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## Search History

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1. MEDLINE; \*TRANSCUTANEOUS ELECTRIC NERVE STIMULATION/; 1908 results.
2. MEDLINE; \*PAIN/; 59669 results.
3. MEDLINE; \*PAIN, INTRACTABLE/; 3906 results.
4. MEDLINE; 1 AND 2; 302 results.
5. MEDLINE; 1 AND 3; 30 results.
6. AMED; exp TRANSCUTANEOUS ELECTRIC NERVE STIMULATION/; 565 results.
7. AMED; exp PAIN INTRACTABLE/; 408 results.
8. AMED; exp PAIN/; 15038 results.
9. AMED; 6 AND 8; 300 results.
10. AMED; 6 AND 7; 10 results.
11. CINAHL; \*CENTRAL NERVOUS SYSTEM STIMULANTS/; 547 results.
12. CINAHL; (Transcutaneous AND Electrical AND Nerve AND Stimulator).ti,ab; 13 results.
13. CINAHL; 11 OR 12; 560 results.
14. CINAHL; \*CHRONIC PAIN/; 5078 results.
15. CINAHL; \*PAIN/; 15926 results.
16. CINAHL; 13 AND 14; 1 results.
17. CINAHL; 13 AND 15; 8 results.
18. EMBASE; \*TRANSCUTANEOUS NERVE STIMULATION/; 1954 results.
19. EMBASE; \*CHRONIC PAIN/; 10542 results.
20. EMBASE; \*PAIN/; 56027 results.
21. EMBASE; 18 AND 19; 78 results.
22. EMBASE; 18 AND 20; 294 results.
23. HEALTH BUSINESS ELITE; (Transcutaneous AND Electrical AND Nerve AND Stimulator).ti,ab; 3 results.
24. HMIC; exp INTRACTABLE PAIN/; 9 results.
25. HMIC; (Transcutaneous AND Electrical AND Nerve AND Stimulator).ti,ab; 1 results.
26. PsycINFO; (Transcutaneous AND Electrical AND Nerve AND Stimulator).ti,ab; 6 results.
28. PsycINFO; \*CHRONIC PAIN/; 6206 results.
29. PsycINFO; 26 AND 28; 1 results.
30. MEDLINE,AMED,CINAHL,EMBASE; Duplicate filtered: [1 AND 3], [6 AND 7], [13 AND 14], [18 AND 19]; 119 results.

**1. Pain: Continued uncertainty of TENS' effectiveness for pain relief**

<b>Citation:</b>	Nature Reviews Rheumatology, June 2010, vol./is. 6/6(314-316), 1759-4790;1759-4804 (June 2010)
<b>Author(s):</b>	Johnson M.I.; Walsh D.M.
<b>Institution:</b>	(Johnson) Faculty of Health, Leeds Metropolitan University, Calverley Street, Leeds LS1 3HE, United Kingdom; (Walsh) Health and Rehabilitation Sciences Research Institute, University of Ulster, Shore Road, Newtownabbey, Co. Antrim BT37 0QB, United Kingdom
<b>Language:</b>	English
<b>Country of Publication:</b>	United Kingdom
<b>Publisher:</b>	Nature Publishing Group (Houndmills, Basingstoke, Hampshire RG21 6XS, United Kingdom)
<b>CAS Registry Number:</b>	9008-44-0 (muscle relaxant agent)
<b>Publication Type:</b>	Journal: Short Survey
<b>Subject Headings:</b>	<p>analgesia</p> <p>*chronic pain/dt [Drug Therapy]</p> <p>*chronic pain/th [Therapy]</p> <p>clinical trial</p> <p>Cochrane Library</p> <p>diabetic neuropathy/th [Therapy]</p> <p>evidence based medicine</p> <p>human</p> <p>intermethod comparison</p> <p>kinesiotherapy</p> <p>low back pain/th [Therapy]</p> <p>medical decision making</p> <p>medical research</p> <p>medical society</p> <p>nerve stimulation</p> <p>nervous system electrophysiology</p> <p>nociception</p> <p>osteoarthritis/th [Therapy]</p> <p>pain assessment</p> <p>priority journal</p> <p>rheumatoid arthritis/th [Therapy]</p> <p>sample size</p> <p>sensory nerve</p> <p>short survey</p> <p>synaptic inhibition</p> <p>*transcutaneous nerve stimulation</p> <p>treatment outcome</p> <p>visual analog scale</p> <p>analgesic agent/ct [Clinical Trial]</p> <p>analgesic agent/dt [Drug Therapy]</p> <p>muscle relaxant agent/ct [Clinical Trial]</p> <p>muscle relaxant agent/dt [Drug Therapy]</p> <p>nonsteroid antiinflammatory agent/ct [Clinical Trial]</p> <p>nonsteroid antiinflammatory agent/dt [Drug Therapy]</p>
<b>Source:</b>	EMBASE

**2. Feasibility study of Transcutaneous Electrical Nerve Stimulation (TENS) for cancer bone pain.**

<b>Citation:</b>	Journal of Pain, April 2010, vol./is. 11/4(351-9), 1526-5900;1528-8447 (2010 Apr)
<b>Author(s):</b>	Bennett MI; Johnson MI; Brown SR; Radford H; Brown JM; Searle RD

<b>Institution:</b>	Professor of Palliative Medicine, Lancaster University, Lancaster, United Kingdom. m.i.bennett@lancaster.ac.uk
<b>Language:</b>	English
<b>Abstract:</b>	<p>This multicenter study assessed the feasibility of conducting a phase III trial of transcutaneous electrical nerve stimulation (TENS) in patients with cancer bone pain recruited from palliative care services. Eligible patients received active and placebo TENS for 1 hour at site of pain in a randomized crossover design; median interval between applications 3 days. Responses assessed at 30 and 60 minutes included numerical and verbal ratings of pain at rest and on movement, and pain relief. Recruitment, tolerability, adverse events, and effectiveness of blinding were also evaluated. Twenty-four patients were randomised and 19 completed both applications. The intervention was well tolerated. Five patients withdrew: 3 due to deteriorating performance status, and 2 due to increased pain (1 each following active and placebo TENS). Confidence interval estimation around the differences in outcomes between active and placebo TENS suggests that TENS has the potential to decrease pain on movement more than pain on rest. Nine patients did not consider that a placebo was used; the remaining 10 correctly identified placebo TENS. Feasibility studies are important in palliative care prior to undertaking clinical trials. Our findings suggest that further work is required on recruitment strategies and refining the control arm before evaluating TENS in cancer bone pain. PERSPECTIVE: Cancer bone pain is common and severe, and partly mediated by hyperexcitability. Animal studies suggest that Transcutaneous Electrical Nerve Stimulation can reduce hyperalgesia. This study examined the feasibility of evaluating TENS in patients with cancer bone pain in order to optimize methods before a phase III trial. Copyright 2010 American Pain Society. Published by Elsevier Inc. All rights reserved.</p>
<b>Country of Publication:</b>	United States
<b>Publication Type:</b>	Journal Article; Multicenter Study; Randomized Controlled Trial
<b>Subject Headings:</b>	<p><a href="#">Aged</a>  <a href="#">Aged, 80 and over</a>  <a href="#">*Bone Neoplasms/co [Complications]</a>  <a href="#">*Bone Neoplasms/sc [Secondary]</a>  <a href="#">Cross-Over Studies</a>  <a href="#">Female</a>  <a href="#">Humans</a>  <a href="#">Male</a>  <a href="#">Middle Aged</a>  <a href="#">Outcome Assessment (Health Care)</a>  <a href="#">Pain Measurement</a>  <a href="#">Pain, Intractable/et [Etiology]</a>  <a href="#">Pain, Intractable/pp [Physiopathology]</a>  <a href="#">*Pain, Intractable/th [Therapy]</a>  <a href="#">Palliative Care/mt [Methods]</a>  <a href="#">Palliative Care/sn [Statistics &amp; Numerical Data]</a>  <a href="#">Patient Selection</a>  <a href="#">Pilot Projects</a>  <a href="#">Placebo Effect</a>  <a href="#">*Transcutaneous Electric Nerve Stimulation/mt [Methods]</a>  <a href="#">Transcutaneous Electric Nerve Stimulation/sn [Statistics &amp; Numerical Data]</a>  <a href="#">Treatment Outcome</a></p>
<b>Source:</b>	MEDLINE

### 3. Validation, reproducibility and safety of trans dermal electrical stimulation in chronic pain patients and healthy volunteers

<b>Citation:</b>	BMC Neurology, January 2010, vol./is. 10/1, 1471-2377 (13 Jan 2010)
<b>Author(s):</b>	Lecybyl R.; Acosta J.; Ghoshdastidar J.; Stringfellow K.; Hanna M.



<b>Institution:</b>	(Lecybyl, Acosta, Ghoshdastidar, Stringfellow, Hanna) King's College London, Pain Clinical Research Hub, Denmark Hill Campus, London, United Kingdom; (Lecybyl) Royal Free Hospital, Anaesthesiology Department, Pond Street, London, United Kingdom; (Lecybyl) Queen's Mary Hospital, Anaesthesiology Department, Froggnal Avenue, Sidecup, United Kingdom; (Lecybyl) Lewisham University Hospital, Anaesthesiology Department, Lewisham High Street, London, United Kingdom
<b>Language:</b>	English
<b>Abstract:</b>	<p>Background: Surrogate pain models have been extensively tested in Normal Human Volunteers (NHV). There are few studies that examined pain models in chronic pain patients. Patients are likely to have altered pain mechanisms. It is of interest to test patient pain responses to selective pain stimuli under controlled laboratory conditions. Methods: The Institutional Ethic Committee approved the study. 16 patients with chronic neuropathic radiculopathy and 16 healthy volunteers were enrolled to the study after obtaining informed consent. During electrical stimulation (150 minutes for volunteers and 75 minutes for patients) the following parameters were measured every 10 minutes: Ongoing pain: Visual Analogue Scale (VAS) and Numeric Rate Scale (NRS). Allodynia (soft foam brush). Hyperalgesia (von Frey monofilament 20 g). Flare. For each endpoint, the area under the curve (AUC) was estimated from the start of stimulation to the end of stimulation by the trapezoidal rule. The individual AUC values for both periods were plotted to show the inter- and intra-subject variability. For each endpoint a mixed effect model was fitted with random effect subject and fixed effect visit. The estimate of intra-subject variance and the mean value were then used to estimate the sample size of a crossover study required to have a probability of 0.80 to detect a 25% change in the mean value. Analysis was done using GenStat 8<sup>th</sup> edition. Results: Each endpoint achieved very good reproducibility for patients and NHV. Comparison between groups revealed trends towards: Faster habituation to painful stimuli in patients. Bigger areas of hyperalgesia in patients. Similar area of allodynia and flare (no statistical significance). Conclusion: The differences demonstrated between patients and NHVs suggest that the electrical stimulation device used here may stimulate pathways that are affected in the pathological state. 2010 Lecybyl et al; licensee BioMed Central Ltd.</p>
<b>Country of Publication:</b>	United Kingdom
<b>Publisher:</b>	BioMed Central Ltd. (34 - 42 Cleveland Street, London W1T 4LB, United Kingdom)
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	<p>adult aged allodynia article *chronic pain clinical article clinical feature controlled study human hyperalgesia low back pain male neuropathic pain patient safety radicular pain radiculopathy rating scale reproducibility *transcutaneous nerve stimulation validation process visual analog scale</p>
<b>Source:</b>	EMBASE
<b>Full Text:</b>	Available in <i>fulltext</i> at <a href="#">BioMedCentral</a>

Available in *fulltext* at [National Library of Medicine](#)

#### 4. Transcranial DC stimulation coupled with TENS for the treatment of chronic pain: A preliminary study

<b>Citation:</b>	Clinical Journal of Pain, October 2009, vol./is. 25/8(691-695), 0749-8047;1536-5409 (October 2009)
<b>Author(s):</b>	Boggio P.S.; Amancio E.J.; Correa C.F.; Cecilio S.; Valasek C.; Bajwa Z.; Freedman S.D.; Pascual-Leone A.; Edwards D.J.; Fregni F.
<b>Institution:</b>	(Boggio, Valasek) Nucleo de Neurociencias, Centro de Ciencias Biologicas e da Saude, Universidade Presbiteriana Mackenzie; (Amancio, Correa, Cecilio) Centro de Dor e Neurocirurgia Funcional, Hospital 9 de Julho; (Bajwa) Comprehensive Cancer Pain Service, Department of Anesthesia, Harvard Medical School, Boston, United Kingdom; (Freedman, Pascual-Leone, Edwards, Fregni) Berenson-Allen Center for Noninvasive Brain Stimulation, 330 Brookline Avenue, KS 452, Boston, MA 02215, United States; (Edwards) School of Exercise, Biomedical and Health Sciences, Edith Cowan University; (Edwards) Centre for Neuromuscular and Neurological Disorders, University of Western Australia, Western Australia, United States; (Fregni) Nucleo de Neurociencias (NEC), University of Sao Paulo, Sao Paulo, Brazil
<b>Language:</b>	English
<b>Abstract:</b>	<p>Objective: Based on evidence showing that electrical stimulation of the nervous system is an effective method to decrease chronic neurogenic pain, we aimed to investigate whether the combination of 2 methods of electrical stimulation-a method of peripheral stimulation [transcutaneous electrical nerve stimulation (TENS)] and a method of noninvasive brain stimulation [transcranial direct current stimulation (tDCS)]-induces greater pain reduction as compared with tDCS alone and sham stimulation. Methods: We performed a preliminary, randomized, sham-controlled, crossover, clinical study in which 8 patients were randomized to receive active tDCS/active TENS ("tDCS/TENS" group), active tDCS/sham TENS ("tDCS" group), and sham tDCS/sham TENS ("sham" group) stimulation. Assessments were performed immediately before and after each condition by a blinded rater. Results: The results showed that there was a significant difference in pain reduction across the conditions of stimulation (<math>P=0.006</math>). Post hoc tests showed significant pain reduction as compared with baseline after the tDCS/TENS condition [reduction by 36.5% (<math>\pm 10.7</math>), <math>P=0.004</math>] and the tDCS condition [reduction by 15.5% (<math>\pm 4.9</math>), <math>P=0.014</math>], but not after sham stimulation (<math>P=0.35</math>). In addition, tDCS/TENS induced greater pain reduction than tDCS (<math>P=0.02</math>). CONCLUSIONS: The results of this pilot study suggest that the combination of TENS with tDCS has a superior effect compared with tDCS alone. 2009 by Lippincott Williams &amp; Wilkins.</p>
<b>Country of Publication:</b>	United States
<b>Publisher:</b>	Lippincott Williams and Wilkins (530 Walnut Street, Philadelphia PA 19106-3621, United States)
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	<a href="#">adult</a> <a href="#">article</a> <a href="#">*brain depth stimulation</a> <a href="#">*chronic pain/th [Therapy]</a> <a href="#">clinical article</a> <a href="#">clinical assessment</a> <a href="#">clinical trial</a> <a href="#">controlled clinical trial</a> <a href="#">controlled study</a> <a href="#">disease duration</a> <a href="#">female</a> <a href="#">human</a> <a href="#">male</a> <a href="#">mini mental state examination</a> <a href="#">pain assessment</a> <a href="#">pilot study</a>

priority journal  
 randomized controlled trial  
 sham procedure  
 \*transcranial direct current stimulation  
 \*transcutaneous nerve stimulation  
 visual analog scale

**Source:** EMBASE

**5. [Percutaneous electrical nerve stimulation of peripheral nerve for the intractable occipital neuralgia]. [Italian]  
 Neurostimolazione elettrica subcutanea del nervo periferico utilizzata nel controllo della nevralgia occipitale  
 refrattaria.**

**Original Title:** Neurostimolazione elettrica subcutanea del nervo periferico utilizzata nel controllo della nevralgia occipitale refrattaria.

