



Corporate Overview

Contents

- Vibrant Medical Overview
- Technology and Science
- Market and Product Review
- Vibro-Pulse®– Wound Care Applications



Vibrant Medical Overview

Vibrant Medial Overview

- Active therapy, non-invasive application for biologic response to stimulate regeneration of soft tissue and vascular structures.
- VIBRO-PULSE® Cycloidal Vibration Therapy (CVT) delivers a 3 dimensional oscillating low amplitude and frequency vibration energy.
- This activates biologic signaling at the cellular level to increase circulation and an angiogenic response to stimulate healing processes and regeneration.
- Wound Care – VIBRO-PULSE® addresses the \$10 billion global advanced wound care market.
- Physiological and wound care research.
- European regulatory approvals.
- UK healthcare supply contract and reimbursement approvals.
- Patent portfolio granted and pending.
- Reducing the burden on health care resource an active treatment that can be easily self –administered at home by the patient.



Technology and Science

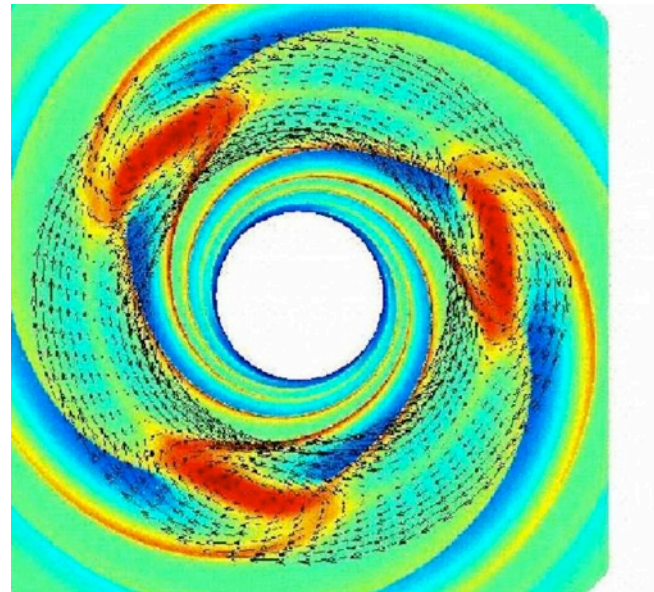
Science and Technology

- VIBRO-PULSE® Technology delivers cycloidal vibration a low amplitude, frequency vibration action that produces a 3 dimensional oscillating movement across the surface of the applicator.
- Mechanical stresses compressive, tensile, shear and distention at cellular level result in a cellular and physiological response.
- This initiates microcirculatory improvement and angiogenic stimulation resulting in the cellular expression of proteins and growth factors.
- Some proteins may also effect the inflammatory response of a wound to progress healing.
- Increase in neo-vascularization – an improved blood supply – to the site of treatment.

Science and Technology

- VIBRO-PULSE® –Cycloidal vibration therapy = a small amplitude, low frequency oscillating vibration that produces circular motion in three different directions across the surface of the applicator pad.

Vibro-Pulse®



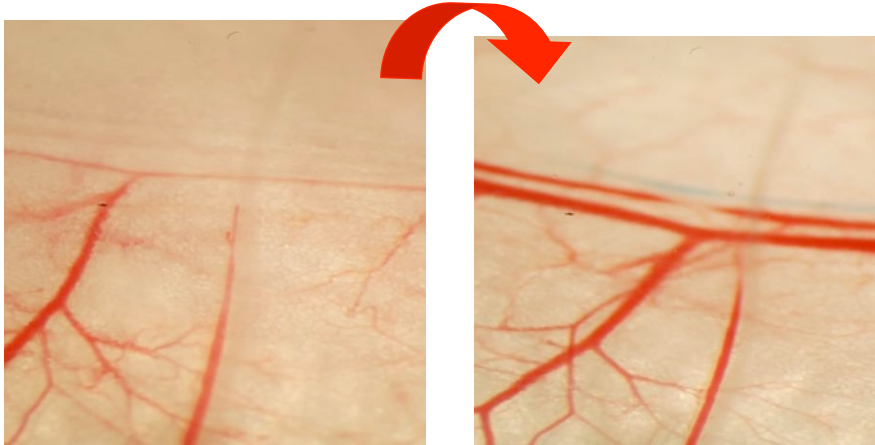
Science and Technology – Physiological Effects

What exactly does Vibro-Pulse® (Cycloidal Vibration Therapy) do to the wound-bed?

