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Instituto Andaluz del Deporte

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DOCUMENTACIÓN

Código curso 200823701

NUEVAS TENDENCIAS EN EL FITNESS: MATERIALES PEQUEÑOS

Vibration & Balance

ALEX MARTÍN
Fisioterapeuta

Sevilla
18 y 19 de septiembre de 2008

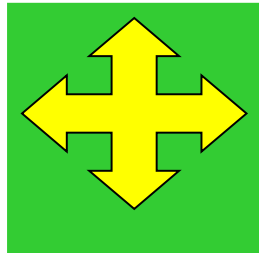
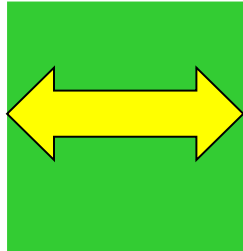
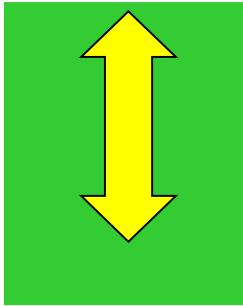


Vibration & Balance

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"BALANCE AND VIBRATION IN ONE"



Los efectos positivos del entrenamiento de vibración están clínicamente probados por numerosos estudios.



"BALANCE AND VIBRATION IN ONE"

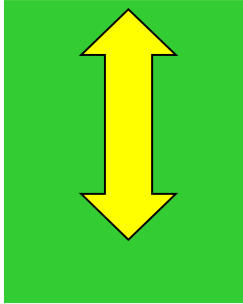
Balance Training

- **Purpose** – Efficiency of a home based balance training program on a balance plate to increase the static as well as the dynamic balance in order to prevent sport related injuries
- **Material** - 127 sporting individuals (66 balance training, 61 control group) 14-19 years of age
- **Method** – 6w 1 time/day, remaining 6 months 1 time/week
- **Result** – Increase of static balance 20,7 sec, dynamic 2,3 sec, 12 injuries (2 in training group, 10 i control group)
- **Conclusion** – Training on a balance board increases the static as well as the dynamic balance and decreases the risk for sport traumas

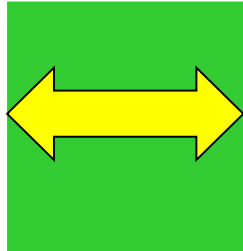
[Carolyn A et al. Effectiveness of a home-based balance-training program in reducing sports related injuries among healthy adolescents: a cluster randomized controlled trial. CMA Media Inc 2005;172 (6)]



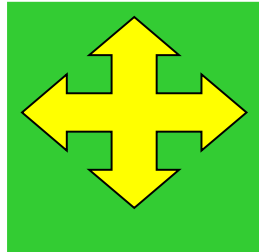
"BALANCE AND VIBRATION IN ONE"



Los efectos positivos del entrenamiento de vibración están clínicamente probados por numerosos estudios.



El entrenamiento de la estabilidad hace muchos años que se utiliza y su efectos positivos están ampliamente documentados





"BALANCE AND
VIBRATION
IN ONE"

Muscle strength

Torvinen et al 2002, could in his research about WBV (Whole Body Vibration) show a significant improvement regarding jumping height, leg extension strength and balance 2 minutes after the vibration training. The effects had returned to normal values after one hour. The vibration training was done using a frequency of 15-30Hz and 10 mm amplitude

[Torvinen et al. Effect of a vibration exposure on muscular performance and body balance. Randomized cross-over study. Clin Physiol & Func Im 2002;22:145-152]



"BALANCE AND
VIBRATION
IN ONE"

Muscle Strength

- **Purpose** – Compare the effects of conventional strength training to WBV
- **Material** - 67 untrained women, older than 21 years
- **Method** – WBV (n=18) 3-20 min 35-40Hz, 2,5-5 mm amp, conventional training (n=18) 1h, placebo 0,4 mm amp (n=19), control group (n=12), 12w (3 times/w)
- **Result** – Increased muscle strength and increased elasticity for the WBV group
- **Conclusion** – WBV is a potential method of training for untrained women, as well as the conventional training

[Delecluse C et al. Strength Increase after Whole- Body Vibration Compared with Resistance Training. Med & Scien in Sports & Exc 2003; 1033-1041]



"BALANCE AND
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Circulation

Kerschan-Schindl et al proved 2001 that the circulation measured with m. gastrocnemius and m. quadriceps was significantly increased using WBV (26Hz, 3 mm amp). Increased blood throughout by an increased number of capillaries with at least 2 mm diameter and arterial vasodilation.

