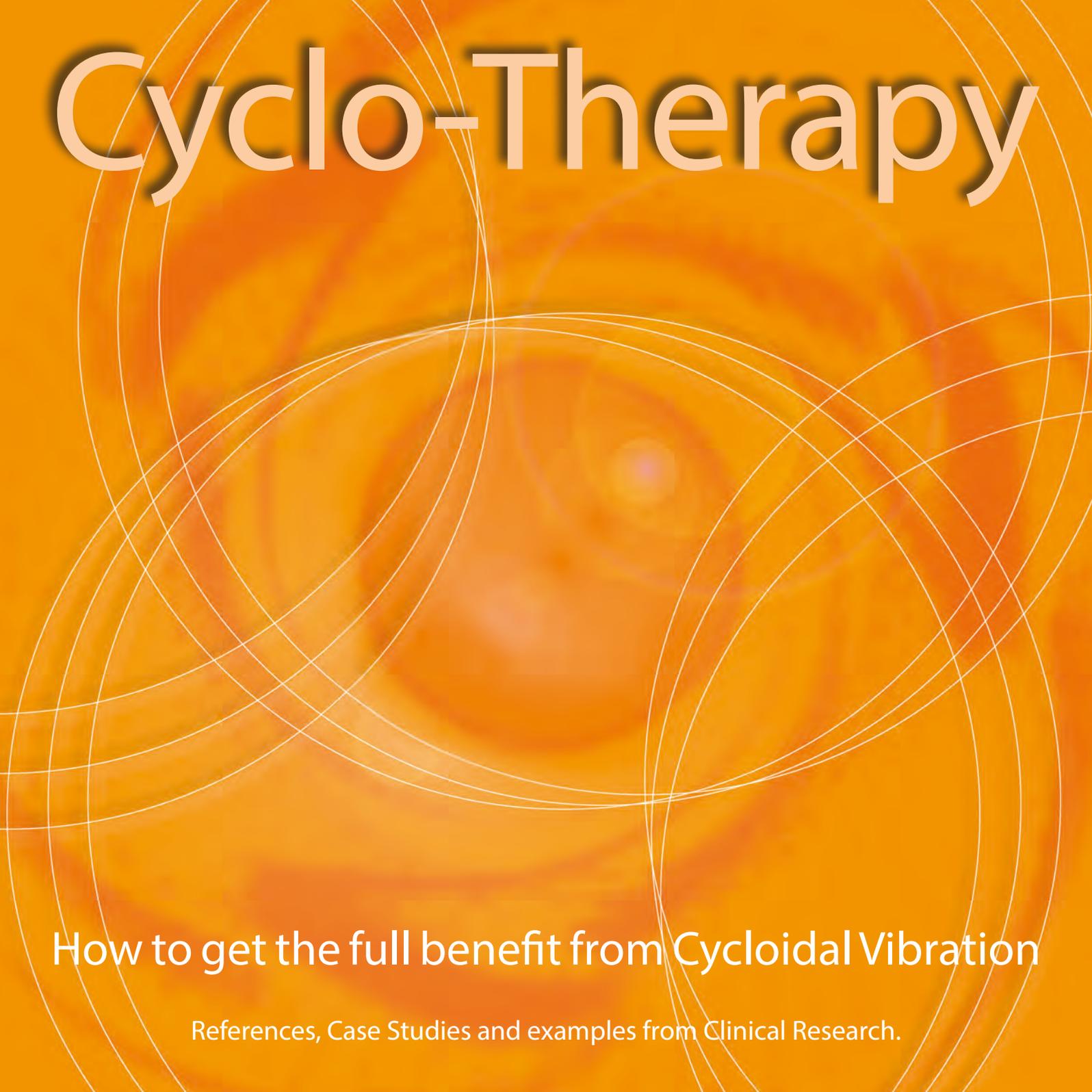


Cyclo-Therapy

The background features a warm orange-to-yellow gradient. Overlaid on this are several thin, white, overlapping circles of varying sizes and positions, creating a complex, web-like pattern that suggests cycloidal motion or vibration.

How to get the full benefit from Cycloidal Vibration

References, Case Studies and examples from Clinical Research.

Introduction

Cyclo-Therapy is characterized by a unique three-dimensional vibration generated by a special electromechanical oscillator. Cyclo-Therapy is incorporated into various products produced by NHC Technology Ltd and may be easily used at home by an individual, by a non-professional assistant, or by a medical or physical therapy professional in the home or clinic.

The purpose of this document is:

- To explain some of the benefits derived by using the equipment, to provide information so that decisions on how and when to use the product to its best, and highest potential can be made.
- To acquaint people with the full range of benefits, which can be gained by using Cyclo-Therapy products. The benefits obtained may vary from one individual to another.

It is not the purpose of this document to make claims of any kind beyond those specified in this booklet.

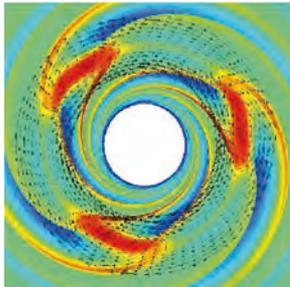
It is highly recommended that a prospective purchaser try out the equipment by having a qualified Representative demonstrate the various products available so as to become acquainted with the techniques and benefits of using each one.

DISCLAIMER - WE SHOULD EMPHASISE THAT CYCLO-THERAPY (CYCLOIDAL VIBRATION) IS NOT A CURE FOR THESE CONDITIONS BUT IT CAN DO MUCH TO HELP ALLEVIATE THE SYMPTOMS ASSOCIATED WITH THEM. IT IS DESIGNED TO COMPLEMENT THE RANGE OF CURRENT THERAPIES AVAILABLE FROM THE CUSTOMER'S FAMILY DOCTOR AND ITS USE CAN ALWAYS BE DISCUSSED WITH A HEALTH CARE PROFESSIONAL IF YOU ARE CONCERNED. THE CUSTOMER SHOULD NOT DISCONTINUE ANY CURRENT THERAPY WITHOUT FIRST SEEKING ADVICE.

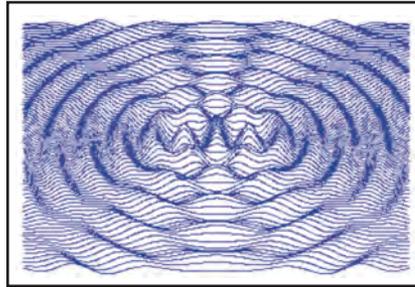
The Cyclo-Therapy Difference

Initially there is no obvious difference between the feel of a conventional massage vibrator and a cycloidal vibrator. However, conventional units can produce aggressive slapping or pounding vibrations of high amplitude which are on a single-plane and have a high fundamental frequency. This ultimately produces an uncomfortable sensation that in some cases can be damaging to muscles and soft tissue.

The Cyclo-Therapy unit has a very special suspension system, which is the reason it does not generate a single-plane vibration but a three-dimensional “cycloidal vibration” in a circular movement.



This illustration shows the three dimensional circular movement created by cycloidal vibration.



This illustration shows the three dimensional circular wave transverse movement. (A transverse wave is a moving wave that consists of oscillations occurring perpendicular, or at right angles to the direction of energy transfer.)

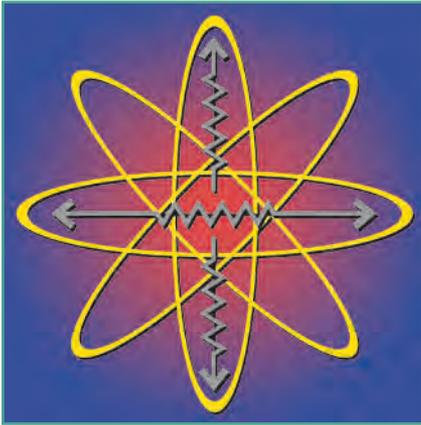
This type of suspension improves upon the action of a single-plane vibration by adding additional dimensions of motion both transversely and radially from the vibration generator. This causes the energy to penetrate gently and deeply into the body.

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Deep Penetration

Cycloidal vibration penetrates deeply and effectively into the human body.



Cycloidal vibration's acceleration rate is very low compared to other vibration techniques (which can be up to fifty times greater). These high rates of acceleration can traumatise and cause damage to tissue.

Cyclo-Therapy's non aggressive technique sets it apart from other massage systems.

At the University of Brussels Medical Faculty, a study completed by Professor P. Lievens demonstrated that cycloidal vibrational energy effectively penetrates the human body. Two accelerometers were placed on the body approximately ten and twenty centimeters from the cycloidal vibration generator. The vibrations' mechanical waves were measured in terms of their acceleration rate and then, by means of a spectrum analyser the mechanical vibrations were further measured both at the fundamental frequency and at harmonic frequencies. The fundamental frequency of the cycloidal vibration generator is approximately forty eight cycles per second and at double that frequency we have an harmonic that is very important to the characteristics of the three dimensional vibration.

In order to determine the strength of vibration, acceleration rates must be measured.

- The acceleration rate of Cycloidal vibration is very low - approximately twenty eight meters per second squared
- Other forms of vibration can produce up to one thousand two hundred and ninety meters per second squared. This is fifty times greater than a Cycloidal vibration generator
- That is why cycloidal vibration is a non-aggressive technique.