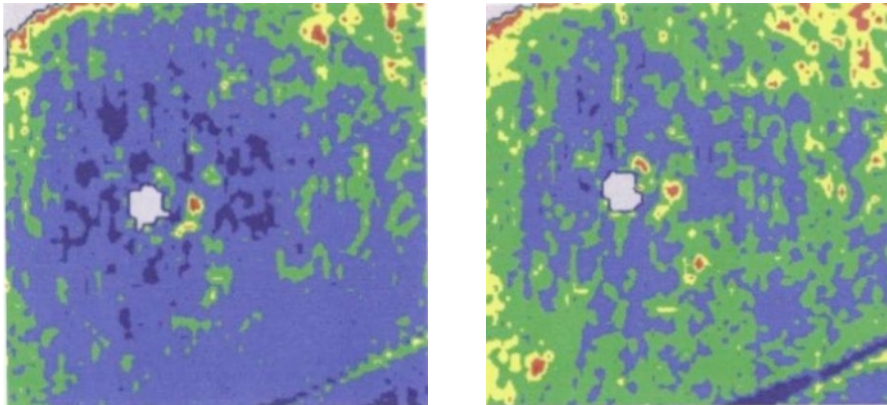
- Increases blood flow / microcirculation to and around a wound.
- Stimulates angiogenic reaction, growth of new blood vessels and angiogenesis. (VegF)
- Alleviates/reduces patient Pain
- Reduces Oedema
- Reduces a prolonged chronic inflammatory phase to stimulate healing.
- Increases production of vascular Nitric oxide (beneficial).

Science and Technology – Physiological Effects

Increases blood flow / microcirculation to and around a wound.



BEFORE and AFTER 10 minutes of Vibro-Pulse®



- Mechanical stimulation of vascular wall endothelial cells resulting in increased production of nitric oxide (eNOS) resulting in vasodilation.
- In addition skin surface nerve axon reflex, type IIa muscle fibres contraction rates respond to the vibration frequency resulting in vasodilation.
- Laser Doppler studies revealed a consistent increase in blood supply.
- Neovascularization – improved blood gases and nutrients to enter the area treated / applied.

Ref: Maloney-Hinds et al. The Role of Nitric Oxide in Skin Blood Flow Increases due to vibration in healthy adults and adults with type 2 diabetes. School of Medicine, Loma Linda University. Ca. USA. Diabetes technology & therapeutics. 11, 1, 2009 pg 39–43.

Ref: Nakagami et al. Effect of vibration on skin blood flow in an in vivo microcirculatory model. Dept of wound care. The University of Tokyo, Japan. Bio-Science Trends 2007; 1 (3): 161–166

TJ 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**" Oxford Wound Healing Institute, Oxford. Journal of Tissue Viability July 2001 VI 11 No3

Science and Technology – Physiological Effects

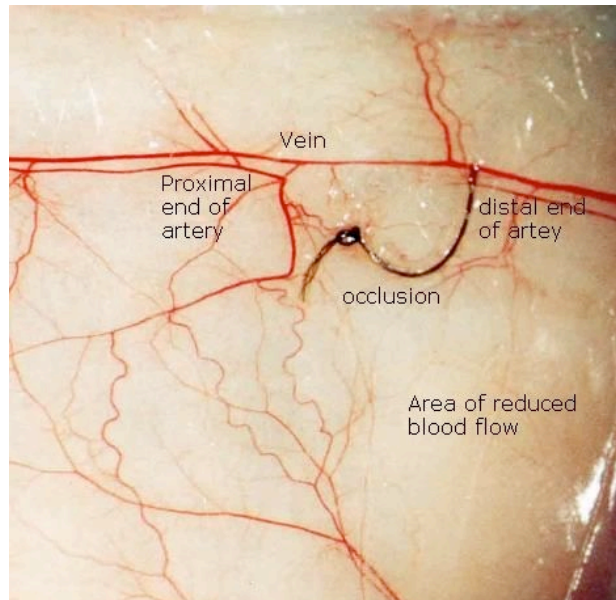
Effects on the growth of new blood vessels / angiogenesis.

