into two groups through an online randomization tool. Group A received low-frequency segmental muscle vibration (41 Hz) applied over the flexor muscles of the upper limb, along with routine physical therapy. Group B received the same vibration frequency applied to the extensor muscles of the upper limb, in addition to routine physical therapy. Stroke patients with spasticity graded 1-3 on the Modified Ashworth Scale and who were 3-6 months post-stroke were included in the study. The intervention lasted for six weeks, comprising 18 sessions (three sessions per week). The Wolf Motor Function Test (WMFT) was used to assess upper extremity functional ability, while the Fugl-Meyer Assessment (FMA) evaluated motor function. Muscle spasticity was measured using the Modified Ashworth Scale (MAS), and motor recovery stages were assessed via the Brunnstrom scale. Data analysis was performed using SPSS version 26. An independent t-test was used for between-group comparisons, and a paired t-test was applied for within-group analysis.

Results: Post-intervention, WMFT scores improved in Group A (60.93 ± 6.12) compared to Group B (58.45 ± 7.66), though the difference was not statistically significant (p = 0.207). MAS scores decreased in Group A (0.56 ± 0.58) versus Group B (0.72 ± 0.74; p = 0.151). BSMR scores improved in both Group A (4.94 ± 1.19) and Group B (5.25 ± 1.23; p = 0.148). FMA scores increased in Group A (57.41 ± 3.97) compared to Group B (53.61 ± 4.89; p = 0.151). However, none of the between-group differences reached statistical significance.

Conclusion: The findings of this study suggest that segmental vibration therapy applied to both flexor and extensor muscles effectively improves upper limb function in post-stroke patients. However, no statistically significant difference was observed between the effects of vibration therapy on the two muscle groups.

8. Effectiveness of focal muscle vibration on hemiplegic upper extremity spasticity in individuals with stroke: A systematic review.

NeuroRehabilitation. 2019 Dec 18;45(4):471-481. Anas R Alashram, Elvira Padua, Cristian Romagnoli, Giuseppe Annino.

Background: The upper extremity spasticity following stroke limits individuals' activities of daily living. Focal muscle vibration (FMV) is a device producing vibration signals affecting the central nervous system.

Objective: This systematic review was conducted to investigate the effects of FMV on individuals with stroke, and to identify the effective training protocol in reducing upper extremities spasticity post-stroke.

Methods: We searched in SCOPUS, PEDro, PUBMED, REHABDATA, and Web of Science for randomized clinical trials (RCTs) and pseudo-RCTs published in English. The outcome measure included is the Modified Ashworth Scale (MAS). The methodological quality of the included trials was evaluated using the Cochrane Collaboration's instrument. Effect sizes were calculated.

Results: Eight articles published from 2012 to 2019 were included in this systematic review. A total of 268 post-stroke patients, 28.73% of which were females, were included in all studies. The methodological quality for included studies ranged from moderate to high. FMV showed some evidence in reducing hemiplegic upper extremity spasticity in patients with stroke.

Conclusions: The FMV may be an efficient intervention in reducing upper extremity spasticity in the stroke population. The efficient treatment protocol and dosage remain unclear. Additional randomized controlled trials are strongly needed to study the effects of FMV on spasticity in individuals with stroke.

9. Neuroplastic Responses to Chiropractic Care: Broad Impacts on Pain, Mood, Sleep, and Quality of Life

Brain Sci. 2024 Nov 7;14(11):1124. Heidi Haavik, Imran Khan Niazi, Imran Amjad, Nitika Kumari, Usman Ghani, Moeez Ashfaque, Usman Rashid, Muhammad Samran Navid, Ernest Nlandu Kamavuako, Amit N Pujari, Kelly Holt

Objectives: This study aimed to elucidate the mechanisms of chiropractic care using resting electroencephalography (EEG), somatosensory evoked potentials (SEPs), clinical health assessments (Fitbit), and Patient-reported Outcomes Measurement Information System (PROMIS-29).

Methods: Seventy-six people with chronic low back pain (mean age ± SD: 45 ± 11 years, 33 female) were randomised into control (n = 38) and chiropractic (n = 38) groups. EEG and SEPs were collected pre and post the first intervention and post 4 weeks of intervention. PROMIS-29 was measured pre and post 4 weeks. Fitbit data were recorded continuously.