Cycloidal vibrations can stimulate the mechano - receptors in muscles causing a very gentle contraction, the level of contraction is determined by the intensity of the stimulus. Muscle spasm is a result of too much contraction.

Because the intensity of an electrical or tactile stimulation (from the brain or from an outside source) determines the level or amount of contraction of the muscle group. It has been found that vibration with too high an acceleration rate may cause too much of a response and may stress, traumatise or fatigue the muscle group. This is akin to straining or stressing the muscle and is counter-productive, particularly as it produces additional metabolic waste in an area. In some situations this can cause too much load on the lymphatic system and therefore produces "lymphatic overload" or oedema.

Deep Penetration

When using a vibratory technique with small amplitude, such as that produced by cycloidal vibration, a very high muscle motor response is obtained. However, it has been found that vibration with a large amplitude, as found in other products, will not obtain a muscle motor response, i.e. the muscle will not react. In other words, to be beneficial, the vibratory amplitude must remain within normal physiological (reactive) range. It has been found that because of the very high motor response (without stress) which occurs with cycloidal vibration, muscles begin to react and perform in a very positive manner. This is due to the use of cycloidal vibration having an effect on the muscle's electrical sensitivity; i.e. after using cycloidal vibration on a muscle, the muscle will react with less electrical input required.

In scientific studies, the conclusion reached was that on human subjects, the rheobase (the lowest possible electrical impulse necessary to cause a muscle reaction) was reduced by 20% after just fifteen minutes of cycloidal vibration application. The benefits of this are of great importance for sports medicine and muscle toning, allowing greater mobility, especially with continued usage.

CLINICAL PAPERS, The following is a guide to cycloidal vibration therapy and refers to a small selection of the medical evidence from presented and published clinical trials and investigations. For example over 50 clinical papers have been presented and published to date involving 3000 testers and patients investigating the benefits of pain relief as a result of vibration therapy.

All of our cycloidal vibration products are CE marked and are registered as CLASS 2A Medical Devices with UK medicines and healthcare regulatory authority.

This means that we have had to meet European Standards and demonstrate on an ongoing basis the evidence, quality, safety and effectiveness of our products to deliver the benefits discussed in this booklet.



Cyclo-Therapy – The Benefits



Cycloidal vibration along with the positional adjustments available from our products can help relieve the symptoms of a range of medical conditions.

Results of independent research by universities, research institutes and hospitals show that the cycloidal ranges of vibration therapy in our products:-

- Produce the ability to rest and relax easily and naturally
- Soothe most rheumatic pains
- Assist muscle relaxation
- Ease simple nervous tension
- Generate pain relief
- Raise pain thresholds
- Improve local blood circulation
- Improve venous drainage
- Improve lymphatic drainage
- Assist in the reduction of swelling due to excess tissue fluid
- Improve joint mobility in most instances
- Help to ease high and low back pains
- Have no pharmaceutical side effects

The human body is a balanced system. Changes in any one area, tissue or system can upset the whole physiological balance, and lead ultimately to debilitating medical conditions. Many illnesses and specific conditions have symptoms that include:

- Tension and muscle spasm
- Poor circulation
- Poor venous or lymphatic drainage
- Chronic or acute pain

Although we cannot say that the use of our products can cure specific medical conditions, cycloidal vibration combined with the positional adjustments of our products can help relieve common and sometimes debilitating associated symptoms.

Cyclo-Therapy and its effect on Pain

What follows is a brief explanation of the effect of cycloidal vibration therapy on several of the conditions listed.

When applied non-invasively to the skin, direct to or surrounding an area of pain, cycloidal vibration is a non-pharmacological aid to generate pain relief. It is a sensory stimulant by activating primarily, although not exclusively, on fast-conducting myelinated A delta fibres which in turn activate inhibitory interneuron's to control pain transmission. This means cycloidal vibration can stimulate alternative nerve fibres that don't carry pain signals, stimulating enough of these alternative nerve fibres then blocks the pain transmitted signals from the source of the pain. This results in an analgesic effect, raised pain threshold levels and subsequently a reduction in pain.

Many conventional stimulators deliver most of the stimulation directly under things like contact electrodes. Whilst cycloidal vibration is delivered across a much larger surface area of the skin and can penetrate more deeply.

Reference: Melzack R, Wall PD, Pain mechanism a new theory. Published in medical journal. Science 1965; 150:971- 978.

Kandel ER, Schwartz JH, Jessell TM. Published in medical journal Principles of Neural Science, 4th ed., pp.178-180. McGraw-Hill, New York (2000).

Advantages over other means of pain relief include:-

- No pharmaceutical side effects
- Non-invasive
- Deeper penetration into the tissues
- Larger surface area of application
- Stimulates skin and soft tissue blood flow
- Reduced inflammation and swelling
- Ease of use
- Pleasant experience

A complete library of published and unpublished medical research, scientific studies and papers is now held by NHC Technology Ltd, for further authorised study.

Chronic and acute pain associated with Musculo-Skeletal conditions.

- Arthritis
- Rheumatism
- Frozen shoulder
- Tennis elbow
- High/low back pain
- Myalgia/nerve pain
- Fibromyalgia
- Hiatus hernia

Nervous system problems associated with:-

- Tension
- Anxiety
- Insomnia

Circulatory problems associated with:-

- Oedema e.g. lower leg/ankle and foot swelling
- Leg ulcers
- Poor circulation due to diabetes
- Walking pain
- Cold feet

Respiratory problems associated with:-

- COPD
- Bronchiectasis
- Asthma

Common Forms of Pain

Arthritis research UK news release.

March 2011

“Vibration therapy reduces chronic pain” Published in the ‘European Journal of Pain’.

Vibration can help to ease certain types of pain by more than 40%, new research suggests. Scientists at the University of Florida College of Medicine found that vibration produces an “analgesic effect”, according to Dr Roland Staud, a professor of rheumatology and clinical immunology at the institute.

Reference - Roland Staud et al. “Attenuation of experimental pain by vibro-tactile stimulation in patients with chronic local or widespread musculoskeletal pain.” European Journal of Pain. February 2011.

Arthritis

Arthritic pain of the joints has been shown to be reduced considerably – and in cases eliminated, on a reproducible basis by the application of vibration therapy.

One of the causes of arthritic-like conditions is the build up of metabolic waste material in the synovial fluid, resulting in irritation and increased swelling / inflammation in and around the joint. Movement is accompanied by pain and reduced mobility due to limited joint flexion caused by inflammation.

It has been noted on many occasions following the application of cycloidal vibration that joint pain and swelling is reduced, in turn resulting in improved joint and general mobility.

Cycloidal vibration therapy will not cure the underlying cause of the Arthritis but will help relieve symptoms such as pain and joint movement and mobility. These are two key factors that can improve quality of life and general wellbeing.

Back Pain

Both upper and lower back pain have been found to be considerably reduced due to the gentle action created by cycloidal vibration therapy.

This gentle action reduces pain and relaxes the muscle groups removing any oedema from the affected area. Pain in almost all cases, including radiating pain, is reduced by the reduction of pressure (from muscle spasm and/or swelling) on the nerves and reduction in muscle tightness.



Common Forms of Pain

Clinical Research

Vibration Therapy has been shown to be more effective at reducing pain when compared to a placebo therapy (ref 1). Published in the Medical Journal of Pain.

In a study of 366 people with different forms of musculoskeletal pain ranging from extremity pain-arthritis, tendinitis, nerve pain, lower back pain and others.

- 69% of people reported a reduction in pain due to vibration therapy
- 142 patients (64%) had more than 50% reduction
- 58 patients (26%) had complete relief

To obtain a maximal duration of relief of chronic pain the vibration therapy had to be applied for about 25-45 minutes with many reporting pain relief for 3 to 6 hours.

Ref 1. Lundeberg T, Nordemar R, Ottoson D. Pain Alleviation by Vibratory Stimulation. Journal of Pain 20 (1984) 25-44.

Vibration therapy can help with acute and chronic pain (ref 2). Published in medical journal Acta Physiologica Scandinavica. (Scandinavian physiology journal).

- In a study on 731 patients. 135 with acute pain. 596 with chronic pain
- Most of the patients had previously undergone treatments of various kinds without sufficient pain relief
- Vibration therapy for 20 minutes produced relief of chronic muscle pain that lasted at least 3 hours but in many cases 12 hours or more

Ref 2. Lundeberg T, Vibratory stimulation for the alleviation of chronic pain. Acta Physiol Scand Suppl. 1983; 523:1-51.

Regular vibration therapy use to reduce pain can help long term. Published in medical Journal Pain (ref 3).

- 68 percent of 267 patients with chronic neurogenic (nerve) or musculoskeletal pain such as neuralgia, low back pain, myalgia, tendonitis, epicondylitis and rheumatoid arthritis had pain reduction



It has been noted on many occasions following the application of cycloidal vibration that joint pain and swelling is reduced, in turn resulting in improved joint and general mobility.

“Vibration therapy for 20 minutes produced relief of chronic muscle pain that lasted at least 3 hours but in many cases 12 hours or more.”

Reference - Lundeberg T, Vibratory stimulation for the alleviation of chronic pain. Acta Physiol Scand Suppl. 1983; 523:1-51.

Common Forms of Pain

"59% had ongoing relief when followed up 18 months later, indicating that induced pain relief may have long lasting effects."

