

POWER  PLATE®



AN INTRODUCTION TO THE BENEFITS OF
POWER PLATE® EXERCISE
FOR A HEALTHIER POPULATION

INTRODUCTION

The more fast-paced and stressful our lives become, the more we seek practical solutions to remain healthy. Unfortunately too few people exercise properly, or as often as they should, to achieve their health and fitness goals. There are also a very large number of people who would benefit from regular exercise but suffer from a specific illness or condition that prevents them from doing so.

Studies conducted around the world to try to understand the reasons why people do not take part in regular, structured physical activity cite the following as barriers:

- Too physically demanding (people believe they are too unfit, to get fit)
- Too complicated
- Not enough time
- Feeling uncomfortable in a social setting
- Bad previous experiences
- Not achieving goals or expectations not being reached
- Feeling unsupported

It can take a long time to educate people to overcome these barriers to entry and bring about a widespread change in behaviour and beliefs. Power Plate® machines can help users to achieve a variety of health and fitness benefits, in a more easily accessible way and with less impact on the joints, as well as greatly reducing the time it takes to achieve results.

WHAT IS ACCELERATION TRAINING™ EXERCISE?

The Advanced Vibration Technology™ of the Power Plate® machine is backed by more than 10 years of practice-based evidence and scientific research to support its efficacy. Through this research and practical use it has become increasingly clear that this training intervention is valid, effective and will continue to grow in popularity.

The Power Plate® machine is one of the most exciting technological advances in the fields of sports medicine, athletics, and health and fitness. Acceleration Training™ exercise can help people to enhance fitness and wellness as well as improve sports and functional performance.

As an exercise intervention, Acceleration Training™ exercise on Power Plate® equipment can provide the following benefits:

- Shorter training time for comparable results
- A more accessible way to exercise
- One machine for multiple purposes
- An increase in muscle strength and tone
- An improvement in flexibility
- Intensified stimulation and improvement of the neurological system
- Increased blood circulation
- Aids in the reduction of pain
- Increased Bone Mineral Density (BMD)
- Improved balance and coordination to prevent falls
- Increased metabolism to aid weight loss

As research continues, we are learning even more about the principles and effects of Acceleration Training™ exercise, and the implications in terms of who can benefit from it are becoming clearer.

HISTORY AND DEVELOPMENT

Whilst the Power Plate® machine may seem like a brand new technological innovation, the first use of vibration to improve human function and performance dates back as far as ancient Greece, where physicians used saws covered in cotton to transfer vibrations to parts of the body which required stimulation.

These manual devices could only offer vibration in one direction, and it was not until the middle of the 19th century that physicians developed machines which produced both vertical and circular movements, which were used to treat disorders as diverse as neuralgia, atrophy, emaciation and

constipation. Professor W. Biermann was one of the first modern scientists to realise the potential of vibration – he studied Rhythmic Neuromuscular Stimulation through cycloid vibrations, the foundations of today’s vibration technology.

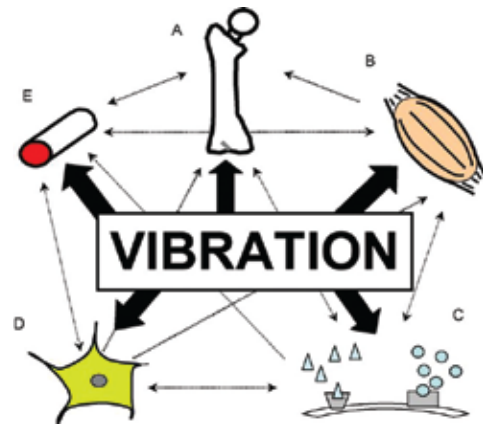
The effects of vibration training were then researched in the former Soviet Union during the 1960s, as it was used to help Russian cosmonauts withstand the negative effects of microgravity while in space. As research continued, it showed the potential for vibration training to benefit muscular strength, flexibility, power, bone mineral density, circulation and recovery.

Another scientist, Dr. Nasarov, published research stating that the unconscious muscle contractions induced by vibration could be the key to halting osteoporosis and strengthening bones significantly. Subsequently, ballerinas, who are often plagued by injuries, were studied, and tremendous results were noted, including increases in jump height and strength, as well as reduced incidence of injury. In 1999, Dutch Olympic coach Guus van de Meer introduced vibration training technology to Western Europe, heralding a paradigm shift for training which offered the possibility of optimising human function naturally, using the body’s own reflexes, while preserving joint health and maximising power. Seeking to improve on the vibration models available at that time, Guus van der Meer’s development of the Power Plate® machine relied on his own clinical data, imagination and invention. He slowly improved on each of the separate functions and parts of the early machines to develop a platform he thought would promote the greatest benefits.