[Kerschan-Schindl et al. Whole-body vibration exercise leads to aternations in muscle blood volume. Clin Physiol 2001;21 (3): 377-382]



"BALANCE AND
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Postural control

- Increased postural activity by WBV and by leg vibration
- Increased proprioceptive inflow
- Increased signal flow - VIPI (Vibrations Induced Postural Illusion)
- 30 min
- 18,5Hz

[Martin BJ et al. Effects of whole-body vibrations on standing posture in man. Aviation, Space and Environmental Medicine 1980;51 (8):778-787]



"BALANCE AND
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Osteoporosis

- **Purpose**– Investigate the effects of WBV
- **Material** - 70 women in menopause, 58-74 years
- **Method** – WBV (n=25) 30 min 35-40Hz, 1,7-2,5mm amp, strength training (n=22) 1h, no training at all (n=23) 3 times/w i 6 months.
- **Tests** – BMD (bone mass density), strength test, balance etc.
- **Result** – BMD in prox femur increased by WBV, not by conventional strength training, musculoskeletal swing decreased in two of the exercises for the WBV group
- **Conclusion** – WBV might be an effective and suitable method to prevent case injuries and fractures for elderly women. More studies are required,

[Verschueren S et al. Effect of 6-month Whole Body Vibration Training on Hip Density, Muscle Strength, and postural control in Postmenopausal Women: A randomized controlled pilot study. Amer Soc for Bone & Mineral Res 2004;352-359]



"BALANCE AND VIBRATION IN ONE"

Hydrocortisone and serotonin

- Decreased level of hydrocortisone in plasma after 10 minutes WBV

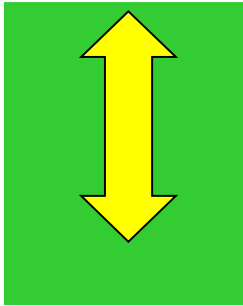
[Bosco C et al. Hormonal responses to whole-body vibration in men. Eur J: Appl Physiol 2000;81 (6) 449-454]

- Increased levels of serotonin i CNS (Central Nervous System) – animal study

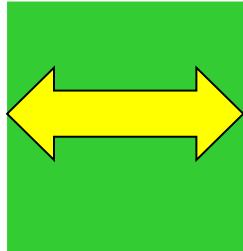
[Ariizumi M et al. Effect of whole body vibration on the rat brain content of serotonin and plasma corticosterone. Eur J: Appl Physiol 19 1983 15-19]



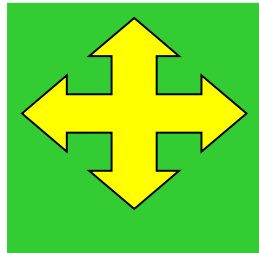
"BALANCE AND
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Los efectos positivos del entrenamiento de vibración están clínicamente probados por numerosos estudios.



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Combinar el entrenamiento de vibración y estabilidad proporciona el doble de beneficios



"BALANCE AND
VIBRATION
IN ONE"

Osteoarthritis in the knee

Parker Institute, Inst. For sports science, Denmark
Master thesis, March 2007

Objective:

- Assess effect of WBV on pain, functional capacity and quality of life

Setup:

- Single blinded, randomised controlled clinical trial, 52 female patients. Three groups: stable vibration platform, Vibrosphere®, control group
- 8 wks, twice a week, 3-12 minutes

Results:

- Vibrosphere® positive MCS (Mental Component)Score, balance and proprioceptive acuity
- Stable vibration: Muscular performance and proprioceptive acuity

Conclusion:

- WBV is time-saving, effective, and safe method for knee-OA



"BALANCE AND
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Pain reduction chronic acchilles tendinopathy patients

Bispebjergs Hospital, Inst. of sports Medicine, Denmark
Bachelor thesis June 2007

Objective:

- Examine the effect on pain reduction and rehabilitation of Vibrosphere® training versus eccentric training

Setup:

- 2 active women and 14 active men, 8 persons in each group. Three times Vibrosphere® training each week, eccentric group home training twice a week for four weeks

Results:

- 4 wks Vibrosphere® training significant reduction of VAS in rest and after toe-raise test. Eccentric training shows no significant improvement.

Conclusion:

- Vibrosphere® training for patients with chronic acchilles tendinopathy gives a greater pain reduction than eccentric training





"BALANCE AND
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Pain relief patients with chronic neck pain

Karolinska Institutet, Div. of Physiotherapy
Master thesis, Autumn 2006

Objective:

- To investigate if training on Vibrosphere® could give patients with chronic neck pain pain relief

Setup:

- 29 patients with chronic neck pain randomised in two groups, an experimental group and a control group. Vibration group stood on Vibrosphere® 3 times 30 sec. 35 Hz and lay on the Vibrosphere® 3 times 30 sec 35 Hz. Control group did the same exercises without vibrations.