Vasodilation = increase shear stress at the blood vessel wall = cytokines & growth factors (such as VEGF & eNOS) = stimulate endothelium (blood vessel) cell growth and fibroblast proliferation.

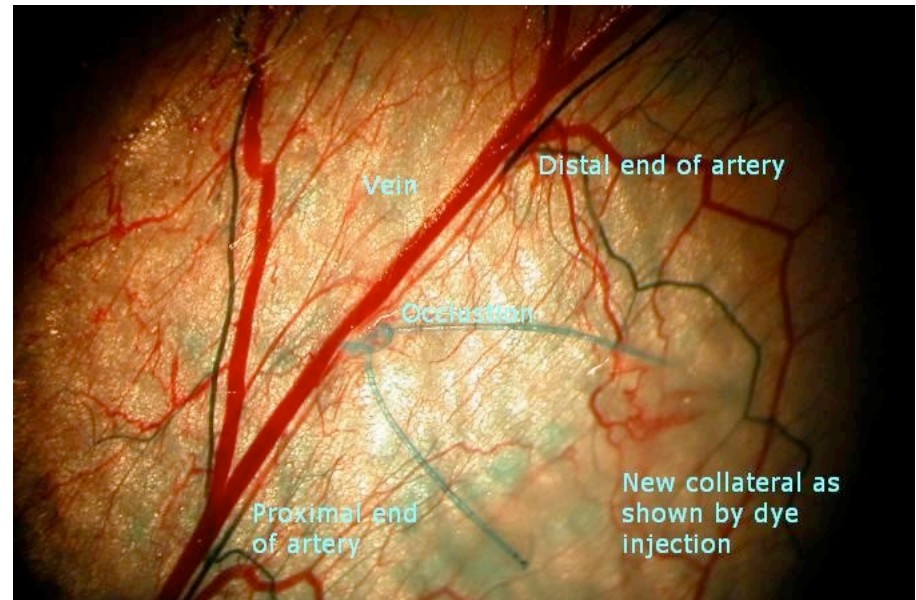
Animal model. Skin blood flow, artery occluded via a ligature as shown. Reduced blood flow to surrounding tissues. CONTROL group. No intervention = 0% collateral vessel growth. 35% anastomosis.

Experimental group Vibro-Pulse® 20 minutes a day.– 25% growth functioning collaterals to restore the flow in the artery. 85% anastomosis.