Reference - Lundeborg T. Long-term results of vibratory stimulation as a pain relieving measure for chronic pain. Pain.1984 Sept; 20 (1):13-23.

- All had pain suffered for 6 months to 8 years
- All had previously tried a range of analgesics and interventions to treat the pain with little effect
- 59% had ongoing relief when followed up 18 months later, indicating that induced pain relief may have long lasting effects

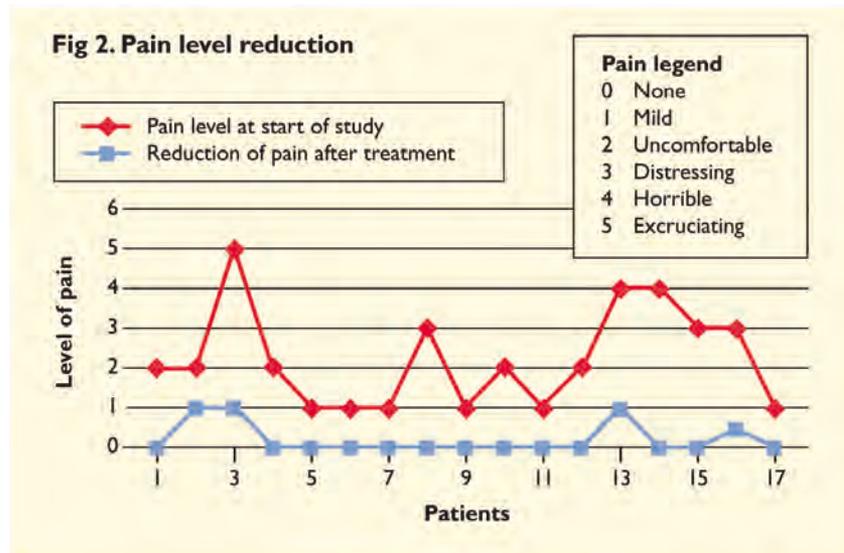
Ref 3. Lundeborg T. Long-term results of vibratory stimulation as a pain relieving measure for chronic pain. Pain.1984 Sept; 20 (1):13-23.

Examples

Example 1

Reduced lower leg wound pain as a result of cycloidal vibration.

BEFORE and AFTER results, published in the Medical Journal of Wound Care.



The Lancet medical journal editorial concludes:-

"...the treatment of pain by vibration, it is simple, safe, and highly effective."

Ref 4. Wilson JM, Arseculeranate YM, Yang, Y, Cherry, W. Healing Ulcers with cycloidal multidirectional therapy, Journal of Wound Care :11: No 9 Oct 2002

Common Forms of Pain

Medical journal the The Lancet editorial concludes:-

“the treatment of pain by vibration, it is simple, safe, and highly effective.”

Reference: Vibration therapy for pain. Lancet. 1992 Jun 20; 339(8808):1513-4.

Example 2

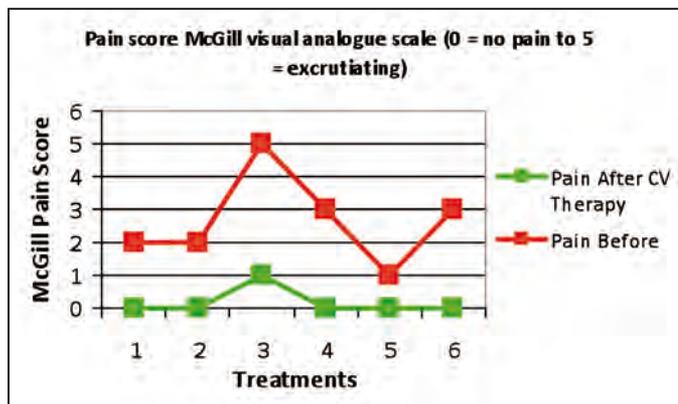
Dr Lin Berwick is an MBE, lecturer and writer on disability matters. Lin is blind, has cerebral palsy, is wheelchair dependant, suffers severe back, leg and knee pain and inflammation of the sciatic nerve.

- Before using cycloidal vibration Lin had twice-weekly acupuncture and was prescribed morphine patches but suffers side effects
- How was cycloidal vibration used? Behind the back over the area of pain while seated for 30 minutes
- Results: Within 20 minutes the pain levels had dropped dramatically and the reduction in pain lasts for up to 2 hours
- Cycloidal vibration is consistent at reducing her back pain and has reduced acupuncture sessions and she no longer requires morphine

Example

A 20 year old male with Cerebral Palsy and recurring back pain resulting from prolonged sitting in a wheelchair. Cycloidal vibration used in 20 minutes sessions results in:-

- Reduced back pain



Pain score before and after using Niagara Cycloidal Vibration:-

He commented “It is relaxing and I have more energy afterwards.”



Lin stated “It was excellent to reduce the pain and incredible to have extended periods of being pain free which I have not felt for some time. Not only did it reduce my pain my muscles felt softer and I was more relaxed overall.”

He commented “It is relaxing and I have more energy afterwards.”

Common Forms of Pain

Example 3

Mr. C is a 66 year old male and has suffered with muscular, joint pain and fatigue in the back, neck and upper and lower limbs for over 40 years. Three years ago Mr. C was diagnosed with fibromyalgia, he also suffers with polymyalgia, spondylosis and arthritis.

Mr C suffers permanently with varying levels of back, neck and shoulder pain, this then affects both his arms and legs. On an average day Mr C will take the following medication to help with his pain, Tramadol (TDS), Paracetamol (TDS) and Amitriptyline (OD). Mr C however states he has pain all the time and that the analgesia only helps reduce its intensity. Mr C has also experienced little or no pain reduction with acupuncture and TENS.

- How was cycloidal vibration used? The pad was used against the back and across the shoulders in the seated position over the area of pain. The pad was applied 3 times a day for 30 minutes
- Result of use – Mr C recorded changes in pain using a 0 - 10 visual analogue scale, before and after applying the pad
- On average Mr C recorded a score of 8 before use, after average score was 5. A reduction in pain and intensity was noted. This could last over 2 hours. Mr C also stated that he found the product comfortable to apply and very easy to use

(Pain scale. 0 = none, 2 = annoying, 4 = uncomfortable, 6 = dreadful, 8 = horrible, 10 = agonising).

Mr. C commented. "It also helped with muscle relaxation; I had more mobility in my neck and shoulders. I found it very beneficial to reduce my pain first thing in the morning. This made going out and daily activities more comfortable."

Mr. C commented. "It also helped with muscle relaxation; I had more mobility in my neck and shoulders. I found it very beneficial to reduce my pain first thing in the morning. This made going out and daily activities more comfortable."

Circulatory Problems

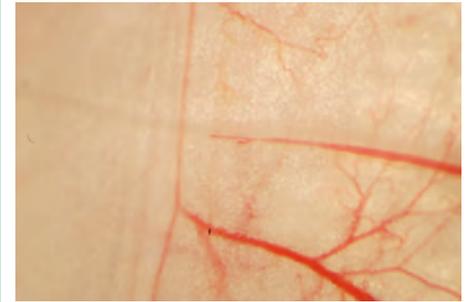
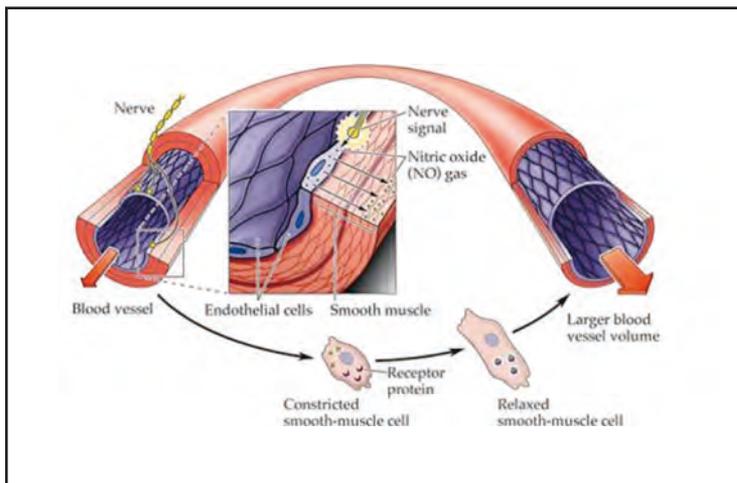
Oedema / Swelling

Oedema is an abnormal accumulation of fluid beneath the skin or in one or more cavities of the body that produces swelling. Peripheral lower limb oedema is the more common type and results from water retention. It can be caused by circulatory problems, either directly or as a result of heart problems, or conditions like varicose veins, thrombophlebitis, insect bites, and dermatitis. Cycloidal vibration has produced superb results in the reduction of oedema.

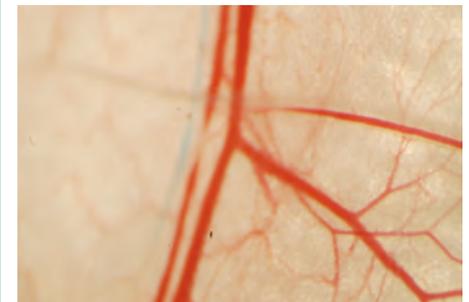
How does cycloidal vibration therapy increase circulation?

The non-invasive application of cycloidal vibration results in mechanotransduction the process of cells converting mechanical energy (vibration) into chemical activity.