**Citation:** Recenti Progressi in Medicina, June 2008, vol./is. 99/6(295-301), 0034-1193;0034-1193 (2008 Jun)

**Author(s):** Shaladi A; Crestani F; Saltari R; Piva B

**Institution:** Servizio di Terapia Antalgica, Azienda ULSS 18, Rovigo-Trecenta.

**Language:** Italian

**Abstract:** Occipital neuralgia is characterized by pain paroxysm occurring within distribution of the greater or lesser occipital nerves. The pain may radiates from the rear head toward the ipso-lateral frontal or retro-orbital regions of head. Though known causes include head injuries, direct occipital nerve trauma, neuroma formation or upper cervical root compression, most people have no demonstrable lesion. **METHOD AND MATERIALS:** A sample of 8 patients (5 females, 3 males) aging 63,5 years on the average with occipital neuralgia has been recruited. The occipital neuralgic pain had presented since 4, 6 years and they had been treated by pharmacological therapy without benefit. Some result has been obtained by blocking of the grand occipital nerve so that the patients seemed to be suitable for subcutaneous peripheral neurostimulation. The pain was evaluated by VAS and SVR scales before treatment (TO) and after three and twelve months (T1, T2). **RESULTS:** During the follow up period 7 patients have been monitored for a whole year while one patient was followed only for 3 months in that some complications have presented. In the other 7 patients pain paroxysms have interrupted and trigger point disappeared with a VAS and SVR reduction of about 71% and 60%, respectively. **CONCLUSIONS:** Our experience demonstrates a sound efficacy of such a technique for patients having occipital neuralgia resistant to pharmacological therapies even if action mechanisms have not yet clearly explained. Some hypothesis exist and we think it might negatively affect the neurogenic inflammation that surely acts in pain maintaining.

**Country of Publication:** Italy

**Publication Type:** English Abstract; Journal Article

**Subject Headings:** Aged  
 \*Cervical Plexus/pp [Physiopathology]  
 Female  
 Follow-Up Studies  
 Humans  
 Male  
 Middle Aged  
 \*Neuralgia/th [Therapy]  
 \*Occipital Bone/ir [Innervation]  
 Pain Measurement/mt [Methods]  
 \*Pain, Intractable/th [Therapy]  
 Retrospective Studies  
 \*Transcutaneous Electric Nerve Stimulation/mt [Methods]  
 Treatment Outcome

**Source:** MEDLINE

**6. Predicting outcome of TENS in chronic pain: A prospective, randomized, placebo controlled trial**

<b>Citation:</b>	Pain, May 2008, vol./is. 136/1-2(11-20), 0304-3959 (May 2008)
<b>Author(s):</b>	Oosterhof J.; Samwel H.J.A.; de Boo T.M.; Wilder-Smith O.H.G.; Oostendorp R.A.B.; Crul B.J.P.
<b>Institution:</b>	(Oosterhof, Samwel, Wilder-Smith, Crul) Pain Expertise Centre, Department of Anesthesiology, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, P.O. Box 9101, 6500 HB Nijmegen, Netherlands; (Oosterhof) Research Centre for Allied Health Sciences, Department of Physiotherapy, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (Samwel) Department of Medical Psychology, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (de Boo) Department of Epidemiology and Biostatistics, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (Oostendorp) Research Centre for Allied Health Care, Department of Quality of Care Research, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (Wilder-Smith) Pain and Nociception Research Group, Department of Anesthesiology, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (Oostendorp) National Institute for Allied Health Care, Amersfoort, Netherlands
<b>Language:</b>	English
<b>Abstract:</b>	<p>Transcutaneous electrical nerve stimulation (TENS) is an easy to use non-invasive analgesic intervention applied for diverse pain states. However, effects in man are still inconclusive, especially for chronic pain. Therefore, to explore the factors predicting result of TENS treatment in chronic pain we conducted a prospective, randomized, placebo-controlled trial (n = 163), comparing high frequency TENS (n = 81) with sham TENS (n = 82). Patients' satisfaction (willingness to continue treatment; yes or no) and pain intensity (VAS) were used as outcome measures. The origin of pain and cognitive coping strategies were evaluated as possible predictors for result of TENS treatment. Results: Fifty-eight percent of the patients in the TENS group and 42.7% of the sham-TENS group were satisfied with treatment result (chi square = 3.8, p = 0.05). No differences were found for pain intensity. Patients diagnosed with osteoarthritis and related disorders (especially of the vertebral column) or peripheral neuropathic pain were less satisfied with high frequency TENS (OR = 0.12 (95% CI 0.04-0.43) and 0.06 (95% CI 0.006-0.67), respectively). Injury of bone and soft tissue (especially postsurgical pain disorder) provided the best results. Treatment modality or interactions with treatment modality did not predict intensity of pain as a result of treatment. We conclude, that predicting the effect of high frequency TENS in chronic pain depends on the choice of outcome measure. Predicting patients' satisfaction with treatment result is related to the origin of pain. Predicting pain intensity reflects mechanisms of pain behavior and perceived control of pain, independent of treatment modality. Pain catastrophizing did not predict TENS treatment outcome. 2007 International Association for the Study of Pain.</p>
<b>Country of Publication:</b>	Netherlands
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	<p>adult  article  *chronic pain/th [Therapy]  clinical trial  controlled clinical trial  controlled study  diathermy  human  major clinical study  neuropathic pain  osteoarthritis/di [Diagnosis]  patient satisfaction  peripheral neuropathy</p>

prediction  
 priority journal  
 prospective study  
 randomization  
 randomized controlled trial  
 sham procedure  
 \*transcutaneous nerve stimulation  
 placebo

**Source:** EMBASE

## 7. Transcutaneous electrical nerve stimulation (TENS) versus placebo for chronic low-back pain

**Citation:** Cochrane Database of Systematic Reviews, 2008, vol./is. /4, 1469-493X (2008)

**Author(s):** Khadilkar A.; Odebiyi D.O.; Brosseau L.; Wells G.A.

**Institution:** (Brosseau) School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa, Ottawa, ON, Canada; (Khadilkar) Rehabilitation Sciences, University of Ottawa, Ottawa, ON, Canada; (Odebiyi) Department of Physiotherapy, University of Lagos, Lagos, Nigeria; (Wells) Cardiovascular Research Reference Centre, University of Ottawa Heart Institute, Ottawa, ON, Canada; (Brosseau) School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa, 451 Smyth Road, Ottawa, ON K1H 8M5, Canada

**Language:** English

**Abstract:** Background: Transcutaneous electrical nerve stimulation (TENS) was introduced more than 30 years ago as a therapeutic adjunct to the pharmacological management of pain. However, despite widespread use, its effectiveness in chronic low-back pain (LBP) is still controversial. Objectives: To determine whether TENS is more effective than placebo for the management of chronic LBP. Search strategy: The Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, PEDro and CINAHL were searched up to July 19, 2007. Selection criteria: Only randomized controlled clinical trials (RCTs) comparing TENS to placebo in patients with chronic LBP were included. Data collection and analysis: Two review authors independently selected the trials, assessed their methodological quality and extracted relevant data. If quantitative meta-analysis was not possible, a qualitative synthesis was performed, taking into consideration 5 levels of evidence as recommended by the Cochrane Collaboration Back Review Group. Main results: Four high-quality RCTs (585 patients) met the selection criteria. Clinical heterogeneity prevented the use of meta-analysis. Therefore, a qualitative synthesis was completed. There was conflicting evidence about whether TENS was beneficial in reducing back pain intensity and consistent evidence in two trials (410 patients) that it did not improve back-specific functional status. There was moderate evidence that work status and the use of medical services did not change with treatment. Conflicting results were obtained from two studies regarding generic health status, with one study showing no improvement on the modified Sickness Impact Profile and another study showing significant improvements on several, but not all subsections of the SF-36 questionnaire. Multiple physical outcome measures lacked statistically significant improvement relative to placebo. In general, patients treated with acupuncture-like TENS responded similarly to those treated with conventional TENS. However, in two of the trials, an inadequate stimulation intensity was used for acupuncture-like TENS, given that muscle twitching was not induced. Optimal treatment schedules could not be reliably determined based on the available data. Adverse effects included minor skin irritation at the site of electrode placement. Authors' conclusions: At this time, the evidence from the small number of placebo-controlled trials does not support the use of TENS in the routine management of chronic LBP. Further research is encouraged. Copyright 2008 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

**Country of Publication:** United Kingdom

**Publisher:** John Wiley and Sons Ltd (Southern Gate, Chichester, West Sussex PO19 8SQ, United Kingdom)

**Publication Type:** Journal: Review

**Subject Headings:** acupuncture  
 acupuncture analgesia  
 analgesia  
 \*chronic pain/th [Therapy]  
 clinical trial  
 Cochrane Library  
 demography  
 \*electrostimulation therapy  
 EMBASE  
 health status  
 human  
 intermethod comparison  
 \*low back pain/th [Therapy]  
 MEDLINE  
 pain assessment  
 placebo effect  
 randomized controlled trial  
 rash/co [Complication]  
 review  
 Short Form 36  
 skin irritation/co [Complication]  
 systematic review  
 therapy effect  
 \*transcutaneous nerve stimulation  
 treatment outcome  
 \*placebo

**Source:** EMBASE

**Full Text:** Available in *fulltext* at [Wiley InterScience](#)

## 8. Transcutaneous electrical nerve stimulation (TENS) for chronic pain

**Citation:** Cochrane Database of Systematic Reviews, 2008, vol./is. /3, 1469-493X (2008)

**Author(s):** Nnoaham K.E.; Kumbang J.

**Institution:** (Nnoaham) Public Health Medicine, University of Oxford, Oxford, United Kingdom; (Kumbang) Public Health Medicine, Milton Keynes PCT, Milton Keynes, United Kingdom; (Nnoaham) Public Health Medicine, University of Oxford, Rosemary Rue Building, Old Road Campus, Headington, Oxford, Oxfordshire, OX3 7LF, United Kingdom

**Language:** English

**Abstract:** Background: Transcutaneous electrical nerve stimulation (TENS) is a popular pain treatment modality but its effectiveness in chronic pain management is unknown. This review is an update of the original Cochrane review published in Issue 3, 2001. Objectives: To evaluate the effectiveness of TENS in chronic pain. Search strategy: The Cochrane Library, EMBASE, MEDLINE and CINAHL were searched. Reference lists from retrieved reports and reviews were examined. Date of the most recent search: April 2008. Selection criteria: RCTs were eligible if they compared active TENS versus sham TENS controls; active TENS versus 'no treatment' controls; or active TENS versus active TENS controls (e.g. High Frequency TENS (HFTENS) versus Low Frequency TENS (LFTENS)). Studies of chronic pain for three months or more which included subjective outcome measures for pain intensity or relief were eligible for evaluation. No restrictions were made to language or sample size. Abstracts, letters, or unpublished studies, and studies of TENS in angina, headache, migraine, dysmenorrhoea and cancer-related pain were excluded. Data collection and analysis: Data were extracted and summarised on the following items: patients and details of pain condition, treatments, study duration, design, methods, subjective pain outcome measures, methodological quality, results for pain outcome measures and adverse effects, and conclusions by authors of the studies. Extracted data and methodological quality of studies were confirmed by the review



authors. Main results: Of 124 studies identified from the searches, 99 did not fulfil pre-defined entry criteria. Twenty-five RCTs involving 1281 participants were evaluated. Included studies varied in design, analgesic outcomes, chronic pain conditions, TENS treatments and methodological quality. The reporting of methods and results for analgesic outcomes were inconsistent across studies and generally poor. Meta-analysis was not possible. Overall in 13 of 22 inactive control studies, there was a positive analgesic outcome in favour of active TENS treatments. For multiple dose treatment comparison studies, eight of fifteen were considered to be in favour of the active TENS treatments. Seven of the nine active controlled studies found no difference in analgesic efficacy between High Frequency (HF) TENS and Low Frequency (LF) TENS. Authors' conclusions: Since the last version of this review, new relevant studies have not provided additional information to change the conclusions. Published literature on the subject lacks the methodological rigour or robust reporting needed to make confident assessments of the role of TENS in chronic pain management. Large multi-centre RCTs of TENS in chronic pain are still needed. Copyright 2008 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

<b>Country of Publication:</b>	United Kingdom
<b>Publisher:</b>	John Wiley and Sons Ltd (Southern Gate, Chichester, West Sussex PO19 8SQ, United Kingdom)
<b>Publication Type:</b>	Journal: Review
<b>Subject Headings:</b>	<a href="#">analgesia</a> <a href="#">angina pectoris</a> <a href="#">cancer pain</a> <a href="#">*chronic pain/th [Therapy]</a> <a href="#">CINAHL</a> <a href="#">clinical effectiveness</a> <a href="#">clinical trial</a> <a href="#">Cochrane Library</a> <a href="#">data extraction</a> <a href="#">dysmenorrhea</a> <a href="#">EMBASE</a> <a href="#">headache</a> <a href="#">human</a> <a href="#">MEDLINE</a> <a href="#">methodology</a> <a href="#">migraine</a> <a href="#">outcome assessment</a> <a href="#">quality control</a> <a href="#">review</a> <a href="#">sample size</a> <a href="#">systematic review</a> <a href="#">*transcutaneous nerve stimulation</a> <a href="#">treatment duration</a>
<b>Source:</b>	EMBASE
<b>Full Text:</b>	Available in <i>fulltext</i> at <a href="#">Wiley InterScience</a>

#### 9. The Effects of a Two-Week Trial of Transcutaneous Electrical Nerve Stimulation for Pediatric Chronic Back Pain

<b>Citation:</b>	Journal of Pain and Symptom Management, August 2007, vol./is. 34/2(115-117), 0885-3924 (Aug 2007)
<b>Author(s):</b>	Van Epps S.; Zempsky W.; Schechter N.; Pescatello L.S.; Lerer T.
<b>Institution:</b>	(Van Epps, Zempsky, Schechter) Pain Relief Program, Connecticut Children's Medical Center, Hartford, CT, United States; (Pescatello) University of Connecticut, School of Allied Health, Storrs, CT, United States; (Lerer) Child Health Data Center, Connecticut Children's Medical Center, Hartford, CT, United States
<b>Language:</b>	English

**Country of Publication:** United States

**CAS Registry Number:** 50-48-6 (amitriptyline); 549-18-8 (amitriptyline); 15687-27-1 (ibuprofen)

**Publication Type:** Journal: Letter

**Subject Headings:** [absenteeism](#)  
[adolescent](#)  
[\\*backache/dt \[Drug Therapy\]](#)  
[\\*backache/th \[Therapy\]](#)  
[case report](#)  
[child](#)  
[\\*chronic pain/dt \[Drug Therapy\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[female](#)  
[human](#)  
[letter](#)  
[pain assessment](#)  
[pilot study](#)  
[quality of life](#)  
[scoring system](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)  
[visual analog scale](#)  
[amitriptyline/dt \[Drug Therapy\]](#)  
[cocodamol/dt \[Drug Therapy\]](#)  
[ibuprofen/dt \[Drug Therapy\]](#)

**Source:** EMBASE

#### 10. Treatment of refractory ischemic pain from chemotherapy-induced Raynaud's syndrome with spinal cord stimulation.

**Citation:** Pain Practice, June 2007, vol./is. 7/2(143-6), 1530-7085;1533-2500 (2007 Jun)

**Author(s):** Ting JC; Fukshansky M; Burton AW

**Institution:** University of Texas M.D. Anderson Cancer Center, Department of Anesthesiology and Pain Medicine, Houston, Texas 77030, USA.

**Language:** English

**Abstract:** We report the successful treatment of refractory ischemic pain from cisplatin-induced Raynaud's syndrome with spinal cord stimulation after failed pharmacologic management and surgical sympathectomy. Case Report: A 48-year-old man developed ischemic pain of the hands while undergoing cisplatin and gemcitabine chemotherapy for metastatic pancreatic carcinoma. After extensive pharmacologic management and surgical sympathectomy failed to provide adequate analgesia, the patient underwent a percutaneous spinal cord stimulation trial followed by permanent implantation and received significant pain relief prior to succumbing to his illness. Spinal cord stimulation provided effective therapy for refractory ischemic pain, even after failed sympathectomy.