Results:

- All in the Vibrosphere® stated a decrease in pain measured on the VAS-scale (from 56,5 to 25,5) and with Painmatcher from 7,5 to 5,5. Balance improvement enhanced for 15 persons in Vibrosphere® group. No pain relief for control group.

Conclusion:

- Training on Vibrosphere® gives patients with chronic neck pain an immediate pain relief and improved ability to balance.



"BALANCE AND
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Clinical trial: Continence training

Day care centre Husie, Malmö, Sweden

Clinical trial, Autumn 2007

Objective:

- To investigate if training on the Vibrosphere® could shorten the time required to get positive results for female patients with strain incontinence.

Setup:

- 8 patients trained for 2 months. The patients initially answered a survey regarding their use of napkins, number of times they had to go to the toilet in the night etc. The patients combined home based exercises with training on the Vibrosphere® three times a week, sitting on the Vibrosphere® 3 times 45 sec 30 Hz and doing pinch exercises. After two months, the initial survey was answered again.

Results:

- 6 out of the 8 persons showed a significant improvement and got rid of most of their strain incontinence. The consumption of napkins went down to half, number of nightly visits to the toilets went down to zero or was considerably lowered. Generally, the patients experienced an improvement in quality of life and more freedom to move.

Conclusion:

- Continence training on Vibrosphere® might be an effective method to rehabilitate strain incontinence.





"BALANCE AND
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La Estabilidad Física

- La estabilidad y el control postural es un prerrequisito para la movilidad y función humana
- El equilibrio es crucial para evitar lesiones post-esfuerzo
- La mayoría de lesiones disminuyen el nivel de estabilidad global
- Más edad menos estabilidad física
- El que más y el que menos necesita mejorar la estabilidad





"BALANCE AND
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El Sistema de Equilibrio

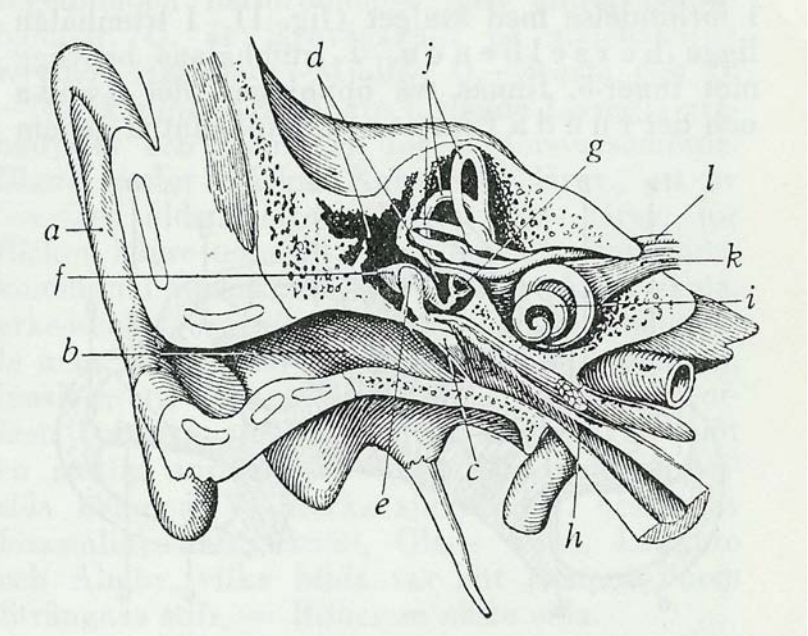
- Sistema Vestibular
- La vista
- Propiocepción



"BALANCE AND VIBRATION IN ONE"

Sistema vestibular

- Equilibrio
- La audición





"BALANCE AND
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La vista



Transforma percepción del espacio en información eléctrica y química en nuestro interior



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Propriocepción

- Propriocepción: del latín *proprius*, hace referencia a "a uno mismo" y percepción a la posición relativa de las diferentes partes del cuerpo.
- Proprioceptores son receptores que revelan información sobre la posición del cuerpo en el espacio, la actividad muscular, calidad y aceleración de los movimientos, posibles peligros, facilita el aprendizaje motor...