The vibration penetration into the vascular cells that line the blood vessels results in the activation of a number of chemical reactions. This includes the release of nitric oxide that is a smooth muscle relaxer. Relaxation of the smooth muscle walls of the blood and lymph vessels increases the diameters of the blood vessels (veins and arteries), resulting in dilation and greater blood flow



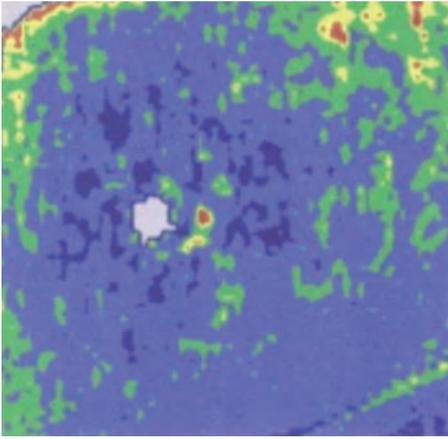
Before



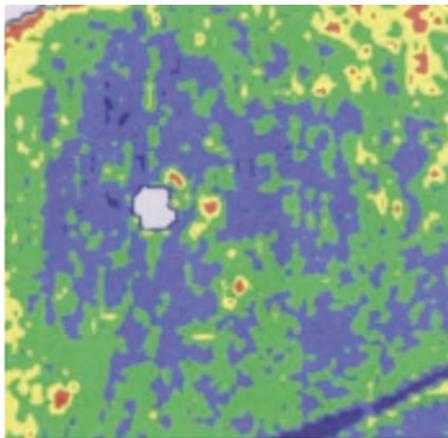
After 10 minutes of cycloidal vibration. Note the enlarged veins due to the increase in blood vessel flow.

Reference-Professor Pierre Lievens. Head of the department of Medical Rehabilitation Research. Faculty of Medicine, Vrije Universiteit Brussels. Presented at Wounds UK medical conference. Autumn 2011.

Circulatory Problems



Before



After

The blood flow is shown as the green and yellow area by scanning with Laser Doppler imaging before and after cycloidal vibration.

and fluid movement within the vessels.

Clinical Reference. Sackner MA, Gummels E, Adams JA. Mount Sinai Medical Center, Miami Beach, USA. Nitric Oxide is released into circulation with whole-body, periodic acceleration 127: 30-39 (2005). Published in Chest. Official medical Journal of the American college of Chest Physicians.

Increase in blood vessel flow and diameter observed in skin and soft tissue in the following study.

Influence of cycloidal vibration on skin blood flow changes observed in an invivo microcirculatory model.

Professor Pierre Lievens. Head of the department of Medical Rehabilitation Research. Faculty of Medicine, Vrije Universiteit Brussels. Presented at Wounds UK medical conference. Autumn 2011.

Increase in blood flow due to the non-invasive application of cycloidal vibration has been shown in numerous ways including measurement by Laser Doppler imaging and Plethysmography.

Laser Doppler imaging

In 2001 Professor T Ryan and colleagues at the Oxford Wound Healing Institute (Oxford Brookes University and Churchill Hospital) measured blood flow in skin / soft tissue of adults with Laser Doppler Ultrasound before and after cycloidal vibration. "They found that it recorded a consistent increase in blood supply following cycloidal vibration". Published in the medical journal of Tissue Viability 2001.

Ref: Ryan et al. The effect of mechanical forces (vibration or external compression) on the dermal water content of the upper dermis and epidermis, assessed by high frequency ultrasound.

Journal of tissue viability 2001 Vol 11 NO 3

Plethysmography (An instrument for measuring changes in volume resulting from fluctuations in the amount of blood).

A measure of mean blood flow in the lower legs compared vibration therapy to a placebo (a simulated intervention with no effect).

Circulatory Problems

Results showed an increase in peripheral lower limb blood flow approximately 14% higher than that shown in the placebo. Peak blood flow occurred after 22 minutes of vibration therapy.

Study carried out at the Human Performance Centre, School of Physical Education, University of Otago, Dunedin, New Zealand in 2007 and published in the medical journal Clinical Physiological functional Imaging.

Ref: Button C, Anderson N, Bradford C, et al (2007). The effect of multidirectional mechanical vibration on peripheral circulation of humans. Clin Physiol Funct Imaging, 27, pp211–216.

Lymphatics

90% of fluid in the body is circulated by blood vessels and 10% by the lymphatic system as the body's overflow system. Lymphatics are vital in removing excess fluid and oedema, as they remove not only fluid, but also the larger particulate matter (proteins, microphages, macrophages, metabolic waste material, etc.), which cannot be removed via the blood capillary system.

Clinical Research - Oedema Swelling

Cycloidal vibration stimulates lymphatic flow.

Reference - Influence of cycloidal vibration on lymphatic flow and changes observed in lymphatic vessels.

Professor Pierre Lievens, Vrije Universiteit Brussels. Head of the department of Medical Rehabilitation Research. Vrije University Brussels, presented at Wounds UK 2008 medical conference. 2008.

The combined effects of stimulating blood flow and lymphatics can help reduce the symptoms of

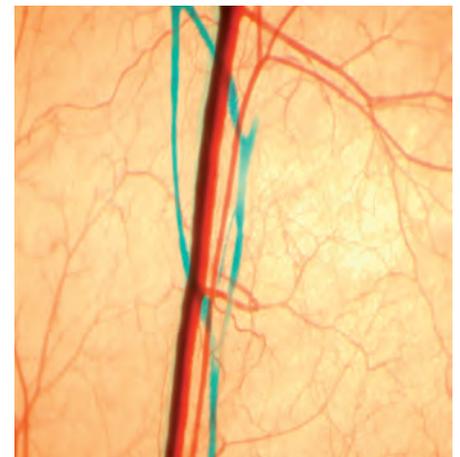
- Oedema (e.g. lower leg, ankle and foot swelling)

A study by Dr Cherry published in the Journal of Wound Care in 2002 showed that the application of cycloidal vibration showed up to a 15% reduction in leg limb volume/swelling when applied daily for three months.

Reference: Wilson J, Arseculeratne YM, Yang Y and Cherry GW Oxford Wound Healing Institute, Churchill Hospital, Oxford, Journal of Wound Care Vol 11 NO 9 October. 2002



Before



After

The Lymphatic vessel is highlighted with blue dye before and after 10 minutes cycloidal vibration. Clearly visible in the after photograph is the increased lymphatic flow.

Cyclo-Therapy – Effects on Wounds

Cycloidal vibration improves circulation which increases the delivery of healthy oxygenated blood and the removal of waste products and toxins.

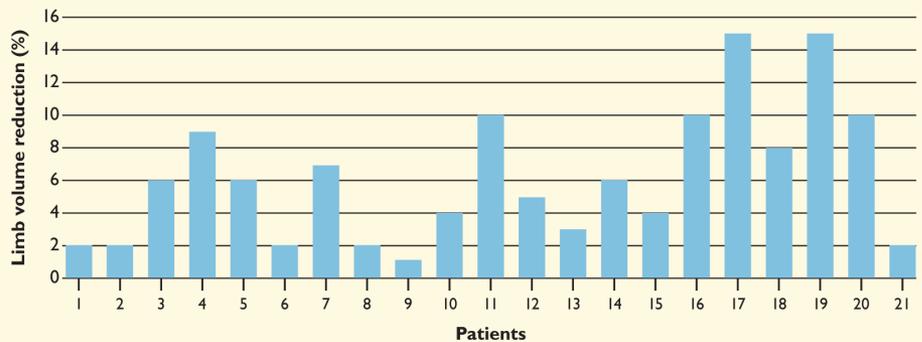


Leg skin infection (Cellulitis) - leg and foot swelling before and after 5 days of cycloidal vibration.

A study by wound care specialists and the vascular department at a UK hospital in 2007 showed that patients with lower leg skin infections and leg swelling, having bed rest alone (for a period of seven days) had an average reduction in lower leg circumference and swelling of 2.3%.

This compared to an average reduction of 6.6% for patients having bed rest and cycloidal vibration.

Fig 3. Percentage of limb volume reduction



Published in the medical Journal of Wound Care 2007.

Reference: Johnson S, Leak K, Mostyne E, Tan P, Pillay W, Singh S, Cuschieri "Can cycloidal vibration plus standard treatment reduce lower limb cellulitis treatment times? Results from a randomised controlled trial. Journal of Wound Care. Vol 16, No 4, April 2007.

Leg ulcers and pressure wounds (stage 1)

Cycloidal vibration improves circulation which increases the delivery of healthy oxygenated blood and the removal of waste products and toxins.

This can improve the healing of soft tissue injury and wounds like leg ulcers. Increased circulation stimulates the production processes involved in the healing and regeneration of cells and soft tissues.

Cyclo-Therapy – Effects on Wounds

Clinical Research - Wound Healing

A study by Dr Cherry published in the Journal of Wound Care in 2002 showed that the application of cycloidal vibration 3 times a day for 30 minutes in conjunction with bandaging can stimulate the healing of 'hard to heal' venous leg ulcers.

