

The Science of Vibraboard Lymph Detox

Biomechanical Stimulation

BMS and lymphatic flow

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This effect is pronounced at frequencies between 5 and 15 hertz. While overlooked by most BMS manufacturers, these low frequencies follow the guidelines set out by Vodder in his Manual Lymph Drainage for the slow and gentle pulsing of the tissue. Low frequencies are also known to “induce muscular relaxation”.¹⁶

BMS and neural reconditioning

An exciting application of BMS is its ability to increase neural coordination and efficiency. BMS has been shown to “...increase in motor unit synchronization, co-contraction of the synergist muscles, or increased inhibition of the antagonist muscles.”¹⁹ BMS also “induced an improvement of the neuromuscular efficiency of the muscles involved in the vibration treatment.”²⁰

The fact that BMS also has a history of effectiveness with Strokes, Parkinson’s and M.S. suggests that the improvement in neural functioning may go beyond simply increasing coordination. BMS may in fact stimulate nerve re-growth in all tissues of the body. As such BMS may have a therapeutic role in the all neural injuries.

Benefits to the elderly

The elderly have perhaps the greatest need for and the least capacity for exercise. Given that “the risk expected when VE (BMS) is applied in the elderly is negligible”²¹ BMS represents an important breakthrough in the care of our senior population.

The following results²² with BMS speak for themselves.

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

77% improvement in equilibrium
39% decrease in time required to get up and go

Internal massage

While the musculature (and for those versed in visceral manipulation, some of the internal organs) can be massaged by hand, most internal organs cannot. BMS allows for the massage of the entire body. All tissues, including the small muscles that control the eyesight and hearing, bone marrow, internal organs, glands and the entire connective tissue can be mobilized simultaneously with BMS.

“Chest wall vibration in turn, has been used to enhance pulmonary hemodynamics and O₂ saturation in patients with chronic obstructive pulmonary disease.”²³

Other benefits

Many other benefits have also been noted in the literature including improvements in scleroderma and migraines²⁴, glaucoma, improved vision (1.5 to 2 diatribes)²⁵, Parkinson’s disease, strokes, M.S., cellulite, and joint mobility²⁶. Adhesions caused by scar tissue have also been effectively treated²⁷. Vibratory stimulation combined with a substantial effort was shown to elicit movement in neuromuscular patient who were unable to contract their paretic muscles²⁸. Last, but not least, a significant increase in the plasma concentration of testosterone and growth hormone, whereas cortisol was decreased.²⁹

BMS and hyperthermia therapy

Hyperthermic (sweating) therapies have been shown to be far more effective when a patient exercises before the application of heat. Often with hyperthermia therapy, niacin is also given to create a histamine reaction, which increases membrane permeability thus allowing toxins stored in the fat and connective tissues faster egress into the sweat and out of the body.

BMS given before hyperthermic therapies makes hyperthermic therapies more effective at detoxification. This is because BMS will both exercise the body passively, and if applied properly, induce histamine release. At frequencies above 20 hertz, BMS will, after a sufficient amount of time, stimulate histamine release globally in the body when a patient is supine.

Conclusions

BMS possesses a wide spectrum of benefits both physiological and psychological. These benefits include increases in strength, bone density, balance, flexibility, coordination, neural function, growth hormone and detoxification ability. It also includes the suppression of pain, the decreasing of cortisol and reduction of psychological stress. Many of these benefits are understood in the context of tremor, some are understood as a form of exercise, and some are unique to BMS itself.

Guidelines to the Vibraboard

5 to 8 hertz: Lymphatic detoxification, muscle relaxation and theta brainwave entrainment.

8 to 12 hertz: Lymphatic detoxification, muscle relaxation and alpha brainwave entrainment.

12 to 18 hertz: Lymphatic detoxification, muscle relaxation and beta brainwave entrainment.

25+ hertz: Muscle and bone stimulation.

25 hertz: Felid purr frequency first harmonic. Accelerated wound repair.

26 to 28 hertz: Nazarov Russian muscle resonance frequency. May unlock 'frozen' muscles.

50 hertz: Felid purr frequency second harmonic. Accelerated wound repair.

For frequencies above 25, supine positioning above 25 hertz is likely to be too intense for more than a few minutes.

Are there any contraindications to using Vibraboard?

While Vibraboard is very safe for most individuals, there are certain contraindications. If you are experiencing any of the following conditions, then you should not use Vibraboard.