"BALANCE AND VIBRATION IN ONE"

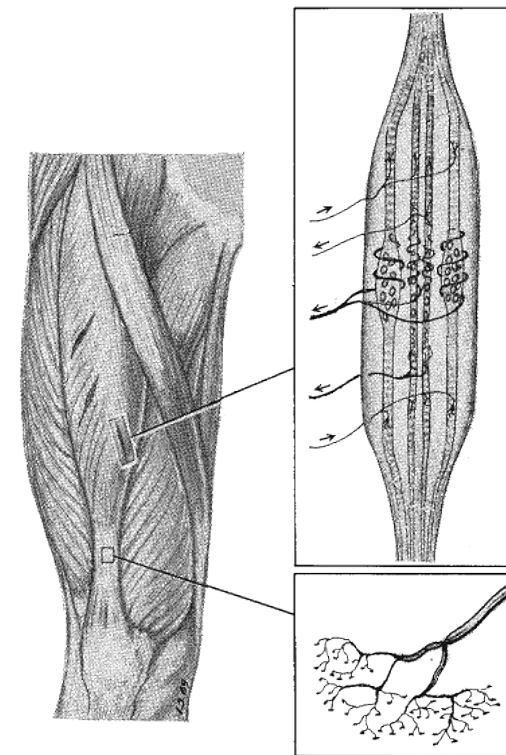
Proprioceptores

Musculares

- Organos de Golgi
- Husos musculares

Articulaciones y ligamentos

- Meissner`s corpuscles
- Pacinian corpuscle





"BALANCE AND VIBRATION IN ONE"

Sir Charles Scott Sherrington

neurophysiologist
1857 - 1952

Nobelprize 1932 in physiology and medicine

E G. T. Liddell and Sir Charles Scott Sherrington.

Reflexes in response to stretch (myotatic reflexes).

Proceedings of the Royal Society of London. Series B, Biological Sciences, 1924, 86: 212-242.

Respuesta involuntaria

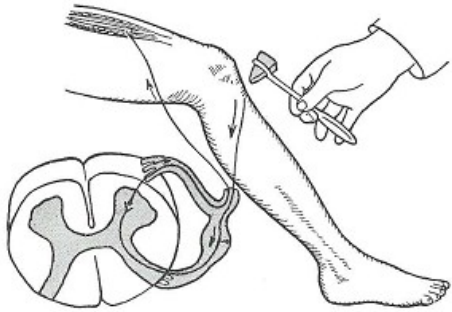


Figure 513. Diagram of the nervous mechanism involved in normal knee kick.

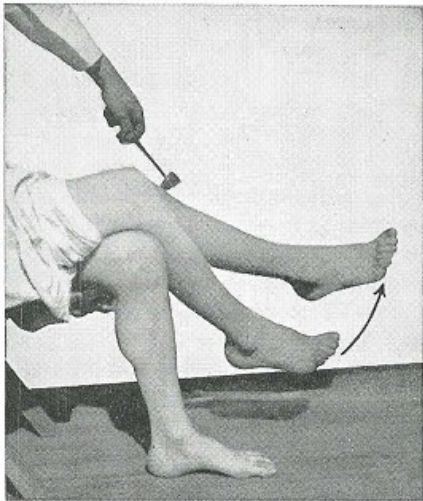


Figure 514. Knee kick.



"BALANCE AND
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IN ONE"

¿Son las vibraciones un fenómeno natural?

Sí, cada día estamos expuestos a vibraciones: conduciendo el coche, viajando en tren, en barco, avión, ascensores, usando maquinarias...

¿Son las vibraciones siempre positivas?

No, pueden producir daños en los materiales y tejidos: terremotos, grietas en edificios (metro), lesiones musculares...



"BALANCE AND
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La clave

Conseguir activar el sistema de propicepción con:

- Mínimo impacto en tejidos, articulaciones, organos interno
- Máximos resultados físicos y psicológicos
- Reduciendo sensaciones desagradables
- Mínimos daños secundarios: ruido, transmisión de la vibración



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Pasado, presente y futuro

- Plataformas de vibración:
 - Vibración vertical o axial
 - Vibración basculante
- Esferas de vibración
 - Balance & Vibration Training (2ª generación)
- Raquetas de vibración, Sillas de vibración...