Patients on the trial had their leg ulcers for an average of 8 months duration. (They can be defined as 'hard to heal')

Key outcomes included:-

- 62% of the patients receiving cycloidal vibration to the lower leg healed within 12 weeks and of the rest all showed a 31-90% improvement in healing

Conclusion of the study:-

- Using cycloidal vibration to stimulate lower leg circulation, in combination with traditional forms of treatment, reduces healing times
- It not only improves patient outcomes but also their quality of life by reducing pain

Reference: Wilson J, Arseculeratne YM, Yang Y and Cherry GW Oxford Wound Healing Institute, Churchill Hospital, Oxford, Journal of Wound Care. Vol 11 No 9 October 2002

"It not only improves patient outcomes but also their quality of life by reducing pain."

Reference-Wilson J, Arseculeratne YM, Yang Y and Cherry GW. (Healing venous ulcers with cycloidal multidirectional vibration therapy.) Oxford Wound Healing Institute, Churchill Hospital, Oxford, Journal of Wound Care. Vol 11 No 9 October 2002.

An 84 year old female with a venous leg ulcer received standard treatment for six weeks showing no improvement. After using cycloidal vibration for four weeks scabs formed and the ulcer was healed during week six.



Before

After

Cyclo-Therapy – Effects on Wounds

“A significant increase in blood flow was seen in both the healthy and diabetic groups.”

Reference - Maloney-Hinds C, Petrofsky JS, Zimmerman G, Hessinger DA (2009). The role of Nitric Oxide in skin blood flow increases due to vibration in healthy adults and adults with type 2 diabetes. *Diabetes Technology and Therapeutics*. 11:1; 39-43.

Clinical Research – Pressure wounds (Stage 1)

A study carried out at the University of Tokyo in Japan determined that patients with Stage 1 pressure damage to the skin would heal quicker if vibration therapy was applied 3 times a day for 30 minutes when compared to patients that did not receive vibration therapy.

Study published in medical journal *Advances in Skin and Wound Care* 2010.

Reference - Arashi M, Sugama J, Sanada H, et al (2010). Vibration Therapy Accelerates Healing of Stage I Pressure Ulcers in Older Adult Patients. *Advances in Skin & Wound Care*. 23(7):321-327

Poor circulation due to diabetes.

A complication of diabetes is both micro and macro-vascular disease, the narrowing, hardening and blocking of both large and small blood vessels. With peripheral vascular disease this occurs in the lower legs resulting in poor circulation. Cycloidal vibration can increase blood vessel dilation and stimulate blood flow in the limbs of diabetics.

Clinical research, blood flow diabetes.

In clinical research published in the medical journal *Diabetes Technology* in 2009 (carried out at the Department of Physical Therapy, Loma Linda University, California) skin blood flow was measured and compared in age matched healthy older adults to adults with type 2 diabetes when both groups were submitted to vibration therapy.

A significant increase in blood flow was seen in both the healthy and diabetic groups. There was an increase in blood flow in the diabetic group but it was less than in the healthy group. As already described diabetes can result in the thickening of blood vessel walls that can impede dilation of the smooth vascular muscle wall of vessels reducing blood flow. However the increase in blood flow in the diabetics due to vibration would still have circulatory benefits.

Reference - Maloney-Hinds C, Petrofsky JS, Zimmerman G, Hessinger DA (2009). The role of Nitric Oxide in skin blood flow increases due to vibration in healthy adults and adults with type 2 diabetes. *Diabetes Technology and Therapeutics*. 11:1; 39-43.

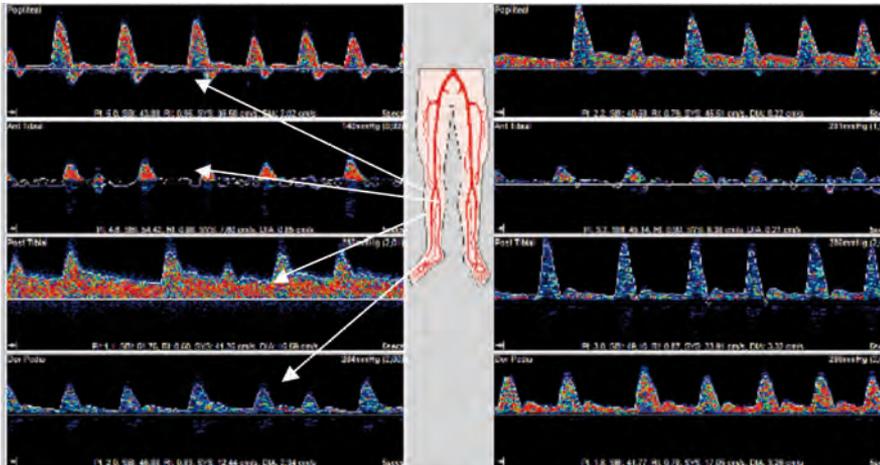
Cyclo-Therapy – Effects on Wounds

Examples

Example 1

This is shown by measuring blood flow in the arteries of the lower leg by means of Doppler Ultrasound imaging. Both the right and left legs of this 72

Patient 72 year old male with poor blood flow due to diabetes resulting in amputation of all his toes to the right foot and a 6 month old non-healing post surgical foot wound. Risks of infection and complications due to an open wound.

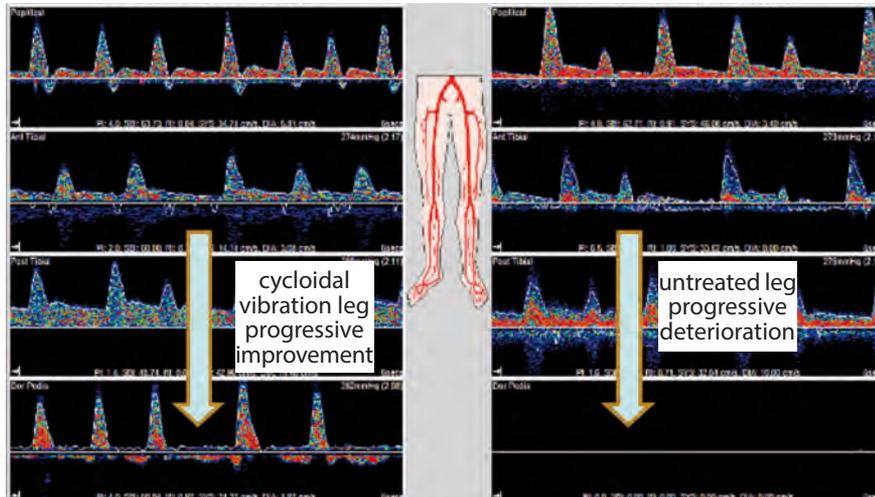


Right Leg Foot Wound (at start)

Left Leg



After 12 weeks of cycloidal vibration to the lower limb the foot wound had healed.



Right Leg Foot Wound (treated)

Left Leg (untreated)

The treated leg showed improved blood flow

The untreated leg showed progressive deterioration of blood flow

Cyclo-Therapy – Effects on Wounds



Before

After

Six month old leg ulcer healed after 12 weeks of cycloidal therapy.

Stimulating circulation can also benefit conditions such as:-

- Walking pain due to poor circulation and peripheral vascular disease.
- Cold feet due to poor circulation.

year old man are showing signs of progressive changes in his lower limb blood flow due to diabetes.

The right lower leg was treated with cycloidal vibration to aid the healing of a six month old foot wound. This was compared to the left leg that did not receive cycloidal vibration.

After 16 weeks of cycloidal vibration the wound had healed and from further Doppler imaging it was shown that there was a marked improvement in blood flow in the treated right leg, compared to a deterioration of blood flow in the untreated left leg.

Reference – Clinical case presented: Improved lower limb circulation and wound healing due to cycloidal vibration leg progressive improvement. Doppler comparison of the untreated diabetic limb. Dr Jurkovic. Consultant Vascular Surgeon, Eskamed Vascular and Wound Care Clinic, Topolcany, Slovakia. presented at Wounds UK 2011 medical conference.

Example 2

Diabetic patient ankle trauma wound

Type 1 Diabetic with a history of foot wounds/ulcers resulting in tissue ischemia, infection and multiple amputations including a left leg below the knee amputation and right foot 2nd and 3rd toe amputations. None of his previous ulcers had healed. He had a non-healing 6 month old right ankle wound. After 12 weeks of cycloidal vibration the wound had improved and continued to heal.

Effects on the Nervous System

Nervous System

- Tension
- Anxiety
- Insomnia

All the above often occur with muscle tightness or tension otherwise known in physiotherapy as high tone or spasticity. Medically this can be a severe and constant problem for sufferers of cerebral palsy, post stroke victims and following spinal injuries.

Muscle tightness or spasm can result in reduced mobility and pain. Reducing muscle tightness or spasticity will improve joint mobility and movement as well as lead to general relaxation.

How is cycloidal vibration beneficial for muscle relaxation?

In the skin and muscles there are sensory and mechanical receptors that respond to cycloidal vibration, “mechanical stimulation”, this can be described as a diffuse humming feeling which is localized in the deep tissues. These receptors can reflexively override pain sensations and cause the muscles to vary in length by a small amount resulting in relaxation.

Clinical References demonstrating the above include:-

After effects of mechanical vibration and muscle contraction on limb position-sense. Yohei I et al, Department of Physiology, Showa University School of Medicine, Tokyo, Department of Orthopaedic Surgery, Showa University Fujigaoka Hospital, Japan. Published in medical journal. Muscle and Nerve October 2004.