- Metal implants
- Stroke within the last 6 months
- Broken bones, fractures or non-healing fractures.
- Acute arthritis.
- Cancer
- ALS
- Pacemaker
- IUD (intrauterine device)
- Aneurysm
- Pregnancy

How should I lie on the table?

In whatever way is most comfortable, either prone, supine or on your side. A pillow under the head will decrease the vibration to the brain and is suggested. You can also

place pillows under your feet or knees. When using Vibraboard specifically with the lungs and chest, place your mid to upper back directly over the motor by sliding down the table and raising your knees up with your feet at the end of the table.

Biomechanical Stimulation

Spencer Feldman
October 2004

Introduction

Biomechanical Stimulation (BMS) as a therapeutic modality has recently undergone a renaissance in athletic and physical therapy circles. While much has been written about it, I believe the full significance of its therapeutic application has yet to be grasped. To more fully understand the potential benefits of BMS, I believe we must understand the etiology of tremor and the benefits of exercise, as BMS is indeed their physiological involuntary recreation. This paper will discuss tremor, exercise and BMS, as a means to further understand the potential therapeutic roles of BMS in clinical practice.

BMS Therapy

Let us first define BMS and give a short history. Traditional BMS is a form of physical therapy where a patient stands on a vibrating platform oscillating at between 18 and 50 hertz. This creates a reflexive reaction of skeletal muscles in a chain of small and rapid involuntary muscle contractions. In this way, tremor is induced involuntarily in the body. Unlike electrical muscle stimulation, which is painful in subjects with intact afferent pathways, BMS is purely mechanical.

Discovered by Nazarov in the 1970's, BMS was first utilized by Soviet gymnasts in training for Olympic gold. BMS later began being used by Russian cosmonauts for micro-gravity induced osteopenia and muscle degeneration. While word of BMS spread, for many years it was primarily used by elite athletes to help increase the strength and coordination of the musculoskeletal and nervous systems and to increase the rate at which athletic injuries heal. Now however, BMS is being discovered as a therapy by many practitioners outside of the physical therapy sciences, and for a variety of conditions.

As BMS is a form of induced tremor, to gain a deeper understanding BMS we must first study the nature tremor itself, and so, on to tremor.

Tremor in Nature

We are all familiar with tremor at least in one form, and that is the purring of cats. Cat purrs are created by false vocal cords and based on spectral analysis, have three predominant frequencies, namely 25, 50 and 120 hertz. What is not widely known is that it is not only the felid family that purrs, and that purring does not always indicate contentment.

Many other animals also exhibit purring including bears, rhinoceros, whales, and dolphins. Furthermore, purring also happens when animals are frightened or injured.

Since purring takes some considerable effort on the side of the purror, and given that is not simply used as a method of communication, we may conclude that there is some specific benefit afforded the animal that

purrs. This is supported by the veterinary observations showing that animals that purr heal injuries to their skin, bones, muscles tendons, ligaments and lungs much faster than those that do not. Comparing domestic dogs and cats sheds some light on the subject. The records of 31,484 dogs and 15,226 cats from 52 veterinary practices reveals that the prevalence of arthritis and lameness in dogs as 2.4 and 3.1%. In cats it is not mentioned as being reported.¹ Additionally, non-union of fractures in cats is rare.² Finally, in free skin grafting in dogs, the overlapped skin edges of the graft usually become necrotic by 3 days postoperatively, and need to be debrided. In cats, the grafts are usually viable even after six days.³

Thus the question begs to be asked, what is it about purring that is therapeutic, and in what ways can we as humans avail ourselves of its benefits?

Tremor in people

While humans cannot purr per say, we do exhibit various forms of tremor which is in some ways similar to purring. Although our tremors are not audible like purring is, our tremors do vibrate our bodies. Tremors manifest in humans in several categories.

Types of tremors

For the purposes of this paper, I will divide tremors into 2 categories, namely what I call homeostatic tremors and non-homeostatic tremors. Homeostatic tremors are those tremors that are beneficial to and planned for by the body. Non-homeostatic tremors are tremors that have no apparent benefit to the organism. The homeostatic tremors I label thermoregulatory, orthostatic, toxic and psychogenic. The non-homeostatic tremors would be associated with conditions such as Wilson's diseases (excess copper) use of beta-adrenergic agonists, and cerebellar and Rubral tremor (brain damage). Non-homeostatic tremors will not be discussed in this paper.