**Country of Publication:** United States

**Publication Type:** Case Reports; Journal Article

**Subject Headings:** [Drug Therapy/ae \[Adverse Effects\]](#)  
[Humans](#)  
[Ischemia/et \[Etiology\]](#)  
[Male](#)  
[Middle Aged](#)  
[Pain Measurement/mt \[Methods\]](#)  
[Pain, Intractable/et \[Etiology\]](#)  
[Pain, Intractable/pa \[Pathology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Raynaud Disease/ci \[Chemically Induced\]](#)



\*Raynaud Disease/co [Complications]  
 Spinal Cord/pp [Physiopathology]  
 \*Spinal Cord/re [Radiation Effects]  
 \*Transcutaneous Electric Nerve Stimulation/mt [Methods]

**Source:** MEDLINE

# 11. Transcutaneous Electrical Nerve Stimulation vs. Transcutaneous Spinal Electroanalgesia for Chronic Pain Associated with Breast Cancer Treatments

**Citation:** Journal of Pain and Symptom Management, April 2007, vol./is. 33/4(410-419), 0885-3924 (Apr 2007)

**Author(s):** Robb K.A.; Newham D.J.; Williams J.E.

**Institution:** (Robb, Newham, Williams) Division of Applied Biomedical Sciences Research, School of Biomedical and Health Sciences, King's College London, London, United Kingdom

**Language:** English

**Abstract:** Chronic pain associated with breast cancer treatment is becoming increasingly recognized. Patients with this condition can experience significant physical and psychological morbidity and may benefit from nonpharmacological interventions as part of a multidisciplinary team approach. We compared the effectiveness of transcutaneous electrical nerve stimulation (TENS), transcutaneous spinal electroanalgesia (TSE), and a placebo (sham TSE) in a randomized controlled trial. The study sample comprised 41 women with chronic pain following breast cancer treatment, and outcome measures included pain report, pain relief, pain interference, anxiety and depression, arm mobility, and analgesic consumption. There was little evidence to suggest that TENS or TSE were more effective than placebo. All three interventions had beneficial effects on both pain report and quality of life, a finding that may be due to either psychophysical improvements resulting from the personal interaction involved in the treatment or a placebo response. Although electrical stimulation appears to be well tolerated in this population, further research is needed to establish its effectiveness for chronic cancer treatment-related pain. 2007 U.S. Cancer Pain Relief Committee.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[anxiety](#)  
[arm movement](#)  
[article](#)  
[\\*breast cancer](#)  
[cancer pain](#)  
[\\*cancer therapy](#)  
[\\*chronic pain/co \[Complication\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[clinical trial](#)  
[comparative study](#)  
[controlled clinical trial](#)  
[controlled study](#)  
[depression](#)  
[double blind procedure](#)  
[drug use](#)  
[\\*electroanalgesia](#)  
[electrostimulation](#)  
[female](#)  
[human](#)  
[outcome assessment](#)  
[population](#)  
[psychophysics](#)  
[quality of life](#)

[randomized controlled trial](#)  
[research](#)  
[sample](#)  
[social interaction](#)  
[therapy effect](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*transcutaneous spinal electroanalgesia](#)  
[analgesic agent](#)  
[placebo](#)

**Source:** EMBASE

**12. Pain relief by transcutaneous electric nerve stimulation with bidirectional modulated sine waves in patients with chronic back pain: A randomized, double-blind, sham-controlled study**

**Citation:** Neuromodulation, January 2007, vol./is. 10/1(42-51), 1094-7159 (Jan 2007)

**Author(s):** Shimoji K.; Takahashi N.; Nishio Y.; Koyanagi M.; Aida S.

**Institution:** (Shimoji) Department of Human Sciences, Ube Frontier University Graduate School, Ube, Yamaguchi, Japan; (Takahashi) Takahashi Clinic, Business Development Center, Omron Healthcare Co. Ltd., Kyoto, Japan; (Nishio, Koyanagi) Research and Development Department, Business Development Center, Omron Healthcare Co. Ltd., Kyoto, Japan; (Aida) Department of Anesthesiology, Saitama Medical School, Moroyama, Saitama, Japan; (Aida) Department of Anesthesiology, Saitama Medical School, 38 Morohongo, Moroyama-machi, Saitama Prefecture 350-0495, Japan

**Language:** English

**Abstract:** Objectives. Newly developed bidirectional modulated sine waves (BMW) might provide some derived benefit to patients with low back pain. Pain relief by transcutaneous electric nerve stimulation (TENS) with BMWs was tested. Materials and Methods. Analgesic effects of BMWs and conventional bidirectional pulsed waves on chronic back pain in 28 patients were compared, and effects of repeated TENS using BMWs on chronic back pain were investigated in 21 patients by means of a randomized double-blind, sham-controlled, parallel-group method. Pain intensity was assessed using numerical rating scale (NRS). Results. There was significant immediate reduction in NRS in patients receiving BMWs, and 60 min after treatment compared to sham TENS. Weekly repeated treatments using massage and TENS with BMWs for 5 weeks resulted in a decrease of NRS, but there were no significant differences between the TENS plus massage and sham TENS plus massage groups. Conclusions. This study shows that TENS with BMWs significantly inhibits chronic back pain, and treatment effects are attained within a day. The results also suggest that there were no statistically significant long-term effects of TENS with BMW in the repeated treatment. 2007 International Neuromodulation Society.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[aged](#)  
[\\*analgesia](#)  
[article](#)  
[\\*backache/th \[Therapy\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[clinical trial](#)  
[comparative study](#)  
[controlled clinical trial](#)  
[controlled study](#)  
[double blind procedure](#)  
[female](#)  
[human](#)  
[male](#)  
[massage](#)

pain assessment  
 pulse wave  
 randomized controlled trial  
 rating scale  
 skin irritation/co [Complication]  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

### 13. Transcutaneous electrical nerve stimulation (TENS) [German] Transkutane elektrische nervenstimulation (TENS)

**Original Title:** Transkutane elektrische nervenstimulation (TENS)

**Citation:** KIM - Komplementare und Integrative Medizin, Arztzeitschrift für Naturheilverfahren, 2007, vol./is. 48/3(43-47), 1863-8678 (2007)

**Author(s):** Emrich O.M.; Zoller B.

**Institution:** (Emrich) Regionalen Schmerzzentrums Ludwigshafen DGS; (Emrich) Rosenthalstr. 17, 67069 Ludwigshafen - Oppau; (Zoller) Fachärztin für Anästhesie Zusatzbezeichnungen: Chirotherapie, Naturheilverfahren, Ernährungsmedizin; (Zoller) Romerstr. 8, 69115 Heidelberg

**Language:** German

**Country of Publication:** Germany

**Publication Type:** Journal: Article

**Subject Headings:** acupuncture  
 allodynia/th [Therapy]  
 article  
 central nervous system  
 \*chronic pain/th [Therapy]  
 electric potential  
 electrode  
 gate control theory  
 human  
 hyperalgesia/th [Therapy]  
 nerve conduction  
 nociception  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

### 14. Outcome of transcutaneous electrical nerve stimulation in chronic pain: Short-term results of a double-blind, randomised, placebo-controlled trial

**Citation:** Journal of Headache and Pain, September 2006, vol./is. 7/4(196-205), 1129-2369;1129-2377 (September 2006)

**Author(s):** Oosterhof J.; De Boo T.M.; Oostendorp R.A.B.; Wilder-Smith O.H.G.; Crul B.J.P.

**Institution:** (Oosterhof) Research Centre for Allied Health Care, 645 Department of Physiotherapy CSS, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (Oosterhof, Wilder-Smith, Crul) Department of Anesthesiology, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (De Boo) Department of Epidemiology and Biostatistics, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, 6500 HB Nijmegen, Netherlands; (Oostendorp) Research Centre for Allied Health Care, Department of Quality of Care Research, Radboud University Nijmegen Medical Centre, Geert Grooteplein 10, Nijmegen 6500 HB, Netherlands; (Oostendorp) National Institute for Allied Health Care, Amersfoort, Netherlands

**Language:** English

**Abstract:** The aim of this study was to test the efficacy of short term transcutaneous electrical nerve stimulation (TENS) treatment in chronic pain with respect to pain intensity and patients-satisfaction with treatment results. We therefore performed a randomised controlled trial comparing TENS and sham TENS. Patients, researchers and therapists were blinded for treatment allocation. One hundred and sixty-three patients with chronic pain referred to the Pain Centre entered the study. Conventional TENS and sham TENS were applied in the segments of pain, for a period of ten days. Outcome measures were pain intensity (visual analogue scale) and patients' satisfaction with treatment result (yes or no). The proportions of patients satisfied with treatment result differed significantly for TENS compared to sham TENS (58 and 42.7% respectively,  $\chi^2 = 3.8$ ,  $p = 0.05$ ). However, no differences in pain intensity were found for patients treated with TENS or sham TENS. Only for patients satisfied with treatment results pain intensity gradually decrease equally both for TENS and sham TENS with repeated treatment application. Springer-Verlag Italia 2006.

**Country of Publication:** Italy  
**Publisher:** Springer Milan (Via Podgora 4, Milan I-20122, Italy)  
**Publication Type:** Journal: Article  
**Subject Headings:**

adult  
 article  
 \*chronic pain/th [Therapy]  
 clinical effectiveness  
 clinical trial  
 controlled clinical trial  
 controlled study  
 double blind procedure  
 female  
 human  
 major clinical study  
 male  
 outcome assessment  
 pain assessment  
 patient satisfaction  
 priority journal  
 randomized controlled trial  
 retreatment  
 short course therapy  
 \*transcutaneous nerve stimulation  
 treatment duration  
 treatment outcome  
 visual analog scale

**Source:** EMBASE  
**Full Text:** Available in *fulltext* at [ProQuest](#)

#### 15. Outcome of transcutaneous electrical nerve stimulation in chronic pain: short-term results of a double-blind, randomised, placebo-controlled trial.

**Citation:** Journal of Headache & Pain, September 2006, vol./is. 7/4(196-205), 1129-2369;1129-2369 (2006 Sep)  
**Author(s):** Oosterhof J; De Boo TM; Oostendorp RA; Wilder-Smith OH; Crul BJ  
**Institution:** Research Centre for Allied Health Care, 645 Department of Physiotherapy CSS, Radboud University Nijmegen Medical Centre, 6500 HB, Nijmegen, The Netherlands. j.oosterhof@fysiocss.umcn.nl  
**Language:** English  
**Abstract:** The aim of this study was to test the efficacy of shortterm transcutaneous electrical nerve stimulation (TENS) treatment in chronic pain with respect to pain intensity and patients' satisfaction with treatment results. We therefore performed a randomised controlled trial

comparing TENS and sham TENS. Patients, researchers and therapists were blinded for treatment allocation. One hundred and sixty-three patients with chronic pain referred to the Pain Centre entered the study. Conventional TENS and sham TENS were applied in the segments of pain, for a period of ten days. Outcome measures were pain intensity (visual analogue scale) and patients' satisfaction with treatment result (yes or no). The proportions of patients satisfied with treatment result differed significantly for TENS compared to sham TENS (58 and 42.7% respectively,  $\chi^2(2)=3.8$ ,  $p=0.05$ ). However, no differences in pain intensity were found for patients treated with TENS or sham TENS. Only for patients satisfied with treatment results pain intensity gradually decrease equally both for TENS and sham TENS with repeated treatment application.

**Country of Publication:** Italy

**Publication Type:** Journal Article; Randomized Controlled Trial; Research Support, Non-U.S. Gov't

**Subject Headings:** [Adult](#)  
[Chronic Disease/th \[Therapy\]](#)  
[Double-Blind Method](#)  
[Female](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[Pain Measurement/mt \[Methods\]](#)  
[Pain Threshold/ph \[Physiology\]](#)  
[Pain, Intractable/pp \[Physiopathology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Patient Compliance/sn \[Statistics & Numerical Data\]](#)  
[Patient Satisfaction/sn \[Statistics & Numerical Data\]](#)  
[\\*Peripheral Nerves/pp \[Physiopathology\]](#)  
[Placebo Effect](#)  
[Prospective Studies](#)  
[Time Factors](#)  
[\\*Transcutaneous Electric Nerve Stimulation/sn \[Statistics & Numerical Data\]](#)  
[Transcutaneous Electric Nerve Stimulation/td \[Trends\]](#)  
[Treatment Outcome](#)

**Source:** MEDLINE

**Full Text:** Available in *fulltext* at [ProQuest](#)

#### 16. Role of psychological problems in efficacy of transcutaneous electrical nerve stimulation in patients suffering from chronic pain

**Citation:** Acta Medica Iranica, 2006, vol./is. 44/3(181-186), 0044-6025;0044-6025 (2006)

**Author(s):** Mirzamani S.M.; Safari A.; Jena S.K.; Hollisaz M.T.; Safara M.

**Institution:** (Mirzamani) Department of Psychology, Baqiyatallah University of Medical Sciences, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, Islamic Republic of; (Safari, Safara) Department of Psychology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran, Islamic Republic of; (Jena) Department of Applied Psychology, School of Medicine, Delhi University of Medical Sciences; (Hollisaz) Baqiyatallah University of Medical Sciences, Tehran, Iran, Islamic Republic of

**Language:** English

**Abstract:** Patients afflicted with chronic pain have both physical and psychological problems. This research investigated the impact of the psychological factors in the treatment results of transcutaneous electrical nerve stimulation (TENS) in the patients afflicted with chronic diseases. The subjects were 37 individuals (20 males and 17 females) with the mean age of 46 who had referred to two centers of physiotherapy treatment to receive TENS treatment process. Subjects were suffering from chronic pain in upper part of their body, hands and legs. The subjects were tested and screened psychologically by PDQ4+, MPQ, MPI, and BDI questionnaires. On the basis of the personality disorder and the intensity of the depression, they were divided into two groups: 1) patients with psychological symptoms ( $n = 14$ ); and 2) patients without psychological symptoms ( $n = 23$ ). In order to

study the rate of the pain intensity reduction in both groups, the MPQ questionnaire was used in three stages (before beginning, in the middle and at the end of the treatment). Also, the MPI questionnaire was used in order to review the inter-personal problems, the interference of the pain in life, daily performance and the rate of social support. Results showed that in each group, the pain intensity had significantly reduced as a result of the impact of TENS treatment and the psychological factors did not have meaningful impacts. Also there was statistically significant correlation between the rate of social support of the family members and the reduction of pain intensity. 2006 Tehran University of Medical Sciences. All rights reserved.

