



EVOLUTIONS IN VIBRATION, INC.

Summary of Primary Research Results Related
to Whole Body Vibration (WBV)

1. Human Performance

Citation	New Trends in Training Science: The use of vibrations for enhancing performance. (Bosco et al.)
Results Summary	Muscle Stimulation for 2 min per week for a total amount of 108 min in year stimulated the biological systems of athletes to perform in the same way as a strength training or explosive training program. Vibration can be applied in a much shorter period of time than traditional training methods and produce the same results. Subject saw remarkable and significant enhancement of the height and mechanical power of the best jump.
Link:	Full Text Article

Citation	Strength gain Following 12 Weeks of whole Body Vibration Training. (Roelants Et al.)
LiResults Summary	After 12 weeks of vibration 3/week isometric knee extensor strength increased significantly in both groups. Vibration has the potential to induce a significant strength gain in the knee extensor to the same degree or greater than a regular high resistance training program. 35-40 Hz, 3 x wk, 12 weeks. Isometric knee extensor strength increased significantly in both groups. Potential to induce a significant strength gain in knee extensors and this to the same extent as regular high resistance training.
Link:	Full Text Article

Citation	Vibration Training: An Overview of the Area, Training Consequences, and Future Considerations. (Jordan et al.).
Results Summary	Following the 21-day training block, force production measured on the isometric leg press increased by 43% over the initial value and vertical jump also increased from 38.9 to 47.8cm. Lieberman and Issurin evaluated the effects of vibration applied to the upper extremities and found that a 3-week training period of vibration during the seated row resulted in an average increase in 49.8% in strength compared with 16.1% increased in strength for the training group not exposed to vibrations.
Link:	Full Text Article

Citation	Adaptive Responses of Human Skeletal Muscle to Vibration Exposure. (Bosco et al.)
Results Summary	Results showed remarkable and statistical enhancement of the

	experimental treatment in average velocity, average force, and average power. Consequently, the velocity-force and power-force relationship shifted to the right after the treatment. In conclusion, it was affirmed that the enhancement could be caused by neural factors, as athletes were well accustomed to the leg press exercise and the learning effect was minimized.
Link:	Full Text Article

Citation	Influence of Vibration on Mechanical Power and Electromyogram Activity in Human Arm Flexor Muscles. (Bosco et al.).
Results Summary	The results showed statistically significant enhancement of the average power in the arm treated with vibrations as well as significant increases in neural efficiency. The analysis of EMG recorded before the treatment and during the treatment itself showed an enormous increase in neural activity during vibrations up to more than twice the baseline values. This would indicate that this type of treatment is able to stimulate the neuromuscular system more than other treatments used to improve neuromuscular properties.
Link:	Full Text Article

Citation	Strength increase after whole-body vibration compared with resistance training. (Delecluse C, Roelants M, Verschueren S.)
Results Summary	After a 12 week whole body vibration training program, it was concluded that whole body vibration, and the reflexive muscle contraction it provokes, has the potential to induce strength gains in knee extensors of previously untrained females.
Link:	Full Text Article

Citation	Effect of vibratory stimulation training on maximal force and flexibility. Issurin VB, Liebermann DG, Tenenbaum
Results Summary	Trained participants found that maximal strength increased by 49.8%, and flexibility in a two leg split increased by 14.5cm over control groups.
Link:	Full Text Article

Citation	Effect of four-month vertical whole body vibration on performance and balance. (Torvinen S. et al)
Results Summary	Results showed that vibration intervention induced an 8.5% net improvement in the jump height and lower-limb extension strength increased by 3.7% in 2 months over control groups.

