

# Power Plate® Equipment

Medical Device Certification and  
Supporting Scientific Research



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# The Power Plate® machine

- The leading brand of whole body vibration training devices
- Developed by Dutch Olympic coach Guus van der Meer, in the 1990s
- Launched in 1999, giving the company a decade of experience in practice-based evidence and independent research to validate the benefits
- The first choice for a huge variety of fitness, wellbeing and healthcare facilities, as well as thousands of home users globally
- Only vibration training manufacturer worldwide to have full product range certified as Medical Devices
  - Power Plate International holds ISO 13485 certification for its Quality Management System (QMS) as well as Medical Device Manufacturer Certification
  - All company processes from manufacturing, risk assessment, order fulfilment, customer care, and warranty and after sales service conform to highest European standards

# Medical Devices

- The term 'Medical Devices' covers a huge range of products that have a medical use but are not medicines
- These can include everything from walking sticks to hip replacement parts, blood pressure machines and pregnancy testing kits
- Most medical devices are used by doctors, nurses and other healthcare workers in a clinical environment
- Manufacturers of medical devices are required by law to ensure any medical devices they make are acceptably safe

# Regulations

- In the UK, and across the European Economic Area, the regulations relating to Medical Devices are known as *Medical Devices Directive 93/42/EEC*
- This is often abbreviated to MDD.
- The regulations define what and how something is classified as a medical device
- There are four categories of medical device, based on the level of potential risk posed:
  - Class I, IIa, IIb and III
- Power Plate® equipment is categorised as a Class IIa (medium to low risk) device

# What does this mean?

- With the classification of Power Plate® equipment as a medical device, healthcare professionals now have another treatment option to assist with a range of conditions
- As awareness of this newly available treatment option grows, it is anticipated that more people will ask for access to Power Plate® machines
- Medical Device certification also gives valuable credibility from a reputable third party, as to the health benefits of exercise on a Power Plate® machine
- The body of peer-reviewed scientific evidence compiled as part of the certification process also supports the benefits of exercise on a Power Plate® machine

# Medical Device Certification

Power Plate® equipment has been certified for use as a medical device to assist in the following areas:

- Fall prevention
- Improving muscle strength and power
- Alleviating pain
- Reducing the appearance of cellulite
- Aiding weight loss
- Increasing bone mineral density and preventing bone mineral density loss related to ageing
- Improving circulation and cardiovascular function
- Improving flexibility and range of motion
- Improving general wellbeing, fitness and daily life functioning in patient populations

# Target audiences

The Power Plate® machine appeals to a wide range of people, but its medical device certification makes it of particular interest or benefit to the following groups:

- Elderly people
- Untrained or de-conditioned people
- People with injuries, illnesses or disabilities
- Those who are overweight or obese
- Athletes or those preparing for an intensive sports event
- Those at risk of developing, or those with osteoporosis or osteopenia
- Anyone seeking a time-efficient and low impact form of exercise



# Use of the Power Plate® machine

- All potential users must consult their doctor or medical specialist before they start using the Power Plate® machine
- In most cases, if an individual is currently active, cleared medically for exercise and already does weight-bearing exercise such as weight training or jogging, they may be a suitable candidate for training on a Power Plate® machine. However, every person should be examined on an individual basis by someone qualified to advise them
- As with any type of exercise, if a user feels faint, dizzy or ill while training on a Power Plate® machine, they should cease their session immediately and consult a doctor or medical specialist before they resume training

# Fall Prevention

- Fall prevention is defined as a variety of actions to help reduce the number of accidental falls suffered by older people (*Wikipedia*)
- Regular exercise on a Power Plate® machine can be a beneficial tool or intervention to help prevent falls, particularly amongst the elderly population
- Target audiences:
  - Elderly
  - Untrained
  - De-conditioned
  - Injured
  - Those with disabilities

# Fall Prevention – Key Findings

- Research into the benefits of Power Plate® exercise as part of a falls prevention programme shows that it has the potential to **significantly improve or assist with:**
  - strength and power
  - proprioception
  - balance/postural control
  - coordination
  - prevention of loss of muscle mass (sarcopenia)
  - circulation
  - mobility and gait
  - flexibility

# Fall Prevention Research – Bautmans et al

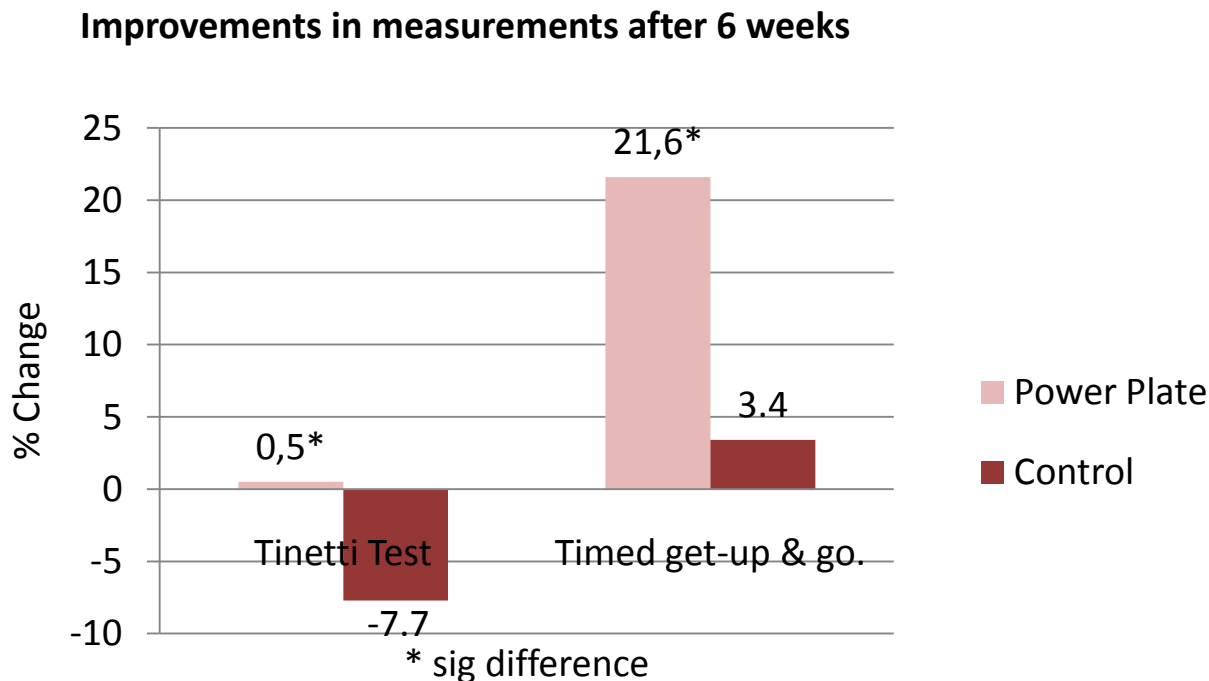
*I. Bautmans, E. van Hees, J.C. Lemper and T. Mets; The feasibility of whole body vibration in institutionalized elderly persons and its influence on muscle performance, balance and mobility: a randomized controlled trial - BMC Geriatrics 2005, 5:17*

Twenty-four nursing home residents undertook three sessions a week of whole body vibration exercise for six weeks, including six static exercises (lunge, squats, calves) starting at 30 seconds for each exercise and progressing to two exercises at 30 seconds and four exercises at 45 seconds.