Relaxation Measured by EMG as a Function of Vibrotactile Stimulation. D. W. Matheson, et al. Department of Psychology, University of the Pacific, Stockton, California 95204. Published in medical journal. Biofeedback and Self-Regulation, VoL 1, No 3, 1976.



Muscle tightness or spasm can result in reduced mobility and pain. Reducing muscle tightness or spasticity will improve joint mobility and movement as well as lead to general relaxation.

Nervous System

Clinical Research

For example in a study published in the Journal of Perception Motor Skills the effect of vibration stimulation on muscle relaxation was measured by EMG recording (a technique for evaluating and recording the electrical activity produced by skeletal muscles).

It was predicted that low-frequency vibration stimulation (less than 70 Hz) would facilitate muscle relaxation. The participants (8 male and 8 female) were randomly assigned to split-plot, before/after design consisting of four between-subjects treatments and one within-subjects treatment (pre-treatment and post-treatment). The between-subjects treatments were footrest vibration, backrest vibration, footrest-backrest vibration combined, and control. The within-subjects treatment included pre-treatment and post-treatment levels. Results of repeated-measures analyses of variance on each set of data yielded a significant change from pre-treatment to post-treatment condition on all EMG and subjective report measures of muscle tension except the control.

Reference - Vibration effects on three measures of relaxation Johnson MD, Hensel CL, Matheson DW. Percept Mot Skills. 1982 June; 54(3 Pt 2):1071-6

Vibration therapy has been shown to reduce muscle tension and tightness in some of the severe medical conditions mentioned. This is illustrated in the following clinical research published in Neuro-rehabilitation and Neural Repair Journal in 2011. A study examined whether repeated muscle vibration over the flexor carpi radialis (forearm) and biceps would induce long lasting changes.

Thirty stroke patients with wrist and elbow contractions due to muscle tension were randomly split into two groups to receive physiotherapy and vibration therapy or physiotherapy alone.

Patients who received regular muscle vibration and physiotherapy had increased limb movement and increased muscle relaxation compared to those that had physiotherapy alone.

Reference - Vincenzo M. Saraceni and Carlo Caltagirone et al. Long-Term Effects on Cortical Excitability and Motor Recovery Induced by Repeated Muscle Vibration in Chronic Stroke Patients. Neurorehabil Neural Repair 2011 25: 48.

“Patients who received regular muscle vibration and physiotherapy had increased limb movement and increased muscle relaxation compared to those that had physiotherapy alone.”

Reference - Vincenzo M. Saraceni and Carlo Caltagirone et al. Long-Term Effects on Cortical Excitability and Motor Recovery Induced by Repeated Muscle Vibration in Chronic Stroke Patients. Neurorehabil Neural Repair 2011 25: 48.

Nervous System

A further study highlighted that spasticity and muscle tension is common after spinal cord injury, resulting in exaggerated tendon jerks, clonus, and spasms. In this study the effects of vibration on the tightness of the rectus femoris muscle (thigh muscle) of 19 patients with spinal cord injury was measured by clinical and electrophysiological means before and after the application of vibration therapy to the area.

They found that prolonged vibration on lower extremity muscles decreased limb spasticity (decreased muscle tension) in patients with spinal cord injury.

Published in the Clinical Neurophysiology Journal 2011.

Reference- Murillo N, Kumru H et al Decrease of spasticity with muscle vibration in patients with spinal cord injury. Institut Guttmann, Hospital de Neurorehabilitación, Institut Universitari adscript a la Universitat Autònoma de Barcelona, Spain. Clin Neurophysiol. 2011 June; 122(6): 1183-9. Epub 2010 Dec 18.

Examples

Example 1

LM is a 20 year old male and has cerebral palsy.

LM suffers with:-

- Involuntary movements of upper and lower limbs
- Increased upper and lower limb tone (muscle tightness / tension)
- Decreased independent weight bearing ability. (Unable to stand un-aided)

Cycloidal vibration was used to reduce lower limb muscle tension/tone with a view to enhance control and improve standing transfers from his wheelchair. A cycloidal vibration pad was placed under the top of the legs lying supine, at a speed set to 3 – 3.5 for 20 mins.

Results - Independent standing time pre and post cycloidal vibration was recorded with an average taken from three un-aided stands. The results demonstrate on average LM's un-aided standing time increased by 24 seconds after each session of cycloidal vibration. This was a 37% improvement as a result of improved muscle control and relaxation.



LM is a 20 year old male with Cerebral Palsy who after treatment enjoyed improved walking tolerance.

Nervous System

Physiotherapist comments after cycloidal vibration therapy

- Less involuntary upper limb movement when standing
- Improved walking tolerance

Summary - Overall when cycloidal vibration was applied to LM's legs his independent standing time increased afterwards. It is hypothesized that this is due to improved reduction in spasticity (muscle tension) resulting in better limb control.

Example 2

NT is an 18 year old female and has cerebral palsy.

- Lumbar Lordosis
- Poor pelvic and lower limb postural alignment
- Decreased independent weight bearing
- Increased lower limb tone (muscle tightness) particularly when sitting and weight bearing

Cycloidal vibration was used to reduce tone (increase muscle relaxation) at the lower back and top of the legs to determine any change in walking ability (stride/gait).

How was cycloidal vibration therapy used?

- A cycloidal vibration pad was placed under the top of the legs and the lower back in a supine position. Speed 2.5 - 3.3 for 20 mins

Results

- Consistently improved right foot clearance post therapy
- Consistently reduced extensor thrust of trunk post therapy

NT's comments

- 'Easier to walk'
- 'Feel able to walk faster'

Summary - Overall when cycloidal vibration was applied to NT there was a reduction in tone/spasticity (muscle tightness) which allowed for improved limb control resulting in improved walking ability (stride/gait).



NT is an 18 year old female with cerebral palsy who found that walking was easier after treatment.

Effects on Respiration

Respiratory

- COPD – chronic obstructive pulmonary disease
- Bronchiectasis
- Asthma

Positional benefits

The positional benefits of our products may help alleviate the secondary symptoms of some of the respiratory conditions stated above. Cycloidal vibration may help secondary symptoms of the above conditions as a result of aiding muscle relaxation as previously explained and may help mobilize chest congestion to improve the process of chest clearance.

Cycloidal vibration may stimulate the smooth muscles of the trachea bronchial tubes. These muscles are controlled by the automatic nervous system but we have seen how muscles respond favourably to cycloidal vibration, usually within five to ten minutes without other modalities (i.e. muscle relaxing drugs).

Effective chest clearance is vital to improve breathing and to prevent chest infections.

Clinical Research

Vibration affects breathlessness

In the Journal of Applied Physiology in 1991 a study evaluated the effect of chest wall vibration (115Hz) on breathlessness. Breathlessness was induced in normal subjects by a combination of methods (hypercapnia and an inspiratory resistive load; both minute ventilation and end-tidal CO₂ were kept constant.)

To evaluate potential contribution of intercostal (between the ribs) vibration to any changes in breathlessness several aspects of ventilation were assessed, including chest wall configuration, functional residual capacity (FRC), and the ventilatory response to steady-state hypercapnia.

Intercostal vibration reduced breathlessness ratings by 6.5 to 5.7% compared with deltoid (shoulder) vibration ($P < 0.05$) and by 7.0 & 8.3% compared with no vibration ($P < 0.05$). The reduction in breathlessness



Cycloidal vibration may stimulate the smooth muscles of the trachea bronchial tubes, which usually cannot be stimulated by normal body movements (exercise).

Effects on Respiration

was accompanied by either no change or negligible change in minute ventilation, tidal volume, frequency, duty cycle, compartmental ventilation, FRC, and the steady-state hypercapnic response.

It concluded that chest wall vibration reduces breathlessness and speculates that it may do so through stimulation of receptors in the chest wall.

Reference - MANNING, HAROLD et al. Effect of chest wall vibration on breathlessness in normal subjects. *J. Appl. Physiol.* 71(l): 175-181,1991.

'Improving Secretion Clearance in Airways' a 2009 clinical study compared 45 patients receiving routine positioning care, which consisted of a change in body position every 2 hours, to 50 patients receiving routine positioning care plus the use of chest vibration nursing intervention for 72 hours. This intervention consisted of placing a mechanical chest wall vibration pad on the patients back for 60 minutes when the patient was in a supine position. The chest vibration intervention was performed 6 times a day. All patients were in-patients on intensive care receiving mechanical ventilation. Outcomes measured were dry sputum weight (DSW) per 24 hours and lung collapse index (LCI); these were measured at 24, 48 and 72 hours.

Patients who received the chest vibration nursing intervention had greater DSW and lower LCI after 24 hours. Pre-test DSW and group could explain 48.2% of the variance in DSW at 24 hours. The LCI at 24, 48 and 72 hours were all significantly improved in the chest vibration group compared to the non-vibration group. The previous LCI measured was the most significant predictor of the next LCI measured. A significant difference was found between the non-vibration and vibration groups in their 24, 48 and 72-hour DSW and LCI after vibration, when monitored by the generalized estimating equation in time sequence.

Conclusion: The results suggest that chest vibration may contribute to expectoration among ventilated patients in an ICU. Chest vibration nursing intervention is a safe and effective alternative pulmonary clearance method and can be used on patients who are on ventilators in ICUs.