Today, Power Plate® equipment is available globally, and offers a wide range of applications from fitness, health, anti-ageing, wellness, rehabilitation, functional and sports performance enhancement to name just a few. Many professional sports teams use it as a standard training protocol, while the list of home users, coaches, trainers, scientists, doctors and therapists participating in Power Plate® exercise is growing daily.

ACCELERATION TRAINING™ EXERCISE IN PRACTICE

The way the body reacts to the Power Plate® machine follows the same principles as conventional strength and power training – the body simply responds to a set of stimuli. Positioning the body on the Power Plate® machine’s vibrating platform in a standing, kneeling, lying or sitting position causes a set of chain reactions at different biological and physical levels. The different systems involved in these responses are the bone and connective tissue, neuromuscular, vascular and hormonal systems. These complex systems interact to provide the necessary reactions to the training environment, as shown in the diagram below.



The potential effects of WBV on physiological systems and the potential interplay among systems. WBV modulates the (A) skeletal, (B) muscular, (C) endocrine, (D) nervous, and (E) vascular systems, which may elicit secondary responses through interaction among the systems of which the figure presents only the most obvious. (From Prisyb et al. 2008)

THE POWER PLATE® MACHINE AS A TRAINING ENVIRONMENT

The Power Plate® machine causes mechanical vibrations to oscillate in three directions.

- Vertical axis (up-and-down), Z axis in diagram
- Frontal plane (side-to-side), X axis in diagram
- Sagittal plane (front-to-back), Y axis in diagram



The manipulation of frequency (rate of vibration) and amplitude (displacement) creates what is known as acceleration, which can be compared to g-forces on earth. Our bodies are accustomed to and respond to the gravity on earth, which is defined as one g-force. The force of gravity the body experiences is dependent on mass (weight), so by increasing mass (such as lifting a barbell or dumb-bell) your body builds strength to cope with the increase in force.

Training on a Power Plate® machine however manipulates acceleration, therefore creating an environment where the body is stimulated to increase force due to alternating g-forces, without the need for additional loads being placed on the muscular-skeletal system.

The alternating g-forces caused by the rapidly moving platform stimulates the body's reflexes. This induces the responses needed to keep the individual upright, which in turn causes the muscles to produce more force.

THE BENEFITS OF POWER PLATE® EXERCISE

In everyday life, gravity has the greatest effect on muscular development. Specific training programs that are designed to improve muscle strength, such as weights and other forms of resistance training use fast and abrupt changes in gravity to increase influence on muscle structure.

Muscle strength increases through resistance training when proper progression and protocol is employed – this is called super compensation. Acceleration Training™ exercise follows these same principles, but creates a change in gravity through acceleration without excessive loads being placed on the muscular-skeletal structure.

Improved muscle strength is also strongly linked to fall prevention, as everyone, from highly trained athletes through to frail elderly people, needs sufficient balance, stability and reserves of neuromuscular power to carry out their daily activities, and prevent falling.

Improved muscle strength can be achieved through neurological and myogenic adaptation.

At first, increases in strength stem from a neurological adaption and are characterised by an improved neurological system. These neurological adjustments can set in directly after using the Power Plate® machine, while myogenic adaptation can begin just after a few weeks.

It is often assumed that only athletes or advanced trainers require the effects of myogenic adaptation. However, everyone, especially the elderly, require the same advantages for their bodies to develop and to maintain balance, strength and the ability to adapt to a surface that they would otherwise be unstable on.

IMPROVING MUSCULAR STRENGTH AND POWER

Neurological Adaptation

The process of neurological adaptation can be summarised as a faster accessibility of the motor units and more effective execution of the muscle contraction. This is achieved through inter-muscular coordination and is characterised as follows:

- Improved synchronisation of the impulses
- Improved co-contraction of the synergists
- Inhibition of the antagonists
- Recruiting number of motor units
- Recruiting types of motor units

The body learns to use these neurological adaptations available in an optimal way. This is called Motor Learning. During a motion sequence the involved muscles can fulfill different tasks:

- Function as an agonist (prime mover)
- Function as an antagonist (retardation: provides a braking force)
- Function as a synergist (support, stabilization: assists indirectly in the movement)

In the progress of “Motor Learning” there will be a better interaction between the different muscles.