**Country of Publication:** Iran, Islamic Republic of

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[aged](#)  
[article](#)  
[Beck Depression Inventory](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[controlled study](#)  
[correlation analysis](#)  
[daily life activity](#)  
[depression](#)  
[disease severity](#)  
[family](#)  
[female](#)  
[hand](#)  
[human](#)  
[leg pain/th \[Therapy\]](#)  
[male](#)  
[McGill Pain Questionnaire](#)  
[\\*mental stress](#)  
[patient referral](#)  
[personality disorder](#)  
[physiotherapy](#)  
[psychological aspect](#)  
[questionnaire](#)  
[screening test](#)  
[social support](#)  
[statistical significance](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)

**Source:** EMBASE

#### 17. TENS of unknown value in the treatment of chronic low back pain

**Citation:** Australian Journal of Physiotherapy, 2006, vol./is. 52/1(64), 0004-9514 (2006)

**Author(s):** Hush J.

**Institution:** (Hush) University of Sydney, Sydney, NSW, Australia

**Language:** English

**Country of Publication:** Australia

**Publication Type:** Journal: Short Survey

**Subject Headings:** [acupuncture](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical effectiveness](#)  
[clinical practice](#)  
[clinical trial](#)  
[follow up](#)

functional status  
 human  
 \*low back pain/th [Therapy]  
 medical literature  
 MEDLINE  
 neuromuscular electrical stimulation  
 pain assessment  
 scoring system  
 short survey  
 standard  
 statistical significance  
 systematic review  
 \*transcutaneous nerve stimulation  
 treatment duration  
 treatment outcome

**Source:** EMBASE

# 18. Transcutaneous electrical nerve stimulation for the treatment of chronic low back pain: A systematic review

**Citation:** Spine, December 2005, vol./is. 30/23(2657-2666), 0362-2436;1528-1159 (Dec 2005)

**Author(s):** Khadilkar A.; Milne S.; Brosseau L.; Wells G.; Tugwell P.; Robinson V.; Shea B.; Saginur M.

**Institution:** (Khadilkar, Brosseau) School of Rehabilitation Sciences, University of Ottawa, Ottawa, Ont., Canada; (Milne) Physical Therapy and Epidemiology and Community Medicine, University of Ottawa, Ottawa, Ont., Canada; (Wells, Saginur) Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Ont., Canada; (Tugwell) Centre for Global Health, Institute of Population Health, University of Ottawa, Ottawa, Ont., Canada; (Robinson, Shea) Institute of Population Health, University of Ottawa, Ottawa, Ont., Canada; (Brosseau) School of Rehabilitation Sciences, University of Ottawa, Department of Rehabilitation Sciences, 451 Smyth Road, Ottawa, Ont. K1H 8M5, Canada

**Language:** English

**Abstract:** Study Design. Systematic review. Objective. To determine the effectiveness of transcutaneous electrical nerve stimulation (TENS) in the management of chronic LBP. Summary of Background Data. Chronic low back pain (LBP) affects a significant proportion of the population. TENS was introduced more than 30 years ago as an adjunct to pharmacologic pain management. However, despite its widespread use, the usefulness of TENS in chronic LBP is still controversial. Methods. We searched MEDLINE, EMBASE, PEDro, and the Cochrane Central Register of Controlled Trials (Issue 2, 2005), up to April 1, 2005. Only randomized controlled clinical trials (RCTs) evaluating the effect of TENS on chronic LBP were included. Two reviewers independently selected trials and extracted data using pre-determined forms. Heterogeneity was tested with Cochrane's Q test. A fixed effect model was used throughout for calculating continuous variables, except where heterogeneity existed, in which case a random effects model was used. Results are presented as weighted mean differences with 95% confidence intervals (95% CI), where the difference between the treated and control groups was weighted by the inverse of the variance. Standardized mean differences were calculated by dividing the difference between the treated and control by the baseline variance. Standardized mean differences were used when different scales were used to measure the same concept. Dichotomous outcomes were analyzed with odds ratios. Results. Two RCTs (175 patients) were included. They differed with respect to study design, methodologic quality, inclusion and exclusion criteria, characteristics of TENS application, treatment schedule, cointerventions, and measured outcomes. In one RCT, TENS produced significantly greater pain relief than the placebo control. However, in the other RCT, no statistically significant differences between treatment and control groups were shown for multiple outcome measures. Preplanned subgroup analyses, intended to examine the impact of different stimulation parameters, sites of TENS application, treatment durations, and baseline patient characteristics were not possible because of the small number of included



trials. Conclusions. Evidence for the efficacy of TENS as an isolated intervention in the management of chronic LBP is limited and inconsistent. Larger, multicenter, RCTs are needed to better resolve its role in this condition. Increased attention should be given to the risks and benefits of long-term use, which more appropriately addresses the realities of managing chronic low back pain. 2005, Lippincott Williams & Wilkins, inc.

**Country of Publication:** United States

**Publication Type:** Journal: Review

**Subject Headings:** [\\*chronic pain/th \[Therapy\]](#)  
[clinical trial](#)  
[Cochrane Library](#)  
[confidence interval](#)  
[EMBASE](#)  
[human](#)  
[\\*low back pain/th \[Therapy\]](#)  
[MEDLINE](#)  
[model](#)  
[priority journal](#)  
[randomization](#)  
[rating scale](#)  
[review](#)  
[standardization](#)  
[statistical significance](#)  
[systematic review](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)

**Source:** EMBASE

**Full Text:** Available in *fulltext* at [Ovid](#)

#### 19. A randomized clinical trial of TENS and exercise for patients with chronic neck pain

**Citation:** Clinical Rehabilitation, December 2005, vol./is. 19/8(850-860), 0269-2155 (Dec 2005)

**Author(s):** Chiu T.T.W.; Hui-Chan C.W.Y.; Cheing G.

**Institution:** (Chiu, Hui-Chan, Cheing) Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hung Hom, Hong Kong

**Language:** English

**Abstract:** Objective: To investigate the effect of transcutaneous electrical nerve stimulation (TENS) on acupuncture points and neck exercise in chronic neck pain patients. Design: A randomized clinical trial. Setting: Hospital-based practice. Subjects: Two hundred and eighteen patients with chronic neck pain. Interventions: Subjects were randomized into three groups, receiving either (1) TENS over the acupuncture points plus infrared irradiation (TENS group); (2) exercise training plus infrared irradiation (exercise group); or (3) infrared irradiation alone (control); twice a week for six weeks. Outcome measures: The values of verbal numeric pain scale, Northwick Park Neck Pain Questionnaire, and isometric neck muscle strength were assessed before, at the end of the six-week treatment, and at the six-month follow-up. Results: Results demonstrated that after the six-week treatment, significant improvement in the verbal numerical pain scale was found only in the TENS group (0.60 +/- 2.54,  $p = 0.027$ ) and the exercise group (1.57 +/- 2.67,  $p < 0.001$ ). Though significant reduction in Northwick Park Neck Pain Questionnaire score was found in all three groups, post-hoc tests showed that both the TENS and the exercise group produced better improvement (0.38 +/- 0.60% and 0.39 +/- 0.62% respectively) than the control group (0.23 +/- 0.63%). Significant improvement ( $p = < 0.001$  to 0.03) in neck muscle strength was observed in all three groups, however, the improvement in the control group was not clinically significant and it could not be maintained at the six-month follow-up. Conclusions: After the six-week treatment, patients in the TENS and exercise group had a better and clinically relevant improvement in disability, isometric neck muscle strength, and pain. All the improvements in the intervention groups were maintained at the six-month follow-up. 2005 Edward Arnold (Publishers) Ltd.



**Country of Publication:** United Kingdom

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[aged](#)  
[article](#)  
[\\*chronic pain/di \[Diagnosis\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical trial](#)  
[controlled clinical trial](#)  
[controlled study](#)  
[female](#)  
[follow up](#)  
[human](#)  
[infrared radiation](#)  
[intermethod comparison](#)  
[major clinical study](#)  
[male](#)  
[\\*muscle exercise](#)  
[muscle isometric contraction](#)  
[muscle strength](#)  
[neck muscle](#)  
[\\*neck pain/di \[Diagnosis\]](#)  
[\\*neck pain/th \[Therapy\]](#)  
[pain assessment](#)  
[questionnaire](#)  
[randomized controlled trial](#)  
[rating scale](#)  
[scoring system](#)  
[statistical analysis](#)  
[statistical significance](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**Full Text:** Available in *fulltext* at [ProQuest](#)

**20. Spinal cord stimulation for axial low back pain: a prospective, controlled trial comparing dual with single percutaneous electrodes.**

**Citation:** Spine, June 2005, vol./is. 30/12(1412-8), 0362-2436;1528-1159 (2005 Jun 15)

**Author(s):** North RB; Kidd DH; Olin J; Sieracki JM; Farrokhi F; Petrucci L; Cutchis PN

**Institution:** Department of Neurosurgery, School of Medicine, Johns Hopkins University, Baltimore, Maryland 21287-7881, USA. RNorth@jhmi.edu

**Language:** English

**Abstract:** STUDY DESIGN: A prospective, controlled, clinical trial comparing single and dual percutaneous electrodes in the treatment of axial low back pain from failed back surgery syndrome. OBJECTIVES: To clarify technical requirements and test the hypothesis that placing two linear arrays in parallel, thereby doubling the number of contacts, improves outcome. SUMMARY OF BACKGROUND DATA: Technical improvements have enhanced outcomes of spinal cord stimulation for chronic axial low back pain. Dual, parallel electrodes reportedly improve these outcomes. METHODS: Acting as their own controls, 20 patients who passed screening with single, 4-contact electrodes received permanent dual, 4-contact electrodes with 7- or 10-mm intercontact distances at the same vertebral level(s). We quantified and compared the technical and clinical results of the single and dual electrodes, adjusting stimulation parameters to specific psychophysical thresholds. RESULTS: Single electrodes provided significant ( $P < 0.01$ ) advantages in patient- and computer-calculated ratings of pain coverage by paresthesias and in the scaled amplitude necessary to cover the low back, compared with dual 7-mm electrodes. Slight advantages without statistical significance were observed for the single over the

dual 10-mm electrodes. Amplitude requirements were significantly lower for the single electrode than for either dual electrode. At long-term follow-up, 53% of patients met the criteria for clinical success. CONCLUSIONS: While we observed disadvantages for dual electrodes in treating axial low back pain, we achieved technical success with single or dual electrodes in most patients and maintained this success clinically with dual electrodes in 53%.

**Country of Publication:** United States

**Publication Type:** Comparative Study; Controlled Clinical Trial; Journal Article; Research Support, Non-U.S. Gov't

**Subject Headings:** [Adult](#)  
[Aged](#)  
[Electrodes, Implanted](#)  
[Equipment Design](#)  
[Female](#)  
[Humans](#)  
[Low Back Pain/pp \[Physiopathology\]](#)  
[\\*Low Back Pain/th \[Therapy\]](#)  
[Male](#)  
[Middle Aged](#)  
[Pain, Intractable/pp \[Physiopathology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Prospective Studies](#)  
[\\*Spinal Cord/pp \[Physiopathology\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/is \[Instrumentation\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)  
[Treatment Outcome](#)

**Source:** MEDLINE

**Full Text:** Available in *fulltext* at [Ovid](#)

**21. [Against severest pain. A new nerve stimulator tested]. [German] Gegen starkste Schmerzen: Neuer Neurostimulator im Test.**

**Original Title:** Gegen starkste Schmerzen: Neuer Neurostimulator im Test.

**Citation:** MMW Fortschritte der Medizin, March 2005, vol./is. 147/12(21), 1438-3276;1438-3276 (2005 Mar 24)

**Author(s):** Rasche D

**Language:** German

**Country of Publication:** Germany

**Publication Type:** Interview

**Subject Headings:** [\\*Analgesia, Epidural/is \[Instrumentation\]](#)  
[\\*Analgesia, Patient-Controlled/is \[Instrumentation\]](#)  
[Humans](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/is \[Instrumentation\]](#)

**Source:** MEDLINE

**22. Pain reducing effect of three types of transcutaneous electrical nerve stimulation in patients with chronic pain: A randomized crossover trial**

**Citation:** Pain, March 2004, vol./is. 108/1-2(36-42), 0304-3959 (Mar 2004)

**Author(s):** Koke A.J.A.; Schouten J.S.A.G.; Lamerichs-Geelen M.J.H.; Lipsch J.S.M.; Waltje E.M.H.; Van Kleef M.; Patijn J.

**Institution:** (Koke, Van Kleef, Patijn) Pain Management and Research Center, University Hospital Maastricht, P.O. Box 5800, 6202 AZ Maastricht, Netherlands; (Koke) Hoensbroeck Rehabilitation Center, Hoensbroek, Netherlands; (Lamerichs-Geelen, Lipsch, Waltje)

Department of Physical Therapy, University Hospital Maastricht, Maastricht, Netherlands; (Schouten) Department Epidemiology, University Maastricht, Maastricht, Netherlands

**Language:** English

**Abstract:** Transcutaneous electrical nerve stimulation (TENS) is a frequently applied therapy in chronic pain although evidence for effectiveness is inconclusive. Several types of TENS, based on different combinations of frequency, pulse duration and intensity, exist. The precise mechanism of action and the relevance of combinations of stimulus parameters are still unclear. To compare the effectiveness of three types of TENS we conducted a randomized, single blinded crossover trial. Patients received two times a 2-week period of daily TENS treatment, separated by a washout period of 2 weeks. In total, 180 chronic pain patients were randomized into three groups. In group 1, high frequency, low intensity TENS (HFT) was compared with high frequency, high intensity TENS (HIT). In groups 2 and 3, HFT and HIT were compared with a control TENS (COT). The order of applying the different modalities of TENS in each group was also randomized. Primary outcome was the patient's overall assessment of effectiveness and pain reduction (VAS). No differences were found in patient's assessment or pain reducing effect between the three groups, indicating no superiority of one type of TENS. In total, 56% continued TENS after the 2-week treatment period. At 6 months, 42% of all patients still used TENS. We concluded that there were no differences in effectiveness for the three types of TENS used in this study. Because no placebo group was included, no definite conclusions on effectiveness of TENS in general in the treatment of chronic pain could be made. 2003 International Association for the Study of Pain. Published by Elsevier B.V. All rights reserved.

**Country of Publication:** Netherlands

**Publication Type:** Journal: Article

**Subject Headings:** [article](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[clinical trial](#)  
[controlled study](#)  
[crossover procedure](#)  
[female](#)  
[human](#)  
[male](#)  
[medical assessment](#)  
[\\*pain/th \[Therapy\]](#)  
[priority journal](#)  
[randomization](#)  
[randomized controlled trial](#)  
[reduction](#)  
[single blind procedure](#)  
[stimulus response](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)  
[placebo](#)

**Source:** EMBASE

### 23. Pain reducing effect of three types of transcutaneous electrical nerve stimulation in patients with chronic pain: a randomized crossover trial

**Citation:** Pain, 2004, vol./is. 108/1-2(36-42), 0304-3959 (2004 Mar)

**Author(s):** Koke AJ; Schouten JS; Lamerichs-Geelen MJ; Lipsch JS; Waltje EM; van Kleef M; Patijn J

**Language:** English

**Abstract:** Transcutaneous electrical nerve stimulation (TENS) is a frequently applied therapy in chronic pain although evidence for effectiveness is inconclusive. Several types of TENS,

based on different combinations of frequency, pulse duration and intensity, exist. The precise mechanism of action and the relevance of combinations of stimulus parameters are still unclear. To compare the effectiveness of three types of TENS we conducted a randomized, single blinded crossover trial. Patients received two times a 2-week period of daily TENS treatment, separated by a washout period of 2 weeks. In total, 180 chronic pain patients were randomized into three groups. In group 1, high frequency, low intensity TENS (HFT) was compared with high frequency, high intensity TENS (HIT). In groups 2 and 3, HFT and HIT were compared with a control TENS (COT). The order of applying the different modalities of TENS in each group was also randomized. Primary outcome was the patient's overall assessment of effectiveness and pain reduction (VAS). No differences were found in patient's assessment or pain reducing effect between the three groups, indicating no superiority of one type of TENS. In total, 56% continued TENS after the 2-week treatment period. At 6 months, 42% of all patients still used TENS. We concluded that there were no differences in effectiveness for the three types of TENS used in this study. Because no placebo group was included, no definite conclusions on effectiveness of TENS in general in the treatment of chronic pain could be made.

**Publication Type:** Journal Article

**Subject Headings:** [Transcutaneous electric nerve stimulation](#)  
[Pain intractable](#)  
[Therapy](#)  
[Treatment outcome](#)  
[Randomized controlled trials](#)

**Source:** AMED

#### 24. Transcutaneous electrical nerve stimulation. Electrotherapy in the management of chronic pain [German] Transkutane elektrische nervenstimulation. Elektrotherapie bei chronischen schmerz Zuständen

**Original Title:** Transkutane elektrische nervenstimulation. Elektrotherapie bei chronischen schmerz Zuständen

**Citation:** Tagliche Praxis, September 2003, vol./is. 44/3(561-565), 0494-464X (Sep 2003)

**Author(s):** Steuernagel B.; Doering T.J.

**Institution:** (Doering) Abteilung Allgemeinmedizin, Medizinische Hochschule, Carl-Neuberg-Strasse 1, 30623 Hannover, Germany

**Language:** German

**Abstract:** Summary: One understands by transcutaneous electrical nerve stimulation (TENS) the electrical irritation of nerves through the skin. Two electrodes are fastened on the skin over or in the neighbourhood of a nerve and the nerve then is irritated through the skin. Our question was, what is TENS and which one are the indication areas? One distinguishes two stimulation forms: 1. the conventional high-frequency TENS method. Here rectangle current pulses are brought on the skin in the area of 10-100 hz and an impulse breadth of 60-200 mus. 2. The >>acupuncture similar<< low-frequency TENS method. Needle impulses are taken to the skin here in the area of 2-10 hz. Scientific background of this method is the 1965 of MELZACK and WALL (2)posited >>Gate Control Theory<<. It means that by not painful irritations of myelinic afferent fibers of the skin (A beta and A delta) the pain conveyance is impeded about not myelinisated thin C fibers from the hurting body area. In the newer research one assumes that in addition to this first pain synapse a second control authority occurs further centrally, possibly in the brain stem or in the thalamus. Here endogenous opiate-like substances are released. The indication list gets together as follows in our opinion: Neuralgias, cervical spine syndrome, shoulder arm syndrome, crucial ligament pains, ischialgia (apart from intervertebral disc prolapse), headaches and migraine (in a qualified sense), stump and phantom pains. The therapeutical evidence of the TENS treatment of chronic pains is controversial mainly due to the fact that most studies cannot show any essential effectiveness of this method at today's time. Independent of this, whether TENS works placebo mediated or directly an essay shows after that all a long time TENS treatment with chronic pain patients both the use of pain-killers and physiotherapy lowers and thus considerably contributes to the cost reduction of the therapy.

