











SCIENTIFIC BOOKLET

Vibra **moov** 
PHYSIO



10 scientific references











1. Gait-like vibration training improves gait abilities: a case report of a 62-year-old person with a chronic incomplete spinal cord injury - [Barthelemy, 2016](#) 
2. Alternate rhythmic vibratory stimulation of trunk muscles affects walking cadence and velocity in Parkinson's disease - [De Nunzio, 2009](#) 
3. Vibration Elicits Involuntary, Step-Like Behavior in Individuals With Spinal Cord Injury - [Field-Fote, 2012](#) 
4. Effect of illusory kinesthesia on hand function in patients with distal radius fractures: a quasi-randomized controlled study - [Imai, 2017](#) 
5. Effect of a local vibration stimulus training programme on postural sway and gait in chronic stroke patients - [Lee, 2013](#) 
6. Focal vibration in neurorehabilitation - [Murillo, 2014](#) 
7. Illusory movements prevent cortical disruption caused by immobilization - [Roll, 2012](#) 
8. Segmental muscle vibration improves reaching movement in patients with chronic stroke. A randomized controlled trial - [Tavernese, 2013](#) 
9. Short-Term Effects of Focal Muscle Vibration on Motor Recovery After Acute Stroke - [Toscano, 2019](#) 
10. Effectiveness of matrix-rhythm therapy on increased muscle tone, balance and gait parameters in stroke survivors - [Unal, 2020](#) 

Clinical Benefits

- + FPS applied very early during the acute phase before passive mobilization or conventional therapy
- + FPS preserve sensory-motor interaction
- + FPS can compensate for the lack of feedback due to long-term immobility
- + FPS activate the cortical networks of active movements guiding cortical plasticity
- + FPS reduce the side-effects of immobility and the need for re-training
- + FPS trigger motor responses consistent with the sensation evoked
- + FPS enhance the coordination and limit the co-contractions
- + FPS accelerate the recovery of mobility and motor control
- + FPS reduce the duration of the treatment while improving patient comfort
- + Positive additive effect (enhance the corticomotor excitability) of the combined work of FPS/motor imagery/passive manipulation or active participation



10 scientific references











1. After-effects of neck muscle vibration on sensorimotor function and pain in neck pain patients and healthy controls - [Beinert, 2019](#) 
2. The analgesic effect of localized vibration: a systematic review - [Casale, 2022](#) 
3. Proprioceptive feedback enhancement induced by vibratory stimulation in complex regional pain syndrome type I - [Gay, 2007](#) 
4. Substance P-like immunoreactivity and analgesic effects of vibratory stimulation on patients suffering from chronic pain - [Guieu, 1993](#) 
5. How does vibration reduce pain? - [Hollins, 2014](#) 
6. Mechanisms of pain relief by vibration and movement - [Kakigi, 1992](#) 
7. Pain alleviation by vibratory stimulation - [Lundeberg, 1984](#) 
8. Somatosensory rehabilitation for allodynia in complex regional pain syndrome of the upper limb - [Packham, 2018](#) 
9. Static mechanical allodynia (SMA) is a paradoxical painful hypo-aesthesia - [Spicher, 2008](#) 
10. Vibration reduces thermal pain in adjacent dermatomes - [Yarnitsky, 1997](#) 

Clinical benefits

- + Reduction of pain through the stimulation of skin mechanoreceptors, at distance to the painful area, through the Gate Control effect: pain can be reduced by simultaneous activation of nerve fibres that conduct non-noxious stimuli
- + Make the patient gradually bear increasingly significant dose of mechanical vibrations
- + Application of FV with light pressure generates a powerful sensory flow transmitted to the nerve centers via large-diameter afferent fibers to give rise painless tactile sensations
- + Low-intensity mechanical stimuli, not aggressive enough to stimulate nociceptors, activates the inhibiting interneurons: closed-door theory of Melzack & Wall
- + Reduction of pain and improvement of comfort allow to do more conventional therapy
- + Inhibitory effects of peripheral origin would combine with those of central origin, resulting from spinal or cortical treatment of painful informations
- + Possible desensitization : proximal to distal examination with focal vibrations in zig zag along the path of the nerve
- + Allodynia : remote vibrotactile counter-stimulation at distance to the painful area
- + Preserving one's maximum force production capacities allow to carry out daily activities but also to prevent osteoarthritis
- + In case of mechanical allodynia, it is crucial to use FV to ensure that the correct diagnosis is made before starting treatment