At the start of the study, both the control and Whole Body Vibration (WBV+) groups were tested on various aspects of balance, muscle performance and mobility. The results were similar for both groups. Twenty-one participants completed the program and attended respectively 96% and 86% of exercise sessions for WBV+ and control groups.

Training-induced changes in the timed up-and-go and Tinetti tests were better for WBV+ compared to control, while an alternative analysis method also showed the differences in change between both groups remained significant on the Tinetti body balance and total score.

# Fall Prevention Research – Bautmans et al cont.



**The researchers concluded that in nursing home residents with limited functional dependency, six weeks static whole body vibration exercise is feasible and can be beneficial for balance and mobility. The supplementary benefit of WBV on muscle performance compared to classic exercise remains to be explored further.**

# Fall Prevention Research – Bogaerts et al

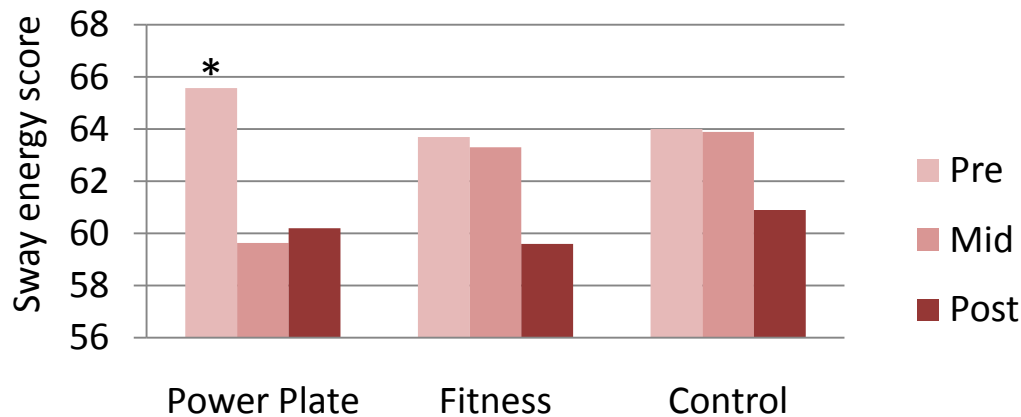
*A. Bogaerts, S. Verschueren, C. Delecluse, A. Claessens, S. Boonen; Effects of whole body vibration training on postural control in older individuals: A 1 year randomized controlled trial; Gait & Posture 26 (2007) 309–316*

Two hundred and twenty people between the ages of 60 and 80 (community dwelling) were randomly assigned to one of three groups – whole body vibration (WBV), fitness or control - to undertake a one-year program.

The WBV group performed exercises on a Power Plate® machine consisting of: squat, deep squat, wide stance squat, toes-stand, toes-stand deep, one-legged squat, and lunge for 40 minute sessions, while the fitness group followed cardiovascular, resistance, balance and flexibility exercises for 90 minute sessions.

# Fall Prevention Research – Bogaerts et al

Sway Energy Score in toes down condition



\* sig. difference

The researchers concluded that whole body vibration training was associated with reduced falls frequency on a moving platform in the most challenging condition of the Sensory Organisation Test (SOT). It was also associated with improved responses to support surface rotations. The positive effects of vibration training on muscle strength seen in previous studies, its short training time and the encouraging trends seen in the present study support the need for future research of WBV in frail elderly individuals.

# Muscular Strength and Power

- Physical strength or power is the ability of a person or animal to exert force on physical objects using muscles. Increasing physical strength is the goal of strength training. Power is the amount of work done or energy transferred per unit of time. *(From Wikipedia, the free encyclopaedia)*
- Exercise on a Power Plate® machine can be a beneficial tool or intervention to help increase muscular strength and power to improve daily life performance and functioning, both acute and structural.
- Target Audiences:
  - All



# Muscular Strength and Power – Key Findings

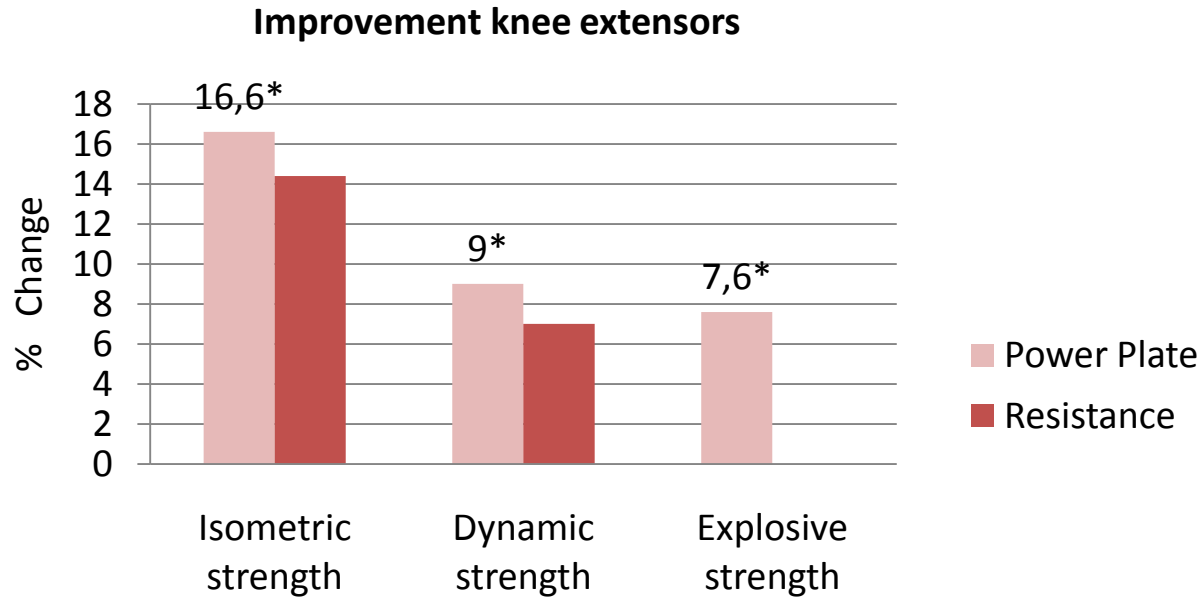
- Research into the benefits of Power Plate® exercise as a way to improve muscular strength and power shows that it has the potential to **significantly improve or assist with:**
  - Neural adaptations
  - EMG (muscle) activity
  - Morphological adaptations

# Muscular Strength and Power Research – Delecluse et al

*Christophe Delecluse; Machteld Roelants; Sabine Verschueren, Strength Increase after Whole-Body Vibration Compared with Resistance Training Medicine & Science in Sports & Exercise 2003*

The study involved 67 untrained females ( $21.4 \pm 1.8$  yr), divided into whole body vibration (WBV n-18), placebo (PL n-19), resistance (RES n-18) and control (CO n-12) groups. The WBV group performed static and dynamic knee-extensor exercises on a Power Plate® machine which accelerated at between 2.28g and 5.09g while the PL group did the same exercises on a vibration platform which accelerated at only 0.4g. The RES group trained knee extensors by performing dynamic leg press and leg extension exercises (10-20 RM). The CO group did not change their lifestyle at all.

