XXII World Congress of Neurology
Santiago - Chile 2015
Changing Neurology Worldwide

Santiago, Chile, October 31 - November 5, 2015

Surgical and noninvasive alternative treatmens for Neuropathic Pain

Pedro Schestatsky MD, PhD
Faculdade de Medicina da UFRGS, Porto Alegre, Brazil
Hospital Moinhos de Vento de Porto Alegre
CLINOSON

www.sobreneurologia.com.br

- **Disclosure slide**

I do sporadic lectures for Mundipharma (Oxycontin®) and Aché (Dorene®) companies since june/2015

- **Learning objective**

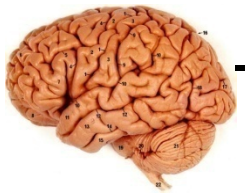
Summarize invasive and non-invasive treatment options for neuropathic pain

- **Key message:**

Dont wait for guidelines to help your patient! Increase your treatment options by using evidence-based treatments that are not included in formal guidelines yet

Alternative treatments for NP

- Acupuncture
- PENS
- Capsaicin
- Botulinum toxin
- Lipoic Acid
- Cannabis
- Hypnosis
- Biofeedback
- Motor Imagery
- Surgery
- rTMS
- tDCS



Ant Cingulate Cortex
hypothalamus

PAG

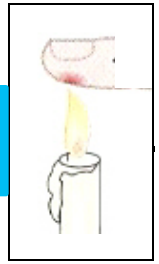
PAG, periaqueductal gray matter

A ng
p

The pain inhibitory system

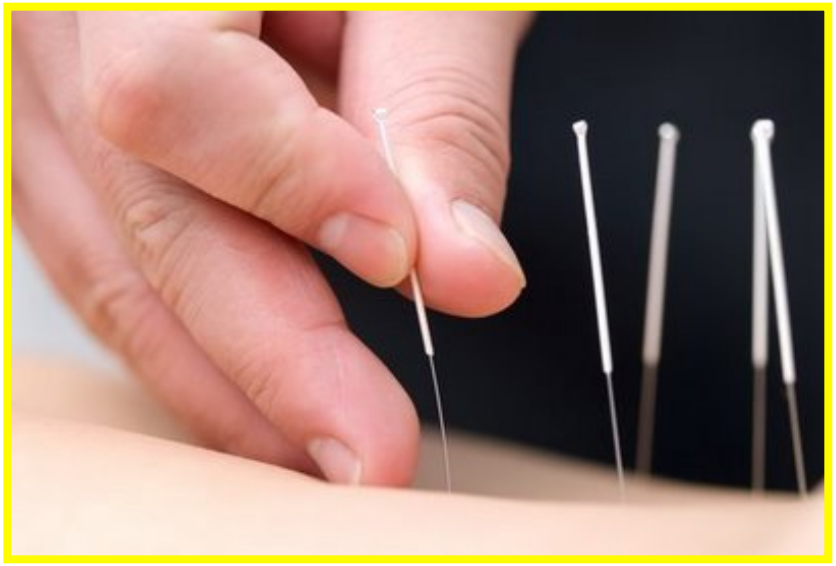
(modified from Wall & Melzack, Textbook of pain, 1999)

Painful stimulus



Primary afferent

Acupuncture can activate the PAG and induces analgesia via descending pain inhibition.



Liu X, Zhu B, Zhang SX.
Relationship between acupuncture analgesia and descending pain inhibitory mechanism of nucleus raphe magnus and PAG. Pain. 1986;24: 383-96.

BMJ 2009;338:a3115

BMJ

Acupuncture treatment for pain: systematic review of randomised clinical trials with acupuncture, placebo acupuncture, and no acupuncture groups

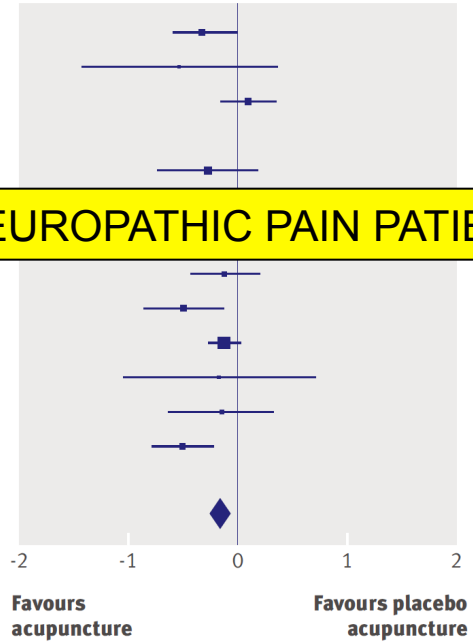
Matias Vested Madsen, physician, Peter C Gøtzsche, director, Asbjørn Hróbjartsson, senior researcher

Trial	Acupuncture Mean	SD	No	Placebo acupuncture Mean	SD	No	Weight (%)	Standardised mean difference (95% CI)
Brinkhaus[w11]	34.5	28.5	140	43.7	29.8	70	9.3	-0.32 (-0.61 to -0.03)
Fanti[w5]	2.0	1.3	10	2.8	1.6	10	1.0	-0.53 (-1.42 to 0.37)
Foster[w9]	6.38	4.1	113	5.98	4.3	115	11.5	0.09 (-0.16 to 0.35)
Kotani[w13]	2.5	2.3	23	5.6	1.2	23	0	-1.66 (-2.34 to -0.98)
Leibing[w12]	-2.7	2.2	35	-2.1	2.2	40	3.7	-0.27 (-0.73 to 0.19)
Lin[w3]	30.6	23.5	50	34.5				-0.65 to 0.32)
Linde[w2]	3.7	2.0	138	3.6				-0.23 to 0.33)
Melchart[w1]	2.9	1.6	119	3.1	1.7	58	7.9	-0.12 (-0.44 to 0.19)
Molsberger[w10]	26.0	21.0	58	36.0	19.0	58	5.7	-0.50 (-0.87 to -0.13)
Scharf[w8]	3.0	2.3	315	3.3	2.4	358	33.7	-0.13 (-0.28 to 0.02)
Sprott[w4]	6.9	5.6	10	7.9	5.7	10	1.0	-0.17 (-1.05 to 0.71)
Wang[w6]	44.5	24.5	50	48.0	22.0	25	3.4	-0.15 (-0.63 to 0.33)
Witt[w7]	24.4	16.9	145	33.2	17.1	73	9.5	-0.52 (-0.80 to -0.23)
Total (95% CI)			1206			943	100.0	-0.17 (-0.26 to -0.08)

Test for heterogeneity: χ^2=17.23, df=11, P=0.10, I^2=36%

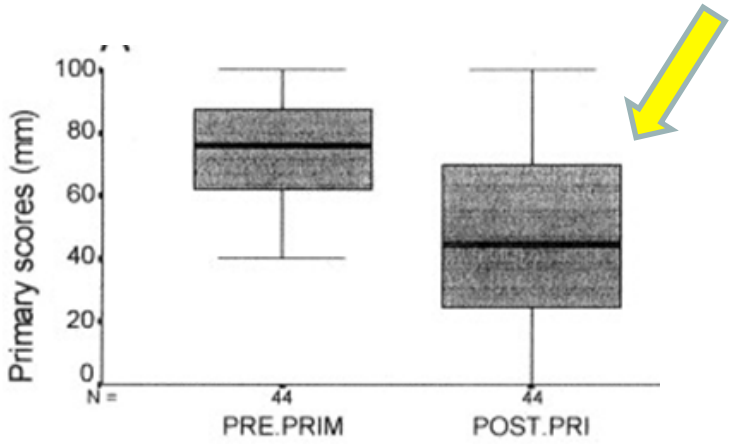
Test for overall effect: z=3.80, P<0.001

NO NEUROPATHIC PAIN PATIENTS!

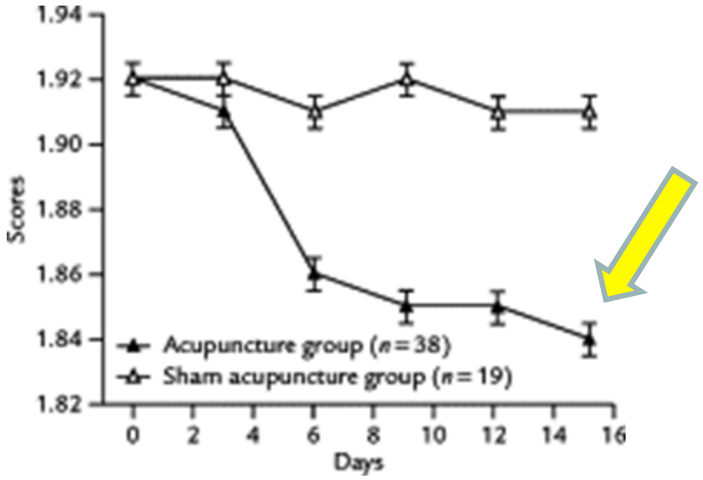


Positive results in Neuropathic Pain:

Abuaisha BB, Costanzi JB, Boulton AJ.
Acupuncture for the treatment of chronic painful peripheral diabetic neuropathy: A long-term study.
Diabetes Res Clin Pract 1998;39:115–21.



Tong Y, Guo H, Han B.
Fifteen-day acupuncture treatment relieves diabetic peripheral neuropathy.
J Acupunct Meridian Stud 2010;3:95–100.



However...

Pain Medicine 2011; 12: 1819–1823

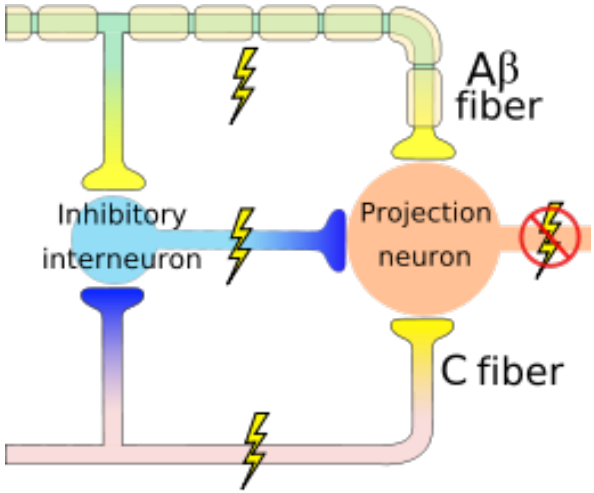
Electroacupuncture Is Not Effective in Chronic Painful Neuropathies

Paola Penza, MD,* Monica Bricchi, MD,† Amalia Scola, MD,† Angela Campanella, BScN,* and Giuseppe Lauria, MD*

The Gate Control Theory

Melzack and Wall, 1965

Non-nociceptive afferents "close"... } *a gate to the SNC transmission of noxious input*



"Closed gate" for pain inputs!

Melzack R, Wall PD. Pain mechanisms: a new theory. Science. 1965;150:971-9.