Reference - Chen YC, Wu LF et al. Department of Nursing, Taipei Veterans General Hospital, Taipei, Taiwan. Using chest vibration nursing intervention

"The LCI at 24, 48 and 72 hours were all significantly improved in the chest vibration group compared to the non-vibration group."

Reference - MANNING, HAROLD et al. Effect of chest wall vibration on breathlessness in normal subjects. *J. Appl. Physiol.* 71(l): 175-181,1991.

Effects on Respiration

to improve expectoration of airway secretions and prevent lung collapse in ventilated ICU patients: a randomized controlled trial. J Chin Med Asso. 2009 Jun;72(6):316-22.

Effects of vibrating pad on chest clearance.

The effect of vibration (41.0 +/- 5.4 Hz; 2 mm amplitude) on the clearance of lung secretions was ascertained in 10 patients with chronic bronchitis who complained of difficulty in raising sputum. Vibration was applied to the back for one hour by an electrically driven pad while the patients reclined on a couch with the trunk at 45 degrees to the vertical. Each patient had randomized control and experimental runs of 5 hours duration that were identical in all respects except for vibration. The rate of clearance of secretions from the lung was assessed by serial whole lung counts after inhaling mono-dispersed tracer particles tagged with a gamma-emitting radioisotope (technetium-99m) and by sputum production. The mean rates of clearance and of sputum production were slightly higher during the vibration runs than the control runs but the differences were not significant.

Reference - Thomson ML, Phillipakos D. A preliminary study of the effect of a vibrating pad on bronchial clearance. Am Rev Respir Dis. 1976 Jan;113(1):92-6.

“Chest vibration nursing intervention is a safe and effective alternative pulmonary clearance method and can be used on patients who are on ventilators in ICUs.”

Reference - Thomson ML, Phillipakos D. A preliminary study of the effect of a vibrating pad on bronchial clearance. Am Rev Respir Dis. 1976 Jan;113(1):92-6.

Additional References

CYCLO-THERAPY MEDICAL RESEARCH HISTORY

The following is a summary of a selection of additional medical research, scientific study and published articles relating to cycloidal vibration.

CYLCOID VIBRATION THERAPY IN CHRONIC RHEUMATOID ARTHRITIS

Ruth M. Lieber, RPT, Director, Dept. of Physical Therapy, Robert B. Brigham Hospital, 10 Barbara R. Washburn, RPT, Staff Member, Dept. of Physical Therapy, Robert B. Brigham Hospital, Boston, Massachusetts, USA. Theodore B. Bayles, M.D., Director of Research, Robert B. Brigham Hospital, Boston, USA.

“Cycloidal vibration therapy in the joints of chronic rheumatoid arthritics was proven to be simple, safe and effective in the cases studied. There is an immediate, repeatable, beneficial effect of treatment in that pain, muscle spasm and stiffness are diminished in nearly all instances which lasts from forty minutes to two or more hours. The additive gains of long term therapy are difficult to evaluate in a chronic variable disease but the increase in the activities of daily living resulting from the use of this equipment may well play a significant role in the long term therapy of this disease”.

THE INFLUENCE OF CYCLOIDAL VIBRATION ON MUSCLE SPASM

William Bierman, MD, University of California Medical School, San Francisco, Ca. USA. READ AT THE 33RD SESSION OF THE AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION, DETROIT, MICHIGAN, USA 1995

“Cycloidal vibration is an agency which can influence striated muscle spasm occurring in varied clinical states. It possesses that advantage of relative innocuousness, of simplicity of use, and of ready availability”.

INFLUENCE OF MECHANICAL CYCLOIDAL VIBRATION ON EMG POTENTIAL DURING MAXIMAL MUSCLE TENSION

D. G. Young Jnr., M.D., Royal Free Hospital, London, England. 1975

“The application of Tri-Planar Cycloidal vibration (50 c.p.s.) for 30 minute time periods reduces the frequency of occurrence of high voltage motor unit smooth contractors during maximal muscle contraction. This suggests more smooth use of muscular energy and better muscular co-ordination. This inhibitory effect is produced at segmental spinal level as shown. It is hypothesised that Supra-Spinal level inhibition in the normal subject plays an additional inhibitory role”.

JOINT MOBILITY CHANGES DUE TO LOW FREQUENCY VIBRATION AND STRETCHING EXERCISE

J. Atha, PhD, MA, DPE, Loughborough University of Technology, Loughborough, Leicester. D.W. Wheatley, Bsc., Loughborough University, Loughborough, Leicester, England. BRITISH JOURNAL OF SPORTS MEDICINE Vol. 8 No. 1 MARCH 1976

“It has been shown that fifteen minutes of locally applied cycloidal vibration of low amplitude and frequency is equally as effective as a fifteen minute program of flexibility exercise in increasing short term mobility of the hip flexors. It is suggested that this mobility change may occur as a result of improved muscle relaxation”.

MOBILISING EFFECTS OF REPEATED MEASUREMENT OF HIP FLEXION

J. Atha, PhD, MA, DPE, Dept. Human Sciences, Loughborough University, Leicester. D. W. Wheatley, Bsc, Dept. Human Sciences, Loughborough University, Leicester, England. BRITISH JOURNAL OF SPORTS MEDICINE 10 00-00 1976

“The following conclusions are drawn:

A. The act of increasing joint mobility increases mobility.

B: The magnitude of the effect is a linear and quadratic function of the frequency of measurements, which eventually levels off to a stable baseline.

C: There is a slight statistically non-significant but consistent tendency for these mobilising effects to persist for more than one day”.

LITHENS AND HAMSTRING MUSCLES

A. Stevens University of Leuven, Belgium H. Stuns University of Leuven, Belgium 12 N. Rosselle University of Leuven, Belgium F. Decock University of Leuven, Belgium. ELECTROMYOGOR CLIN NEUROPHYSIOL Vol. 17 507-511 1977

“We found a significant difference between lithe and stiff subjects, concerning the maximum angle of the stretch movement. The means integrated activity did not differ. It was only in the stiff subjects that repeated stretch movements provoked a decreasing gradient of the maximal angle and the point at which the stretch activity started. The mean integrated activity showed no gradient as a function of the 5 stretch movements. These findings may suggest the hypothesis that the visco-elastic component of a stiff muscle changes by stretching while the neurological component remains constant. These tendencies were not found in lithe subjects. The occurrence of the T.V.R. under

Additional References

test conditions was significantly less in subjects with lithe hamstrings. This data supports our hypothesis of enhanced gamma activity among stiff subjects. The analysis of the integrated activity in this test situation, however, does not corroborate this hypothesis”.

CYCLOIDAL VIBRATION THERAPY – A GENERAL REVIEW WITH SPECIFIC REFERENCE TO RESEARCH INTO THE EFFECTS OF LUMBO-SACRAL PAIN

L. Culley, MCSP, Derby Royal Infirmary, Derby, England

C. R. Hayne, FSCP, Derby Royal Infirmary, Derby, England PHYSIOTHERAPY JUNE 1984

“The experience gained as a result of this nine month study to test the hypothesis about the effects of specific frequencies of cycloidal vibration therapy on low back pain indicates that with the exception of nerve root entrapment syndromes, cycloidal vibration therapy of low amplitude between the frequency band of 47-53 Hz has beneficial effects. Patients treated demonstrated an increased range of spinal movement, lowered blood pressure and respiration rate after treatment. They subjectively reported that they felt looser, more relaxed and that the treatment was very soothing. Many fell asleep during treatment. It is possible that the majority of the effects achieved were due to a combination of mechano receptor stimulation and endorphine release. Ideally this project should be considered to be the pilot study for a much longer and more detailed programme of research.

Many valuable lessons have been learnt including the difficulties of trying to evaluate the subjective elements of physiotherapy treatments, particularly those related to pain evaluation.

THE INFLUENCE OF CYCLOIDAL VIBRATIONS ON THE KNEE JOINT MOBILITY OF OSTEO-ARTHRITIS PATIENTS

Professor P. Lievens, MD, Medical Faculty, University of Brussels, Belgium J. Van de Voorde, Physiotherapist, Medical Faculty, University of Brussels, Belgium. PHYSIOTHERAPY, Vol. 70, No. 6 JUNE 1984

“The paper describes a study conducted on an experimental and control group to show the influence of cycloidal vibration on the knee joint mobility of osteo-arthritic patients. Although the results did not show that one treatment of cycloidal vibration had an effect on mobility, a significant increase in mobility was shown after ten days”.

INFLUENCE OF CYCLOIDAL VIBRATION ON THE PAIN THRESHOLD

Professor P. Lievens, MD, Medical Faculty, University of Brussels, Belgium E. Kerckhofs, Medical Faculty, University of Brussels, Belgium. P. Snykers, Medical Faculty, University of Brussels, Belgium

“The effects of tridimensional mechanical vibration are studied with respect to possible changes of the perception threshold and pain-threshold in healthy subjects and in patients. The thresholds were experimentally induced by an electro stimulation method deduced from literature. The mechanical vibrations were applied on the right forearm of the healthy subjects and in the painful region of the patients suffering from pain originating from PSH or sciatica. The vibrations were applied in different ways.

One treatment of 10 minutes.

Three successive treatments of 10 minutes.

Three successive treatments of 10 minutes with frequency changes during treatment.

Pain sensations were objectivated by means of a visual analogue scale. In healthy humans no alteration of the pain-threshold occurred, but in patients a significant increase was detected and was correlated to a clinical but incomplete pain relief”.