# Muscular Strength and Power Research – Delecluse et al cont.



\* sig. difference over 12 weeks

**This is the first placebo-controlled study that compares the effects of 12 weeks of WBV training and resistance training on knee-extensor strength and CMJ performance in previously untrained subjects. The results clearly indicate that strength, and more specifically isometric and isokinetic strength, significantly improved after WBV training. The data clearly indicate that strength increases in the WBV group are not related to a placebo effect. WBV training, and the muscle contractions it provokes, appears to be an efficient training stimulus to increase muscle strength.**

# Muscular Strength and Power Research – Roelants et al

*M. Roelants, C. Delecluse and S. Verschueren. Whole-Body-Vibration Training Increases Knee-Extension Strength and Speed of Movement in Older Women; Journal of American Geriatrics Society JAGS, June 2004– Vol. 52, NO. 6. 901-908*

The study looked at 89 postmenopausal women, off hormone replacement therapy, aged 58 to 74, who were divided into a whole body vibration (WBV n-30), a resistance training group (RES n-29), and a control group (CON n-29), who were asked not to change their lifestyle.

Each exercise group did three training sessions per week for 24 weeks. The WBV group performed progressive unloaded static and dynamic knee-extensor exercises on a Power Plate® machine, including high squats, deep squats, wide stance squats and lunges. The RES group exercised for one hour during each session, starting with a standardised warm-up consisting of 20 minutes of cardiovascular exercises followed by a full body program including leg extensions and leg presses.

**WBV is a suitable training method and is as efficient as conventional RES training to improve knee extension strength and speed of movement and countermovement jump performance in older women. As previously shown in young women, it is suggested that the strength gain in older women is mainly due to the vibration stimulus and not only to the unloaded exercises performed on the WBV platform.**

# Alleviation of Pain

- Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. (*Defined by the International Association for the Study of Pain (IASP)*)
- Exercise on a Power Plate<sup>®</sup> machine can be a beneficial tool or intervention to reduce and/or alleviate (chronic) pain.
- Target audiences:
  - Athletes and those training for sporting events
  - The elderly
  - People with disabilities, injuries or illnesses

# Alleviation of Pain – Key Findings

- Research into the benefits of Power Plate® exercise as a way to alleviate pain shows that it has the potential to **significantly improve or assist with:**
  - Breaking the pain cycle
  - Inhibiting pain receptors
  - Removal of toxics and waste products through increased circulation
  - Increasing serotonin levels

# Alleviation of Pain Research – Bakhtiary et al

*Bakhtiary, A, Z. Safavi-Farokhi and A. Aminian-Far, Influence of vibration on delayed onset of muscle soreness following eccentric exercise British Journal of Sports Medicine. Vol. 41, pp: 145-148. 2007*

The study involved 50 healthy non-athletic volunteers who undertook a one session massage for the quadriceps, hamstrings and calves and a one minute massage application to muscles before 30 minutes downhill treadmill walking. The Isometric maximum voluntary contraction force of the quadriceps in the non-vibration group showed a significant decrease compared with the vibration group (VT). Pain pressure threshold in the quadriceps in the non-VT showed significant reduction compared with the VT. The same was seen in the calves. The non-VT showed significantly higher muscle soreness than the VT; also, higher concentrations of CK enzymes (creatine-kinase, defined as an index for muscle damage) were found in the non-VT then in the VT.

**Delayed Onset Muscle Soreness (DOMS) is a major complication faced by athletes after eccentric activities, which may compel them to postpone their sports activities, thus prevention and treatment of DOMS is of great concern to coaches, trainers, and therapists. In this study the effect of vibration on muscle before downhill treadmill walking was investigated and results showed that applying vibration before eccentric activities may prevent DOMS and so it may help non-athletic people to follow and complete their sport activities without any delay.**

# Reduction of Cellulite

- Cellulite describes a condition that occurs in men and women (although much more common in women) where the skin of the lower limbs, abdomen, and pelvic region becomes dimpled after puberty. (*From Wikipedia, the free encyclopaedia*)
- Exercise on a Power Plate<sup>®</sup> machine can be a beneficial tool or intervention to diminish the appearance of cellulite
- Target audiences:
  - All, although predominantly females



# Reduction of Cellulite – Key Findings

- Research into the benefits of Power Plate® exercise to help reduce cellulite shows that it has the potential to **significantly improve or assist with:**
  - Circulation
  - Skin and connective tissue massage
  - Reduction of body fat

# Cellulite Research – Frank & Moos

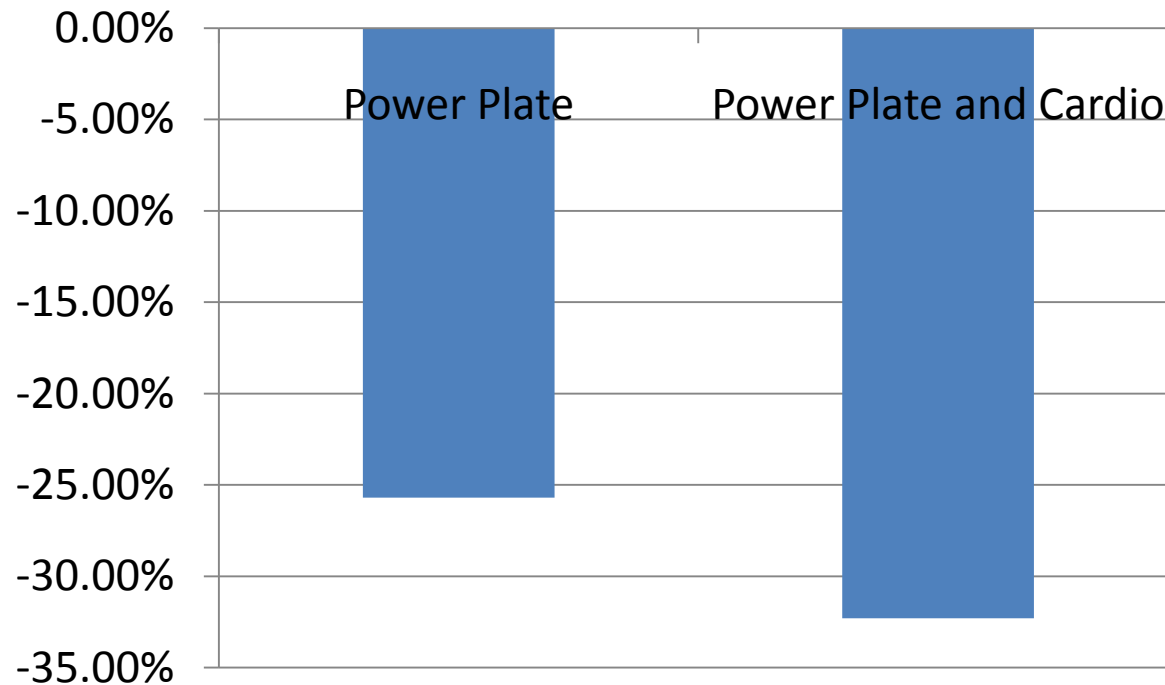
*SANADERM Professional Clinic for Skin Disease and Allergology, Bad Mergentheim, Germany. Dr Horst Frank and Dr Birgit Moos, (May – November 2004)*