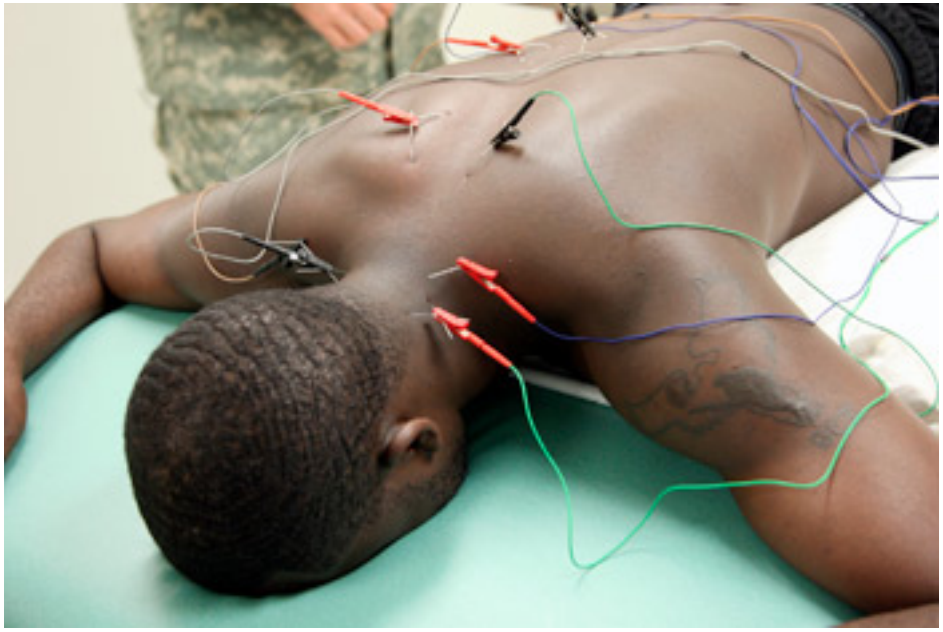
J Rehabil Res Dev. 2009;46(1):85-93.

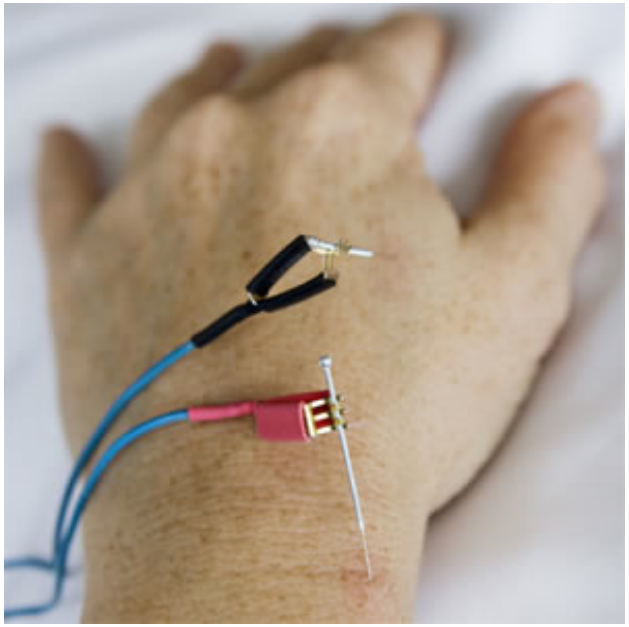
Transcutaneous electrical nerve stimulation for treatment of spinal cord injury neuropathic pain.

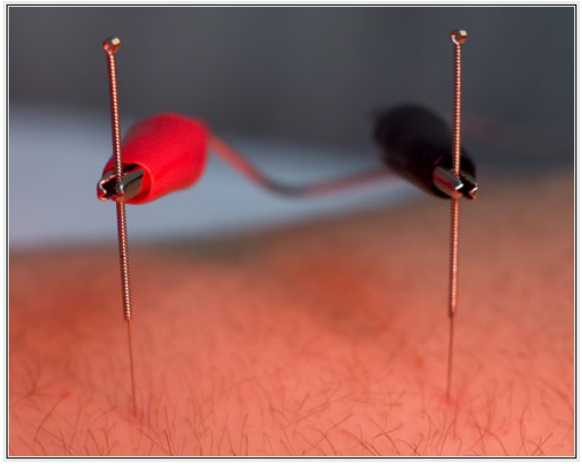
Norrbrink C.

Department of Clinical Sciences, Karolinska Institutet Danderyd Hospital, Stockholm, Sweden. cecilia.norrbrink@ki.se

No significant differences in comparison to placebo



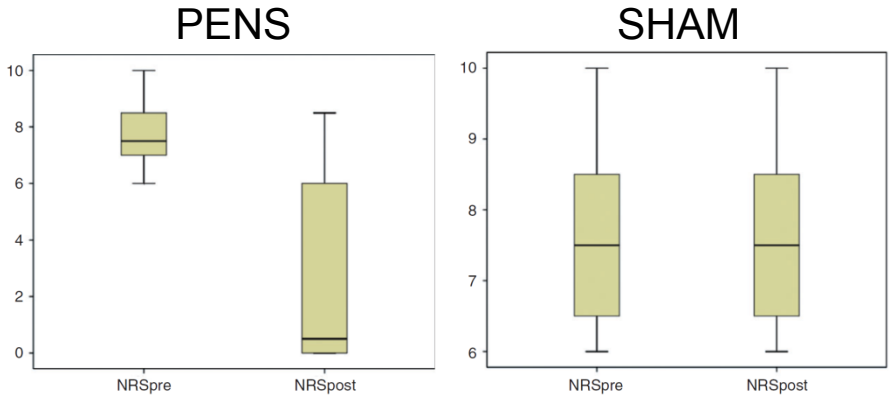




Pain Medicine 2011; 12: 1515–1522

Randomized Double-Blind Sham-Controlled Crossover Study of Short-Term Effect of Percutaneous Electrical Nerve Stimulation in Neuropathic Pain

Jon H. Raphael, MD,* Tarek A. Raheem, MB BCh,* Jane L. Southall, RN,† Alan Bennett, FRCA,‡ Robert L. Ashford, PhD,* and Sharon Williams, RN‡

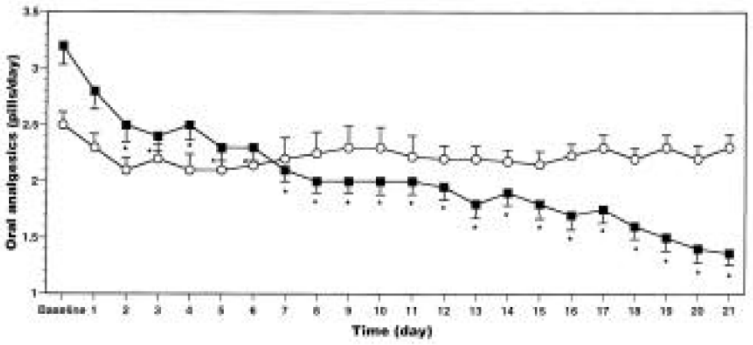


Diabetes Care 23:365–370, 2000

Percutaneous Electrical Nerve Stimulation

A novel analgesic therapy for diabetic neuropathic pain

MOHAMED A. HAMZA, MD
PAUL F. WHITE, PHD, MD, FANZCA
WILLIAM F. CRAIG, MD
EL-SAYED A. GHONAME, MD
HESHAM E. AHMED, MD
TIMOTHY J. PROCTOR, BA
CARL E. NOE, MD
AKSHAY S. VAKHARIA, MD
NOOR GAJRAJ, MD



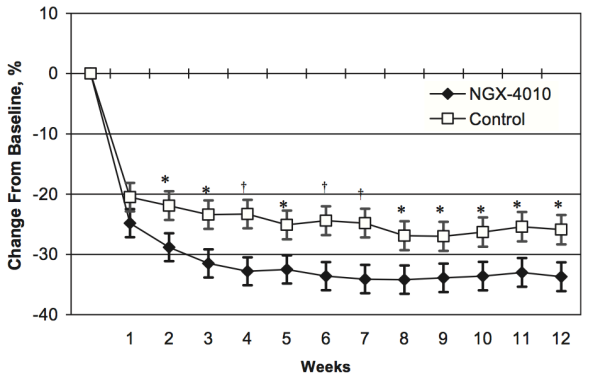
Decrease the number of pills/day

Other “skin” treatments

Pain Medicine 2011; 12: 99–109
Wiley Periodicals, Inc.

A Multicenter, Randomized, Double-Blind, Controlled Study of NGX-4010, a High-Concentration Capsaicin Patch, for the Treatment of Postherpetic Neuralgia

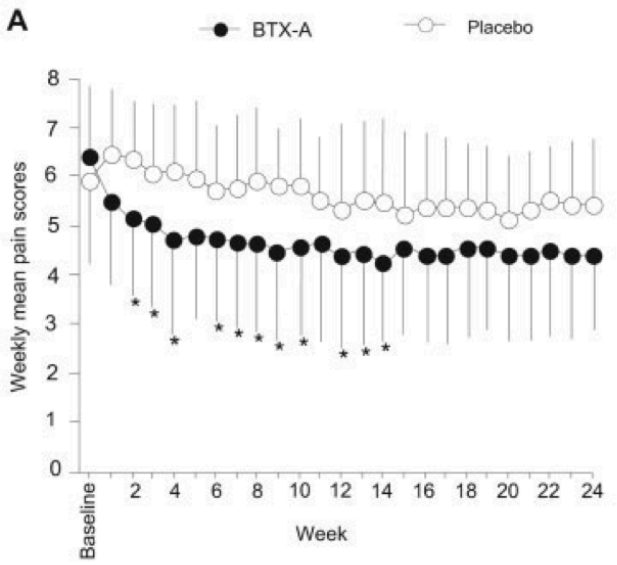
Gordon A. Irving, MD,* Miroslav M. Backonja, MD,† Edwin Dunteman, MD,‡ E. Richard Blonsky, MD,§ Geertrui F. Vanhove, MD, PhD,¶ Shiao-Ping Lu, MS,¶ and Jeffrey Tobias, MD,¶ for the NGX-4010 C117 Study Group**



Ann Neurol 2008;64:274–284

Botulinum Toxin Type A Induces Direct Analgesic Effects in Chronic Neuropathic Pain

Danièle Ranoux, MD,[1] Nadine Attal, MD, PhD,[2–4] Francoise Morain, Clinical Research Assistant,[2–4] and D. Bouhassira[2–4]