Link:	Full Text Article
--------------	-------------------

Citation	High-frequency vibration training increases muscle power in postmenopausal women. (Russo C.R. et al)
Results Summary	Results showed that the reflex muscular contractions induced by vibration training improved muscle power.
Link:	Full Text Article

Citation	Effect of four-month vertical whole body vibration on performance and balance (Torvinen, et al).
Results Summary	Results showed that whole body vibration induced an 8.5% net improvement in the jump height. Lower limb extension strength increased by 3.7% in 2 months.
Link:	Full Text Article

Citation	Effect of a vibration exposure on muscular performance and body balance. Randomized cross-over study (Torvinen et al.)
Results Summary	We have shown in this study that a single bout of whole body vibration transiently improves muscle performance of lower extremities and body balance in young healthy adults.
Link:	Full Text Article

2. Circulation

Citation	Whole body vibration exercise leads to alterations in muscle blood volume. (Kerschman et al.)
Results Summary	It was found that muscular blood circulation in the calf and thigh significantly increased after exercise on the vibrations plate. Results may lead to faster recovery and greater nutrient delivery.
Link:	Full Text Article

Citation	The role of vibratory massage on treating delayed onset muscle soreness (Floris et al.)
Results Summary	Vibration massage therapy helped to decreased delayed onset muscle soreness post run. The control group reported significantly higher perceptions of muscle soreness than the treatment group by 24 hours and 48 hours post run.
Link:	Full Text Article

3. Gait Pattern in Elderly

Citation	Balance Training and Exercise in Geriatric Patients. (Runge et al.)
Results Summary	The vibration training group reached mean performance gains in chair rising of 18%; strikingly different to the constant values of the controls.
Link:	Full Text Article

Citation	Controlled whole body vibration to decrease fall risk and improve health related quality of life of nursing home residents.
Results Summary	The vibration intervention group improved by a mean 2.4 points on the gait score compared with no change in the control, and improved 3.5 points on the body balance score compared with a decrease in the control group.
Link:	Full Text Article

Citation	Vibration therapy improves walk, balance in elderly (Mann).
Results Summary	<p>Patients in the vibration group showed.</p> <ul style="list-style-type: none"> • 143% improvement in physical function • 41% improvement in pain. • 60% increase in vitality. • 23% improvement in general health. • 57% improvement in quality of walking as assessed by the Tinetti test (compared with 2% increase in the control group). • 77% improvement in equilibrium (compared with 1% worsening in the controls) • 39% decrease in time required to get up and go (compared with an increase of 14% among controls).
Link:	Full Text Article

4. Neuromuscular

Citation	New Trends in Training Science: The use of vibrations for enhancing performance. (Bosco et al.)
Results Summary	EMG values increase 200% from baseline.
Link:	Full Text Article

Citation	Acute changes in neuromuscular excitability after exhaustive whole body vibration exercise as compared to exhaustion by squatting exercise.
Results Summary	Vibration appears to elicit an alteration in neuromuscular recruitment patters, which apparently enhance neuromuscular excitability.
Link:	Full Text Article

Citation	Spinal Cord Injury “Motor rehabilitation of spinal cord dysfunction by means of whole body vibration” (Gianutsos et al.).
Results Summary	Whole body vibration represents a promising modality for use in the rehabilitation of persons with motor dysfunction of spinal origin. In our sample, WBV successfully induced reflex standing in all 3 patients and standing was followed by ambulation in 2 cases.
Link:	Full Text Article

5. Jump Training

Citation	The Influence of Whole Body Vibration on Jumping Performance. (Bosco et al.)
Results Summary	Marked significant improvements were noted in group E in the power output and height of the best jump, and mean jump height in continuous jumping for 5 seconds by 12%.
Link:	Full Text Article

Citation	Effect of 8-Month vertical whole body vibration on bone, muscle performance, and body balance: a randomized controlled study. (Kannus et al.)
Results Summary	Subjects in the vibration group showed 7.8% net benefit in the vertical jump height when compared to the control group.
Link:	Full Text Article

6. Osteoporosis

Citation	The Anabolic Activity of Bone Tissue, Suppressed by Disuse, is Normalized by Brief Exposure to Extremely Low-Magnitude Mechanical Stimuli. (Rubin et al.)
Results Summary	Disuse alone reduced Bone Formation Rates, a suppression only slightly curbed when disuse was interrupted by 10 min of weight

	bearing. In contrast, disuse interrupted by 10 min per day of low level mechanical intervention (vibration) normalized Bone Formation Rate to values seen in age match controls.
Link:	Full Text Article