BEFORE

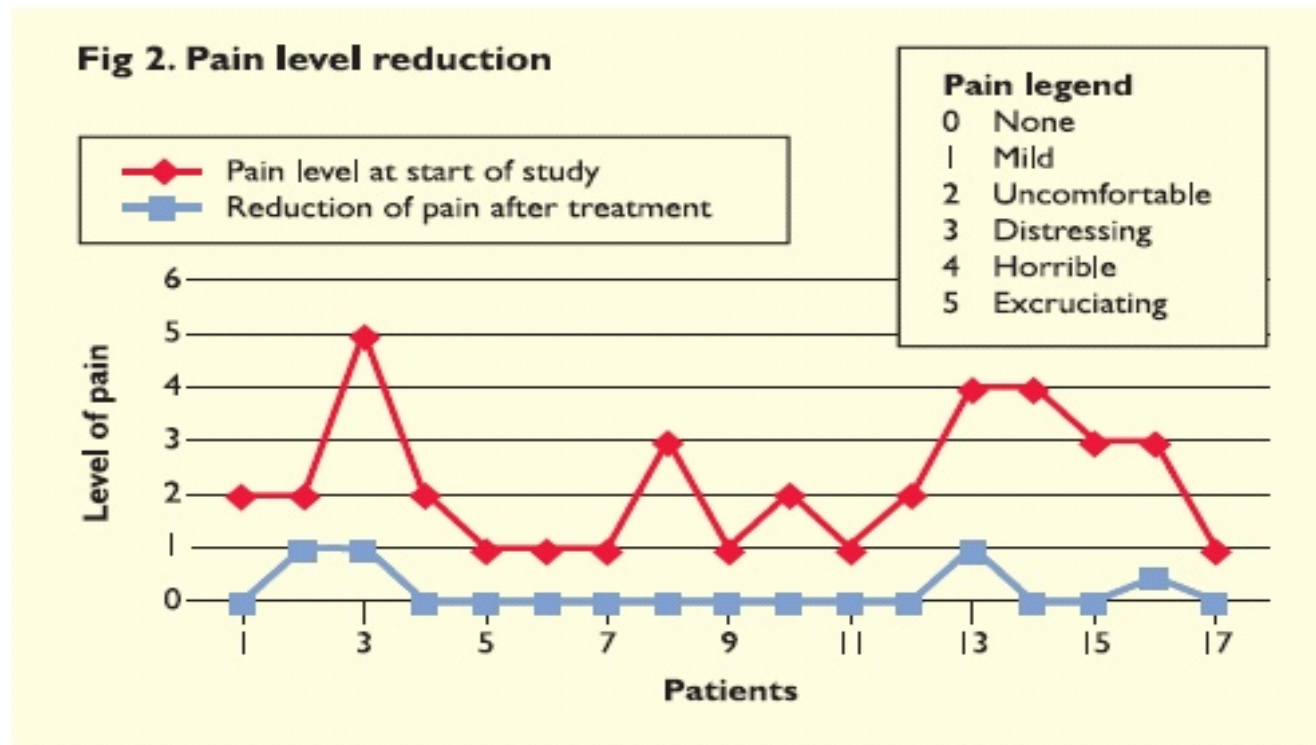


AND AFTER.



Science and Technology – Physiological Effects

Reduces Pain. A sensory stimulant by activating primarily fast-conducting myelinated A delta nerve fibres which in turn can stimulate inhibitory interneuron's to control and reduce pain transmission.



- Before and After Vibro-Pulse® pain scores recorded in a Vibro-Pulse® leg ulcer clinical trial.

Science and Technology – Physiological Effects

Wound healing stimulation

- Increase in soft tissue and skin circulation and Nitric Oxide production.

Ref: Maloney-Hinds et al. The Role of Nitric Oxide in Skin Blood Flow Increases due to vibration in healthy adults and adults with type 2 diabetes. School of Medicine, Loma Linda University. Ca. USA. Diabetes technology & therapeutics. 11, 1, 2009 pg 39-43.

- In diabetes at least three studies have demonstrated decreased formation of NO metabolites in the wound environment.

Bulgrin JP, Shabani M, Chakravarthy D, et al. Nitric oxide synthesis is suppressed in steroid-impaired and diabetic wound healing. Wounds 1995;7:48-57

- Vibration shown to stimulate angiogenesis and growth factors such as VEGF.

Suhr Fr eegt ualla.t Eoffrse cintsh oufm sahnosrt. -Jt Aerpmppl vibration and hypoxia during high intensity cycling exercise on circulating level of angiogenic Physiol 103:474-483, 2007. Yue Z. et al. On the cardiovascular effects of whole-body vibration I. Longitudinal effects: hydrodynamic analysis. Studies Appl Math 119:95-109. 2007.



Science and Technology – Physiological Effects

Wound healing stimulation

- A prolonged inflammatory phase occurs in diabetic wounds. Vibration vasodilation generates an indirect anti-inflammatory action mainly by suppression of nuclear factor- $\kappa\beta$, the key gene for inflammatory mediators.

Marvin A. Nitric Oxide is released into circulation with whole-body, periodic acceleration. Chest 2005;127;30-39.

- The study findings suggest that short duration vibration therapy alone significantly increases lower extremity skin blood flow ; doubling skin blood for a minimum of 10 minutes following intervention.

Lohman III EB et al. The effect of whole body vibration on lower extremity skin blood flow in normal subjects. Department of Physical Therapy, Loma Linda university CA, USA. Med Sci Monit, 2007; 13(2) 71-76





Market and Product Review

Market and Product Review

Advanced Wound Care Market – Large and Growing

est \$10 billion worldwide.