Thermoregulatory tremor

Thermoregulatory tremor, commonly known as shivering is a low frequency (4-8 Hz) high amplitude muscle contraction in conditions of hypothermia where temperature is raised through increased metabolic rate.

Orthostatic tremor

Orthostatic tremor is high frequency (14-18 Hz) low amplitude muscle contractions used to provide proprioceptive feedback to assist in maintaining proper balance.

Toxic tremor

Toxin induced tremor is well known in the case of drug withdrawals and certain kinds of poisonings (heavy metals etc.). It maybe that the increased circulation and metabolic rate of tremor acts in a way similar to fever in helping the body more quickly metabolize toxins.

Psychogenic Tremor

A well-known result of fear is physiologic shock causing the immobility. Freezing in place is a useful response to a predator only as long as the predator does not see the prey, but it is a life threatening response once the predator sees the prey. It may be that psychogenic tremor is the control mechanism to this response to fear,

allowing the 'frozen' animal to be 'thawed' as needs require.

Tremor and etiology

Perhaps in knowing that tremor can be instigated by toxic reactions, we will uncover toxic exposure as part of the etiology of certain tremor related diseases. Already aluminum and mercury have been associated with Parkinson's and M.S. Could it be that part of the tremor associated with these diseases is not a symptom so much as the body's attempt to detoxify itself?

Tremor and BMS therapy

Since tremor is known to be a response to low metabolism (hypothermia) toxic exposure and psychological disturbances, could it also be a therapy for them? Later in this paper we will see that induced tremor (BMS) both increases metabolism (increased VO₂) and detoxification (through lymphatic circulation). Whether induced tremor would be helpful in breaking psychological patterns I leave for another day, but I would however point out that many psychological conditions, such as autism, which have sensory integration problems have rocking as part of their symptomology. Could this be a form of self-medication? Might an underdeveloped or uncoordinated nervous system be benefited by induced tremor? Already Autism and other diseases of development and the nervous system are being treated with vestibular therapy such as spinning platforms. Could it be that it is not the spinning itself but the vestibular and proprioceptive stimulation that is curative?

In any case, we have seen that tremor is a very useful physiological response in both animals and humans with a wide therapeutic range. The ability of BMS to recreate tremor allows us to gain the benefits of tremor without needing to induce hypothermia, toxicity or fight.

Exercise and the human body

Now that tremor has been covered, we turn our gaze to exercise, its benefits and relationship to BMS. The human body was designed with, or evolved with, depending on your belief system, exercise as part of its daily regimen. For thousands of years, we as humans have had to work hard physically for our survival. Then suddenly with the industrial revolution, machines began to take the place of human labor. Now that our economy moved from an industrial engine to an information engine, we work with our bodies even less. The average job now consists of mental work while the body is nearly stationary at a desk. How many of our clients even know what an 'evening constitutional' is? Indeed, even our entertainment is more often watching sports than participating in them. We have paid and will continue to pay a price for the immobility our newfound technology gives us. Enter the age of the couch potato.

Seven important benefits of exercise

Exercise does many things but among the most important and well understood are maintenance of bone density, muscle tone, flexibility, metabolic rate, the movement of lymph fluid, induction of deep sleep, and the generation of endorphins.

These functions are partially or entirely dependant on exercise therefore, an unexercised body is at risk for osteoporosis, muscle loss, inflexibility, obesity, edema, weakened immunity, toxicity, insomnia, chronic pain and depression.

BMS, as will be shown, shares with exercise all of the seven aforementioned benefits and as such, represents

a viable alternative or adjunct to standard resistance exercise (SRE).

BMS and bone mass

According to Turner, "Bone adaptation is driven by dynamic, rather than static loading."⁴ Thus BMS represents perhaps the optimal way to increase bone density as it exemplifies the idea of dynamic over static stimulation. The induced hyper-gravity of BMS need not be intense as Ruben notes "Signals as low as 5 microstrains can be strongly anabolic if applied at 30 hertz"⁵ Additionally, bone stimulation takes very little time "Only a short duration of loading is necessary to initiate an adaptive bone response."⁶ with "72 seconds per day being the saturation point."⁷

BMS and muscle strength

We now know that the strength training response is mediated by both neurogenic and myogenic factors. In the first phase, adaptation is characterized by an improvement of neural factors, whereas the second phase is characterized by improvement in the myogenic factors, which becomes more important as the adaptation continues over several months.