**Country of Publication:** Germany

**CAS Registry Number:** 60118-07-2 (endorphin)

**Publication Type:** Journal: Review

**Subject Headings:** [acupuncture](#)  
[brain stem](#)  
[cervical spine syndrome/th \[Therapy\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[cost control](#)  
[crucial ligament pain/th \[Therapy\]](#)  
[\\*electrostimulation therapy](#)  
[headache/th \[Therapy\]](#)  
[human](#)  
[ischialgia/th \[Therapy\]](#)  
[migraine/th \[Therapy\]](#)  
[myelinated nerve](#)  
[needle](#)  
[nerve stimulation](#)  
[neuralgia/th \[Therapy\]](#)  
[phantom pain/th \[Therapy\]](#)  
[physiotherapy](#)  
[review](#)  
[sensory nerve](#)  
[shoulder hand syndrome/th \[Therapy\]](#)  
[synapse](#)  
[syndrome delineation](#)  
[thalamus](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment indication](#)  
[analgesic agent](#)  
[endorphin/ec \[Endogenous Compound\]](#)

**Source:** EMBASE

## 25. Transcutaneous electrical nerve stimulation: Basic science mechanisms and clinical effectiveness

**Citation:** Journal of Pain, April 2003, vol./is. 4/3(109-121), 1526-5900 (Apr 2003)

**Author(s):** Sluka K.A.; Walsh D.

**Institution:** (Sluka) Phys. Ther./Rehab. Sci. Grad. Prog., Neuroscience Graduate Program, University of Iowa, Iowa City, IA, United States; (Walsh) Rehab. Sciences Research Group, School of Rehabilitation Sciences, University of Ulster, Ulster, United Kingdom; (Sluka) 100 Medical Education Building, Phys. Ther./Rehab. Sci. Grad. Prog., University of Iowa, Iowa City, IA 52242, United States

**Language:** English

**Abstract:** Transcutaneous electrical nerve stimulation (TENS) is used clinically by a variety of health care professionals for the reduction of pain. Clinical effectiveness of TENS is controversial, with some studies supporting whereas others refute its clinical use. Although used by health professionals for decades, the mechanisms by which TENS produces analgesia or reduces pain are only recently being elucidated. This article describes the basic science mechanisms behind different frequencies of TENS stimulation. Specifically, we describe the literature that supports the use of different frequencies and intensities of TENS. We further describe theories that support the use of TENS such as the gate control theory and the release of endogenous opioids. The literature that supports or refutes each of these theories is described. We also review the clinical literature on TENS effectiveness and elucidate the problems with clinical research studies to date. In conclusion, TENS is a noninvasive modality that is easy to apply with relatively few contraindications. However, the clinical efficacy of TENS will remain equivocal until the publication of sufficient numbers of high quality, randomized, controlled clinical trials. 2003 by the American Pain Society.

**Country of Publication:** United States

**CAS Registry Number:** 9000-07-1 (carrageenan); 9049-05-2 (carrageenan); 9061-82-9 (carrageenan); 9064-57-7 (carrageenan); 53663-61-9 (opiate); 8002-76-4 (opiate); 8008-60-4 (opiate)

**Publication Type:** Journal: Review

**Subject Headings:** acupuncture  
analgesia  
\*chronic pain/th [Therapy]  
cost effectiveness analysis  
daily life activity  
disease model  
dysmenorrhea/th [Therapy]  
electric potential  
electrode  
exercise  
frequency modulation  
functional assessment  
human  
inhibition kinetics  
intermethod comparison  
knee osteoarthritis/th [Therapy]  
labor pain/th [Therapy]  
length of stay  
\*low back pain/th [Therapy]  
neurotransmission  
nociception  
non invasive measurement  
pain assessment  
patient satisfaction  
physical activity  
postoperative pain/co [Complication]  
postoperative pain/dt [Drug Therapy]  
quality of life  
rating scale  
review  
shoulder pain/th [Therapy]  
\*transcutaneous nerve stimulation  
treatment contraindication  
treatment outcome  
visual analog scale  
analgesic agent/dt [Drug Therapy]  
carrageenan  
opiate

**Source:** EMBASE

## 26. Percutaneous tibial nerve stimulation as neuromodulative treatment of chronic pelvic pain.

**Citation:** European Urology, February 2003, vol./is. 43/2(158-63; discussion 163), 0302-2838;0302-2838 (2003 Feb)

**Author(s):** van Balken MR; Vandoninck V; Messelink BJ; Vergunst H; Heesakkers JP; Debruyne FM; Bemelmans BL

**Institution:** Department of Urology, University Medical Center Nijmegen, Geert Grooteplein 10, P.O. Box 9101, 6500 HB, Nijmegen, The Netherlands.

**Language:** English

**Abstract:** PURPOSE: Neuromodulative therapies have been used with moderate success in patients with chronic pelvic pain. Intermittent Percutaneous Tibial Nerve Stimulation (PTNS) is a new, minimally invasive treatment option, which has shown to significantly decrease accompanying pain complaints in patients with lower urinary tract dysfunction, such as

urge incontinence or urgency/frequency. In our study, we evaluate the objective results of PTNS in patients with chronic pelvic pain as their main complaint. MATERIALS AND METHODS: In a prospective multicentre trial PTNS was evaluated in 33 patients with chronic pelvic pain. Effects were recorded by Visual Analogue Scale (VAS) for pain diaries, the McGill pain questionnaire and the SF-36 general quality of life questionnaire at baseline and after 12 weeks of treatment. Subjective (patients' request to continue chronic treatment to keep the obtained success) and objective responses (decrease in mean VAS >50% and VAS <3 after treatment) were evaluated. RESULTS: A subjective response was seen in 42% of all patients. In seven patients (21%) mean VAS decreased >50%, in six cases (18%) the decrease was >25%. After 12 weeks of treatment, seven patients (21%) ended up with a mean VAS <3. In all patients quality of life (SF-36) significantly improved, as did the total pain rate intensity (McGill). CONCLUSIONS: Despite very modest overall success rates and the need for placebo-controlled studies, PTNS may have a place in the treatment of patients with chronic pelvic pain who have already tried many other therapies and are left with no further option.

**Country of Publication:** Netherlands

**Publication Type:** Clinical Trial; Journal Article; Multicenter Study

**Subject Headings:** [Adult](#)  
[Aged](#)  
[Female](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[Pain Measurement](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Pelvis](#)  
[Prospective Studies](#)  
[Quality of Life](#)  
[\\*Tibial Nerve](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)  
[Treatment Outcome](#)

**Source:** MEDLINE

#### 27. Spinal cord stimulator can aggravate central pain following incomplete spinal cord injury

**Citation:** Pain Clinic - Bernardsville, 2003, vol./is. 5/7(15-19,24), 1525-576X (2003 Oct)

**Author(s):** Elias M

**Language:** English

**Publisher:** Pain Clinic - Bernardsville

**Publication Type:** Journal Article

**Subject Headings:** [Spinal cord injuries](#)  
[Pain intractable](#)  
[Accidents traffic](#)  
[Transcutaneous electric nerve stimulation](#)  
[Case report](#)  
[Male](#)  
[Treatment outcome](#)  
[Rehabilitation](#)

**Source:** AMED

#### 28. Retrograde nerve root stimulation for coccygodynia [Dutch] Retrograde lumbosacrale zenuwstimulatie voor coccygodynie

**Original Title:** Retrograde lumbosacrale zenuwstimulatie voor coccygodynie

**Citation:** Tijdschrift voor Geneeskunde, September 2002, vol./is. 58/18(1189-1192), 0371-683X (15 Sep 2002)



**Author(s):** Buyse I.; Brabant S.; Willaert J.; Dobbels P.

**Institution:** (Buyse, Brabant, Willaert, Dobbels) Dienst Anesthesie, Multidisciplinair Pijn Centrum, H. Hartziekenhuis, Wilgenstraat 2, 8800 Roeselare, Belgium

**Language:** Dutch

**Abstract:** Electrical nerve root or cauda equina stimulation seems to constitute an effective alternative technique especially in patients with pain syndromes of the pelvic region. For this technique percutaneous leads are directed in a caudal way under fluoroscopic guidance until an optimal paresthesia coverage is obtained. We present a patient who was first treated with spinal cord stimulation at the thoracic level and afterwards at the low lumbar level. One and a half year after the positioning of a quadripolar lead at the L3-L4 level, she still experiences complete analgesia. Although long term studies are required, it seems that this technique of retrograde nerve root stimulation is worthwhile in patients with pain syndromes at the sacral dermatomes.

**Country of Publication:** Belgium

**CAS Registry Number:** 76-57-3 (codeine); 103-90-2 (paracetamol); 27203-92-5 (tramadol); 36282-47-0 (tramadol)

**Publication Type:** Journal: Article

**Subject Headings:** adult  
article  
case report  
cauda equina  
\*chronic pain/th [Therapy]  
\*coccygeal bone  
\*coccygodynia/th [Therapy]  
fluoroscopy  
human  
lumbar spine  
\*nerve root  
paresthesia  
spinal cord stimulation  
thoracic spine  
\*transcutaneous nerve stimulation  
codeine  
paracetamol  
tramadol

**Source:** EMBASE

## 29. Patient reports of the effects and side-effects of TENS for chronic non-malignant pain following a four week trial

**Citation:** Pain Clinic, 2002, vol./is. 13/3(265-76), 0169-1112 (2002)

**Author(s):** Richardson CD; Maciver K; Wright M; Wiles JR

**Language:** English

**Abstract:** The aim of this study was to assess the perceived efficacy, stimulation parameters and side-effect profile of TENS when used for chronic non-malignant pain. A prospective continuous sample of 154 patients was recruited from a nurse-led TENS clinic. Ninety-eight completed questionnaires were obtained following a four-week trial. Most patients chose the continuous mode (59%) because this gave the best reduction in their pain. A 50% or greater reduction in pain occurred in 44% of the sample, 20% had no relief and 8% reported an exacerbation of their pain. There was a trend towards greater effect for neuropathic pains ( $p = 0.17$ ) and for less benefit in the over 60 age group ( $p = 0.16$ ). On average it took 26 min (s.d. 25.47) for analgesia to develop and continued relief was achieved for a mean of 77 min (s.d. 83.45), once the machine was switched off. Nearly 46% of the patients reported some discomfort which they associated with the use of TENS. Unpleasant sensations at and away from the site of TENS were reported by 30.6%, whilst headaches (8.2%), muscle aches (6.1%), nausea (3.1%), bad temperedness



(3.1%) and dizziness (1.0%) were also reported. TENS is an effective treatment for some chronic pain conditions, but a high level of mild and often unusual side effects may limit compliance.

**Publication Type:** Journal Article

**Subject Headings:** [Transcutaneous electric nerve stimulation](#)  
[Pain intractable](#)  
[Prevention](#)  
[Therapy](#)  
[Adverse effects](#)  
[Rehabilitation](#)

**Source:** AMED

**30. [Peripheral and central nervous system stimulation in chronic therapy-resistant pain. Background, hypothetical mechanisms and clinical experiences]. [Swedish] Perifer och centralnervos stimulering vid kronisk terapieresistent smärta. Bakgrund, hypotetiska mekanismer och kliniska erfarenheter.**

**Original Title:** Perifer och centralnervos stimulering vid kronisk terapieresistent smärta. Bakgrund, hypotetiska mekanismer och kliniska erfarenheter.

**Citation:** Lakartidningen, November 2001, vol./is. 98/47(5328-34, 5336), 0023-7205;0023-7205 (2001 Nov 21)

**Author(s):** Linderöth B; Meyerson B

**Institution:** Neurokirurgiska kliniken, Karolinska sjukhuset, Stockholm. bengt.linderöth@ks.se

**Language:** Swedish

**Abstract:** Severe neurogenic pain still constitutes a major problem since it is often resistant to conventional therapy. During the last 30 years electric activation of pain inhibitory mechanisms through stimulation both of peripheral nerves and of central nervous circuits has been used to great advantage. The simplest method of stimulation, transcutaneous electric nerve stimulation (TENS), is extensively used by physiotherapists as well as in pain clinics. The patient should always get his own stimulator for use at home. TENS originally served as a screening method to identify patients suitable for spinal cord stimulation therapy (SCS). The main indication is severe neuropathic pain of peripheral origin, but SCS has also been found valuable in extremity ischemia as well as in refractory angina pectoris. The most severe cases of neuropathic pain may benefit from intracranial stimulation via electrodes placed stereotactically in the posteromedial thalamus or epidurally over the motor cortex.

**Country of Publication:** Sweden

**Publication Type:** English Abstract; Journal Article; Review

**Subject Headings:** [Animals](#)  
[\\*Central Nervous System/pp \[Physiopathology\]](#)  
[\\*Electric Stimulation Therapy/mt \[Methods\]](#)  
[Electrodes, Implanted](#)  
[Humans](#)  
[Medical Illustration](#)  
[Neuralgia/pp \[Physiopathology\]](#)  
[Neuralgia/ra \[Radiography\]](#)  
[\\*Neuralgia/th \[Therapy\]](#)  
[Nociceptors/ph \[Physiology\]](#)  
[Pain, Intractable/pp \[Physiopathology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Pain, Postoperative/pp \[Physiopathology\]](#)  
[\\*Pain, Postoperative/th \[Therapy\]](#)  
[Peripheral Nervous System/in \[Injuries\]](#)  
[\\*Peripheral Nervous System/pp \[Physiopathology\]](#)  
[Spinal Nerve Roots/in \[Injuries\]](#)  
[Spinal Nerve Roots/pp \[Physiopathology\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

[Trigeminal Neuralgia/pp \[Physiopathology\]](#)  
[Trigeminal Neuralgia/ra \[Radiography\]](#)  
[Trigeminal Neuralgia/th \[Therapy\]](#)

**Source:** MEDLINE

### 31. Electrical stimulation of the trigeminal tract in chronic, intractable facial neuralgia.

**Citation:** Archives of Physiology & Biochemistry, October 2001, vol./is. 109/4(304-8), 1381-3455;1381-3455 (2001 Oct)

**Author(s):** Holsheimer J

**Institution:** Institute for Biomedical Technology, University of Twente, Enschede, The Netherlands. j.holsheimer@el.utwente.nl

**Language:** English

**Abstract:** In this paper the treatment of patients with chronic, intractable trigeminal neuralgia by invasive electrical stimulation of the Gasserian ganglion is reviewed. Two different surgical techniques are employed in this treatment. Most frequently, a method similar to the traditional technique for percutaneous glycerol and radiofrequency trigeminal rhizolysis is used: a small percutaneous stimulation electrode is advanced under fluoroscopic control through a thin needle via the foramen ovale to the Gasserian cistern. Some neurosurgeons use an open surgical technique by which the Gasserian ganglion is approached subtemporally and extradurally, and the bipolar pad electrode is sutured to the dura. When percutaneous test stimulation is successful (at least 50% pain relief) the electrode is internalized and connected to a subcutaneous pulse generator or RF-receiver. Data from 8 clinical studies, including 267 patients have been reviewed. Of all 233 patients with medication-resistant atypical trigeminal neuralgia 48% had at least 50% long term pain relief. The result of test stimulation is a good predictor of the long term effect, because 83% of all patients with successful test stimulation had at least 50% long term relief, and 70% had at least 75% long term relief. Patients generally preferred this invasive method over TENS. The success rate in patients with postherpetic trigeminal neuralgia was very low (less than 10%). It is suggested that the likelihood of pain relief by electrical stimulation is inversely related to the degree of sensory loss. It is concluded that invasive stimulation of the Gasserian ganglion is a promising treatment modality for patients with chronic, intractable, atypical trigeminal neuralgia.