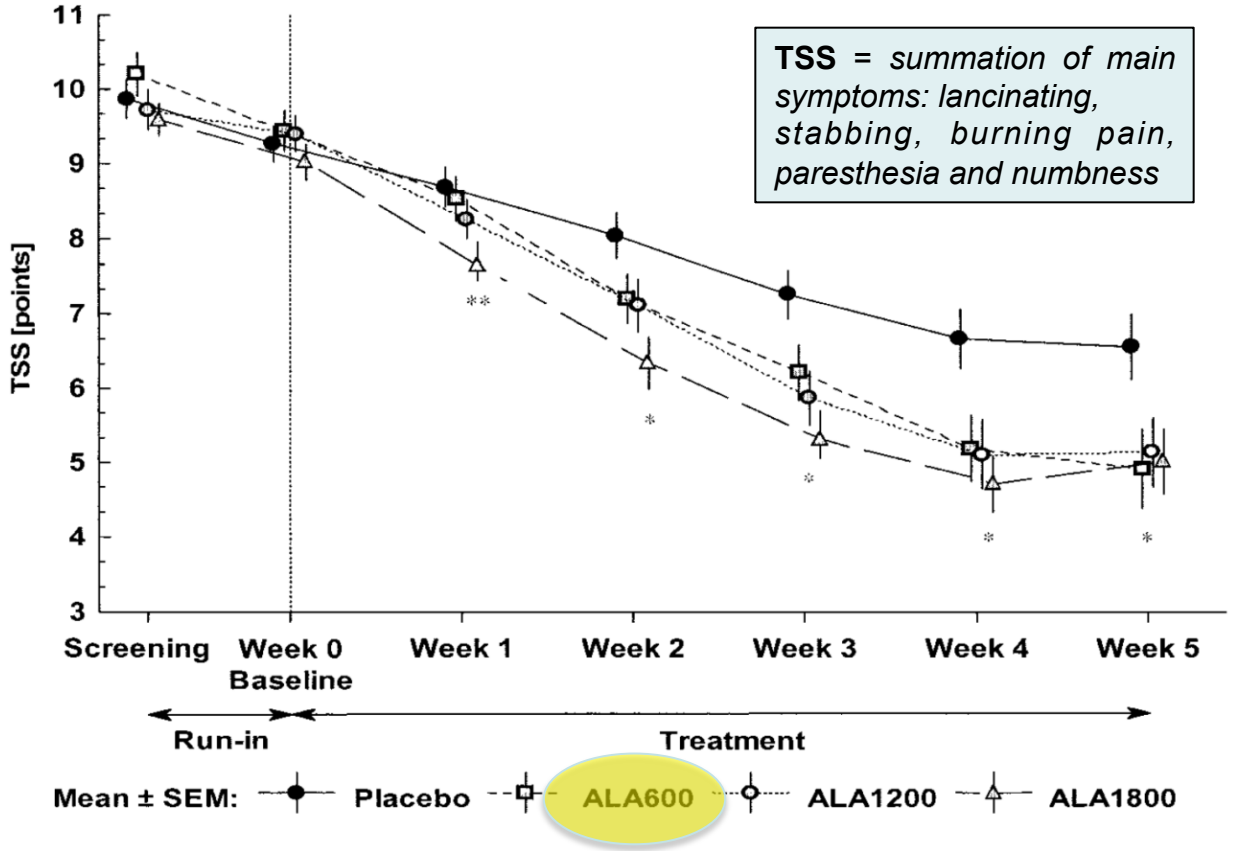
Trader Joe's Market. Boston, 2012

Diabetes Care 29:2365–2370, 2006

Oral Treatment With α-Lipoic Acid Improves Symptomatic Diabetic Polyneuropathy

Ziegler D, Ametov A, Barinov A, Dyck PJ, Gurieva I, Low P, Munzel U, Yakhno N, Raz I, Novosadova M, Maus J, Samigullin R

181 patients
5 weeks
12 discontinued (N/V)

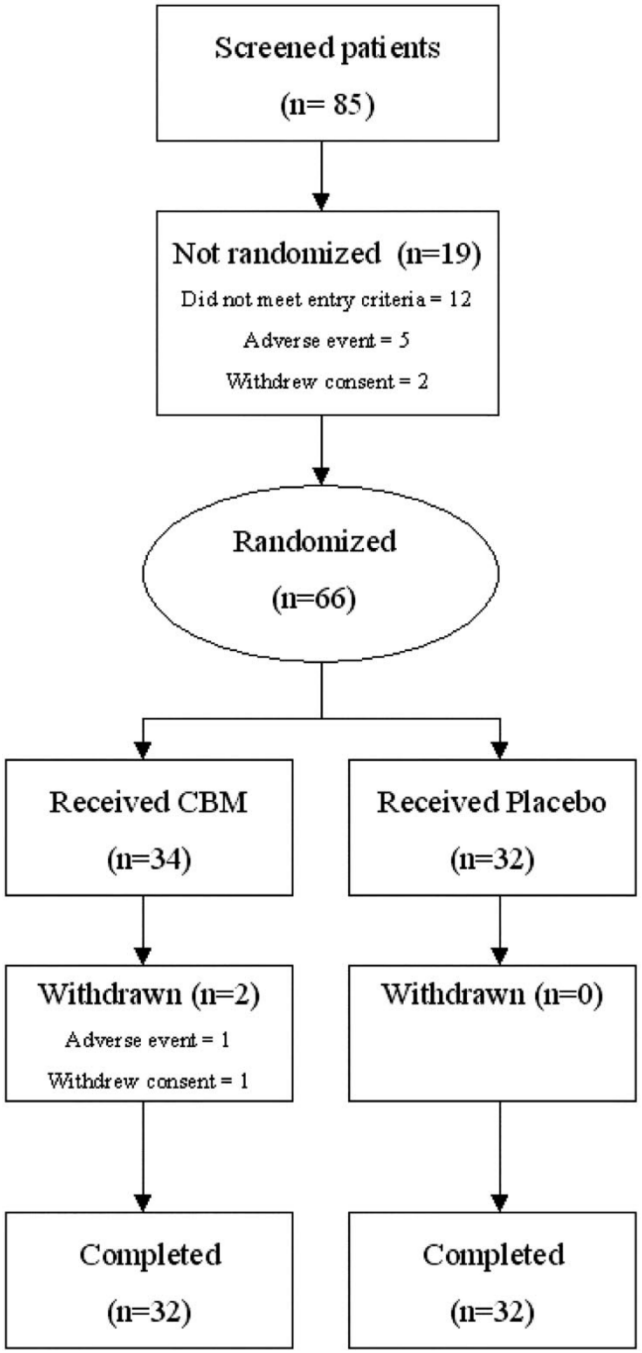


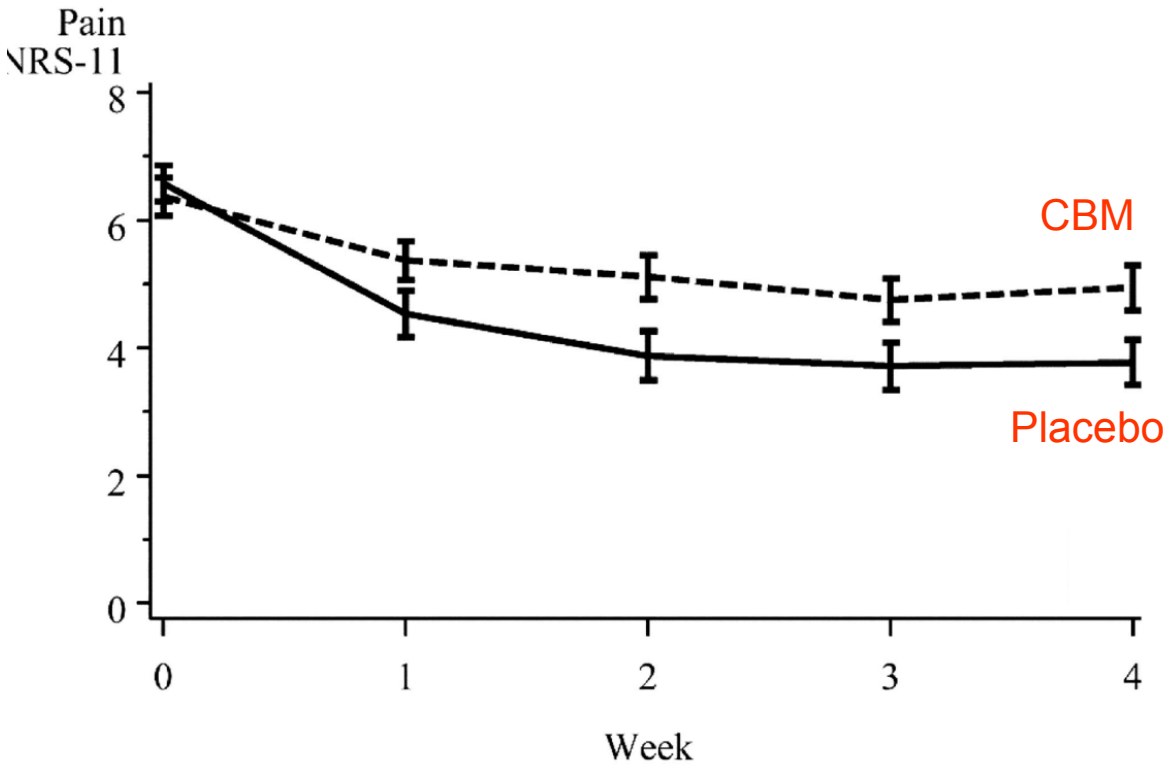
NEUROLOGY 2005;65:812–819

Randomized, controlled trial of cannabis-based medicine in central pain in multiple sclerosis

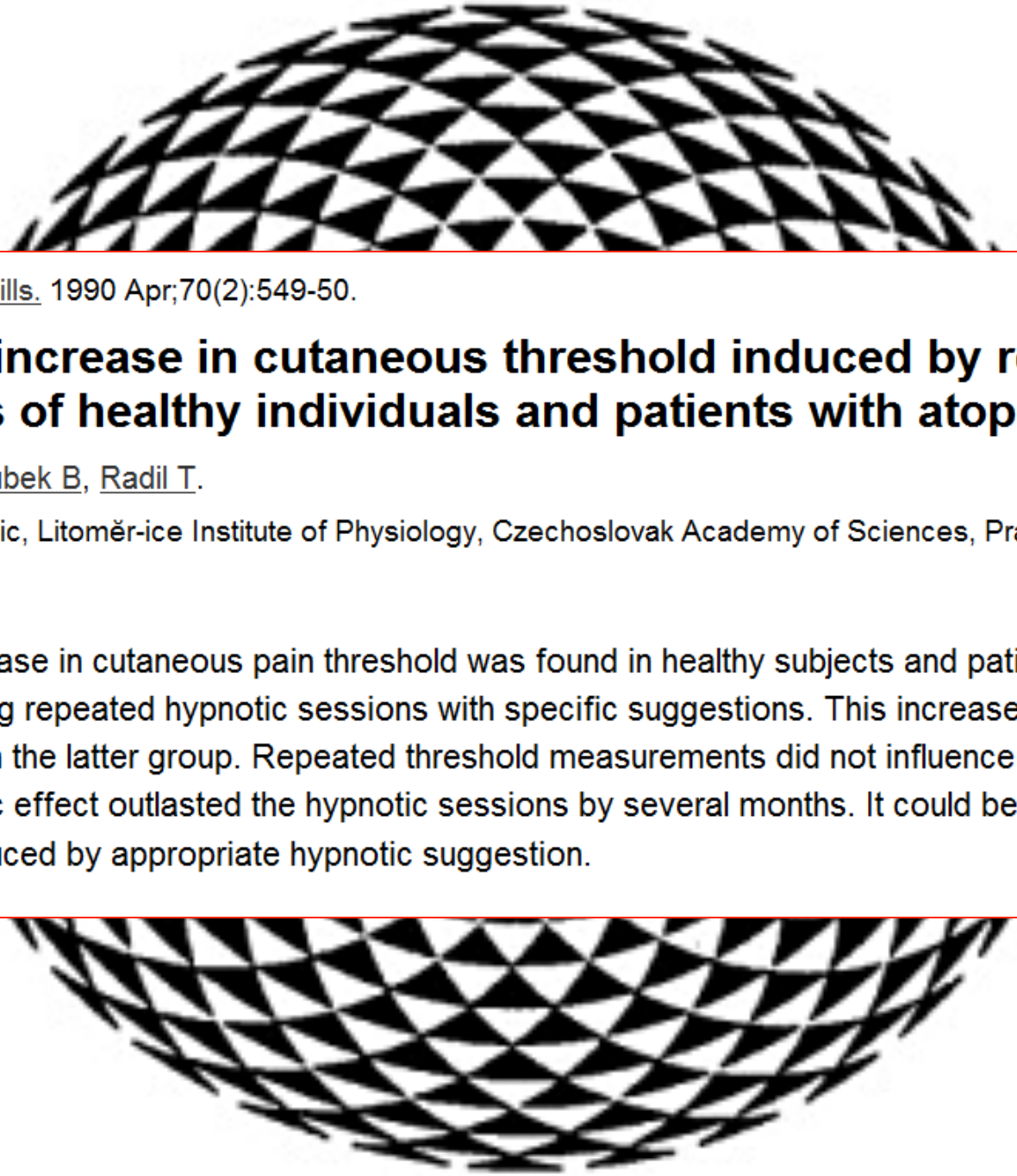
David J. Rog, BMBS; Turo J. Nurmikko, PhD; Tim Friede, PhD; and Carolyn A. Young, MD