- Diabetic foot ulcers
- Chronic wounds
- Pressure wounds/ulcers
- As the population ages, the incidence rate of chronic wounds is rising. UK 200,000 chronic wounds at any one time. Annual cost £2.3 to £3.1 billion. USA 5 – 7 million chronic wounds projected annually.

Diabetic foot wounds alone.

- USA 27 million people with diabetes & 54 million are pre-diabetic. 1.5 million diabetic ulcers annually. UK 2.3 million people with diabetes 0.5 million yet to diagnosed.
- 25% of diabetics will acquire a non-healing ulcer in their lifetime
- USA hospital costs alone of \$16,000 to \$20,000 for a patient with a diabetic foot ulcer, over 82,000 amputations annually at direct and indirect costs from \$20,000 to \$60,000 per patient.
- UK 64,000 individuals with active foot ulcers at any time and 2,600 amputations annually. The cost to the NHS in foot ulcer treatment estimate. £300m per year.

Market and Product Review

VIBRO-PULSE® is applied to all of the lower limb and foot.

Reduce the burden on health care resource, an active treatment that can be easily self-administered at home by the patient.

- Vibro-Pulse® Consul.
- Easy to use – Plug and go.
- Do not remove any dressings or bandaging.
- Suitable for use by patients or carers, without intervention by nurse practitioners.
- Infection Control & effective treatment / disposable cover and limb straps.
- Self regulating
- Auto switch off after thirty minutes – no risk.
- Frequency apply 3 simple 30 minutes sessions per day.



Market and Product Review – Compelling efficacy in advanced wound healing

G Cherry, T Ryan, et al. Journal of Wound Care

- Patient population –Ulcers of 8 month duration. (can be defined as hard to heal)
- 62% of VIBRO-PULSE® patients healed and of the rest all showed a 31–90% improvement in healing.
- Total cost to treat was six times more expensive for the Compression bandage group to date. Compared to healing with VIBRO-PULSE® & compression.
- (a direct result of the quicker time to heal when using VIBRO-PULSE®)
- Conclusion of the study
- “Using **Vibro-Pulse®** to stimulate lower leg circulation, in combination with traditional forms of treatment, **reduces healing times.**”
- “It not only **improves patient outcomes and quality of life by reducing pain** but also **significantly reduces treatment costs.**”



Market and Product Review – Compelling efficacy in advanced wound healing

Circulation stimulation to treat associated skin infection.

Johnson S, Leak K, et al. Journal of Wound Care.

- Patient population – Lower limb severe cellulitis / erysipelas and or associated with a wound.
- Randomised controlled trial comparing standard treatment of antibiotics to antibiotics plus Vibro-Pulse 3 x a day for 30 minutes.
- 67% of patients receiving VIBRO-PULSE® and antibiotics. fully recovered in an average of 5.6 days. Average limb oedema reduction 6.6% day 7.
- Compared to just 11% of cellulitis patients in an average of 6 days receiving antibiotics alone. Average limb oedema reduction 2.3% day 7.
- a statistically significant reduction in treatment time.
- Conclusion of the study
- “Vibro-Pulse®, in combination with traditional the form of treatment had a **statistically significant reduction in healing times** compared to standard treatment alone.”



Market and Product Review – Compelling efficacy in advanced wound healing

Circulation stimulation by vibration therapy can treat wounds due to pressure.

Midori Arashi, Junko Sugama, Hiromi Sanada, et al. Advances in skin and Wound Care.

- Patient population –Nonrandomized, blinded, controlled design. The subjects were hospital patients in long-term-care facilities with Stage I Pressure Ulcers.
- A vibration stimulation was used to for 15 minutes 3 times a day for up to 7 days, until Stage I PrUs healed. The experimental and control groups received the same care, which was provided according to PrU care guidelines. The number of healed ulcers was compared between 2 groups.
- Experimental group, 40.0% PrUs healed; in the control group, 9.5% PrUs healed. **The number of healed ulcers was significantly higher in the experimental group than in the control group ($P = .033$). The healing rate was significantly higher in the experimental group than in the control group $P = .018$.**
- Conclusion of the study– Based on these results, the use of vibration therapy may facilitate the healing of Stage I PrUs.