The study involved 55 subjects, divided into two groups. The first group trained only on a Power Plate® machine, two to three times per week, for sessions of 8-13 minutes. The second group trained on a Power Plate® machine for the same time, but supplemented their workout with 24-48 minutes of cardio training. Each group had baseline measurements taken at the start of the study, and repeated six months later. Their skin condition (measure of cellulite, or evaluation of deposits of dimpled fat under the skin), circumference of calf muscles, buttocks and upper thigh, and body composition including body fat percentage and lean mass percentage, were measured.

**Conclusion: In six months, the whole body vibration group achieved a 25.7% reduction of cellulite on thighs and buttocks, exercising two to three times per week, in sessions of 8-13 minutes. The whole body vibration + cardio group achieved a 32.3% reduction of cellulite on thighs and buttocks. This study concludes that whole body vibration training can reduce cellulite; improve circulation, increase lean tissue and help people to lose fat and reduce the size of buttocks, thighs and calves.**

# Cellulite Research – Frank & Moos cont.

**Change in Cellulite after 6 months**



**Conclusion:** In six months, the whole body vibration group achieved a 25.7% reduction of cellulite on thighs and buttocks, exercising two to three times per week, in sessions of 8-13 minutes. The whole body vibration + cardio group achieved a 32.3% reduction of cellulite on thighs and buttocks. This study concludes that whole body vibration training can reduce cellulite; improve circulation, increase lean tissue and help people to lose fat and reduce the size of buttocks, thighs and calves.

# Weight Loss

- Weight loss, in the context of medicine or health or physical fitness, is a reduction of the total body weight, due to a mean loss of fluid, body fat or adipose tissue and/or lean mass namely bone mineral deposits, muscle, tendon and other connective tissue. (*From Wikipedia, the free encyclopaedia*)
- Exercise on a Power Plate® machine can be a beneficial tool or intervention to lose weight and specifically lose body fat or adipose tissue.
- Target Audiences:
  - People who are overweight and obese
  - Inactive people, at risk of overweight / obesity
  - Those with conditions such as diabetes

# Weight Loss – Key Findings

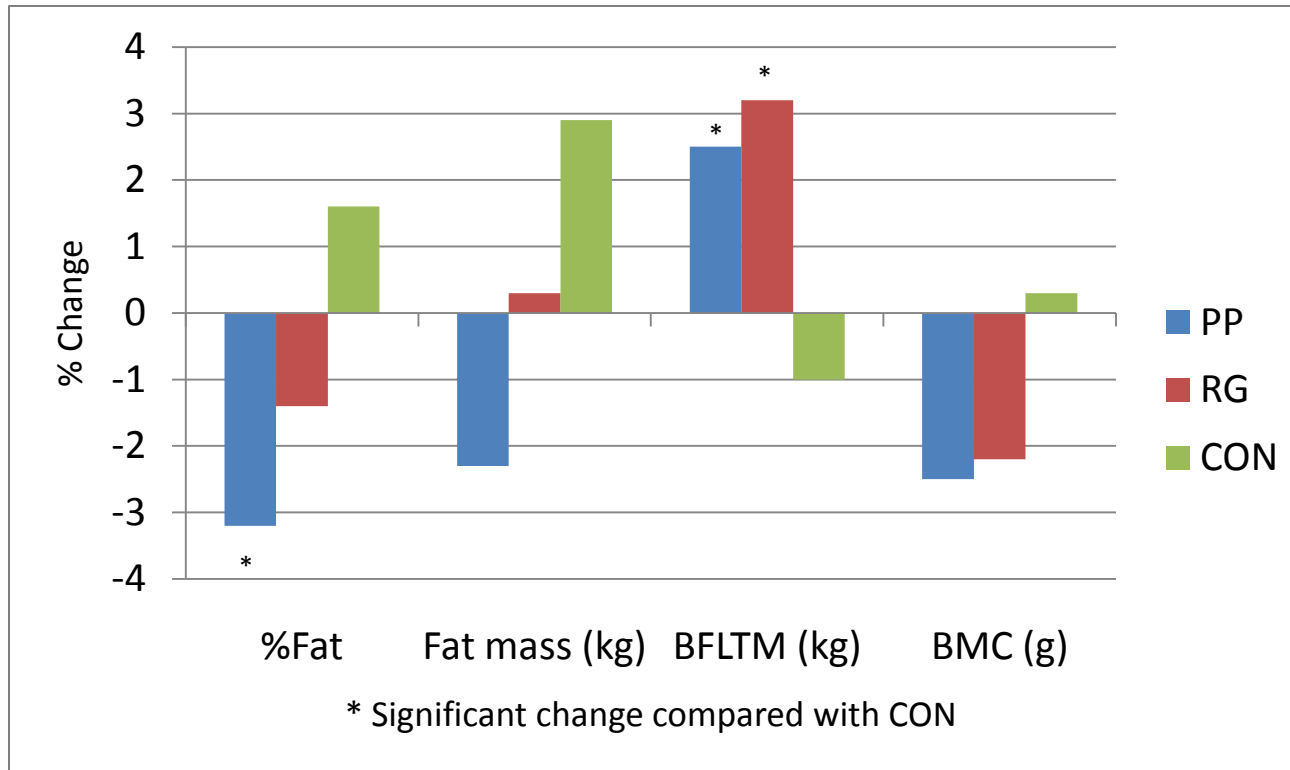
- Research into the benefits of Power Plate® exercise as a way to aid weight loss shows that it has the potential to **significantly improve or assist with:**
  - Increasing metabolism
  - Improving lean body mass / muscle mass
  - Muscle activity
  - Oxygen consumption
  - Energy consumption (energy balance)

# Weight Loss Research – Fjeldstad et al

*Fjeldstad C, I Palmer, M Bemben and D Bemben; Body composition changes after eight months of resistance training with and without vibration in women Maturitas 63 (2009) 79-83*

The study involved 55 women, divided into resistance only, non-exercising controls or vibration plus resistance groups. Total and regional body composition was assessed and regimes were followed for eight months.