Results: Spectral analysis of resting EEG showed a significant increase in Theta, Alpha and Beta, and a significant decrease in Delta power in the chiropractic group post intervention. Source localisation revealed a significant increase in Alpha activity within the Default Mode Network (DMN) post intervention and post 4 weeks. A significant decrease in N30 SEP peak amplitude post intervention and post 4 weeks was found in the chiropractic group. Source localisation demonstrated significant changes in Alpha and Beta power within the DMN post-intervention and post 4 weeks. Significant improvements in light sleep stage were observed in the chiropractic group along with enhanced overall quality of life post 4 weeks, including significant reductions in anxiety, depression, fatigue, and pain.

Conclusions: These findings indicate that many health benefits of chiropractic care are due to altered brain activity.

The Power of Vibration

Notes

Gate control theory of pain

For pain to be perceived “gates” in the dorsal horn, plus higher processing centres, must be passed through

Preferential sensory pathways can diminish pain

In particular vibration

Can offer more than merely temporary relief while the stimulus is in place

Combining the chiropractic premise of diagnosing spinal levels to maximise therapeutic effect

May supplement the positive effect of delivering vibration therapy

Spinal Percussion Therapy – SPT

Gate control theory of pain

(Pain Theory. Lindsay A. Trachsel; Sunil Munakomi; Marco Cascella.)

When stimulus gets sent to the brain, it must first travel to three locations within the spinal cord.

Dorsal horn

Serves to modulate the signals that get through, acting similar to a “gate” for information traveling to the brain

When the signal traveling to the spinal cord reaches a certain level of intensity, the “gate” opens

Effect of low-magnitude, variable-frequency vibration therapy on pain threshold levels and mobility in adults with moderate knee osteoarthritis-randomized controlled trial.

Sensory inputs can have preferential pathway towards conscious sensation

We know intuitively rubbing or moving a sore area can diminish pain sensation

Therapeutic modalities such as TENS have existed for decades to assist with temporary relief of chronic or severe pain

To determine the impact of vibrations of variable frequency and low amplitude on pain perception and mobility in patients suffering from knee OA

Pain, range of motion, and functional disability were assessed

Reduced sensation of pain and improved mobility was recorded

Effects maintained up to 4 weeks in vibration group.

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Focal vibration is an effective intervention for the management of spasticity

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More dramatic impacts on the central nervous system than just pain relief

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Non-pharmacological way to control spasticity

Able to reduce the spasticity of the antagonist to muscle with vibration applied

Reduction of spasticity and function improvement extends (for at least 48 hours) beyond the period of application

Possible role in the rehabilitation of spastic hemiplegia

Vibration therapy is having its therapeutic effect in the central nervous system

The therapy was applied to a muscle and the measurement was made of its antagonist

Cannot be talking about a direct localized effect

Spasticity is a central problem, not a local or peripheral problem

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Stroke patients - suffering from central nervous system dysfunction

Effects of local muscle high frequency mechano-acoustic vibratory treatment on grip muscle strength, muscle tonus, disability and pain

Post-stroke individuals with upper limb spasticity

Statistically significant improvement in grip muscle strength, pain and quality of life and decrease of spasticity

Further studies found similar beneficial results

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Proposing a model for taking this therapeutic effect to another level.

Vibration therapy is having very positive effects in the central nervous system

Chiropractic – the role of specific spinal dysfunction (aka Subluxation)

Negative functional impacts through the peripheral and central nervous system

Chiropractic adjustments most likely act as a salient signal that is able to activate the Salience Network, so that the CNS focuses attention on the vertebral column sensory inputs

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Are neural gate dysfunction and spinal subluxation concurrent or even identical phenomena

Vertebral subluxation includes sensory and motor dysfunction at specific spinal levels

Neural gate theory proposes that pain sensation is accepted or denied at the gateways in the dorsal horns of the spinal column

Perhaps these two scenarios are synonymous but expressed in different professional language

Worked with a manufacturer of percussion massage guns to produce an instrument which can apply percussion vibration therapy to specific spinal segments

Includes a feature regarded as important for the correction of vertebral subluxation – torque

Hypothesis – percussion vibration when applied to a vertebral segment, especially if that segment is in a state of biomechanical and neurological dysfunction, will have direct inflow to the dorsal horns, potentially producing significant therapeutic effects within the neural gateway system