- 5-week treatment in 66 patients
- Oromucosal spray





Adverse event and category	No. experiencing on CBM, n = 34	No. experiencing on placebo, n = 32
Nervous system		
Dizziness	18	5
Somnolence	3	0
Disturbance in attention	2	0
Headache	1	3
Psychiatric		
Dissociation	3	0
Euphoria	2	0
Gastrointestinal		



Percept Mot Skills. 1990 Apr;70(2):549-50.

Gradual increase in cutaneous threshold induced by repeated hypnosis of healthy individuals and patients with atopic eczema.

Hájek P, Jakoubek B, Radil T.

Medical Policlinic, Litoměřice Institute of Physiology, Czechoslovak Academy of Sciences, Prague.

Abstract

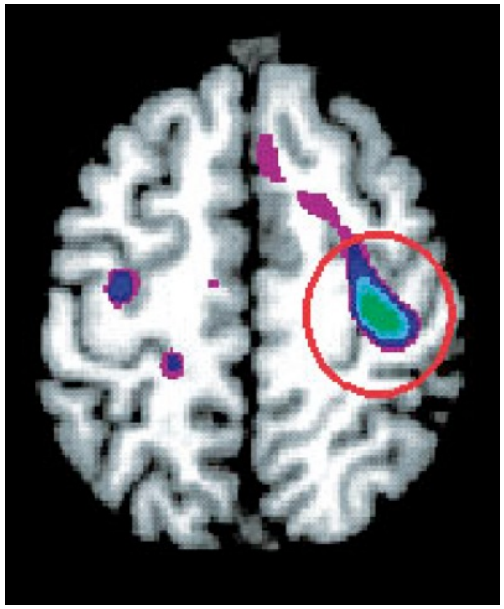
Gradual increase in cutaneous pain threshold was found in healthy subjects and patients with atopic eczema during repeated hypnotic sessions with specific suggestions. This increase was less in the former than in the latter group. Repeated threshold measurements did not influence the threshold. The analgesic effect outlasted the hypnotic sessions by several months. It could be, however, suddenly reduced by appropriate hypnotic suggestion.

Science **277**, 968 (1997)

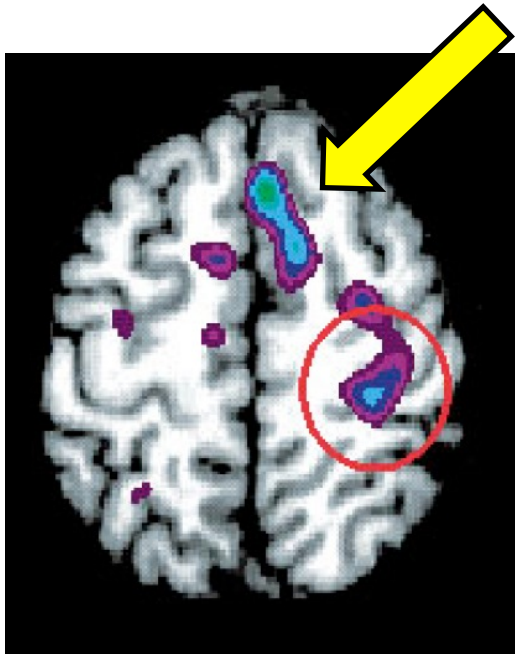
Pain Affect Encoded in Human Anterior Cingulate But Not Somatosensory Cortex

Pierre Rainville, Gary H. Duncan, Donald D. Price,
Benoît Carrier, M. Catherine Bushnell*

PLEASANT FEELING



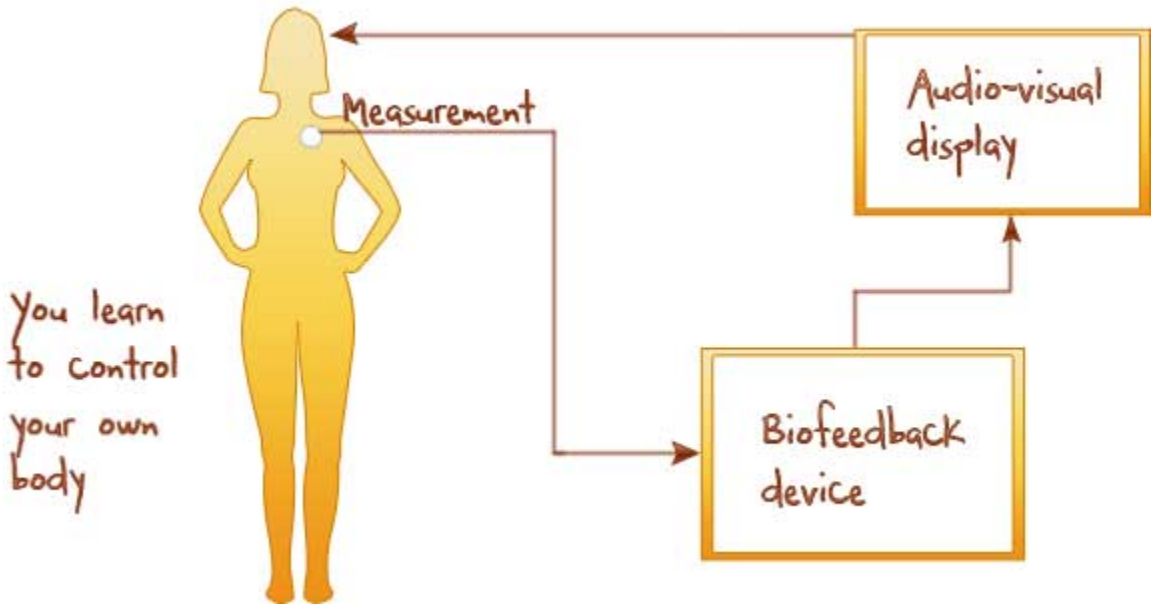
UNPLEASANT FEELING



Biofeedback is information about your biological functions.

It works by detecting changes in your body and providing you with visual information of these changes.

When you see this information, you can then go through a "trial and error" strategy where you learn to control your biological response.



Reference: http://www.stress-relief-tools.com/how-biofeedback-works.html

Int J Clin Exp Hypn. 2009 July ; 57(3): 239–268

Effects of Self-Hypnosis Training and Emg Biofeedback Relaxation Training on Chronic Pain in Persons with Spinal-Cord Injury[1]

Jensen MP, Barber J, Romano JM, Hanley MA, Raichle KA, Molton IR, Engel JM, Osborne TL, Stoelb BL, Cardenas DD, Patterson

- 29 subjects;
- Daily treatment for 10 days
- Stanford Hypnotic Clinical Scale to measure global hypnotizability.
- Duration of effect = 3 months

Means and SDs *for Average Daily Pain Intensity for Participants With and Without Neuropathic Pain in Each Treatment Condition*

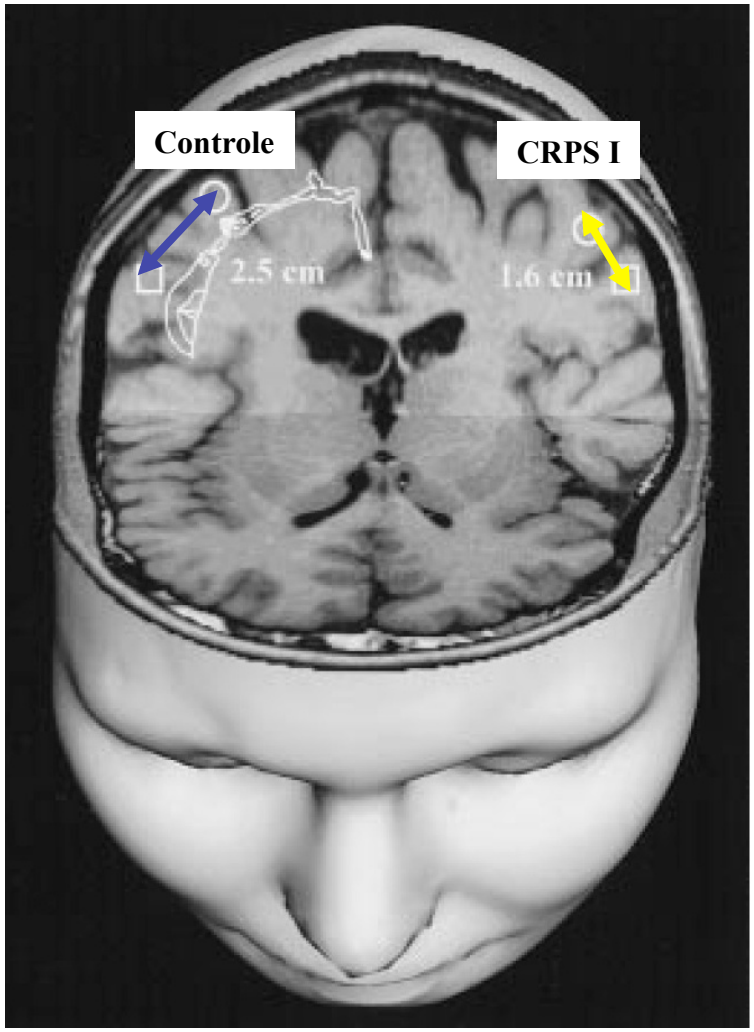
Pain Type	Treatment Condition	Pretreatment		Posttreatment		*t* (*df*)
		Mean	*SD*	Mean	*SD*	
Neuropathic	Hypnosis	6.00	2.20	4.53	2.11	3.96** (12)
	Biofeedback	2.81	0.95	3.19	0.69	0.56 (2)
Nonneuropathic	Hypnosis	5.64	1.31	5.66	1.53	0.11 (7)
	Biofeedback	3.78	1.55	3.32	1.39	1.56 (9)

** $p < .01$.

Neurology. 2003;61:1707-15.