# Weight Loss Research – Fjeldstad et al cont.



The researchers concluded that in older women, resistance training alone and with whole body vibration resulted in positive body composition changes by increasing lean tissue. However, only the combination of resistance training and whole body vibration was effective for decreasing percent body fat.

# Weight Loss Research – Vissers et al

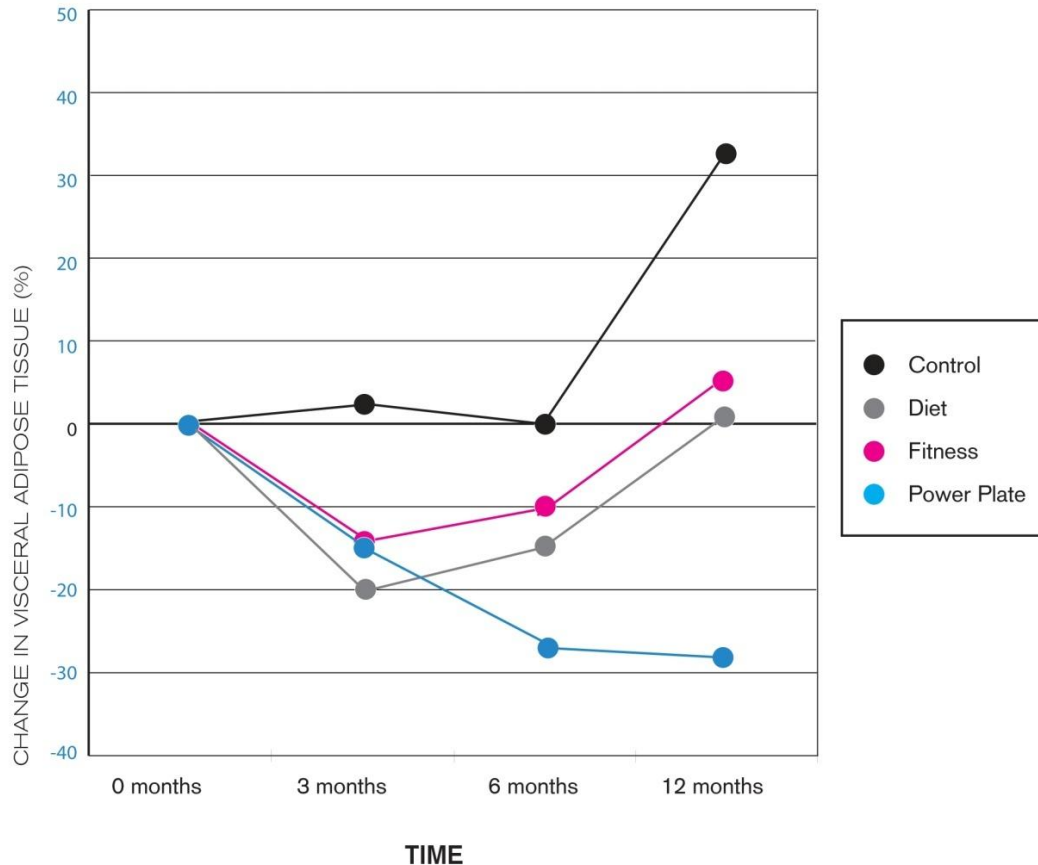
*Vissers, D., A. Verrijken, I. Mertens, C. van Gils, A. van de Sompel, S. Truijen, and L. van Gaal; Does whole body vibration contribute to reduction in visceral adipose tissue? Poster Presentation 2009*

This study involved 70 obese adults, 61 of whom completed the study, and who were randomly divided into four groups. The first group (DIET) received a hypocaloric (low in calories) diet only, the second group (FITNESS) received a hypocaloric diet plus a fitness program including cardio and weights exercises. The third group (POWER PLATE) followed a hypocaloric diet and progressive Power Plate® exercise program, while the final group (CONTROL) made no changes to their lifestyle.

Each group followed their respective intervention for six months, and were also tracked for a further six months with no intervention, to track the long term effects of their program. The anthropometric data, body composition and metabolic features were measured at three, six and 12 months. One of the measurements taken was the determination of visceral fat tissue.



# Weight Loss Research – Vissers et al cont.



In all three intervention groups bodyweight decreased significantly, by 5-10%, which is the international standard for a real impact on health, in measurements taken after the 6 intervention months. But only the **FITNESS** and **POWER PLATE** groups managed to maintain their weight loss of 5% or more in the six 'no intervention' months.

The **POWER PLATE** group lost twice as much visceral fat after six months, when compared to the **FITNESS** and **DIET** groups. The decrease in visceral fat also remained at the same level in the **POWER PLATE** group after 12 months, while the **DIET** and **FITNESS** groups returned to their baseline values after 12 months.

# Bone Density / Bone Mineral Density

- Bone density (or bone mineral density) is a medical term referring to the amount of matter per cubic centimetre of bones. (*From Wikipedia, the free encyclopaedia*)
- Exercise on a Power Plate® machine can be a beneficial tool or intervention to increase bone density and prevent bone mineral density loss related to ageing
- Target Audiences:
  - The elderly
  - Those with, or at risk of developing, osteoporosis or osteopenia

# Bone Density / Bone Mineral Density – Key Findings

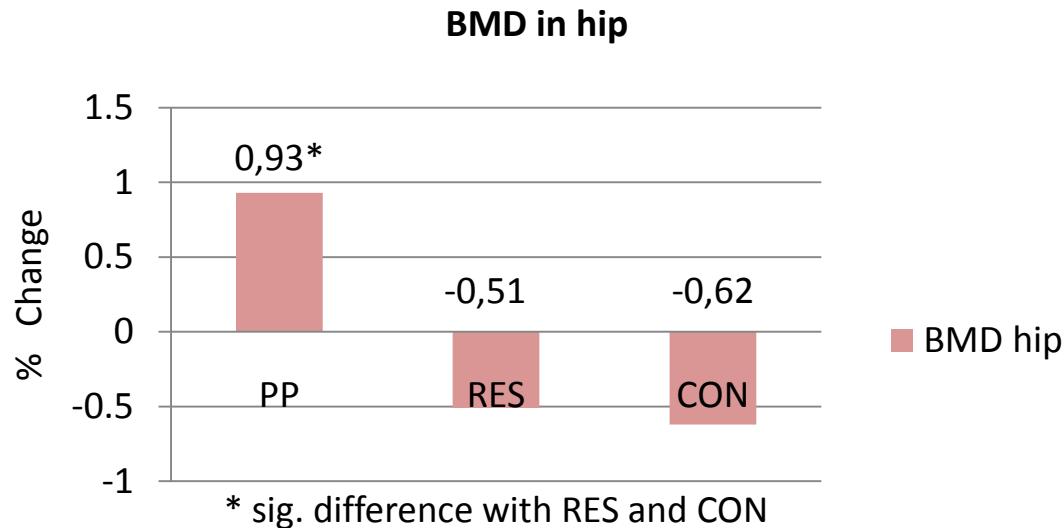
- Research into the benefits of Power Plate® exercise as a way to increase bone density shows that it has the potential to **significantly improve or assist with:**
  - Muscle contractions
  - Improving circulation
  - Hormonal changes