Market and Product Review – Vibro-Pulse® Cost Effectiveness.

Vibro-Pulse® cost effective when compared to other Active intervention treatment modalities.

Applying Vibro-Pulse to reduce treatment times of chronic wounds results in.

- Improved patient outcome.
- Reduced cost of ongoing treatment. (health care personnel and materials)

Cost effective advantage – Vibro-Pulse® is an active treatment that can be easily self –administered at home by the patient reducing costs compared to clinic or hospital based treatment options.

	Previous treatment		Treatment with Vibro-Pulse®	
Savings achieved	Time	Cost	Time	Cost
DFU– 78% saving	30 weeks	£4020	6 weeks	£884
VLU – 31% saving	26 weeks	£1283	6 weeks	£884
Arterial – 76% saving	56 weeks	£4928	8 weeks	£1176
Cellulitis – 78% saving	5 hospital admissions	£1399	0 hospital admissions	£305

data – from published clinical studies and individual case study costing's



Market and Product Review – Vibro-Pulse® Commercial Plan.

- Our business model is based on rental & sales of the Vibro-Pulse® consul, but primarily the repeat requirement for required single use disposables for infection control and effective treatment.
- The Vibro-Pulse® consul requires the disposable for the consul to operate.
- Protocol for wound care treatments 3 x 30 minute Vibro-Pulse® applications per day requiring up to 3 Vibro-Pulse® disposable's. Total length of treatment dependant on wound status, aetiology, duration and patient co-morbidities
- Objective to gain local reimbursement approval for disposables packs. Reimbursement approval granted in the UK and NI.
- Supply contract listing for NHS in the UK
- Sales through a direct sales force that incorporates a clinical advisor as part of the team.
- International distribution partners country by country in Europe and USA.
- Patents granted and pending in USA and EU.





Wound Care Applications

Wound Care Applications

Vibrant Medical Ltd is pioneering the Vibro-Pulse® cycloidal vibration technology to treat and stimulate the healing of a range of chronic wounds and oedema / swelling management to improve patient care and reduce treatment times.

Vibro-Pulse® is currently focused on treating the following lower limb wounds and conditions.

- Diabetic foot wounds
- Venous Leg Ulcers
- Mixed aetiology / arterial leg ulcers
- Oedema
- Cellulitis
- Pressure / damage ulcers. (stage 1 to 3).
- Chronic non-healing wounds.



Wound Care Applications – Diabetic Foot

Diabetic foot –Plantar ulcer receiving standard wound care treatment and off loading duration 7 months and new post surgical wound.

START Plantar ulcer



Week 2 of Vibro-Pulse®



54 year old type 2 diabetic. A history of distal vascular disease resulting in ulceration and peripheral ischemia. A number of amputation procedures to toes and metatarsal's



Week 4 of Vibro-Pulse®



Week 6 of Vibro-Pulse®

Peripheral arterial disease. Duplex scan showed mild to moderate left popliteal arterial multifocal disease, with single vessel run off below the knee not suitable for intervention.

Wound Care Applications – Diabetic Foot

Diabetic foot Plantar ulcer duration 7 months and new post surgical wound



START



Week 2 of Vibro-Pulse®

Post surgical wound treated with standard treatments. Vibro-Pulse commenced 3 days post op.