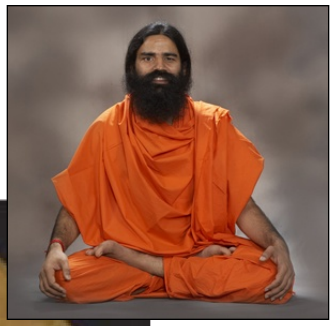
Patterns of cortical reorganization in complex regional pain syndrome

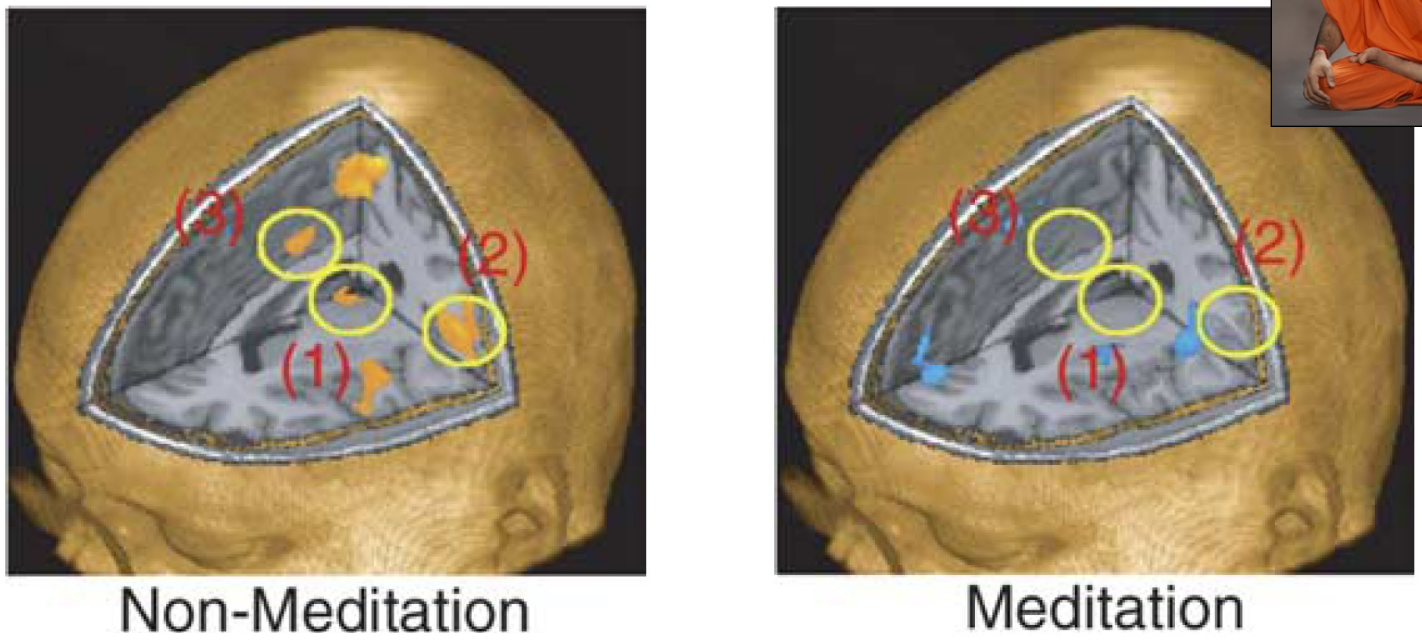
Christian Maihöfner, MD; Hermann O. Handwerker, MD, PhD; Bernhard Neundörfer, MD; and Frank Birklein, MD



Intracerebral pain processing in a Yoga Master who claims not to feel pain during meditation

Ryusuke Kakigi [a,b,d,*], Hiroki Nakata [a,b], Koji Inui [a,b], Nobuo Hiroe [a,b], Osamu Nagata [a], Manabu Honda [b,c], Satoshi Tanaka [b,c], Norihiro Sadato [b,c,d], Mitsumasa Kawakami [e]



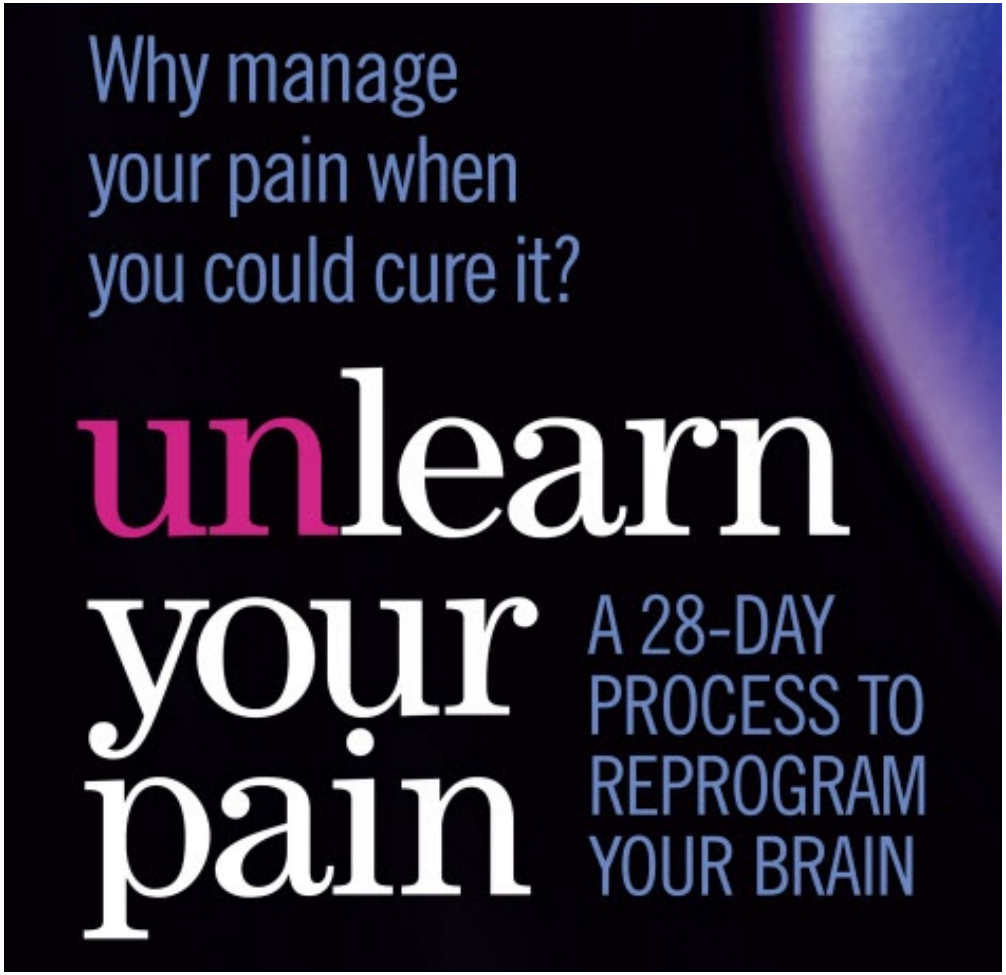


Non-Meditation

Meditation

European Journal of Pain 9 (2005) 581–589

Easy!!!!



From Google

Neurology 2006;67;2129;

Graded motor imagery for pathologic pain

A randomized controlled trial

G. Lorimer Moseley, PhD

Pain 108 (2004) 192–198

Graded motor imagery is effective for long-standing complex regional pain syndrome: a randomised controlled trial

G.L. Moseley*

Methods:

Table 1 *Protocol for training load during each phase of the motor imagery program*

Phase	Day 1–4	Day 5–8	Day 8–14
Limb laterality recognition	Categories 1–2 (80 trials)	Categories 1–3 (120 trials)	Categories 2–4 (120 trials)
Imagined movements	Category 1 (20 trials)	Categories 1–2 (40 trials)	Categories 1–3 (60 trials)
Mirror movements	Category 1 (20 trials)	Categories 1–2 (40 trials)	Categories 1–2 (80 trials)

Results:

Table 2 *Mean (95% CI) for number needed to treat (NNT) to achieve a preset change in pain or function or both*

	NNT to get a 50% decrease in pain	NNT to get a 4-point increase in function	NNT for both criteria
Response at post-program	3 (2–6)	4 (2–11)	4 (2–17)
Response at 6-mo. follow-up	2 (1–5)	2 (1–5)	3 (2–4)

Neurology 2006;67;2129;

N Engl J Med. 2007 May 31;356(22):2245-56.

Surgery versus prolonged conservative treatment for sciatica.

Peul WC[1], van Houwelingen HC, van den Hout WB, Brand R, Eekhof JA, Tans JT, Thomeer RT, Koes BW; Leiden-The Hague Spine Intervention Prognostic Study Group.

Author information

Abstract

BACKGROUND: Lumbar-disk surgery often is performed in patients who have sciatica that does not resolve within 6 weeks, but the optimal timing of surgery is not known.

METHODS: We randomly assigned 283 patients who had had severe sciatica for 6 to 12 weeks to early surgery or to prolonged conservative treatment with surgery if needed. The primary outcomes were the score on the Roland Disability Questionnaire, the score on the visual-analogue scale for leg pain, and the patient's report of perceived recovery during the first year after randomization. Repeated-measures analysis according to the intention-to-treat principle was used to estimate the outcome curves for both groups.

RESULTS: Of 141 patients assigned to undergo early surgery, 125 (89%) underwent microdiskectomy after a mean of 2.2 weeks. Of 142 patients designated for conservative treatment, 55 (39%) were treated surgically after a mean of 18.7 weeks. There was no significant overall difference in disability scores during the first year ($P=0.13$). Relief of leg pain was faster for patients assigned to early surgery ($P<0.001$). Patients assigned to early surgery also reported a faster rate of perceived recovery (hazard ratio, 1.97; 95% confidence interval, 1.72 to 2.22; $P<0.001$). In both groups, however, the probability of perceived recovery after 1 year of follow-up was 95%.

CONCLUSIONS: The 1-year outcomes were similar for patients assigned to early surgery and those assigned to conservative treatment with eventual surgery if needed, but the rates of pain relief and of perceived recovery were faster for those assigned to early surgery. (Current Controlled Trials number, ISRCTN26872154 [controlled-trials.com].).

Lancet. 1996 Dec 21-28;348(9043):1698-701.

Electrical spinal-cord stimulation for painful diabetic peripheral neuropathy.

Tesfaye S[1], Watt J, Benbow SJ, Pang KA, Miles J, MacFarlane IA.

Author information

Abstract

BACKGROUND: Conventional treatment for painful peripheral diabetic neuropathy is largely symptomatic and often ineffective, with unacceptable side-effects. We tested electrical spinal-cord stimulation for the management of chronic neuropathic pain.

METHODS: Ten diabetic patients who did not respond to conventional treatment (mean age 51 [SD 9.3] years, six with type II diabetes, mean duration of diabetes 12 [6.3] years, mean duration of neuropathy 5 [2.1] years) were studied. The electrode was implanted in the thoracic/lumbar epidural space. Immediate neuropathic pain relief was assessed by visual analogue scale (VAS) after connecting the electrode, in a random order, to a percutaneous electrical stimulator or to a placebo stimulator. Exercise tolerance was assessed on a treadmill.