# Bone Density Research – Verschueren et al

*Verschueren S, Roelants M, Delecluse C, Swinnen S, Vanderschueren D and Boonen S.; Effect of 6-month whole body vibration training on hip density, muscle strength, and postural control in postmenopausal women: a randomized controlled pilot study. Journal of Bone and Mineral Research, 2004*

The study involved 90 postmenopausal women ranging in age from 58 to 70, who were divided into three groups. The first group trained three times a week on a Power Plate® machine for no more than 30 minutes per session. They performed a mixture of static and dynamic exercises for the upper leg and hip area. The weight training group trained three times a week for about one hour per session, including a separate warm up and cool down, while the final group was asked not to change their lifestyle at all.

# Bone Density Research – Verschueren et al cont.



The Power Plate® exercise group showed an increased in bone density at the hip of 0.93%. They also showed an improvement in postural control and balance, increased muscle strength and lean mass, while losing body fat and fat mass. Improved postural control and balance is also beneficial for those at risk of osteoporosis, as it can reduce the risk of falling and resulting fractures. Those who did weight training were able to slow the rate of bone density loss, which is consistent with previously published studies on weight training and bone loss, while the control group subjects continued to lose bone mineral density at the average rate.

# Circulation and Cardiovascular Function

- The circulatory system is an organ system that moves nutrients, gases, and wastes to and from cells, helps fight diseases and helps stabilize body temperature and pH to maintain homeostasis. Two types of fluids move through the circulatory system: blood and lymph. The blood, heart, and blood vessels form the cardiovascular system. The lymph, lymph nodes, and lymph vessels form the lymphatic system. The cardiovascular system and the lymphatic system collectively make up the circulatory system. Pulmonary circulation is the portion of the cardiovascular system which transports oxygen-depleted blood away from the heart, to the lungs, and returns oxygenated blood back to the heart. *(From Wikipedia, the free encyclopaedia)*
- Exercise on a Power Plate® machine can be a beneficial tool or intervention to improve and increase circulation and improve the function of the cardiovascular system.
- Target audiences:
  - All

# Circulation and Cardiovascular Function – Key Findings

- Research into the benefits of Power Plate® exercise as a way to improve circulation and cardiovascular function shows that it has the potential to **significantly improve or assist with:**
  - Heart rate
  - Blood pressure
  - Muscle contractions (EMG) (muscle pump)
  - Arterial stiffness
  - VO2max
  - Oxygen consumption

# Circulation Research – Lohman et al

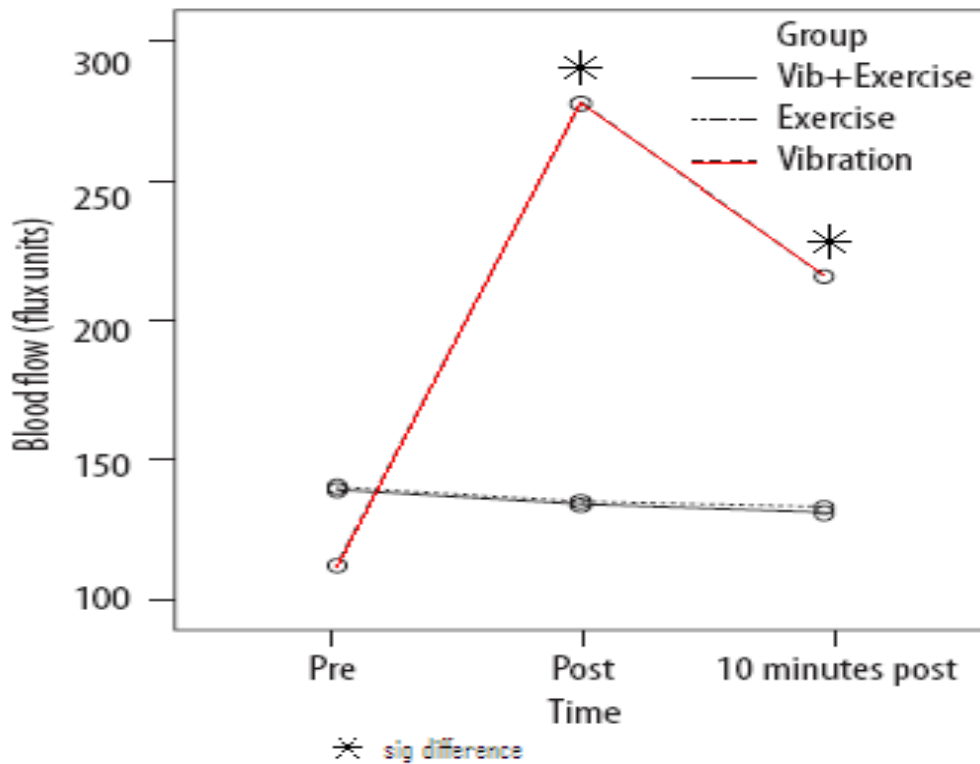
*E. Lohman, J. Petrofsky, C. Maloney-Hinds, H. Betts-Schwab, D. Thorpe; The effect of whole body vibration on lower extremity skin blood flow in normal subjects Medical Science Monitor 2007; 13(2): CR71-76; 2007*

The study involved 45 subjects (18-43) divided into three groups. The first group performed active isometric therapeutic exercise with whole body vibration (WBV) on a Power Plate® machine (VE), the second group performed the same exercises without WBV and the final group received a WBV passive calf massage on a Power Plate® machine.

Significant differences in skin blood flow (SBF) between groups were apparent immediately and 10 minutes following the intervention. For the group that received the passive calf massage, SBF was more than twice that of the VE and exercise only group. Blood flow over the following ten minutes decreased fairly rapidly but remained higher than either comparison group.