**Country of Publication:** Netherlands

**Publication Type:** Journal Article

**Subject Headings:** [Chronic Disease](#)  
[\\*Electric Stimulation Therapy](#)  
[Electrodes, Implanted](#)  
[Humans](#)  
[Pain, Intractable/su \[Surgery\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)  
[\\*Trigeminal Ganglion/ph \[Physiology\]](#)  
[Trigeminal Neuralgia/su \[Surgery\]](#)  
[\\*Trigeminal Neuralgia/th \[Therapy\]](#)

**Source:** MEDLINE

### 32. Acupuncture, transcutaneous electrical nerve stimulation, and laser therapy in chronic pain

**Citation:** Clinical Journal of Pain, 2001, vol./is. 17/4 SUPPL.(S105-S113), 0749-8047 (2001)

**Author(s):** Fargas-Babjak A.

**Institution:** (Fargas-Babjak) Department of Anesthesia, McMaster University, MUMC Division, 1200 Main Street West, Hamilton, Ont. L8N 3Z5, Canada

**Language:** English

<b>Abstract:</b>	Objective: The purpose of this review was to determine how effective acupuncture, transcutaneous electrical nerve stimulation, acupuncture-like transcutaneous nerve stimulation, laser therapy, electrical nerve stimulation, and neuroreflexotherapy are in the management of chronic pain. Methodology: The literature search identified six systematic reviews of the literature and four randomized controlled trials to provide evidence for this review. Results: The systematic reviews included different methodologies and heterogeneity of study groups, but studies were generally of poor methodology. Although sham acupuncture may have analgesic effects, it was used as a control in many studies. Conclusions: In general, the evidence was contradictory or inadequate, reflecting poor study methodologies. No positive conclusion could be reached for acupuncture, transcutaneous electrical nerve stimulation, acupuncture-like transcutaneous nerve stimulation, laser therapy, or neuroreflexotherapy. A single randomized controlled trial provided limited evidence (level 3) that electrical nerve stimulation is effective for pain relief in myofascial pain syndrome for up to 4 weeks, but further study in humans is needed. Future randomized controlled trials and systematic reviews should include subgroup analyses of sham acupuncture and inert placebos as controls.
<b>Country of Publication:</b>	United States
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	<a href="#">*acupuncture</a> <a href="#">alternative medicine</a> <a href="#">analgesia</a> <a href="#">article</a> <a href="#">*chronic pain/su [Surgery]</a> <a href="#">*chronic pain/th [Therapy]</a> <a href="#">clinical trial</a> <a href="#">controlled study</a> <a href="#">human</a> <a href="#">*laser surgery</a> <a href="#">meta analysis</a> <a href="#">myofascial pain/su [Surgery]</a> <a href="#">myofascial pain/th [Therapy]</a> <a href="#">priority journal</a> <a href="#">randomized controlled trial</a> <a href="#">*transcutaneous nerve stimulation</a> <a href="#">treatment outcome</a>
<b>Source:</b>	EMBASE

33. [beta-Endorphin in the blood plasma and cerebrospinal fluid--a marker of analgesic efficacy in acute postoperative and chronic pain in cancer patients]. [Russian] beta-Endorfin v plazme krovi i spinnomozgovoi zhidkosti--marker effektivnosti obezbolivaniia pri ostroi posleoperatsionnoi i khronicheskoi boliakh u onkologicheskikh bol'nykh.

<b>Original Title:</b>	beta-Endorfin v plazme krovi i spinnomozgovoi zhidkosti--marker effektivnosti obezbolivaniia pri ostroi posleoperatsionnoi i khronicheskoi boliakh u onkologicheskikh bol'nykh.
<b>Citation:</b>	Anesteziologiia i Reanimatologiia, March 2000, vol./is. /2(14-7), 0201-7563;0201-7563 (2000 Mar-Apr)
<b>Author(s):</b>	Pavlova ZV; Laktionov KP; Isakova ME; Kushlinskii NE
<b>Language:</b>	Russian
<b>Country of Publication:</b>	RUSSIA
<b>CAS Registry Number:</b>	0 (Analgesics, Opioid); 0 (Biological Markers); 57-27-2 (Morphine); 60617-12-1 (beta-Endorphin)
<b>Publication Type:</b>	Comparative Study; Journal Article
<b>Subject Headings:</b>	<a href="#">Acute Disease</a> <a href="#">Analgesia, Epidural/mt [Methods]</a>

[Analgesia, Epidural/sn \[Statistics & Numerical Data\]](#)  
[\\*Analgesia, Epidural](#)  
[Analgesics, Opioid](#)  
[Analysis of Variance](#)  
[Biological Markers/an \[Analysis\]](#)  
[Humans](#)  
[Morphine](#)  
[Neoplasms/me \[Metabolism\]](#)  
[\\*Neoplasms/th \[Therapy\]](#)  
[Pain, Intractable/me \[Metabolism\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Pain, Postoperative/me \[Metabolism\]](#)  
[\\*Pain, Postoperative/th \[Therapy\]](#)  
[Time Factors](#)  
[Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)  
[Transcutaneous Electric Nerve Stimulation/sn \[Statistics & Numerical Data\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)  
[\\*beta-Endorphin/an \[Analysis\]](#)

**Source:** MEDLINE

#### 34. Criteria for electrical nerve stimulation and outcome of radiofrequency treatment of the dorsal root ganglion in the lower back for chronic pain

**Citation:** Pain Clinic, 2000, vol./is. 12/4(281-6), 0169-1112 (2000)

**Author(s):** Van Wuk RMAW; Geurts JWM; Buijs E

**Language:** English

**Abstract:** Aim of investigation: To investigate the influence of electrical nerve stimulation (ENS) threshold value on outcome of radiofrequency treatment (RF) of the dorsal root ganglion (DRG) in the lower back for chronic segmental pain radiating to the leg. Methods: Sensory and motor ENS threshold values were determined in 279 patients during RF-DRG procedure. Sensory ENS value limits between 0.5 and 1.0 V were pursued. The motor ENS value was required to be at least 1.5 times the sensory ENS value. RF-DRG was done at 67degreesC during 90 seconds. Results were determined after 2 months, using a 4-point verbal pain scale. More than 50% pain relief was considered a success. Results: Sensory ENS values ranged between 0.3 and 2.5 V (mean 0.66 V, SD 0.24). Motor ENS values ranged between 0.75 and 4.00 V (mean 1.54 V, SD 0.54). In 59% of patients RF-DRG was successful. No relation was found between sensory ENS threshold value and outcome of RF-DRG (chi-square  $p = 0.68$ ). Logistic regression analysis did not show any difference between patients with or without prior low back surgery. No unwanted side effects were reported. Discussion: Possible explanations for the findings are presented: (a) procedure of ENS; (b) distance to nerve and type of nervous structure; (c) difference between RF-DRG and other types of radiofrequency treatment; (d) local anatomical and neurophysiological factors; (e) diameter, myelination and conduction velocity of nerve fibres; (f) mode of effect of RF; and (g) inaccuracies in the actual practice of ENS. Conclusions: Sensory ENS threshold value does not influence outcome of RF-DRG. The role of ENS in preventing unwanted sensory or motor side effects could not be established.

**Publication Type:** Journal Article

**Subject Headings:** [Pain intractable](#)  
[Spinal nerve roots](#)  
[Low back pain](#)  
[Transcutaneous electric nerve stimulation](#)  
[Sensory thresholds](#)  
[Radiation](#)  
[Treatment outcome](#)  
[Leg](#)  
[Physiology](#)

**Source:** AMED

**35. Neurostimulation in the treatment of chronic pain [French] Les techniques de neurostimulation dans le traitement de la douleur chronique**

**Original Title:** Les techniques de neurostimulation dans le traitement de la douleur chronique

**Citation:** Neurochirurgie, 2000, vol./is. 46/5(466-482), 0028-3770 (2000)

**Author(s):** Blond S.; Touzet G.; Reyns N.; Buisset N.; Armignies Ph.; Veys B.; Desrousseaux F.-X.; Louis E.

**Institution:** (Blond, Touzet, Reyns, Buisset, Armignies, Veys, Desrousseaux, Louis) Clinique de Neurochirurgie, Hopital Roger-Salengro, CHRU, 59037 Lille Cedex, France

**Language:** French

**Abstract:** Different types of neurostimulation are proposed essentially in cases of chronic neuropathic pain, non controlled by anticonvulsivants and antidepressants. The aim is usually to activate a failing inhibitory system, involved in the transmission and the modulation of the nociceptive stimulus. The site of stimulation (transcutaneous, spinal cord, thalamic) is chosen according to the severity of pain and especially the degree of lemniscal dysfunction evaluated by clinical and electrophysiological data. Transcutaneous electrical stimulation and spinal cord stimulation are efficient for neurogenic pain secondary to partial deafferentation. When dysfunction or lesion extend to the pre-ganglionic portion, it's preferable to propose stereotactic thalamic stimulation or central gyrus stimulation. The analgesic effect concerns permanent burning pain in the context of sensitive deafferentation: after distal nervous lesions, radicular, plexular or spinal lesions or after stroke with ischemic lesions along the nociceptive pathways. These different methods must only be proposed if there is a frequent clinical and technical monitoring.

**Country of Publication:** France

**Publication Type:** Journal: Review

**Subject Headings:** [analgesia](#)  
[\\*chronic pain/dt \[Drug Therapy\]](#)  
[deafferentation](#)  
[electrophysiology](#)  
[electrostimulation](#)  
[human](#)  
[neuromodulation](#)  
[neurotransmission](#)  
[preganglionic nerve](#)  
[review](#)  
[\\*spinal cord stimulation](#)  
[thalamus](#)  
[\\*transcutaneous nerve stimulation](#)  
[anticonvulsive agent/dt \[Drug Therapy\]](#)  
[antidepressant agent/dt \[Drug Therapy\]](#)

**Source:** EMBASE

**36. EEG recordings and functional magnetic resonance imaging (fMRI) procedure during transcutaneous electrical nerve stimulation in patients with chronic pain and controls**

**Citation:** Pain Clinic, 2000, vol./is. 12/2(149-150), 0169-1112 (2000)

**Author(s):** Baud P.; Grimonpont N.

**Language:** English

**Country of Publication:** Netherlands

**Publication Type:** Journal: Short Survey

**Subject Headings:** [alpha rhythm](#)

\*chronic pain/th [Therapy]  
 controlled study  
 electroencephalogram  
 event related potential  
 human  
 nuclear magnetic resonance imaging  
 short survey  
 somatosensory cortex  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

### 37. Transcutaneous electrical nerve stimulation: Nonparallel antinociceptive effects on chronic clinical pain and acute experimental pain

**Citation:** Archives of Physical Medicine and Rehabilitation, March 1999, vol./is. 80/3(305-312), 0003-9993 (Mar 1999)

**Author(s):** Cheing G.L.Y.; Hui-Chan C.W.Y.

**Institution:** (Hui-Chan) Dept. of Rehabilitation Sciences, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong

**Language:** English

**Abstract:** Objective: To investigate to what extent a single 60-minute session of transcutaneous electrical nerve stimulation (TENS) would modify chronic clinical pain, acute experimental pain, and the flexion reflex evoked in chronic low back pain patients. Study Design: Thirty young subjects with chronic low back pain were randomly allocated to two groups, receiving either TENS or placebo stimulation to the lumbosacral region for 60 minutes. The flexion reflex was elicited by an electrical stimulation applied to the subject's right sole and recorded electromyographically from the biceps femoris and the tibialis anterior muscles. Main Outcome Measures: Subjective sensation of low back pain and the electrically induced pain were measured by two separate visual analog scales, termed VAS(LBP) and VAS(FR), respectively. Data obtained before, during, and 60 minutes after TENS and placebo stimulations were analyzed using repeated measures ANOVA. Results: The VAS(LBP) score was significantly reduced to 63.1% of the prestimulation value after TENS ( $p < .001$ ), but the reduction was negligible after placebo stimulation (to 96.7%,  $p = .786$ ). In contrast, no significant change was found in the VAS(FR) score ( $p = .666$ ) and the flexion reflex area ( $p = .062$ ) during and after stimulation within each group and between the two groups ( $p = .133$  for VAS(FR) and  $p = .215$  for flexion reflex area). Conclusions: The same TENS protocol had different degrees of antinociceptive influence on chronic and acute pain in chronic low back pain patients.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** adult  
 \*antinociception  
 article  
 \*chronic pain/th [Therapy]  
 clinical article  
 clinical protocol  
 clinical trial  
 controlled study  
 electromyography  
 experimental test  
 female  
 flexor reflex  
 human  
 leg muscle  
 \*low back pain/th [Therapy]  
 male  
 pain assessment

randomized controlled trial  
 tibialis anterior muscle  
 \*transcutaneous nerve stimulation  
 \*placebo

**Source:** EMBASE

### 38. Long-term effectiveness of TENS in non-malignant chronic pain [Spanish] Eficacia del TENS a largo plazo en el dolor cronico no maligno

**Original Title:** Eficacia del TENS a largo plazo en el dolor cronico no maligno

**Citation:** Revista de la Sociedad Espanola del Dolor, 1999, vol./is. 6/5(351-356), 1134-8046 (1999)

**Author(s):** Fenollosa P.; Salazar H.; Canos M.A.; Pallares J.

**Institution:** (Fenollosa, Salazar, Canos, Pallares) Unidad Terapeutica del Dolor, Hospital Universitario La Fe, Av. Campanar, 21, 46009 Valencia, Spain

**Language:** Spanish

**Abstract:** Objectives: To study the effectiveness of TENS (Transcutaneous Electrical Nerve Stimulation) in non-malignant chronic pain and to determine the percentage of analgesia provided by this procedure, as well as its long- term effectiveness and the pathologies that benefit most from its use. Material and methods: A retrospective sample of 200 cases with two years of follow-up was studied. The sample was heterogeneous and included several diagnostic groups, either with neuropathic pain (122 cases) or nociception excess (78 cases). TENS was used in all cases after failure of the oral pharmacological therapy. The following variables were assessed: 1. Global average percentage of analgesia according to VAS scale. 2. Number of patients attaining 50% of pain relief at each visit. 3. Patients still using TENS at the long term. 4. Results according to the diagnosis. Results: 1. Average analgesia achieved: 44.9% at one month; 58.6% at six months; 56.7% at one year and 54.6% at two years. 2. Patients with analgesia greater than 500%: 37% at one month; 58% at six months; 56% at one year and 53% at two years. 3. Long-term effectiveness: 67% at one month; 57% at six months; 43% at one year; 34% at two years. 4. Results according to diagnosis: best results in patients with myofascial pain, poor results in patients with pain caused by plexus avulsion. Conclusions: TENS is an useful instrument for the treatment of nonmalignant chronic pain. The analgesia attained decreases over time. After six months, more than half of the cases with good initial responses still used it, whereas after two years just 34 per cent of the patients continued with it. It has shown a greater effectiveness in patients with localized muscular pain, its use not being recommended for fibromialgia, hemiplegic central pain, metabolic neuropathy and plexus avulsions.

**Country of Publication:** Spain

**Publication Type:** Journal: Article

**Subject Headings:** analgesic activity  
 article  
 \*chronic pain/rh [Rehabilitation]  
 \*chronic pain/th [Therapy]  
 human  
 major clinical study  
 myofascial pain  
 neuropathy  
 nociception  
 \*transcutaneous nerve stimulation  
 treatment contraindication

**Source:** EMBASE

### 39. Bedside implantation of a trial spinal cord stimulator for intractable anginal pain.

**Citation:** Anesthesia & Analgesia, December 1998, vol./is. 87/6(1242-4), 0003-2999;0003-2999 (1998 Dec)

**Author(s):** Janfaza DR; Michna E; Pisini JV; Ross EL



**Institution:** The Pain Management Center, Department of Anesthesia, Brigham & Women's Hospital, Boston, Massachusetts 02115, USA.