FINDINGS: Eight subjects had statistically significant pain relief with the electrical stimulator ($p < 0.02$) and were therefore converted to a permanent system. Statistically significant relief of both background and peak neuropathic pain was achieved at 3 months ($n = 7$, $p = 0.016$), at 6 months ($n = 7$, $p = 0.03$), and at the end of the study (14 months, $n = 7$, background pain $p = 0.06$, peak pain $p = 0.03$). One patient died 2 months after the start of the study of unrelated cause while continuing to benefit from treatment and another patient ceased to benefit at 4 months. McGill pain questionnaire scores with the stimulator turned off did not change significantly from baseline scores, indicating that the severity of the underlying pain was unaltered. However, with the stimulator turned on, there was a statistically significant ($p < 0.05$) improvement in all four components of the score, by the end of the study. At the end of the study, six patients continued to gain significant pain relief and used the stimulator as the sole treatment for their neuropathic pain. For example, median background and peak pain scores at the end of study, were, respectively, 77 and 81 with the stimulator off and 23 and 20 with the stimulator on. Exercise tolerance significantly improved at 3 months ($n = 7$, median % increase 85 [IQR, 62-360], $p = 0.015$) and at 6 months ($n = 6$, 163 [61-425], $p = 0.0007$). Electrophysiological tests, vibration perception-threshold, and glycaemic control were unchanged.

INTERPRETATION: Electrical spinal-cord stimulation offers a new and effective way of relieving chronic diabetic neuropathic pain and improves exercise tolerance. The technique should be considered in patients with neuropathic pain who do not respond to conventional treatment.

Nature Clin Pract Neurol. 2007;3:383-93.

Technology Insight: noninvasive brain stimulation in neurology: perspectives on the therapeutic potential of rTMS and tDCS

Felipe Fregni and Alvaro Pascual-Leone*

Estimulação magnética transcraniana
- Repetitiva -

NEURO - ESTIMULAÇÃO
NEURO - MODULAÇÃO

Estimulação elétrica transcraniana
- Contínua -

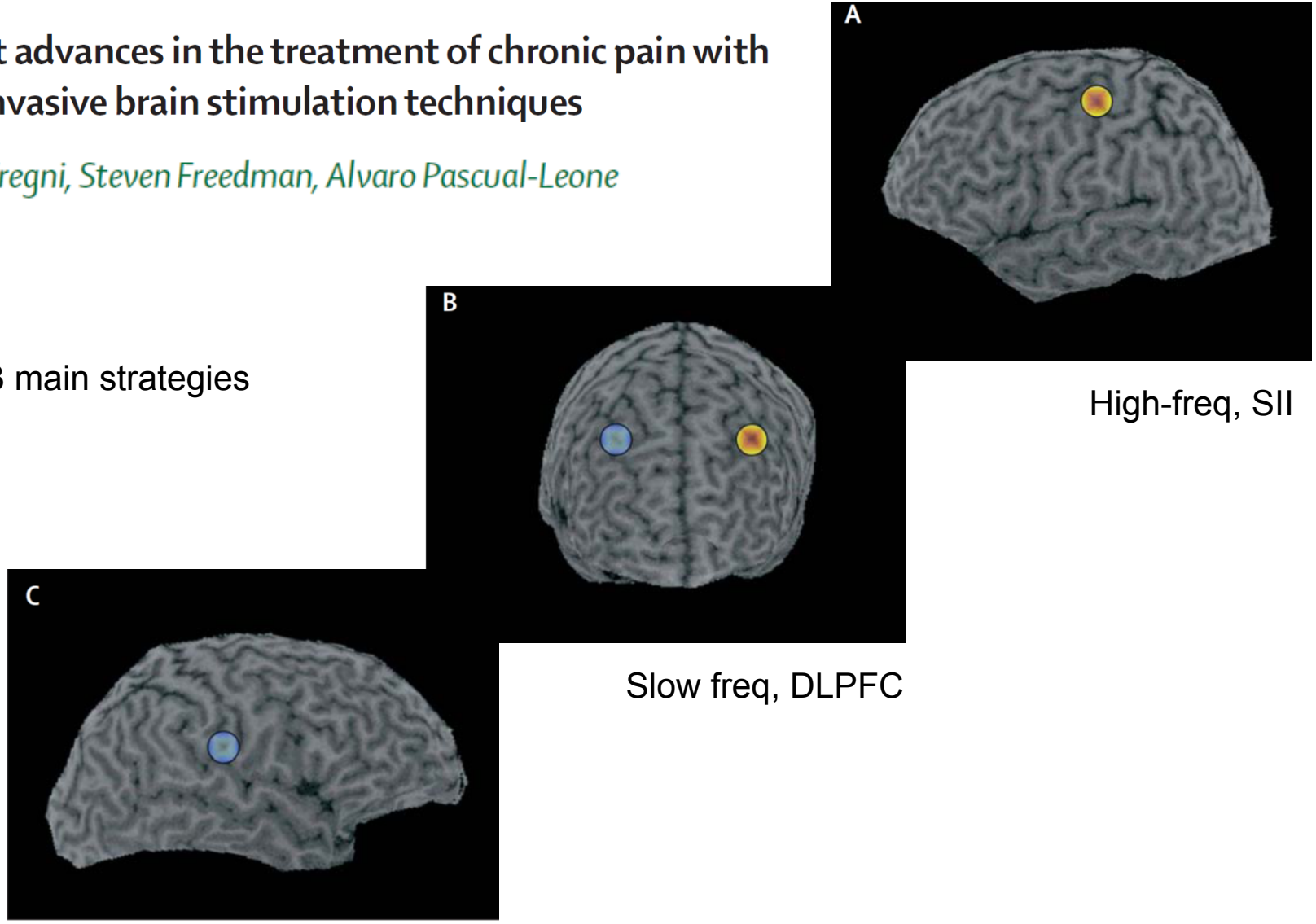
NEURO - MODULAÇÃO

Lancet Neurol 2007; 6: 188–91

Recent advances in the treatment of chronic pain with non-invasive brain stimulation techniques

Felipe Fregni, Steven Freedman, Alvaro Pascual-Leone

3 main strategies



High-freq, SII

Slow freq, DLPFC

High-freq, M1

PubMed | rTMS and neuropathic pain

RSS Save search Advanced

Results: 11

Filters activated: Randomized Controlled Trial

1: Ahmed MA, Mohamed SA, Sayed D. Long-term antalgic effects of repetitive transcranial magnetic stimulation of motor cortex and serum beta-endorphin in patients with phantom pain. Neurol Res. 2011 Nov;33(9):953-8.

2: André-Obadia N, Magnin M, Garcia-Larrea L. On the importance of placebo timing in rTMS studies for pain relief. Pain. 2011 Jun;152(6):1233-

3: Kang BS, Shin HI, Bang MS. Effect of repetitive transcranial magnetic stimulation over the hand motor cortical area on central pain after spinal cord injury. Arch Phys Med Rehabil. 2009 Oct;90(10):1766-71.

4: Borckardt JJ, Smith AR, Reeves ST, Madan A, Shelley N, Branham R, Nahas Z, George MS. A pilot study investigating the effects of fast left prefrontal rTMS on chronic neuropathic pain. Pain Med. 2009 Jul-Aug;10(5):840-9.

5: André-Obadia N, Mertens P, Gueguen A, Peyron R, Garcia-Larrea L. Pain relief by rTMS: differential effect of current flow but no specific action on pain subtypes. Neurology. 2008 Sep 9;71(11):833-40.

6: Borckardt JJ, Smith AR, Reeves ST, Weinstein M, Kozel FA, Nahas Z, Shelley N, Branham RK, Thomas KJ, George MS. Fifteen minutes of left prefrontal repetitive transcranial magnetic stimulation acutely increases thermal pain thresholds in healthy adults. Pain Res Manag. 2007 Winter;12(4):287-90.

7: Saitoh Y, Hirayama A, Kishima H, Shimokawa T, Oshino S, Hirata M, Tani N, Kato A, Yoshimine T. Reduction of intractable deafferentation pain due to spinal cord or peripheral lesion by high-frequency repetitive transcranial magnetic stimulation of the primary motor cortex. J Neurosurg. 2007 Sep;107(3):555-9.

8: Irlbacher K, Kuhnert J, Röricht S, Meyer BU, Brandt SA. [Central and peripheral deafferent pain: therapy with repetitive transcranial magnetic stimulation]. Nervenarzt. 2006 Oct;77(10):1196, 1198-203.

9: Hirayama A, Saitoh Y, Kishima H, Shimokawa T, Oshino S, Hirata M, Kato A, Yoshimine T. Reduction of intractable deafferentation pain by navigation-guided repetitive transcranial magnetic stimulation of the primary motor cortex. Pain. 2006 May;122(1-2):22-7.

10: Pleger B, Janssen F, Schwenkreis P, Völker B, Maier C, Tegenthoff M. Repetitive transcranial magnetic stimulation of the motor cortex attenuates pain perception in complex regional pain syndrome type I. Neurosci Lett. 2004 Feb 12;356(2):87-90.

11: Inghilleri M, Conte A, Frasca V, Curra' A, Gilio F, Manfredi M, Berardelli A. Antiepileptic drugs and cortical excitability: a study with repetitive transcranial stimulation. Exp Brain Res. 2004 Feb;154(4):488-93.

The Journal of Pain, Vol 10, No 12 (December), 2009: pp 1205-1216
Available online at www.sciencedirect.com