Myogenic Adaptation

Myogenic adaptation is the body's ability to adapt to a stimulus over an extended period of time. The factors involved in this specialised type of adaptation include:

- Hypertrophy – an increase in size brought about by the body's ability to create more proteins, thus making the muscles bigger and stronger
- Intra-muscular coordination – this is when the muscle fibres within the same muscle start working together in a smoother and faster way, resulting in a stronger, more toned muscle
- Influences on fibre typification – this allows the body to maintain its fast twitch muscle fibres for longer, thus improving its capacity to develop power and agility.

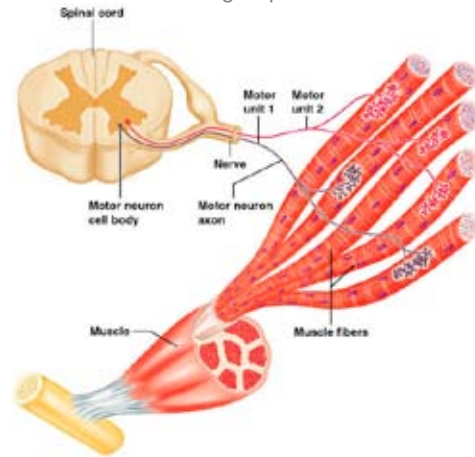
Motor units are reaching the peak contraction simultaneously (“synchronization”)



Modulation of the rate of firing impulses (“rate coding”)



Results in increase of maximum force, explosive and reactive strength qualities



CIRCULATION AND CARDIOVASCULAR FUNCTION

Acceleration Training™ exercise can increase circulation. During contraction of a muscle group, the capillaries are squeezed shut. They open to let blood through when the muscles relax. When a muscle is alternately contracted and relaxed, a natural muscle pump mechanism is created, causing an increase in blood circulation. Optimising blood circulation can be extremely beneficial for anyone suffering from a circulatory or peripheral vascular condition.

The heart and skeletal muscles, which make up 40% of total body weight, ensure a rhythmic circulation of the blood. Microcirculation through the organs is also achieved through the muscles' ability to pump blood. This synchronization of the skeletal muscle fibres, which are not visible to the naked eye, causes a pump and suction effect, supporting the heart and playing a determining role in the blood supply of the entire body, as well as lymphatic drainage.

ALLEVIATION OF PAIN

Exercise on a Power Plate® machine can help to abate or relieve chronic pain, as it stimulates the nervous system, which can overrule the pain sensation being experienced. Research has indicated that Power Plate® exercise can result in a

lower increase in the enzyme creatine kinase (defined as an index for muscle damage). It has also been shown to reduce the occurrence of muscle soreness.

Using the Power Plate® machine for massage can give similar results to traditional relaxation massage, which is often used to relieve the sensation of pain. It encourages myo-fascial release (of the connective tissue around the muscles) to allow muscles to function optimally. The potential to improve circulation (see circulation and cardiovascular function section for more information) also helps to clear ischemia (low blood flow), and improve the delivery of nutrients and removal of waste products, to help relieve the sensation of pain.

WEIGHT REDUCTION

Power Plate® exercise can have a positive impact on the metabolism, to aid weight loss. Metabolism is the use of energy (calories) while resting. Physical, and to a smaller extent, mental activities require energy. The more active a person is, the more energy they burn. However, there is a difference between weight loss and fat loss. It is important to burn unwanted fat while preserving lean muscle, thus improving overall body composition.

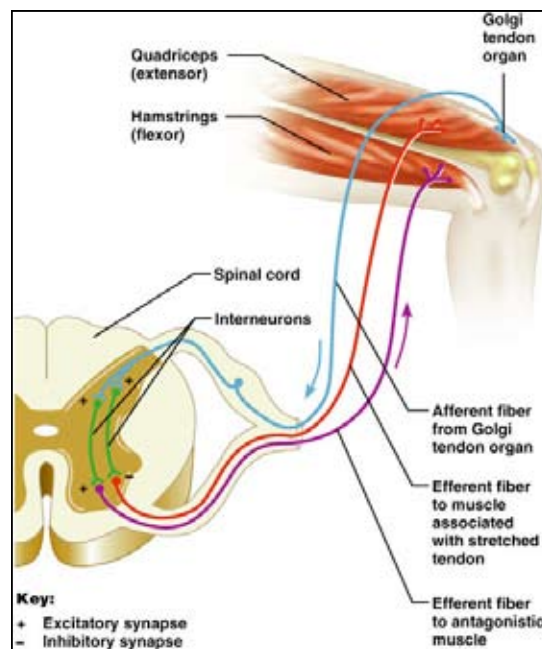
This is because, even at rest, lean muscle tissue uses more energy. Therefore, the primary tool for losing fat is the ability to build lean muscle. As lean muscle is increased, the metabolism will also increase, thus more calories will be burned, even while at rest. Acceleration Training™ exercise helps to recruit more of the body's muscle fibre pool, to encourage the faster development of lean muscle tissue. Alongside a well-managed exercise program, the other essential element of any weight loss program is a well-balanced diet.