Citation	Biomechanical Countermeasure for Disuse Osteopenia. (Rubin Et al.)
Results Summary	Mechanical signals through vibration will inhibit the bone loss which typically parallels disuse, even though 10 min of full weight bearing failed to curb this loss. Longer-term experiments in sheep have shown this stimulus to be strongly anabolic, increasing bone mineral density, trabecular number and connectivity, and improving bone strength.
Link:	Full Text Article

Citation	Effect of 6-month Whole Body Vibration Training on Hip Density, Muscle strength, and Postural Control in Postmenopausal Women: A randomized Controlled Pilot Study. (Verschueren Et al.)
Results Summary	Vibration training improved isometric and dynamic muscle strength and also significantly increased BMD of the hip.
Link:	Full Text Article

7. Lower Back

Citation	Treatment of Chronic Lower Back Pain with Lumbar Extension and Whole Body Vibration Exercise. (Rittweger et al.)
Results Summary	A significant and comparable reduction in chronic lower back pain sensation and pain related disability was observed in both groups. Lumbar extension torque increased significantly in the vibration exercise group.
Link:	Full Text Article

8. Hormonal

Citation	New Trends in Training Science: The use of vibrations for enhancing performance. (Bosco et al.)
Results Summary	Enhanced jumping performance, increase in neuron-muscular activity, significant increases in serum Testosterone and a reduction

	in Cortisol concentration were seen after exercise with the use of vibration.
Link:	Full Text Article

Citation	Hormonal response to whole body vibration in men. (Bosco et al.)
Results Summary	The results showed a significant increase in the plasma concentration of Testosterone and Growth Hormone, whereas Cortisol levels decreased. An increase in the mechanical power output of the leg extensor muscles was observed. Neuromuscular efficiency improved.
Link:	Full Text Article

Citation	The effects of vibration on human performance and hormonal profile (Cardinale).
Results Summary	A total of 10 minutes vibration treatment was administered, divided in two sets of five sub sub-sets lasting one minute each, with 6 minutes rest in between sets. Testosterone levels were shown to improve 7% following the vibration treatment. Growth Hormone levels increased by 460% and Cortisol levels decreased by 32%.
Link:	Full Text Article

9. Scientific Basis

Citation	New Trends in Training Science: The use of vibrations for enhancing performance. (Bosco et al.)
Results Summary	-Vibrations may elicit excitatory inflow through muscle spindle motoneurons connections in the overall motoneuron inflow -Vibration drives alpha-motoneurons via the 1a loop producing force without decreasing motor drive.
Link:	Full Text Article

Citation	Vibration Training: An Overview of the Area, Training Consequences, and Future Considerations. (Jordan et al.).
Results Summary	-Vibration of a muscle stimulates the primary endings of the muscle spindle (Ia afferents), which excites the alpha motoneurons, causing contraction of homonymous motor units, and this results in a tonic contraction of the muscle, referred to as the tonic vibration effect. -During an exposure to vibration, the stretch reflex and the Hoffman-reflex (H-reflex) are inhibited, and this has been referred to as the vibration paradox.

Link:	Full Text Article
--------------	-------------------

Citation	Sports Injury Bulletin: Good Vibrations. (Grantham, Nick).
Results Summary	<p>-Potential adaptation include:</p> <ol style="list-style-type: none"> a. Increased excitation of peripheral and central structures (pre-activation of the musculoskeletal system, resulting in improved readiness for the training stimulus). b. Increased synchronization of motor units. c. Stimulation of golgi-tendon organs, inhibiting activation of antagonist muscles. d. Increased hormonal secretions. e. Variation of neurotransmitter concentrations (dopamine, serotonin). f. Excitation of sensory receptors such as muscle spindles, leading to improvements in the stretch reflex cycle.
Link:	Full Text Article