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Review Article

rTMS for Suppressing Neuropathic Pain: A Meta-Analysis

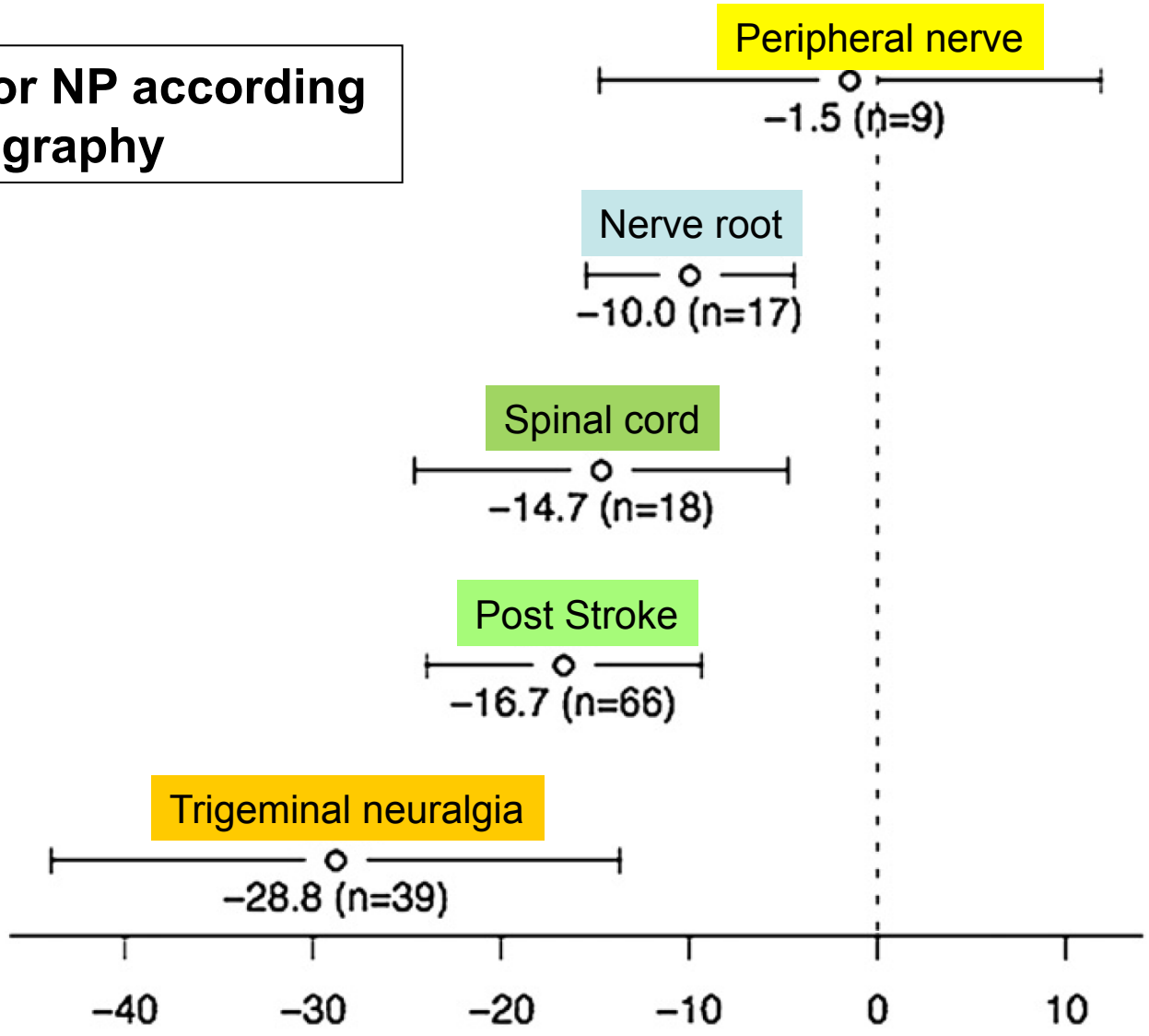
Albert Leung,* Michael Donohue,† Ronghui Xu,‡ Ryan Lee,§ Jean-Pascal Lefaucheur,¶ Eman M. Khedr,‖ Youichi Saitoh,** Nathalie André-Obadia,†† Jens Rollnik,‡‡ Mark Wallace,§§ and Robert Chen¶¶

**Department of Anesthesiology, The University of California, San Diego, School of Medicine, VA San Diego Healthcare System.*
†Department of Family and Preventive Medicine, The University of California, San Diego, School of Medicine.
‡Department of Family and Preventive Medicine, and Department of Mathematics, The University of California, San Diego, School of Medicine.
§The University of California, San Diego.
¶Department of Physiology, Henri Mondor University Hospital, Créteil, France.
‖Department of Neurology, Assiut University Hospital, Assiut, Egypt.
***Department of Neurosurgery, Osaka University Graduate School of Medicine, Osaka, Japan.*
††Department of Neurology, University Hospital Lyon Sud, Lyon, France.
‡‡Department of Neurology and Clinical Neurophysiology, Medical School of Hannover, Germany.
§§Department of Anesthesiology, The University of California, San Diego, School of Medicine.
¶¶Division of Neurology, Department of Medicine, Toronto Western Research Institute, University of Toronto, Toronto, Canada.

of the motor cortex attenuates pain perception in complex regional pain syndrome type I. Neurosci Lett. 2004 Feb 12;356(2):87-90.

11: Inghilleri M, Conte A, Frasca V, Curra' A, Gilio F, Manfredi M, Berardelli A. Antiepileptic drugs and cortical excitability: a study with repetitive transcranial stimulation. Exp Brain Res. 2004 Feb;154(4):488-93.

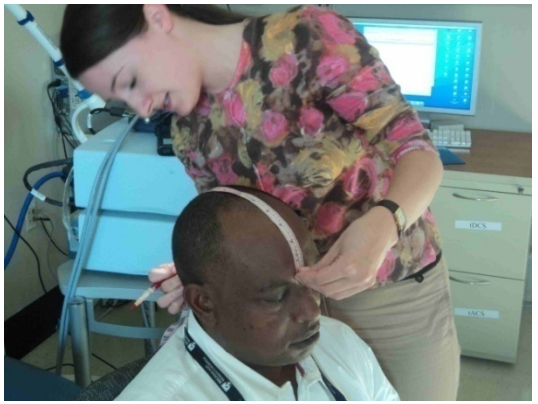
rTMS for NP according to topography



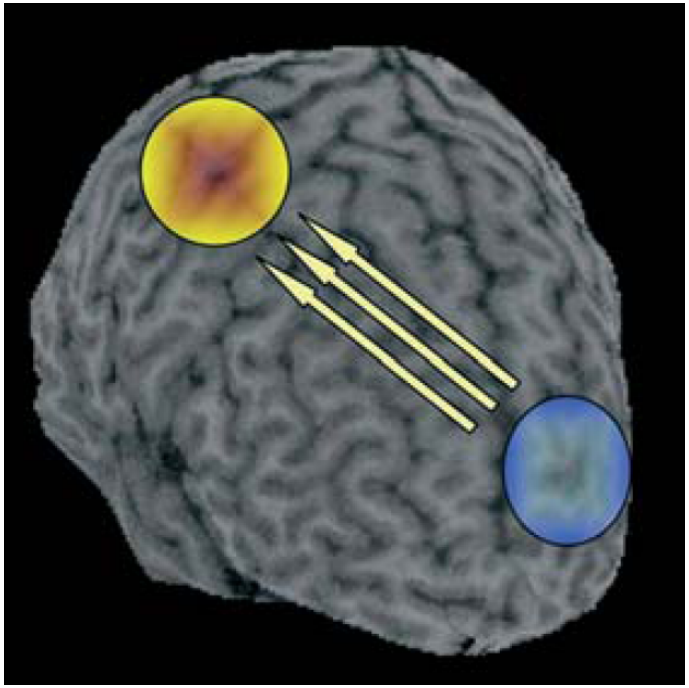
The Journal of Pain, Vol 10, No 12 (December), 2009: pp 1205-1216

Laboratory of Neuromodulation &
Center for Clinical Research Learning

Spaulding Rehabilitation Hospital, Harvard University – Boston MA



tDCS for Neuropathic pain = Anodal stimulation of M1



Felipe Fregni, Steven Freedman, Alvaro Pascual-Leone
Lancet Neurol 2007; 6: 188–91

PubMed | transcranial direct current stimulation and neuropathic pain

RSS Save search Advanced

Results: 4

Filters activated: Randomized Controlled Trial

1: Soler MD, Kumru H, Pelayo R, Vidal J, Tormos JM, Fregni F, Navarro X, Pascual-Leone A. Effectiveness of transcranial direct current stimulation and visual illusion on neuropathic pain in spinal cord injury. Brain. 2010 Sep;133(9):2565-77.

2: Antal A, Terney D, Kühnl S, Paulus W. Anodal transcranial direct current stimulation of the motor cortex ameliorates chronic pain and reduces sh ge. 2010 May; 39(5):890-

NO META-ANALYSES YET!

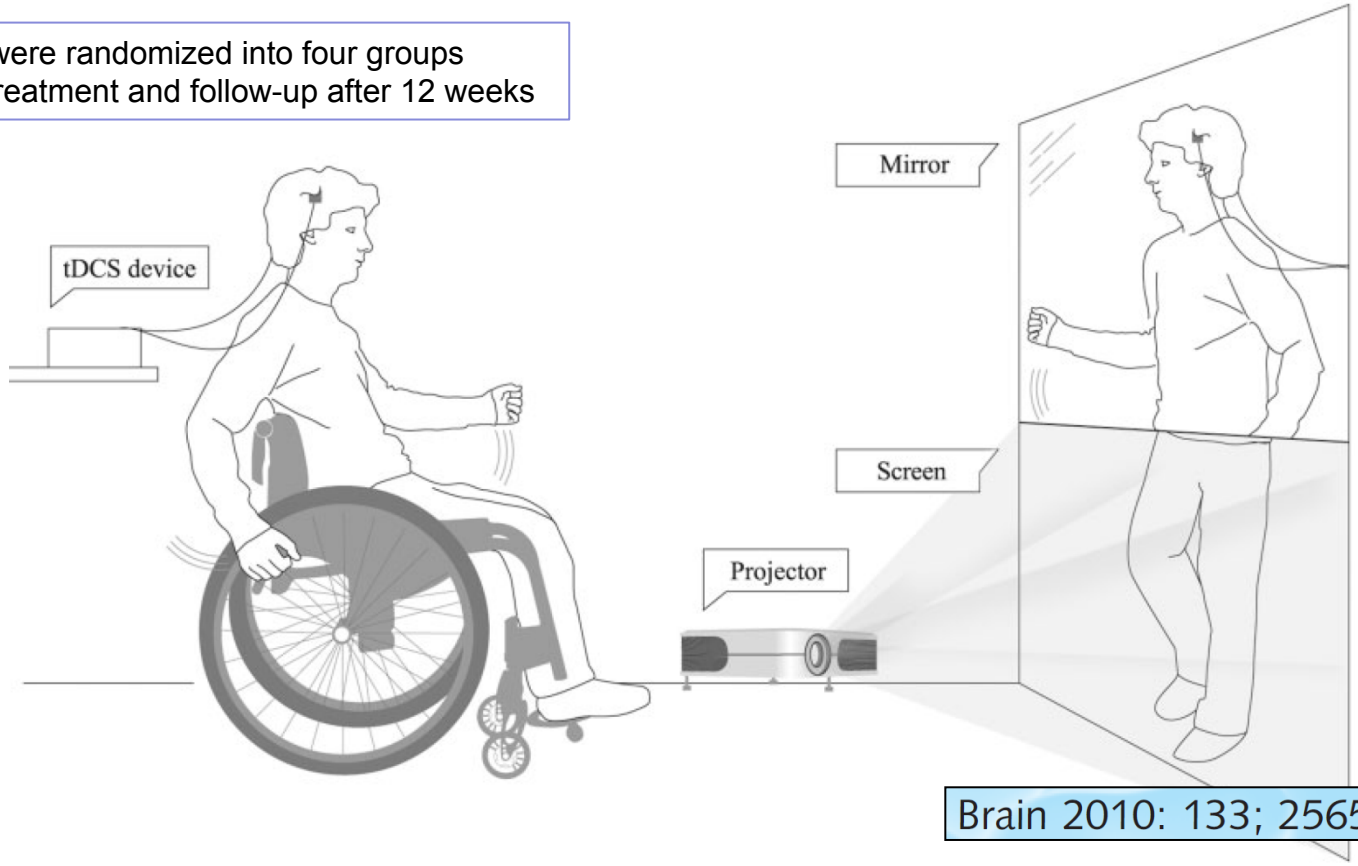
3: Mori F, Codecà C, Kusayanagi H, Monteleone F, Buttari F, Fiore S, Bernardi G, Koch G, Centonze D. Effects of anodal transcranial direct current stimulation on chronic neuropathic pain in patients with multiple sclerosis. J Pain. 2010 May;11(5):436-42.