BMS accomplishes both of these tasks but it accomplished the neurogenic improvement especially well. Studies haven shown a "substantial increase in muscle strength was observed after three weeks of vibratory stimulation strength training when compared with regular strength training"⁸. This suggests that the improvement over regular strength training may be due to the neurogenic complement.

BMS works in part by stimulating the proprioceptive pathways (1a, 2a and probably 1b afferents). This vibratory stimulus results in reflexive muscle contractions. The muscle contraction elicited by BMS is involuntary and "induces strength gain in previously untrained subjects within a short period of time and without much effort."⁹

Bosco continues noting that "the biological mechanism produced by vibration treatment is similar to the effect produced by explosive power training (*plyometrics*). The improvement of the muscle performance after a short period of vibration training has been quoted to be similar to what occurs after several weeks of heavy resistance training."¹⁰

BMS is particularly applicable for seniors as " lower limb explosive strength and performance capacity have been suggested to be even more important determinants of falls (among the elderly) than pure maximum strength."¹¹

BMS and flexibility

BMS has shown to improve flexibility significantly through stimulation of the Golgi organs. "3 applications at 2 minutes each with a 2 minute pause between the series leads to a spontaneous increase in mobility of 10-15% of the muscle length..."¹²

BMS and metabolic rate

While BMS does not raise heart rate or blood pressure as much as standard exercising, it does increase metabolism. Ritwegger reports that "Oxygen uptake and hence metabolism typically increases during VE (Vibration exercise) with 26 Hz by about 5 mlO₂ min⁻¹ kg⁻¹ body weight as compared with to squatting without vibration".¹³

BMS is also an effective aerobic workout as "combination with squatting performed until exhaustion increases VO₂ to about 50% of the aerobic capacity."¹⁴ As clients become more obese, exercise becomes more difficult leading to a vicious circle. BMS allows for the increase in metabolic rate without any effort on the part of the client and offers a way to break the feedback loop between obesity and infirmity.

BMS and lymphatic flow

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BMS and Sleep

While there is no data on the effects of BMS on sleep per say it is a well-known fact that physical exercise induces deeper sleep than inactivity. Currently 15% of the U.S. population suffers from sleep disorders. As an interesting aside, even short naps taken on BMS devices at low frequencies are highly restorative.

BMS and endorphins

No data is available regarding the production of endorphins by BMS as compared to exercise. Given that most subjects "experienced the vibration loading as enjoyable and fatiguing"¹⁷ endorphins are the most likely explanation.

BMS and pain

BMS has a very strong effect on the mechanoreceptors (proprioceptors), the small nerve branches that surround the muscle fibers and give us our awareness of position, movement and weight. An interesting effect of activation of the mechanoreceptors is the inhibition of the nozioception (pain) and the closing of the pain gate¹⁸. Thus BMS plays a very important role in the perception of pain, not just due to the production of endorphins, but also because of the suppression of the nozioceptive pathways. Additionally, if endorphins are indeed being produced as suggested, this offers a second mechanism to lower the perception of pain.

Thus as we have shown, BMS is not only equal to SRE, but in many ways is its superior. It can accomplish the same results in less time and with less perceived effort than SRE. It is also available to those with impaired control over their musculoskeletal systems due to injury or inability.

BMS and other conditions

There are conditions that BMS has proven successful in treating that exercise alone cannot. Some of these unexpected benefits follow.

BMS and neural reconditioning

An exciting application of BMS is its ability to increase neural coordination and efficiency. BMS has been shown to "...increase in motor unit synchronization, co-contraction of the synergist muscles, or increased inhibition of the antagonist muscles." 19 BMS also "induced an improvement of the neuromuscular efficiency of the muscles involved in the vibration treatment." 20

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Brain wave entrainment

The lower frequencies used for lymphatic massage and muscle relaxation also fall in the brainwave range (5-18 Hz Beta, Alpha and Theta). Since the motor used to drive a vibrating platform can, under the right circumstances, also create an electromagnetic pulses equal to the physical pulses. As an example, a 7.8 Hz physical vibration will also create a powerful 7.8 Hz electromagnetic frequency (Schumann resonance) and can induce in the client Alpha waves (typically associated with relaxation.) In this way while simultaneously relaxing the body of the client (4-15 Hz), a practitioner can simultaneously:

- Put the client into a meditative space (4-8 hertz/Theta).
- Relax the client into a calm but ready state (8-12 hertz/Alpha).
- Focus the client into an active decision-making state (12-15 hertz/Beta).