10 scientific references











1. Localized muscle vibration reverses quadriceps muscle hypotrophy - [Benedetti, 2017](#) 
2. Increases in muscle activity produced by vibration of the thigh muscles during locomotion in chronic human SCI - [Cotey, 2009](#) 
3. Is the Focal Muscle Vibration an Effective Motor Conditioning Intervention ? - [Fattorini, 2021](#) 
4. Potentiation of muscle strength by focal vibratory stimulation on quadriceps femoris - [Feltroni, 2018](#) 
5. Improvement of Stance Control and Muscle Performance Induced by Focal Muscle Vibration - [Filipi, 2009](#) 
6. Effect of Segment-Body Vibration on Strength Parameters - [Goebel, 2015](#) 
7. Effect of vibratory stimulation training on maximal force and flexibility - [Issurin, 2008](#) 
8. Effects of focal muscle vibration on physical functioning in patients with knee osteoarthritis: a randomized controlled trial - [Rabini, 2015](#) 
9. Facilitation of triceps brachii muscle contraction by tendon vibration after chronic cervical spinal cord injury - [Ribot-Ciscar, 2003](#) 
10. Influence of vibration on endurance of maximal isometric contraction - [Samuelson, 1989](#) 

Clinical benefits

- + Long-lasting positive motor conditioning effect
- + Increase muscle tone
- + Limit muscle hypotrophy due to immobility or lack of movement
- + Strengthen motor function
- + Carry out important proprioceptive work
- + Additional positive effect of isometric contractions of the stimulated muscles
- + Large acceptance, comfortable sensations and no negative collateral effect
- + Increase balance: plasticity of the motor system can be enhanced by proprioceptive inputs
- + Increasing muscle activity allow to decrease the amount of required support/ assistance & improve the efficacy of the treatment
- + Optimal effects with multiple sessions of treatment (4-5 sessions/week or more)



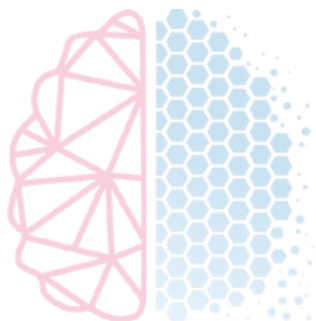
10 scientific references

1. Effectiveness of Focal Muscle Vibration on Hemiplegic Upper Extremity Spasticity in Individuals With Stroke: A Systematic Review - [Alashram, 2019](#) 
2. Focal muscle vibration in the treatment of upper limb spasticity - [Caliandro, 2012](#) 
3. Localized 100 Hz vibration improves function and reduces upper limb spasticity: a double-blind controlled study - [Casale, 2014](#) 
4. Preliminary evidence of focal muscle vibration effects on spasticity due to cerebral palsy in a small sample of Italian children - [Celetti, 2011](#) 
5. Brain oscillatory activity correlates with the relief of post-stroke spasticity following focal vibration - [Li, 2022](#) 
6. Decrease of spasticity with muscle vibration in patients with spinal cord injury - [Murillo, 2011](#) 
7. Anti-spastic effects of the direct application of stimuli to the spastic muscles - [Noma, 2012](#) 
8. Vibration therapy in patients with cerebral palsy a systematic review - [Ritzmann, 2018](#) 
9. The effects of robotic gait neurorehabilitation and focal vibration combined treatment in adult cerebral palsy - [Rutovic, 2019](#) 
10. Motor Recovery After Stroke: From a Vespa Scooter Ride Over the Roman Sampietrini to Focal Muscle Vibration (fMV) Treatment - [Toscano, 2020](#) 

Clinical benefits

- + Safe & well tolerated ; easy to perform at bedside from the acute phase to the chronic one
- + Long-lasting regulation of the muscle tone between agonist & antagonist
- + Can preserve muscular architecture
- + Focal vibration combined with physiotherapy is better and faster than physiotherapy alone in controlling spasticity and improving motor function
- + Different type of application depending on the site and type/level of spasticity
- + Repeated muscle vibration produces a repeated sensory input that reaches, via Ia fiber afferent input, S1/M1 cortical areas and induce plasticity
- + FV can provoke cortical and spinal plasticity leading to the reduction of spasticity
- + Increase excitability in the primary motor cortex especially in S1-M1: biomarker of intrinsic plasticity-related mechanism for the reduction of spasticity
- + The reduction of hypertonia leads to less pain and allow the patients to do more conventional therapy or robotic one
- + Possible reduction of the frequency and amount of medication or toxin taken by the patient





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SENSORY-MOTOR THERAPY



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