

# Vibration Therapy

## Concept of Vibration Therapy



Vibration platform for the whole body.

The idea originated in space science: **BioMechanical Stimulation (BMS)** by means of whole-body vibration.

In 1856, Russian physician and inventor Gustav Zander developed a series of machines that utilized weights and pulleys to create a sense of vibration. The purpose of apparatus was therapeutic.

In 1895, Dr. John Harvey Kellogg implemented vibration therapy in his health practice.

With a vibration chair he developed himself, he claimed the therapy was good for circulation and could also alleviate constipation.

During the Russian space programme, Physicians noticed that the returning astronauts suffered from loss of bone mass & bone fractures at a much earlier age than was normal.

They began to use whole body vibration device to help strengthen astronaut's bone mass & muscles.

Today NASA uses VT to help prevent muscle loss in astronauts.

## The Wave Nature of Matter

- In 1923 de Broglie suggested that if light has both wave-like and particle-like properties, shouldn't all matter?
- Specifically, he proposed that the *wavelength*  $\lambda$  of any particle is related to its momentum  $p$  by

$$\lambda = \frac{h}{p}$$

- For a matter particle,  $\lambda$  is called the *de Broglie wavelength* of the particle



Louis de Broglie  
(1892-1987)

## How does vibration therapy work?

### Whole body Vibration

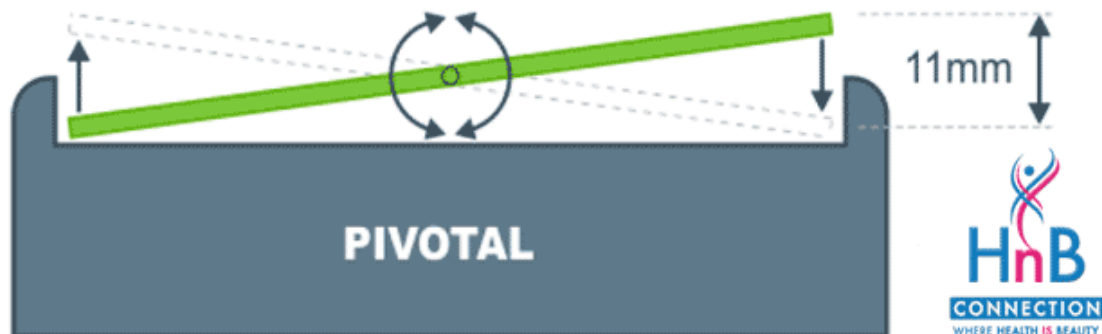
During whole-body vibration therapy, your therapist will ask you to stand, sit, or lay on a machine supported by a vibrating platform. For example, they may ask you to stand in a half-squat position with your knees bent.



## Two types of W-Body Vibration Machines

- **Pivotal**

In Pivotal vibration machines, the platform you stand on tilts around a central pivot point like a see-saw. The left and right sides alternate up and down while the centre remains fixed.



- **Lineal**

In an attempt to compete with the successful German vibration platforms, a Dutch company created a vibration machine with a new kind of platform movement called Lineal.

A Lineal vibration platform remains horizontal at all times with the entire platform moving up and down by the same amount.



## Technical Requirements for VT Platform

Frequency: 20-50Hz

Duration: 0-120s

Pause time: 0-120s

Intensity: low – high

Repetition: 1-20

## Effects I

### *Muscles*

Vibration plate triggers reflexes

Subconscious → Reflexes cannot be controlled

Increased recruitment of muscle fibres:

Vibration Plate: 90-100%

Normal: 60-70%

High performance sports: 80-90%

Example: Muscle Atrophy

(MS, Confinement to bed, Incontinency)

### ***Tendon / Connectivity Tissue***

Tissues taking on vibrations alternatively

Friction of different tissues against each other

→ releasing tissue adherences

Improved blood circulation

### **Effects II**

#### ***Blood Vessels***

- Improved mobility of blood vessels
- Improved circulation
- Improved metabolic function
- Improved removal of metabolic waste

→ faster regeneration

- Example: Intermittent Claudication

#### ***Hormons***

- VT influences the hormonal system positively
- Increased distribution of growth-hormons
- Increase of testosterone
- Increased production of neurotrophin
- Decreased production of cortisol

## Effects III

### *Capsule & Joints*

- Balance (Vestibular system)
- **proprioception**, the process by which the body can vary muscle contraction in immediate response to incoming information regarding external forces
- Improved neuro muscular connection
- Example: High performance sports

### *Nervs / Neuro*

#### *Transmitters*

- Activation of Spinal reflexes
- „Tuning“ of the Nervous system via mobilisation / sensibilisation
- Increased number of Neurotransmitters

(Dopamine / Serotonin)

→ Increase neuromuscular connections

- Example: M. Parkinson

## Effects IV

### *Bones &*

#### *Cartilage*

- Bones follow the same rules as muscles
- Speed of deformation strengthens the bones

→ Build up of bones

- Example: Osteoporosis

- Intermittent pressure improves cartilage function
- Increased synovial fluids surrounding cartilage  
(Improved nutrition)

### ***Skin***

- combination muscle, blood circulation, improved lymphatic transport, connective tissue causes a tightening of the skin

### **Vibration training as a complement**

- VT causes mechanical vibrations which are transferred to the body
- VT is a new and modern form of training because of its positive effects on different systems of the body
- Used as warm-up, Strength training, Coordination training, Balance training, Regeneration, Cool-down
- Excellent alternative to all sports

### **Vibration training in Therapy**

- Absolute Contra-indications:
  - > Cardiac pace maker
  - > Pregnancy

- > Cemented joint implants
  - Relative Contra-indications:
- > Therapist needs to decide whether VT is indicated or not

## Vibration training in sports

- Improved coordination (central/peripheral NS)
- Improved learning situation
  - Increased recruitment of muscle fibres (Intramuscular coordination)
- Increased strength
  - Frequency of training: 3 / week
  - Eventually combined with strength training (super compensation)
    - Warm-up prior to endurance training
- immediate ideal effects (increased efficiency)

## Application area

### Medical Area

- physical therapists, rehab clinics

### Professional Area

- sports consultants, sports clubs, training centers, golf clubs, tennis clubs



## **Fitness Area**

- fitness studios, wellness hotels

### ***Application fields***

#### ***Medical application***

incontinence, osteoporosis, MS, rehabilitation following injuries, treatment of pain and stiffness

#### ***Professional application***

effective exercising method for both hobby and serious athletes, stretches, extends and smoothes muscles, increasing explosive strength, strength training

#### ***Fitness application***

improving coordination and movement ability, eases tension

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