**Language:** English

**Country of Publication:** UNITED STATES

**Publication Type:** Case Reports; Journal Article

**Subject Headings:** [\\*Angina Pectoris/co \[Complications\]](#)  
[Female](#)  
[Humans](#)  
[Middle Aged](#)  
[Pain, Intractable/et \[Etiology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Prostheses and Implants](#)  
[Spinal Cord](#)  
[\\*Transcutaneous Electric Nerve Stimulation/is \[Instrumentation\]](#)

**Source:** MEDLINE

**Full Text:** Available in *fulltext* at [Highwire Press](#)  
 Available in *fulltext* at [Ovid](#)

#### 40. Long-term transcutaneous electrical nerve stimulation (TENS) use: Impact on medication utilization and physical therapy costs

**Citation:** Clinical Journal of Pain, 1998, vol./is. 14/1(66-73), 0749-8047 (1998)

**Author(s):** Chabal C.; Fishbain D.A.; Weaver M.; Heine L.W.

**Institution:** (Chabal) Seattle VA Medical Center, Anesthesiology Department, Univ. of Washington Sch. of Medicine, Seattle, WA, United States; (Fishbain) Department of Psychiatry, Univ. of Miami School of Medicine, Miami Beach, FL, United States; (Weaver) Department of Health Services, University of Washington, Seattle, WA, United States; (Heine) Department of Clinical Research, Empi, Inc., St. Paul, MN, United States; (Chabal) Seattle VA Medical Center, Anesthesiology Department, Univ. of Washington Sch. of Medicine, 1660 South Columbian Way, Seattle, WA 98108, United States

**Language:** English

**Abstract:** Objective: A study was conducted to assess a variety of treatment outcomes in long-term users of transcutaneous electrical nerve stimulation (TENS) who suffer from chronic pain. Key components of the study examined the effects of long-term TENS therapy on pain-related medications and physical/occupational therapy (PT/OT) use. Design: From a population of 2,003 chronic pain patients (CPPs) who acquired a TENS device (Epix XL, Empi, Inc., St. Paul, MN, U.S.A.) for pain management, a randomly selected sample of 376 patients who used TENS were interviewed by telephone by an independent research firm. The survey assessed a variety of outcome variables including changes in medication use, number of pain-related medications, and use of PT/OT prior to TENS and after a minimum 6 months of TENS treatment. The data were subjected to a paired t test analysis. A cost simulation model was then applied to the medication and PT/OT data. Results: The mean duration of pain, for which TENS was prescribed, was 40 +/- 60 months. As compared with the period prior to TENS use, this long-term TENS user group reported a statistically significant reduction in the following types of pain medications: opiate analgesics, tranquilizers, muscle relaxants, nonsteroidal anti-inflammatory drugs (NSAIDs), and steroids. PT/OT use was also significantly reduced. Cost simulations of pain medications and PT/OT are presented. Conclusions: Long-term use of TENS is associated with a significant reduction in the utilization of pain medication and PT/OT. In this study population, cost simulations of medication and PT/OT indicate that with long-term TENS use, costs can be reduced up to 55% for medications and up to 69% for PT/OT. The potential for TENS associated improvement, combined with reduced medication-related complications and costs, are important points that clinicians should consider when constructing a treatment plan for chronic pain patients. Finally, cost simulation techniques provide a useful tool for assessing outcomes in pain treatment and research.



**Country of Publication:** United States

**CAS Registry Number:** 9008-44-0 (muscle relaxant agent)

**Publication Type:** Journal: Review

**Subject Headings:** [\\*chronic pain/dm \[Disease Management\]](#)  
[\\*chronic pain/rh \[Rehabilitation\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical trial](#)  
[controlled study](#)  
[cost effectiveness analysis](#)  
[device](#)  
[human](#)  
[long term care](#)  
[major clinical study](#)  
[medical decision making](#)  
[physiotherapy](#)  
[priority journal](#)  
[randomized controlled trial](#)  
[review](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)  
[\\*muscle relaxant agent](#)  
[\\*narcotic analgesic agent](#)  
[\\*nonsteroid antiinflammatory agent](#)  
[\\*steroid](#)  
[\\*tranquilizer](#)

**Source:** EMBASE

**41. [Transcutaneous electric nerve stimulation: a therapy that promises help in chronic pain]. [German] Transkutane Elektrische Nervenstimulation: Eine Therapie verspricht Hilfe bei chronischen Schmerzen.**

**Original Title:** Transkutane Elektrische Nervenstimulation: Eine Therapie verspricht Hilfe bei chronischen Schmerzen.

**Citation:** Pflege Zeitschrift, June 1997, vol./is. 50/6(318-20), 0945-1129;0945-1129 (1997 Jun)

**Author(s):** Thomm M

**Language:** German

**Country of Publication:** GERMANY

**Publication Type:** Journal Article

**Subject Headings:** [Chronic Disease](#)  
[Humans](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)  
[Transcutaneous Electric Nerve Stimulation/nu \[Nursing\]](#)

**Source:** MEDLINE

**42. Understanding chronic pain and its consequences**

**Citation:** European Journal of Oriental Medicine, 1997, vol./is. 2/4(4-10) (1997 Winter)

**Author(s):** Mayor D

**Language:** English

**Abstract:** This first article in a series on chronic pain covers some general aspects of pain and its taxonomy, in particular the differences between acute and chronic pain, and between nociceptive and neurogenic pain.

**Publication Type:** Journal Article

**Subject Headings:** [Pain intractable](#)  
[Transcutaneous electric nerve stimulation](#)  
[Electroacupuncture](#)  
[Acupuncture therapy](#)  
[Traditional medicine chinese](#)

**Source:** AMED

**43. A review of the treatment of chronic low back pain with acupuncture-like transcutaneous electrical nerve stimulation and transcutaneous electrical nerve stimulation**

**Citation:** Complementary Therapies in Medicine, 1997, vol./is. 5/4(193-201), 0965-2299 (1997)

**Author(s):** Flowerdew M.W.; Gadsby J.G.

**Institution:** (Flowerdew, Gadsby) Beccles Acupuncture Clinic, Beccles, Suffolk, United Kingdom;  
 (Flowerdew, Gadsby) Beccles Acupuncture Clinic, 42 Station Road, Beccles, Suffolk  
 NR34 9QJ, United Kingdom

**Language:** English

**Abstract:** A meta-analysis of published studies was carried out to evaluate the effectiveness of acupuncture-like transcutaneous electrical nerve stimulation (ALTENS) and transcutaneous electrical nerve stimulation (TENS) in controlling pain and improving function in patients with chronic low back pain. Studies in English were identified by searches of EMBASE, MEDLINE, CISCOR and AMED. Other studies were located by citation tracking, searching by hand bibliographies and conference reports, and direct contact with subject experts. Studies were included in the meta-analysis if they were randomized controlled trials comparing ALTENS or TENS with a credible placebo in patients with low back pain of more than 8 weeks duration. Two reviewers extracted data on reduction in pain, changes in range of movement and functional status as well as determining the power of the included studies. Sixty-eight studies were initially identified, of which six (two using ALTENS and four using TENS) involving a total of 288 patients with mixed low back pathologies met the inclusion criteria for meta-analysis. The odds ratio (OR) of improvement in pain was calculated: ALTENS/TENS vs placebo OR = 2.1 (95% CI 1.3-3.4) ALTENS vs placebo OR = 7.2 (95% CI 2.6-20.1), TENS vs placebo OR = 1.5 (95% CI 0.9-2.6). OR for range of motion (ROM) on ALTENS vs placebo was 6.6 (95% CI 2.4-18.6). There were insufficient data to assess the effect of TENS alone on ROM, functional status and return to work. Similarly there were not enough data to assess ALTENS and functional status and return to work. There is limited statistical evidence that ALTENS and TENS reduce pain and improve function in patients with chronic low back pain, at least in the short term. This review and analysis is severely restricted by the lack of quality, randomized controlled trials. Even 25 years since the introduction of these treatments, powerful randomized controlled studies on the most appropriate use of TENS/ALTENS for the management of chronic low back pain have yet to be produced.

**Country of Publication:** United Kingdom

**Publication Type:** Journal: Review

**Subject Headings:** [\\*acupuncture](#)  
[analgesia](#)  
[body movement](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical trial](#)  
[comparative study](#)  
[controlled study](#)  
[data analysis](#)  
[female](#)  
[human](#)  
[\\*low back pain/th \[Therapy\]](#)  
[major clinical study](#)  
[male](#)  
[meta analysis](#)

[patient care](#)  
[randomized controlled trial](#)  
[review](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)  
[work capacity](#)

**Source:** EMBASE

#### 44. Spinal cord stimulation for chronic, nonmalignant pain.

**Citation:** Orthopaedic Nursing, 01 September 1996, vol./is. 15/5(53-58), 07446020

**Author(s):** Ronk LL

**Language:** English

**Abstract:** Chronic, nonmalignant pain differs from acute pain and cancer pain and can have a significant impact on people's lives. Many therapeutic modalities have been attempted for relief of this pain with varying degrees of success. These include opioid analgesics, relaxation methods, nerve blocks, transcutaneous electrical nerve stimulation (TENS), and spinal cord stimulation (SCS). SCS has been successful in decreasing nonmalignant pain when other methods have failed. Nurses play an active role in caring for patients receiving SCS through patient education, psychologic support, and programming the spinal cord stimulator. Because of the active role nurses take in pain management, a knowledge of pain transmission and the techniques and efficacy of spinal cord stimulation is important.

**Publication Type:** journal article

**Subject Headings:** [Spinal Cord](#)  
[Electric Stimulation](#)  
[Chronic Pain](#)  
[Pain](#)  
[Patient Selection](#)  
[Invasive Procedures](#)  
[Electrodes, Implanted](#)  
[Electric Stimulation](#)  
[Electric Stimulation](#)  
[Electric Stimulation](#)  
[Orthopedic Nursing](#)  
[Patient Education](#)

**Source:** CINAHL

#### 45. Transcutaneous electrical nerve stimulation (TENS): A technology assessment

**Citation:** International Journal of Technology Assessment in Health Care, March 1996, vol./is. 12/2(299-324), 0266-4623 (Mar 1996)

**Author(s):** Reeve J.; Menon D.; Corabian P.

**Institution:** (Reeve, Menon) Can. Coord. Off. Hlth. Technol. A.; (Corabian) University of Alberta Hospitals

**Language:** English

**Abstract:** The scientific evidence for clinical effectiveness of transcutaneous electrical nerve stimulation (TENS) for treatment of acute, chronic, and labor and delivery pain is assessed in this paper, and it is concluded that there is little evidence for other than a limited use of TENS. The utilization of TENS in Canadian hospitals and payments for TENS services are addressed. Some practicalities regarding the use and assessment of health technologies are discussed.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [analgesia](#)  
[article](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical research](#)  
[clinical trial](#)  
[data analysis](#)  
[health care cost](#)  
[health care utilization](#)  
[human](#)  
[\\*labor](#)  
[reimbursement](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)

**Source:** EMBASE

#### 46. Transcutaneous electrical nerve stimulation (TENS) in chronic pain

**Citation:** Alternat Ther Clin Pract, 1996, vol./is. 3/4(33-5) (1996 Jul-Aug)

**Author(s):** Salim M

**Language:** English

**Abstract:** Out of 2,780 cases of pain syndrome, we selected 156 patients with chronic pain. Three categories of patients with low back ache, osteoarthritis of the knee, and cervical spondylosis were studied. Their symptoms and duration of pain were more or less of similar nature. Fifteen days of treatment was given to each patient. In one group (TENS group) electrodes were stimulated for half an hour. In the other group (Acupuncture group) the needles were inserted on specific points and were stimulated with a BT 701 stimulator. Patients in the acupuncture group showed that needles were more effective and the effect persisted over a longer period. It was also observed that patients with pain of more than one year duration responded less well to TENS than acupuncture.

**Publisher:** Alternat Ther Clin Pract

**Publication Type:** Journal Article

**Subject Headings:** [Transcutaneous electric nerve stimulation](#)  
[Acupuncture](#)  
[Pain intractable](#)  
[Comparative study](#)  
[Methods](#)

**Source:** AMED

#### 47. Transcutaneous electrical nerve stimulation (TENS) treatment outcome in long-term users

**Citation:** Clinical Journal of Pain, 1996, vol./is. 12/3(201-214), 0749-8047 (1996)

**Author(s):** Fishbain D.A.; Chabal C.; Abbott A.; Heine L.W.; Cutler R.

**Institution:** (Fishbain, Cutler) Univ. of Miami School of Medicine, Department of Psychiatry, Miami, FL, United States; (Fishbain) Department of Neurological Surgery, Miami, FL, United States; (Fishbain) Department of Anesthesiology, Miami, FL, United States; (Chabal) Univ. of Washington Sch. of Medicine, Department of Anesthesiology, Seattle, WA, United States; (Abbott, Heine) Department of Clinical Research, Empi, Inc., Minneapolis, MN, United States; (Fishbain) University of Miami, Department of Psychiatry (D-29), P.O. Box 016960, Miami, FL 33101, United States

**Language:** English

**Abstract:** Objective: Previous reviewers of the literature on transcutaneous electrical nerve stimulation (TENS) outcome have concluded the following: (a) there are few long-term TENS follow-up studies, and (b) fewer studies have addressed the effect of long-term TENS use on outcome variables other than pain (e.g., function).  
 Design/Setting/Participants/Outcome Measures: From a population of 2,003 chronic pain

patients (CPPs) who bought a TENS device for pain management, 506 patients were randomly selected and interviewed by telephone long enough after purchase to allow at least 6 months of TENS use. The interview process used a structured 'skip' questionnaire designed to assess the CPPs' perceptions regarding the effectiveness of TENS for a variety of outcome variables. Of the 506 CPPs interviewed, 376 (74.3%) had used their TENS device for 6 months or longer and were defined as long-term users. The responses of this group of CPPs to the telephone questionnaire were then subjected to statistical analysis. Results: Paired t-tests, correlated z-tests, SS Wilks, and chi-square tests demonstrated statistically significant change or improvement ( $p < 0.05$ ) that paralleled the introduction of TENS use in the following outcome variables: less pain interference with work, home, and social activities; increased activity level and pain management; decreased use of other therapies (e.g., physical therapy, occupational therapy, chiropractic); decreased use of narcotics, tranquilizers, muscle relaxants, nonsteroidal anti-inflammatory drugs and steroids. Conclusions: The results suggest that TENS is associated with improvement on multiple outcome variables in addition to pain relief for CPPs who are long-term users. Also, for some CPPs, long-term TENS use continues to be effective.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[article](#)  
[\\*chronic pain/di \[Diagnosis\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[female](#)  
[follow up](#)  
[functional assessment](#)  
[human](#)  
[major clinical study](#)  
[male](#)  
[manipulative medicine](#)  
[occupational therapy](#)  
[pain assessment](#)  
[physiotherapy](#)  
[priority journal](#)  
[social behavior](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)  
[work capacity](#)

**Source:** EMBASE

#### 48. The discovery of transcutaneous spinal electroanalgesia and its relief of chronic pain

**Citation:** Physiotherapy (London), 1995, vol./is. 81/11(653-61) (1995 Nov)

**Author(s):** Macdonald AJ; Coates TW

**Language:** English

**Abstract:** Transcutaneous spinal electroanalgesia (TSE) is a new method employing brief pulse durations at relatively high voltage, that are designed to modulate processing of chronic pain when surface electrodes are placed on the skin overlying the spinal cord, without causing distress or side effects. A randomised double-blind, cross-over clinical trial comparing the widespread analgesic effects of TSE with a control, showed the new method to be significantly superior. TSE is well tolerated and can scarcely be felt.

**Publication Type:** Journal Article

**Subject Headings:** [Transcutaneous electric nerve stimulation](#)  
[Pain intractable](#)  
[Analgesia](#)  
[Chronic disease](#)

Pain  
Physiotherapy

Source: AMED

#### 49. Long-term use and effectiveness of transcutaneous electrical nerve stimulation in treatment of chronic pain patients

**Citation:** Pain Clinic, 1995, vol./is. 8/4(341-346), 0169-1112 (1995)

**Author(s):** Verdouw B.C.; Zuurmond W.W.A.; De Lange J.J.; Metz G.C.H.; Wagemans M.F.M.

**Institution:** (Verdouw, Zuurmond, De Lange, Metz, Wagemans) Department of Anesthesiology, Free University Hospital, PO Box 7057, 1007 MB Amsterdam, Netherlands

**Language:** English

**Abstract:** This paper aims to evaluate the effectiveness of transcutaneous electrical nerve stimulation (TENS) with long-standing use. A questionnaire was sent to all patients who received a TENS stimulator for use at home between September 1989 and September 1993. Treatment success was defined as: (i) the use of TENS with adequate analgesia, and (ii) quitting TENS because of decrease or disappearance of pain. Two hundred questionnaires were sent to patients: 139 were returned; 132 were complete, seven were incomplete. Of 132 patients 75 still used TENS. The use of TENS stimulators decreased from 76 per cent after 1 year of follow up to 30 per cent after more than 3 years. This decrease was significant if  $P < 0.001$  (Chi-squared test for trend). The percentage of successfully treated patients remained constant with increasing follow up (average 35 per cent). In conclusion, 35 per cent of all patients who start using TENS at home do have a lasting analgesic effect. TENS does have a place in the treatment of chronic pain. Evaluation of the effectiveness of TENS after 1 year of treatment may be advisable. Patients, who still use TENS at that time without benefit are probably unlikely to respond to TENS in the future.