The appearance of cellulite can also be significantly reduced, both through the positive changes in body composition as a result of increasing lean muscle tissue, and improved circulation (see circulation and cardiovascular function section for more information), which can increase lymphatic drainage, to aid the removal of toxins from the body.

FLEXIBILITY AND RANGE OF MOTION

Flexibility is the measure of range of motion in a joint, attainable in a momentary effort. It is determined by several factors; connective tissue structure, age, gender, tendons, ligaments and joint structure, and level of activity.

Nazarov, the first researcher to experiment extensively with vibration training, was primarily concerned with its effect on flexibility. He found that performing stretch exercises with vibration gave a greater increase in flexibility than stretch exercises alone. Stretching is the process of elongating a muscle. To help reduce the risk of injury during stretching, muscle spindles act as sensors to prevent overstretching, while the Golgi Tendon Organ senses increased tension and reflexively relaxes the muscle to protect it from excessive force.



Acceleration Training™ exercise stimulates these sensors and the Golgi Tendon Organs, by creating an alternating reflex activation which encourages the muscle to adopt a new, longer length, even while held in a passive stretch position, helping to increase the body's flexibility.

It is estimated that as much as 99% of the adult population is already suffering from a muscle

imbalance somewhere in the body, leading to the possibility of pain or tightness if left untreated. Therefore, improving flexibility and range of motion within joints helps athletes improve performance, but can also be beneficial in improving daily life and functioning for everyone.

BONE MINERAL DENSITY

It is generally understood that movement favourably influences the bone remodelling process, with bone responding better to dynamic, rather than, static exercises, the level of resistance (load) can also influence the reconstruction and quality of the bone.

If bone is subject to disuse, for example through lack of exercise, the remodelling process will cease. To avoid low bone mineral density in old age and prevent osteoporosis, it is recommended that people train to elevate and retain sufficient bone density and bone mass.

However, not everyone has the physical ability or inclination to perform the necessary resistance training exercises to induce the amount of stimulus necessary to initiate new bone formation. Mechanical loading is essential to the stimulation of bone mineral growth.

For example, it can be difficult for elderly people to achieve the required mechanical loading necessary for bone remodelling to occur. Exercise on a Power Plate® machine can be a viable alternative, by creating the mechanical loading needed without putting unnecessary strain on joints, and decreasing the amount of time needed to complete a training session.

IMPROVING WELLBEING IN PATIENT POPULATIONS

It is well known that individuals suffering from conditions such as arthritis, Parkinson's disease, Multiple Sclerosis, and diabetes, among many other medical conditions, can benefit tremendously from physical activity.

Unfortunately sufferers of these conditions are often unable to exercise due to loss of muscular strength, coordination, balance, joint pain and poor circulation. In many cases, they are also hindered by fear of embarrassment.

The Power Plate® machine's accessibility puts the benefits of physical activity within reach for many of those who may not be able to participate in other forms of exercise such as walking, weight lifting or cycling. Its ability to help increase muscular strength, improve balance, increase circulation, affect bone mineral density and encourage weight loss, all make this form of exercise particularly beneficial for various patient populations.

Although it may not have any influence on the condition itself, it can provide relief from symptoms, and improve general wellbeing and daily life functioning amongst these groups.

IN SUMMARY

The strong link between staying active and the effect on long-term health continues to be reinforced in scientific studies conducted around the world.

But while the benefits of regular exercise are clear, even this is not enough to help overcome the barriers, either physical or emotional, that can prevent people from exercising as often as they should to maintain their fitness.

By introducing a shift in training, Power Plate® equipment offers a viable and accessible alternative, and can help a wide range of people to overcome the obstacles towards achieving their overall health and fitness goals.

To find out more, please visit
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