Other benefits

Many other benefits have also been noted in the literature including improvements in scleroderma and migraines²⁴, glaucoma, improved vision (1.5 to 2 diatribes)²⁵, Parkinson's disease, strokes, M.S., cellulite, and joint mobility²⁶. Adhesions caused by scar tissue have also been effectively treated²⁷. Vibratory stimulation combined with a substantial effort was shown to elicit movement in neuromuscular patient who were unable to contract their paretic muscles²⁸. Last, but not least, a significant increase in the plasma concentration of testosterone and growth hormone, whereas cortisol was decreased.²⁹

BMS and hyperthermia therapy

Hyperthermic (sweating) therapies have been shown to be far more effective when a patient exercises before the application of heat. Often with hyperthermia therapy, niacin is also given to create a histamine reaction, which increases membrane permeability thus allowing toxins stored in the fat and connective tissues faster egress into the sweat and out of the body.

BMS given before hyperthermic therapies makes hyperthermic therapies more effective at detoxification. This is because BMS will both exercise the body passively, and if applied properly, induce histamine release. At frequencies above 20 hertz, BMS will, after a sufficient amount of time, stimulate histamine release globally in the body when a patient is supine.

Working with the body

Many of the body's organs have the ability to rid themselves of irritants and toxins. They do this with the only means available to them, namely exaggerations of their native activity. The stomach for example has a natural churning motion that helps mix the food with digestive juices. When the stomach is irritated, this churning in the extreme results in emesis thereby ridding the stomach of the offending substance. Likewise the intestines have a natural peristaltic action that passes food down the digestive tract. When the intestines are irritated, this peristaltic activity is amplified and the resulting diarrhea rids the intestines of their irritants. Lungs and sinuses respond to irritants with coughing and sneezing, which can be seen as simply an exaggerated form of breathing. When the irritant is at the cell level such as an infection, the cells increase their activity as well. We recognize this metabolic increase as fever.

Medicine has learned from the body and has biological and mechanical ways to mimic these detoxifying reactions. In the case of certain poisonings, emetics are given, mimicking the stomachs natural course of action. When a person is choking, the Heimlich maneuver is applied which is in truth an externally forced cough. While not in practice now, (and in fact actively suppressed with drugs) doctors of old would induce fevers in patients with blankets, both baths certain herbs and saunas to help speed the course of an infection.

Muscles also have a way to flush out toxins. It is called tremor. The muscles themselves are always in motion whether we see it or not, even when we are at rest. This motion assists with the movement of blood and lymph and gives us the gentle oscillation that allows for proprioceptive awareness. In the same way as any organ, when muscles are irritated, they respond with an exaggeration of the only activities they know, namely contraction and relaxation. This tremor increases the rate at which blood and lymph flow through the muscles and helps to carry away irritants and bring in needed nutrients.

As such, it is useful to consider tremor as the muscle's way of coughing or sneezing out an irritant. Taken from this perspective, BMS, as an externally applied tremor is in many ways, the Heimlich maneuver for the

muscles.

When you see tremor in pathology, as yourself. Could it be an attempt to remove an irritant? As in the case of shivering, could the tremors be an attempt to locally increase metabolism in poorly functioning tissue? Might it be an attempt to increase circulation? How might the tremor we are witnessing be beneficial in this circumstance? This may help explain, (along with the ability of BMS to accelerate nerve growth), why diseases that present with tremors (e.g. M.S., Parkinson's etc.) are helped by applying more tremor. It may be that the tremors in some diseases are not part of the pathology, so much as the body's attempt to heal itself. Perhaps using drugs to reduce tremors in certain diseases is as potentially counterproductive as giving drugs to lower fevers during the course of non-life threatening infections. Would we be wiser in some circumstances to ally ourselves with the body's tremor response, reinforcing it externally rather than suppressing it?

Conclusions

BMS possesses a wide spectrum of benefits both physiological and psychological. These benefits include increases in strength, bone density, balance, flexibility, coordination, neural function, growth hormone and detoxification ability. It also includes the suppression of pain, the decreasing of cortisol and reduction of psychological stress. Many of these benefits are understood in the context of tremor, some are understood as a form of exercise, and some are unique to BMS itself.

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