Week 4 of Vibro-Pulse®



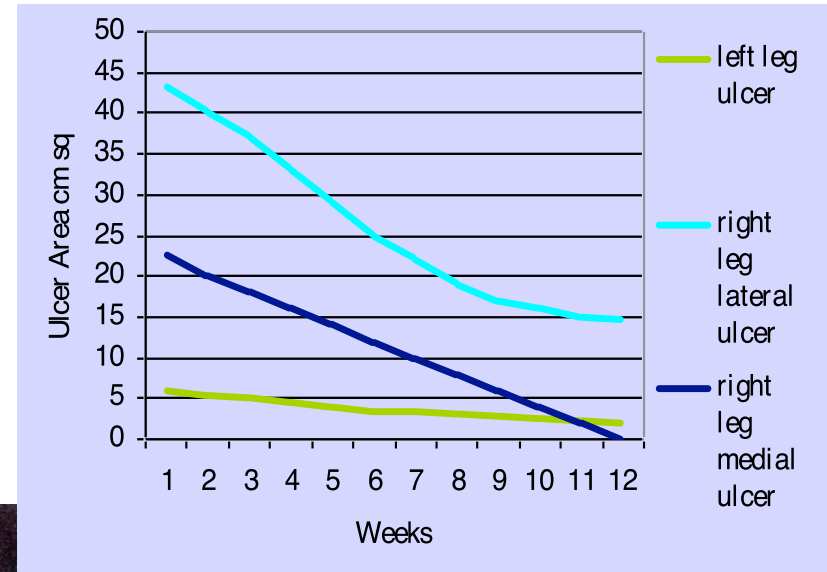
Week 6 of Vibro-Pulse®



Wound Care Applications – Leg Ulcer

LEG ULCER

- 85 year old female
 - Bilateral Venous Leg Ulcers treated with compression.
 - Left Leg **12 months duration**
 - Right Leg ulcer x 2 medial and lateral **3 years duration**.
- Vibro-Pulse® commenced and self administered by the patient at home in conjunction with the same ongoing dressing and compression bandaging.
- Week 10** Right medial healed.
 - Week 12** 66% reduction in other ulcers.



Wound Care Applications

R



- Cellulitis and multiple leg ulcers
- 91 year old patient.
- Bilateral venous leg ulcers (R=72cmsq
L=272cmsq)
- After 4 months of DAILY dressing / compression bandage changes patient developed Cellulitis and admitted into residential care.
- Patient recorded pain as 4 (on 0–5 scale.)
- Vibro-Pulse® cycloidal therapy commenced. Self administered by patient (assisted by residential home staff) .

L



Wound Care Applications

R



- **WEEK 2** Cellulitis in right leg resolved.
- Right Leg ulcer healed.
- Left leg ulcer reduced in size by 48% (272cmsq to 141 cmsq)
- Bandage/dressing changes down to every other day and soon down to every four days.

- **WEEK 4.** Cellulitis resolved in both legs
- Left leg ulcer size reduced by 70% (272cmsq to 81cmsq)
- Patient self recorded pain score of ZERO.
- Dressing/bandage changes now every 4 days.

L



- **WEEK 8.** Cellulitis resolved
- Right leg ulcer healed
- Left leg ulcer down to 2cmsq from 272cmsq.
- Patient later moved to Compression stocking

Estimated COST comparison

Previous 16 weeks treatment = £5,152

8 weeks with Vibro-Pulse™ = £1,589

Saving in treatment cost = £3,563 (69%)

Wound Care Applications – Mixed aetiology Ulcer & Oedema management (leaky legs)



START

51 years old rheumatoid arthritis, ischemic heart disease, and gross oedema of both legs. Mixed aetiology leg ulcers 13 months duration. Duplex scan indicated severe distal disease, ABPI later measured at 0.7. Limited options to reduce oedema due to arterial disease. Dressings changed 3 x a week due to exudate, Mepitel, Actisorb Silver 220, Viscopaste, Sofban and K-Lite.

Calf circumference 47cm, a 16 cm sq ulcer on the back and a 37.5 cm sq ulcer on the front of her left leg duration 13 months. Vibro-Pulse® : started 3 x a day for 30 minutes per treatment.



**Day 7 of
VP Therapy**

DAY 7 of Vibro-Pulse®:

WOUND: The ulcers shallower signs of granulation and debridement over 75% reduction 4 cm sq and 8 cm sq.

OEDEMA: Calf circumference reduced to 39 cm.

WEEK 8 of Vibro-Pulse®:

WOUND: The leg ulcers had healed.



Vibrant Medical Ltd
The Innovation Centre
217 Portobello
Sheffield
South Yorkshire
UK
S1 4DP

Tel: +44 (0114) 2242249
Fax: +44 (0114) 2232300
email: enquiries@vibrant-medical.co.uk
www.vibrant-medical.co.uk