THE INFLUENCE OF MULTIDIRECTIONAL VIBRATIONS ON WOUND HEALING AND ON THE REGENERATION OF BLOOD AND LYMPH VESSELS

Professor P. Lievens, MD, Medical Faculty, University of Brussels, Belgium. Professor A. Leduc, Medical Faculty, University of Brussels, Belgium. J. Dewald, Medical Faculty, University of Brussels, Belgium LYMPHOLOGY Vol. 14 179-185 DECEMBER 1981

“Experiments show that the cycloidal vibration is not an aggressive technique; when applied to the newly formed lymph-vessels in the scar, we observed that they were not damaged by this technique whereas we had found in earlier studies that a gentle effleurage destroyed the newly formed lymph network in the scar. When using this treatment, little or no adhesion of the scar to the underlying tissues is observed. There is a significant decrease of the local edema when compared to a standard group of wound healing without multidirectional vibrations. There is also a significant decrease of general and local congestion and no increase in the permeability of veins and lymph vessels is present. The application of the local multidirectional vibration therapy accelerates the regeneration of the severed vein and lymph vessel”.

IMPROVEMENT OF BLOOD FLOW IN ISCHAEMIC LIMBS BY USE OF Cycloidal vibration THERAPY

Dr. D. Askari, Government Hospital, Jaffa, Israel. Dr. H. Rosov, Government Hospital, Jaffa, Israel

“The improvement in rest pain and walking ability were striking. Considering the rise in toe temperature and the lowering of ankle-toe differences in the occlusive PVD cases, and the increase in Reynaud’s group, it appears that

Additional References

the effects are due at least in part to a more desirable distribution of the available blood throughout the area. This physical modality has been used in a number of countries, mainly in the USA for over twenty years in the alleviation of pain and muscle spasm in a variety of conditions including back pain, arthritic and rheumatic conditions, disseminated sclerosis, paraplegia, hemiplegia, and in rehabilitation. It is used in some fifty hospitals in the United Kingdom to reduce viscosity of phlegm in the lungs of chronic and acute bronchitis, and has applications in sinusitis and migraine. However, as far as is known this is the first time that its properties have been investigated in severe peripheral vascular disease”.

THE APPLICATION OF CYCLOIDAL VIBRATION IN THE TREATMENT OF CHEST PATIENTS AND PATIENTS CONFINED TO BED

Henryk Nrehorow, MCSP, Superintendent Physiotherapist, Beneden Chest Hospital, Kent, England

“After many treatments with cycloidal vibration on those suffering from breathing difficulties, it has been established that it can bring dramatic relief, especially to those who suffer a nearly constant state of breathlessness. The rhythm of the vibration influences relaxation and helps to reduce congestion, enabling the patient to breathe more efficiently. Cycloidal vibration should be found of particular benefit in nursing homes and geriatric establishments. The main advantage of cycloidal vibration is its relaxing effect on those who have a severe degree of breathing difficulty. It provides an ideal medium for the treatment of non-ambulant patients and of older age groups, especially if lack of physiotherapy staff prevents activating these patients by therapeutic exercises. It can also be used as a supplementary to postural drainage”.

THE USE OF CYCLOIDAL VIBRATION AS AN AID IN CHEST PHYSIOTHERAPY

C. R. Hayne, Derbyshire Royal Infirmary, Derby, England THERAPY WEEKLY P.9 APRIL 1987

“The vibration pad has been used mainly on patients with fractured ribs and with those who are unable to tolerate percussion or manual vibration. The frequency selected is at the lower end of the possible range (about 16-20 Hz) as this was found to be most effective for sputum clearance and cough stimulation. A surprising side effect was pain relief. A number of patients experience pain relief at the end of their 15 minute treatment period. Also some patients, particularly those who were tense, relaxed visibly during treatment, promoting deeper breathing and general co-operation. Potentially, this form of treatment could help patients with chronic chest problems, particularly those with cystic fibrosis, bronchiectasis and emphysema. The treatment of asthma could also be considered, particularly with a view to inducing relaxation and deeper breathing”.

CYCLOIDAL VIBRATION AS A MODALITY IN INCREASING GENERAL RELAXATION, IMPROVING SLEEP PATTERNS AND DECREASING THE NEED FOR SEDATIVES AND HYPNOTICS IN GERIATRIC PATIENTS

David E. Irigoyen, MD, Central State Hospital, Louisville, USA 1971

“Although the introduction of this physical modality consumed some amount of nursing care and encouragement in the beginning, the fact is that our use of tranquilisers, sedatives and hypnotics in the geriatric group of patients has been substantially decreased and the patients are more amenable and more co-operative in their institutional care than has been our previous experience. We believe that this physical approach to the problems we encounter, such as anxiety, insecurity and insomnia, is much superior to the widespread use of drugs for these purposes and has none of the side effects of the latter. With our new “unit” system of patient care and more adequate psychiatric and nursing personnel, we are currently evaluating smaller cycloidal vibration pads or bed units to be used on chairs, loungers or beds, as the needs indicate. Certainly there is a place for such cycloidal vibration chairs in the long term care of geriatric patients in decreasing the nursing load, increasing general relaxation, improving sleep patterns and decreasing the need for tranquilisers, sedatives and hypnotics. All of these factors are important in decreasing the cost of the long term care of many geriatric patients”.

THE MECHANICAL MASSAGE ON STRESS RELATED BEHAVIOURS

D. W. Matheson, Phd, Behavioural Medicine Clinic, Dept. of Psychology, University of the Pacific, Stockton, California, USA 1987

“The effect of three dimensional cycloidal vibration was examined on ten physiological responses commonly associated with stress. An attempt was made to find composite response to vibration typical of human beings of different ages and sex. On the responses, only electrodermal response failed to show any consistent variation with regard to any one of the three independent variables (group, age and sex). The significant effects of vibration were observed in peripheral skin temperature, systolic and diastolic blood pressure. Peripheral skin temperature increases occurred as a result of vibration as shown by the tables, the numbers may or may not be clinically significant, Systolic blood pressure decreases occurred in the oldest age group as a function of vibration, a finding that could have important clinical implication. The most striking outcome was the significant decrease in diastolic blood pressure over days as a function of vibration. Although the groups appear different at the outset, analyses reveal a differential diastolic blood pressure effect during days 2 and 3. The effect could have substantial clinical implications for hypertensives. Finally, there were several normative outcomes worth a mention. The respiration results suggest that vibration might have the potential to impact both thoracic and abdominal respiration. Both respiration measures tended to behave

Additional References

as predicted. That is, thoracic respiration tended to decrease with vibration. Whilst not statistically significant, there may be clinical importance to the findings. A startling finding occurred with respiration rate increase with age, with the oldest two groups behaving in the hyperventilation range. The study provides a basis for substantial future research. The parameter of the stressors could be manipulated and the date during the stress periods must be compared to the baseline measures. The outcome strongly suggests that vibration, age and sex are important variables to study when it comes to study the effects of stress of human beings. Considering the conservative arrangements of the data analysis (looking at only measures during stressors), significant changes in 9 out of 10 physiological parameters due to one or more of the independent variables is impressive.

RELAXATION MEASURED BY EMG AS A FUNCTION OF VIBROTACTILE STIMULATION

D. W. Matheson PhD, Dept. of Psychology, University of the Pacific, Stockton, Ca, USA
D. Hiatrides J. Newkirk K. Twinem S. Thurston
BIOFEEDBACK AND SELF REGULATION, Vol. 1, No. 3 1, 285-292 1976

“To summarise, vibrotactile stimulation, especially in the lower body, appears beneficial in enhancing muscle relaxation. Low frequency vibration may be a valuable adjunct with relaxation training programmes such as progressive relaxation of biofeedback. Since relaxation is an important variable in any behaviour therapy setting, vibration may be a useful aid in alleviating various stress-related psychological disorders”.

THE ADJUSTAMATIC BED (PRESSURE POINT CHANGES AND MUSCLE RELAXATION)

Professor P. Lievens MD, Medical Faculty, University of Brussels, Belgium

“The dangerous locations of bed sores are the scapula, processus ishiadicus and the heels. By placing the patient in the Niagara position we are able to reduce the pressure in these points by 50%. This reduction in pressure will reduce the probability of bedsores. Together with the Niagara cycloidal vibration action, which will increase blood circulation, a better preventative situation for the patient is achieved. The lumbar lordosis which will produce the lower back pain will be transformed into a cyphosis and will create a painless position of the spine”.

CONTRAINDICATIONS – Cycloidal Vibration should not be used in the following circumstances if you have any of the following conditions. Deep vein thrombosis / Pulmonary embolism / Acute thrombophlebitis / Osteomyelitis / Aneurysm / Active cancer / Pregnancy / Uncontrolled epilepsy.

Caution

Do not use cycloidal vibration:-

- Directly against the chest or upper back if you have a pacemaker
- If you have an active infection and you are NOT receiving antibiotic therapy
- If you have unstable bone structures e.g. bone fragments
- Over an area of a recent joint replacement.
- Directly against an area of very severe osteoporosis.

Customer Service: NHC Technology Ltd, Colomendy Industrial Estate,
Rhyl Road, Denbigh, Denbighshire, LL16 5TS, UK.

Tel: +44 (0) 1745 811200

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