4: Fregni F, Boggio PS, Lima MC, Ferreira MJ, Wagner T, Rigonatti SP, Castro AW, Souza DR, Riberto M, Freedman SD, Nitsche MA, Pascual-Leone A. A sham-controlled, phase II trial of transcranial direct current stimulation for the treatment of central pain in traumatic spinal cord injury. Pain. 2006 May;122(1-2):197-209.

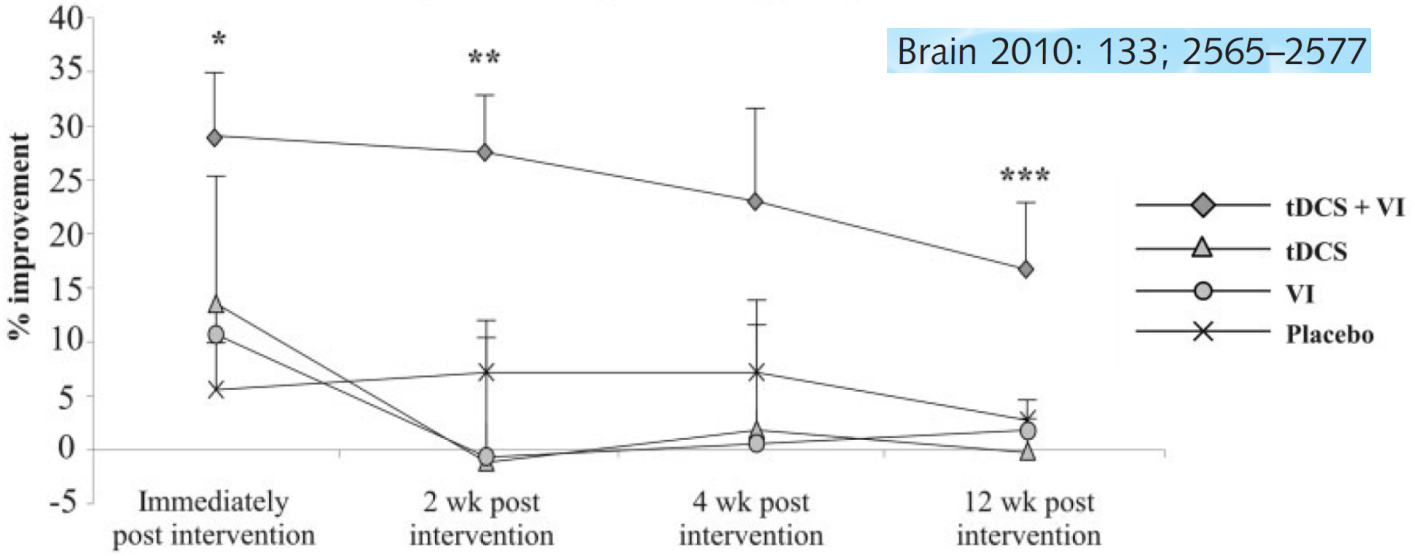
Effectiveness of transcranial direct current stimulation and visual illusion on neuropathic pain in spinal cord injury

Maria Dolors Soler,[1] Hatice Kumru,[1] Raul Pelayo,[1] Joan Vidal,[1] Josep Maria Tormos,[1] Felipe Fregni,[2] Xavier Navarro[3] and Alvaro Pascual-Leone[1,2]

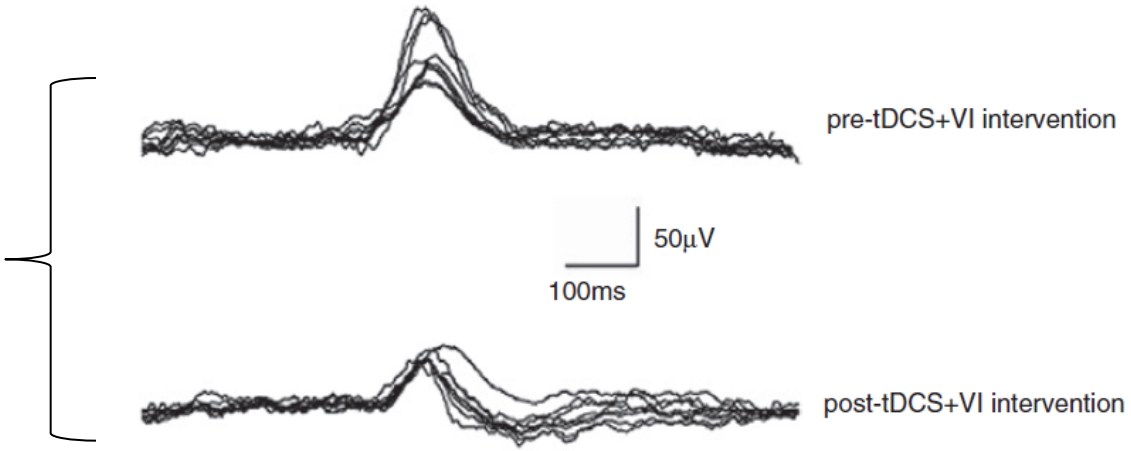
39 patients were randomized into four groups
2 weeks of treatment and follow-up after 12 weeks



Brain 2010: 133; 2565–2577



Contact-heat Evoked potentials (CHEPS)



Kumru H, Soler D, Vidal J, Navarro X, Tormos JM, Pascual-Leone A, Valls-Sole J. Eur J Pain. 2012

Summarizing...

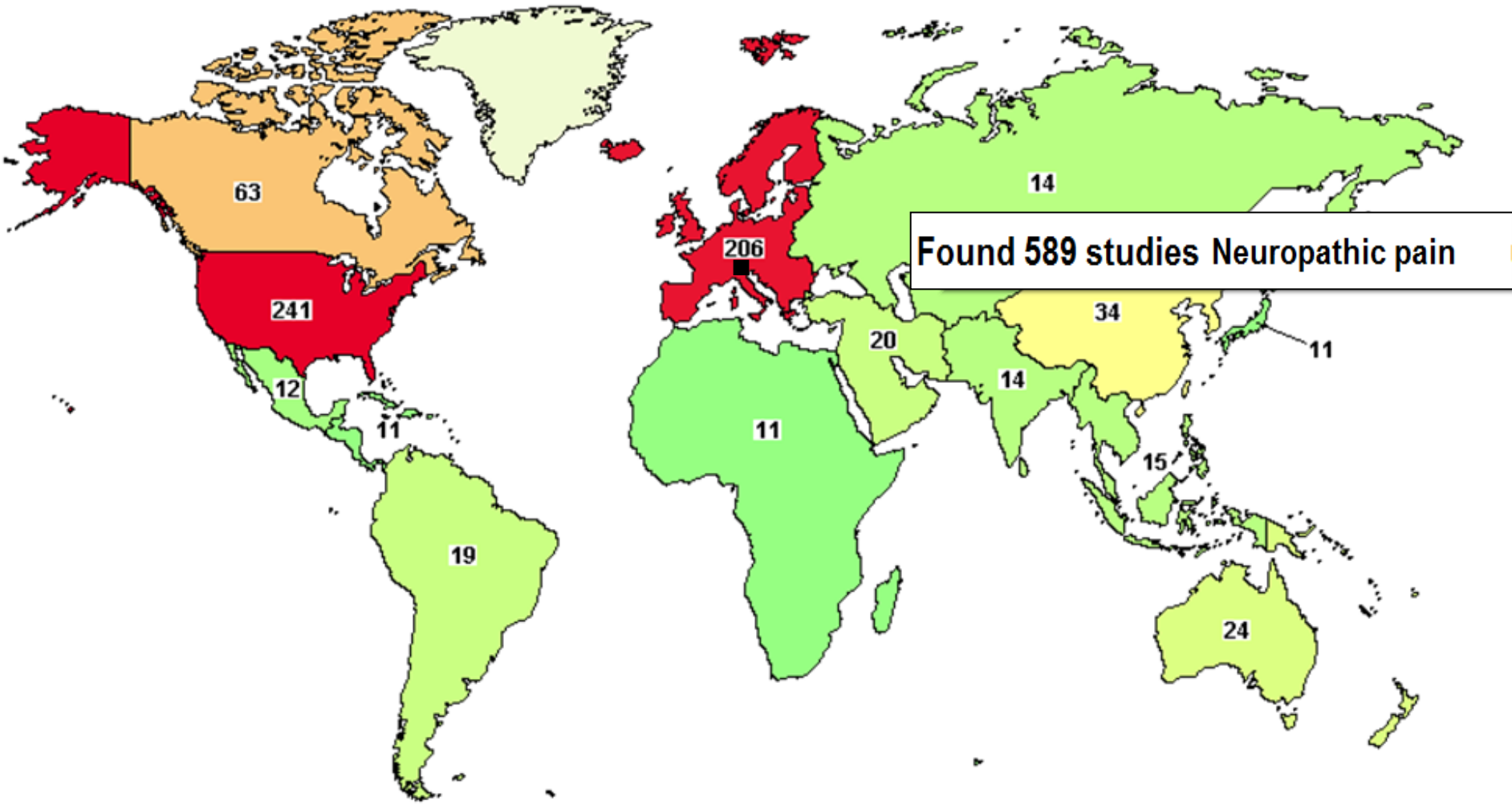
	RCT	Results	Meta-analysis	Adverse effects	Cost
Tryciclics*	**YES**	**++++**	**YES**	**Sedation**	**+**
Acupuncture	YES	++	YES	None	+
PENS	YES	+	-	None	+
Lipoic Acid	YES	++	-	Nausea	++
Cannabis	YES	++	YES	Dizzyness	+
Hypnosis	YES	?	-	Negligible	++
Biofeedback	YES	?	-	Negligible	++
Motor Imagery	YES	++	-	None	++
rTMS	YES	++	YES	Negligible	+++
tDCS	YES	++	-	Negligible	+

*Not unusual, only for comparison

ClinicalTrials.gov
A service of the U.S. National Institutes of Health

Home Search Study Topics Glossary

Neuropathic pain Search



Future directions (www.clinicaltrials.gov)

Accessed: this morning

Status	Study
Completed	Impact of Oral Magnesium on Neuropathic Pain Condition: Patient With Neuropathic Pain Intervention: Drug: Magnogene ® (magnesium)
Unknown †	Intravenous Immunoglobulin (IVIG) for Resistant Neuropathic Pain Condition: Neuropathic Pain Interventions: Biological: Intravenous immunoglobulin; Biological: Normal Saline
Recruiting	Cognitive Behavioral Therapy for Diabetic Neuropathic Pain Condition: Diabetic Peripheral Neuropathic Pain Interventions: Behavioral: CBT plus standard pharmaceutical care (CBT/SC); Behavioral: Diabetic Education plus standard pharmaceutical care (ED/SC)

BMJ 2003;327:1459–61

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Gordon C S Smith, Jill P Pell

Results

Our search strategy did not find any randomised controlled trials of the parachute.

HULTON/GETTY

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

Take home message

■ There is some evidence of good efficacy for all alternative treatments showed here;

■ Most of them are acessible, cheap and with no major adverse effects;

■ Neurologists must always consider their usage (solely or as adjuvant), especially in those intolerant of refractory to conventional NP approaches