# Circulation Research – Lohman et al cont.



**SBF was increased with vibration. Contrary to expectations, exercise of the lower extremities with and without WBV did not increase SBF; rather, SBF was actually decreased slightly. This suggests that the blood flow requirements of active muscles superseded the increased cutaneous vascular changes as a result of vibration. The findings of this study support that vasodilation is increased in endothelial tissues with vibration.**

# Circulation Research – Maloney-Hinds et al

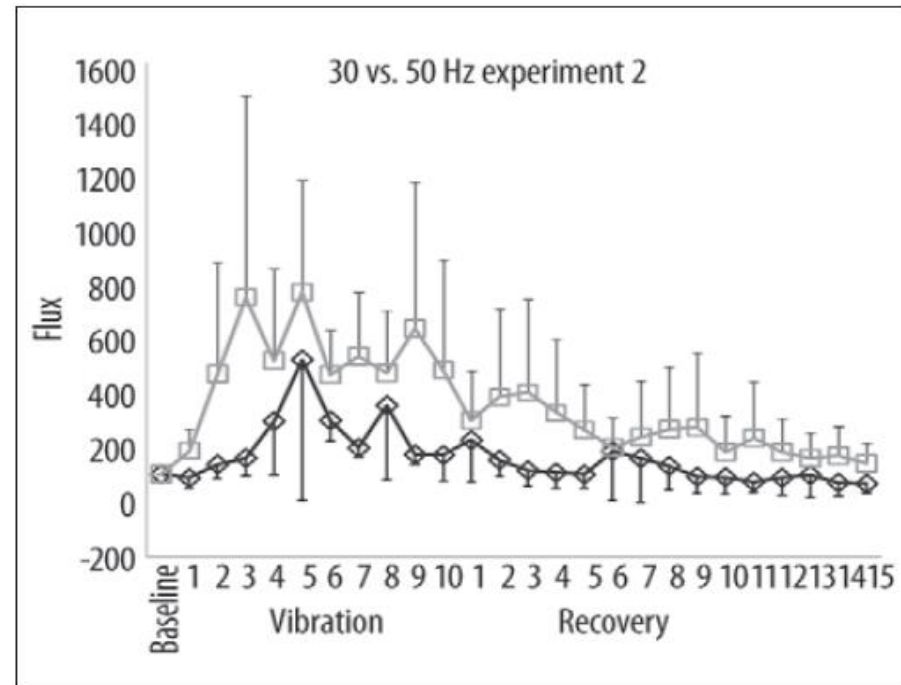
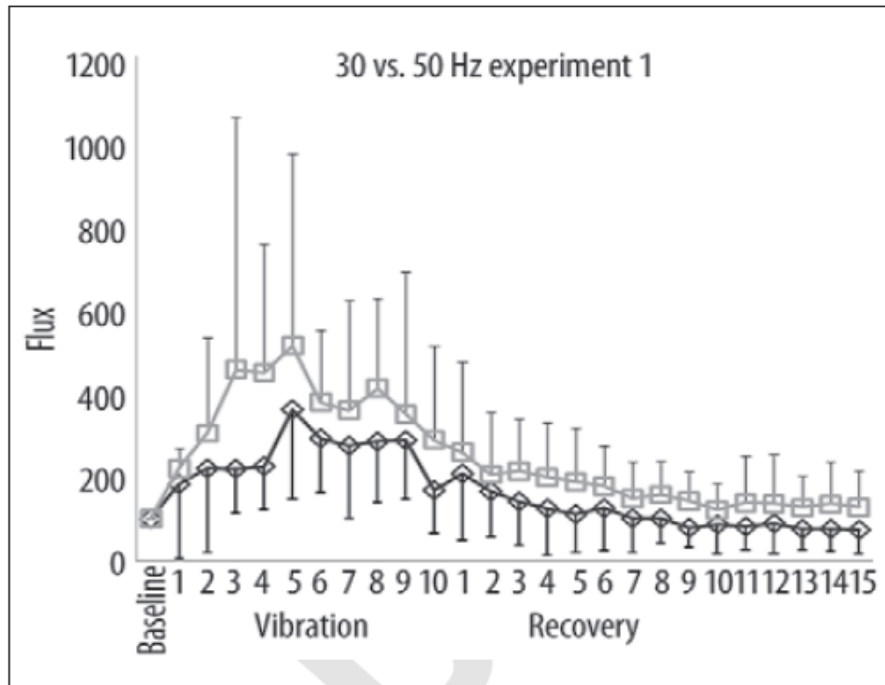
*Maloney-Hinds, C., J.S. Petrofsky and G. Zimmerman; The effect of 30 Hz vs. 50 Hz passive vibration and duration of vibration on skin blood flow in the arm. Med Sci Monit, Vol. 14(3), pp: CR112-116. 2008;*

Two studies were conducted. The first study involved 18 healthy volunteers, split into two groups, who each received passive massage exercise for the arm for 10 minutes. The first group had massage at 30 Hz and the second group had massage at 50 Hz. In the second study, involving seven healthy volunteers, all participants received 10 minutes of passive massage at both 30 Hz and 50 Hz.

In the first study, no significant difference was found between the skin blood flow (SBF) in the two groups (30 Hz or 50 Hz) before, during or after vibration, although there was a trend for greater SBF during and after 50 Hz than for 30 Hz.

In the second study there was a significant increase in SBF by the fourth minute of vibration in both treatment conditions (30 Hz= 293%, 50 Hz = 513%). Flows remained significantly higher throughout vibration treatment and for two minutes after.

# Supporting Research – Maloney-Hinds et al cont.



**Conclusion:** Although the choice between 30 or 50 Hz does not appear to make a difference, this study did reveal an optimal time frame for peak SBF. The greatest increases in SBF are obtained within the first 5 minutes of vibration. 50 Hz has the advantage if increasing SBF more rapidly and remaining elevated during recovery, whereas 30 Hz results in SBF dropping below baseline levels during the recovery period.

# Flexibility and Range of Motion

- Flexibility is the absolute range of movement in a joint or series of joints and muscles that is attainable in a momentary effort that could involve the help of a partner or a piece of equipment. The flexibility of a joint depends on many factors, particularly the length and looseness of the muscles and ligaments due to normal human variation, and the shape of the bones and cartilage that make up the joint. (*From Wikipedia, the free encyclopaedia*)
- Exercise on a Power Plate® machine can be a beneficial tool or intervention to improve flexibility and range of motion
- Target audiences:
  - All

# Flexibility and Range of Motion – Key Findings

- Research into the benefits of Power Plate® exercise as a way to improve flexibility and range of motion shows that it has the potential to **significantly improve or assist with:**
  - Circulation (warming up muscles)
  - Pain inhibition

# Supporting Research – Kinser et al

*Kinser, A., M. Ramsey, H. O'Bryant, C. Ayres, W. Sands and M. Stone; Vibration and stretching effects on flexibility and explosive strength in young gymnasts.; Medical and Science in Sports & Exercise. Vol. 40(1), pp: 133-140.2008;*

The study involved 30 female gymnasts, who did four stretching exercises (forward/backward split for both legs) each day for nine days, for periods of 4 x 10 seconds, followed by five seconds rest per exercise. The vibration and stretching group (VS) significantly increased flexibility for both the favoured and non-favoured leg. The stretching without vibration group (SF) didn't increase flexibility in either leg. The vibration without stretching group (VF) significantly increased flexibility in the non-favoured leg only. None of the groups showed significant changes in explosive jump tests.