The saddle
chair (prototype)
Del. June 2008



"BALANCE AND VIBRATION IN ONE"

Balance & Vibration training

Onda producida por movimientos mecánicos repetidos combinado con trabajo activo de propicepción mediante ejercicios estáticos o dinámicos. Parámetros:

- Aceleración $a = A * (2\pi f)^2$
- Amplitud 2-4 mm

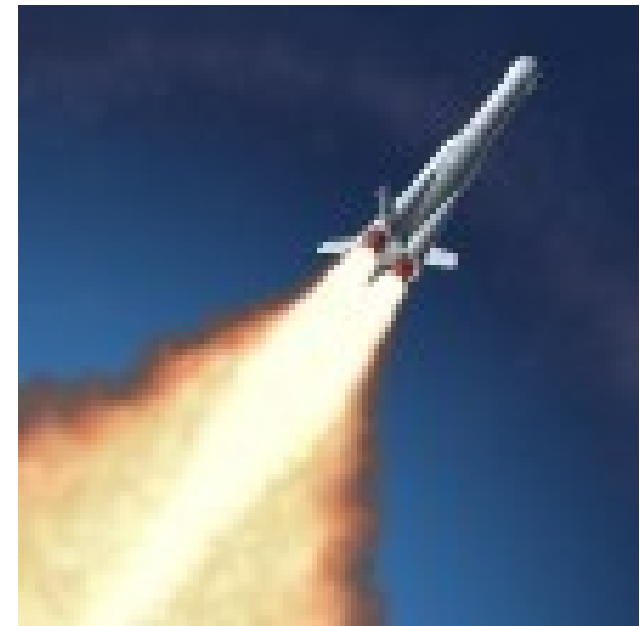


"BALANCE AND
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Aceleración

- La gravedad de la tierra – aceleración de $9,82 \text{ m/s}^2 = 1g$
- Caminar = 1-1,5g
- Correr = 2-3g
- Saltar = 3-8g
- Vibración = 3-15g

[1 Griffin MJ. Handbook of Human Vibration. Academic Press Ltd, London 1990]





"BALANCE AND
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Onda producida por movimientos mecánicos repetidos combinado con trabajo activo de propicepción mediante ejercicios estáticos o dinámicos. Parámetros:

- Aceleración $a = A * (2\pi f)^2$
- Amplitud 2-4 mm
- Frecuencia ≥ 20 Hz - $45 \leq$
- Niveles de inestabilidad



"BALANCE AND
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Balance Adjusting Accessories



The Soft pads



The training mat



"BALANCE AND VIBRATION IN ONE"

Balance & Vibration training

Onda producida por movimientos mecánicos repetidos combinado con trabajo activo de propicepción mediante ejercicios estáticos o dinámicos. Parámetros:

- Aceleración $a = A * (2\pi f)^2$
- Amplitud 2-4 mm
- Frecuencia $\geq 20 \text{ Hz} - 45 \leq$
- Niveles de inestabilidad
- Variedad de ejercicios



"BALANCE AND
VIBRATION
IN ONE"

ProMedVi® Football

By Rickard Dahan, Physio therapist Malmö FF





"BALANCE AND VIBRATION IN ONE"

User references

Soccer

Atletico Madrid, Villarreal, Sevilla, Barcelona etc, Spain
Malmö FF, Halmstads BK Sweden
Inter, Italy

Handball

SG Flensburg Handewitt, , THW Kiel, HSV Hamburg, Germany

General Sports

Bosön, Sweden





"BALANCE AND VIBRATION IN ONE"

Performance requires

- Good balance and coordination
- Strength and explosivity
- Resilience and flexibility
- Technique and good physical condition





"BALANCE AND VIBRATION IN ONE"

ProMedVi® Football

Squat

Functional strength and coordination





"BALANCE AND VIBRATION IN ONE"

ProMedVi® Football





"BALANCE AND
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ProMedVi Neurology

by neurology physio therapists **Bodil Carle Smedley (spec. stroke)**
and **Siv Ohlin (spec. MS)**





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ProMedVi® Neurology

- Specific exercises for neurologically disabled patients.
- Focus on stabilization, balance/proprioception, muscle strength, circulation and tonus diminishing





"BALANCE AND VIBRATION IN ONE"

ProMedVi® Neurology

Balance- and muscle strength for hip and core

Core- and hip stability





"BALANCE AND VIBRATION IN ONE"

ProMedVi® Neurology

Stretching Soft Tissues





"BALANCE AND
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Neurology part 2

Concept under development by Bettina Paeth Rohlfs,
senior Bobath instructor in Germany and Spain



"BALANCE AND
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IN ONE"

Sumario y Consejos

- Sistema propioceptivo
- Efecto de la vibraciones y su naturalidad
- Balance & Vibration Training

- Grandes vibradores – Sistemas de vibración
- Materiales resistentes
- Garantia post-venta
- Certificados sanitarios europeos
- Honestidad en los consejos



Vibrosphere®

Taller



"BALANCE AND
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Vibrosphere®



- Freq. 20-45 Hz
- Time set 15-90 sec
- Sequence programming
- Smartcard function as option (to control usage only)
- Weight 16 kg
- Patented USA, patent pending Europe
- Class 1 product MDD (EN60601)