**Conclusion: The study shows that the addition of vibration to a stretching routine can increase flexibility while maintaining explosive strength. The vibration and stretching group and the vibration-only group showed significant increases of flexibility, whereas the stretching-only group did not. The VS group improved flexibility more than the VF group. Explosive strength is commonly impaired by stretching alone; thus the results of this study support the addition of vibration to stretching as a beneficial warm-up/training tool for gymnasts.**

# Supporting Research – Sands et al

*Sands, W., J. McNeal, M. Stone, E. Russell, M. Jemni. Flexibility Enhancement with Vibration: Acute and Long-Term. Medicine & Science in Sports & Exercise, Vol. 38, No. 4, pp: 720-725. 2006.*

The study involved 10 young male gymnasts from the US Olympic Training Centre, who performed four stretching exercises in a 10 second stretch, with five seconds rest over one minute. Exercises were four different splits (both split positions on both legs). The acute phase showed dramatic significant increase in forward split flexibility for both legs, whereas the long term test showed a statistically significant increase in range of motion on the right rear leg split only. Effect sizes indicated large effects in all cases.

**Conclusion: Many of the athletes had achieved a state where, according to their coach, their improvements in range of motion were trivial or non-existent. The results of this study therefore suggest that vibration can be a promising means of increasing range of movement (ROM) beyond that obtained with static stretching in highly trained male gymnasts.**

# Wellbeing and Quality of Life in Patient Populations

- A diverse group, which includes those with clinical conditions such as Multiple Sclerosis, Parkinson's Disease, Fibromyalgia, Cerebral Palsy, Spinal Cord Injury, Diabetes, Cardiac rehabilitation
- Exercise on a Power Plate® machine can be a beneficial tool or intervention to improve general wellbeing, fitness and daily life functioning in patient populations. The Power Plate® training will (probably) not have any influence on the state of the disease or injury but it will have a positive effect on general fitness, muscle strength, daily life performance and wellbeing that can improve the quality of life of these patients.
- Target audiences:
  - People with a range of illnesses, injuries or disabilities



# Wellbeing and Quality of Life in Patient Populations – Key Findings

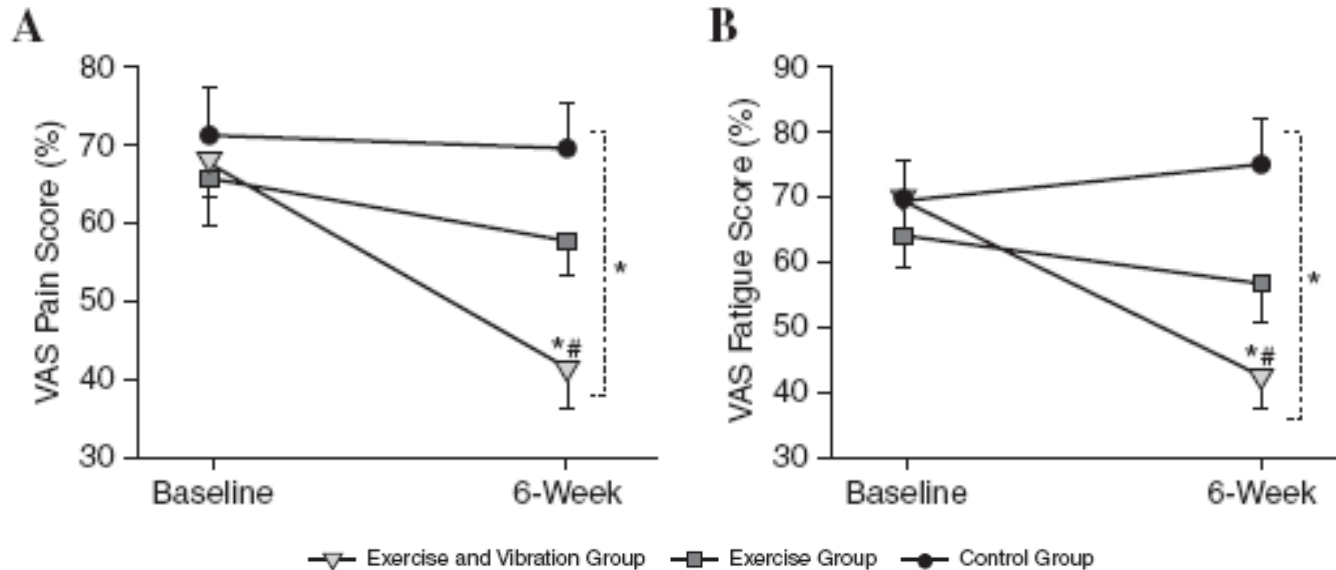
- Research into the benefits of Power Plate® exercise as a way to promote wellbeing and improve quality of life among various patient groups shows that it has the potential to **significantly improve or assist with:**
  - Muscle strength and power
  - Cardio-respiratory fitness
  - Cardiovascular fitness
  - Balance
  - Coordination
  - Stamina
  - Agility
  - Neural /motor control
  - Circulation

# Supporting Research – Alentorn-Geli et al

*Alentorn-Geli, E., J. Padilla, G. Moras, C.L. Haro, and J. Fernandez-Sola. Six weeks of whole-body vibration exercise improves pain and fatigue in women with Fibromyalgia. The Journal of Alternative and Complementary Medicine, Vol. 14(8), pp: 975-981; 2008*

This study involved 36 fibromyalgia patients, divided into two groups. The first group undertook six weeks of Power Plate® exercises namely static squats, dynamic squats, calves, single leg squats (left and right), squat shifting body weight from one leg to the other, for six exercises at 30 seconds each, with three minutes rest after each six exercise, for a total 18 minutes on the Power Plate® machine. The second group undertook a traditional exercise program: consisting of a 15 minute warm-up, 30 minutes of aerobic exercise, 25 minutes of stretching and 20 minutes of relaxation.

# Supporting Research – Alentorn-Geli et al cont.



**Pain and fatigue scores were significantly reduced from baseline in the exercise + Power Plate® machine group, but not in the exercise only and control group. Pain and fatigue scores after 6 weeks of treatment were significantly lower in the exercise + PP group compared to the exercise only and control group. The study found that a six week traditional exercise program with supplementary whole body vibration training safely reduced pain and fatigue, whereas the effect of exercise alone was not evident in any of the parameters.**