**Country of Publication:** Netherlands

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[aged](#)  
[article](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[female](#)  
[follow up](#)  
[human](#)  
[long term care](#)  
[major clinical study](#)  
[male](#)  
[questionnaire](#)  
[\\*transcutaneous nerve stimulation](#)  
[treatment outcome](#)

Source: EMBASE

#### 50. Clinical evaluation of pain treatment with electrostimulation: a study on TENS in patients with different pain syndromes.

**Citation:** Clinical Journal of Pain, March 1994, vol./is. 10/1(22-7), 0749-8047;0749-8047 (1994 Mar)

**Author(s):** Meyler WJ; de Jongste MJ; Rolf CA

**Institution:** Department of Anesthesiology, University Hospital of Groningen, The Netherlands.

**Language:** English

**Abstract:** OBJECTIVE: We evaluated the clinical efficacy and the unwanted side effects of transcutaneous electrical nerve stimulation (TENS) in a consecutive group of patients with intractable pain due to different pain syndromes. METHODS: Two hundred eleven

patients with different pain syndromes, coded according to the International Association for the Study of Pain (IASP), were treated with TENS, using a standardized protocol. After a 6-month treatment period, an independent investigator estimated the effect of TENS in retrospect through assessment of patient files, standardized questionnaires, and diaries. In addition, a physical examination to determine the IASP code was performed, and unwanted side effects were evaluated. RESULTS: TENS showed a favorable response in the majority of patients with pain caused by peripheral nerve damage (53%), anginal pain resulting from ischemic heart disease (75%), and pain of the musculoskeletal system due to mechanical degenerative causes (69%). TENS employed in patients with prominent psychological and social distress, and for pain caused by central and autonomic dysfunction, alleviated pain in only 10-25% of the patients. Side effects occurred in 35% during the initial period of the treatment and were usually able to be resolved, especially with thorough supporting instructions during the initial treatment period. CONCLUSIONS: In this study, the beneficial effect of TENS appeared to be related to the etiology of the underlying pain. The effect of TENS was maintained for > 6 months in the majority of patients with an immediate favorable response. Supporting instructions are crucial for long-term success.

**Country of Publication:** UNITED STATES

**Publication Type:** Journal Article

**Subject Headings:** [Adolescent](#)  
[Adult](#)  
[Aged](#)  
[Aged, 80 and over](#)  
[Evaluation Studies as Topic](#)  
[Female](#)  
[Follow-Up Studies](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[\\*Pain, Intractable](#)  
[Palliative Care](#)  
[Syndrome](#)  
[Transcutaneous Electric Nerve Stimulation/ae \[Adverse Effects\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)

**Source:** MEDLINE

## 51. Pain and the placebo in rehabilitation using TENS and laser

**Citation:** Disability and Rehabilitation, 1994, vol./is. 16/1(13-20), 0963-8288 (1994)

**Author(s):** Simmonds M.J.; Kumar S.

**Institution:** (Simmonds, Kumar) School of Physical Therapy, Texas Woman's University, 1130 MD Anderson Blvd, Houston, TX 77030-2897, United States

**Language:** English

**Abstract:** The placebo effect of many health-related treatments is generally acknowledged. This paper discusses the role of the placebo in relation to pain perception and pain control. The theoretical basis of the placebo response is examined, followed by a discussion of the factors influencing the placebo response. Finally, the magnitude of the placebo response is explored specifically in relation to outcome measures and the efficacy of transcutaneous electrical nerve stimulation (TENS) and laser for pain relief.

**Country of Publication:** United Kingdom

**Publication Type:** Journal: Article

**Subject Headings:** [\\*analgesia](#)  
[article](#)  
[\\*chronic pain/rh \[Rehabilitation\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[coping behavior](#)



ethnology  
helium neon laser  
human  
laser  
nociception  
patient care  
priority journal  
\*psychological aspect  
stress  
\*transcutaneous nerve stimulation  
\*placebo

**Source:** EMBASE

**52. Management of intractable pain with percutaneous epidural spinal cord stimulation: differences in pain-relieving effects among diseases and sites of pain.**

**Citation:** Anesthesia & Analgesia, July 1993, vol./is. 77/1(110-6), 0003-2999;0003-2999 (1993 Jul)

**Author(s):** Shimoji K; Hokari T; Kano T; Tomita M; Kimura R; Watanabe S; Endoh H; Fukuda S; Fujiwara N; Aida S

**Institution:** Department of Anesthesiology, Niigata University School of Medicine, Japan.

**Language:** English

**Abstract:** This study is a survey of the overall clinical results achieved with our pain treatment method, percutaneous epidural low-frequency (1.6-8.0 Hz) spinal cord stimulation. It examines the relationship between the effectiveness of epidural spinal cord stimulation (ESCS) and diseases or sites of pain. Continuous indwelling of the catheter electrodes in the posterior epidural space ranged from 3 to 67 days, and the duration of percutaneous ESCS varied from less than 1 wk to more than 1 yr. Complete pain relief (100%) was achieved during stimulation in 11.5% of the patients (52 of 454). Complete (100%) to partial (more than 30%) pain relief occurred in 71.1% of the patients. In six (1.3%) patients pain was aggravated by stimulation. Analgesics and/or sedatives were discontinued completely after treatment in 52 patients (11.5%) and reduced in 263 patients (57.9%). The number of patients who rated pain relief better than 50% was significantly more in carcinoma/sarcoma and causalgia ( $P < 0.001$ ), and significantly less in postherpetic neuralgia and thromboangitis obliterans/arterial sclerosis obliterans ( $P < 0.001$ ) than the average in all diseases. There was a significantly high responsiveness to ESCS in female patients in comparison to male patients ( $P < 0.05$ ). Pain in the head/face, neck/upper extremities, and trunk responded more to ESCS than pain in the lower extremities. Alleviation of pain by ESCS was lower when the verbal pain score was high. There were no major complications in percutaneous ESCS. Thus, we have demonstrated that pain-alleviating effects of ESCS varies significantly by disease and site of pain, and that this simple percutaneous method can be used for a relatively long period.

**Country of Publication:** UNITED STATES

**Publication Type:** Comparative Study; Journal Article; Research Support, Non-U.S. Gov't

**Subject Headings:** Aged  
Epidural Space  
Female  
Humans  
Male  
Middle Aged  
Neoplasms/co [Complications]  
Neuralgia/co [Complications]  
Pain Measurement  
Pain, Intractable/et [Etiology]  
\*Pain, Intractable/th [Therapy]  
\*Spinal Cord  
Spinal Injuries/co [Complications]

[Transcutaneous Electric Nerve Stimulation/ae \[Adverse Effects\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE  
**Full Text:** Available in *fulltext* at [Ovid](#)

### 53. The use of modulated energy carried on a high frequency wave for the relief of intractable pain.

**Citation:** International Journal of Clinical Pharmacology Research, 1993, vol./is. 13/4(239-41), 0251-1649;0251-1649 (1993)

**Author(s):** Cassuto J; Liss S; Bennett A

**Institution:** Molndal Central Hospital, Sweden.

**Language:** English

**Abstract:** Ten volunteer patients with chronic neck/shoulder or back pain had been taking analgesics, and using conventional transcutaneous electrical nerve stimulation (TENS) with no significant pain relief. On entry to the trial, they were requested to stop taking their analgesics for two days prior to the study and for two days after starting to use the Liss Bipolar Body Stimulator for 20 min 3-5 times daily. Resumption of medication was then allowed. The stimulator (15,000 Hz carrier wave with a double modulation of 15 and 500 Hz) was connected to two adhesive electrodes placed so that the current field encompassed the trigger points, and used at a current that was just threshold for perception (1-4 mA). A visual analogue pain score was recorded before the study, and each evening of the month's study. The pain showed an overall highly significant rapid reduction of approximately 62% ( $p < 0.001$ ), and all but two of the patients received substantial benefit throughout the study. We conclude that the Liss Bipolar Body Stimulator usually causes a substantial reduction of pain even in patients not helped by conventional TENS devices.

**Country of Publication:** SWITZERLAND

**Publication Type:** Clinical Trial; Journal Article

**Subject Headings:** [\\*Back Pain/th \[Therapy\]](#)  
[Humans](#)  
[Neck](#)  
[Pain Measurement](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Radiation](#)  
[Shoulder](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE

### 54. Is TENS purely a placebo effect? A controlled study on chronic low back pain

**Citation:** Pain, 1993, vol./is. 54/1(99-106), 0304-3959 (1993)

**Author(s):** Marchand S.; Charest J.; Li J.; Chenard J.-R.; Lavignolle B.; Laurencelle L.

**Institution:** (Marchand, Charest, Li, Chenard, Lavignolle, Laurencelle) Universite du Quebec, Abitibi-Temiscamingue, C.P. 700, Rouyn-Noranda, Que. J9X 5E4, Canada

**Language:** English

**Abstract:** Although high-frequency low-intensity transcutaneous electric nerve stimulation (TENS) has been extensively used to relieve low back pain, experimental studies of its effectiveness have yielded contradictory findings mainly due to methodological problems in pain evaluation and placebo control. In the present study, separate visual analog scales (VAS) were used to measure the sensory-discriminative and motivational-effective components of low back pain. Forty-two subjects were randomly assigned to 1 of 3 groups: TENS, placebo-TENS, and no treatment (control). In order to measure the short-term effect of TENS, VAS pain ratings were taken before and after each treatment session. Also, to measure long-term effects, patients rated their pain at home every 2 h

throughout a 3-day period before and 1 week, 3 months and 6 months after the treatment sessions. In comparing the pain evaluations made immediately before and after each treatment session, TENS and placebo-TENS significantly reduced both the intensity and unpleasantness of chronic low back pain. TENS was significantly more efficient than placebo-TENS in reducing pain intensity but not pain unpleasantness. TENS also produced a significant additive effect over repetitive treatment sessions for pain intensity and relative pain unpleasantness. This additive effect was not found for placebo-TENS. When evaluated at home, pain intensity was significantly reduced more by TENS than placebo-TENS 1 week after the end of treatment, but not 3 months and 6 months later. At home evaluation of pain unpleasantness in the TENS group was never different from the placebo-TENS group. These results suggest that TENS reduces both the sensory-discriminative and motivational-affective components of low back pain in the short term but that much of the reduction in the affective component may be a placebo effect. We conclude that TENS should be used as a short-term analgesic procedure in a multidisciplinary program for low back pain rather than as an exclusive or long-term treatment.

**Country of Publication:** Netherlands

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[article](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[controlled study](#)  
[female](#)  
[human](#)  
[\\*low back pain/th \[Therapy\]](#)  
[male](#)  
[priority journal](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*placebo](#)

**Source:** EMBASE

#### 55. Acupuncture-like stimulation with codetron for rehabilitation of patients with chronic pain syndrome and osteoarthritis

**Citation:** Acupuncture and Electrotherapeutics Research, 1992, vol./is. 17/2(95-105) (1992 Apr-Jun)

**Author(s):** Fargas-Babjak AM; Pomeranz B; Rooney PJ

**Language:** English

**Publication Type:** Journal Article

**Subject Headings:** [Transcutaneous electric nerve stimulation](#)  
[Pain intractable](#)  
[Osteoarthritis](#)  
[Double blind method](#)  
[Acupuncture therapy](#)

**Source:** AMED

#### 56. Analgesic effects of vibration and transcutaneous electrical nerve stimulation applied separately and simultaneously to patients with chronic pain

**Citation:** Canadian Journal of Neurological Sciences, 1991, vol./is. 18/2(113-119), 0316-1671 (1991)

**Author(s):** Guieu R.; Tardy-Gervet M.-F.; Roll J.-P.

**Institution:** (Guieu, Tardy-Gervet, Roll) Laboratoire de Neurobiologie Humaine, Universite de Provence, URA CNRS 372, Avenue Escadrille Normandie Niemen, 13397 Marseille Cedex 13 France

**Language:** English

**Abstract:** The analgesic effects of transcutaneous electrical nerve stimulation (TENS) and vibratory stimulation (VS), used both separately and simultaneously, were compared in 24 patients suffering from chronic pain. We tested the hypothesis that these combined procedures might improve the pain reducing effects obtained with a single type of stimulation, since they make it possible to recruit a larger number of large diameter afferents and/or to increase the discharge frequencies. Four 35-minute treatment sessions (VS, TENS, VS+TENS, Sham stimulation) were run with each patient. The vibrations (100 Hz) and TENS (100 Hz) were applied to the surface of the painful region. The sham stimulation treatment consisted of positioning the TENS electrodes without actually delivering any current. The short form of the McGill pain questionnaire was used to assess the subjects' pain levels. The assessments took place immediately after any treatment (Oh.), and again 4 hours and 24 hours later. The results showed that dual stimulation not only alleviated pain in more cases than either VS or TENS alone, but also had stronger and more long-lasting analgesic effects. On the other hand, all three types of stimulation used produced stronger analgesic effects than those obtained with the sham stimulation.

**Country of Publication:** Canada

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[aged](#)  
[article](#)  
[\\*chronic pain/et \[Etiology\]](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[female](#)  
[human](#)  
[male](#)  
[priority journal](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*vibration](#)

**Source:** EMBASE

#### 57. The consistency of pulse frequencies and pulse patterns of transcutaneous electrical nerve stimulation (TENS) used by chronic pain patients

**Citation:** Pain, 1991, vol./is. 44/3(231-234), 0304-3959 (1991)

**Author(s):** Johnson M.I.; Ashton C.H.; Thompson J.W.

**Institution:** (Johnson, Ashton, Thompson) Clinical Psychopharmacol. Unit, Dept. Pharmacological Sciences, University Newcastle upon Tyne, Framlington Place, Newcastle upon Tyne NE2 4HH, United Kingdom

**Language:** English

**Abstract:** This study records the consistency of transcutaneous electrical nerve stimulation (TENS) pulse frequency and pulse pattern used by 13 chronic patients over a 1 year period. The results show that patients prefer specific pulse frequencies and pulse patterns unique to the individual and that they turn to such frequencies and patterns on subsequent treatment sessions. Pulse frequencies and pulse patterns were not related to the cause and site of pain, a finding consistent with previous study in this laboratory. This observation, coupled with the large variability in pulse frequencies and pulse patterns used between individuals, implies that patients prefer such frequencies and patterns for reasons of comfort which may not be related to mechanisms specific to the pain system.

**Country of Publication:** Netherlands

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[aged](#)  
[\\*analgesia](#)

[article](#)  
[\\*chronic pain](#)  
[clinical article](#)  
[female](#)  
[human](#)  
[male](#)  
[priority journal](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**58. [Transcutaneous nerve stimulation as palliative treatment of pain]. [Danish] Transkutan nervestimulation som smertepalliativum.**

**Original Title:** Transkutan nervestimulation som smertepalliativum.

**Citation:** Ugeskrift for Laeger, June 1990, vol./is. 152/25(1809-12), 0041-5782;0041-5782 (1990 Jun 18)

**Author(s):** Jorgensen L; Nielsen LM; Kisling AK; Jensen NH; Eriksen J

**Institution:** Bispebjerg Hospital, Kobenhavn, smerteklinikken, afdeling R.

**Language:** Danish

**Abstract:** The value of transcutaneous nerve stimulation (TNS) for palliative relief of pain is reviewed. The presumed mechanisms of effect are briefly described and a review of recent literature concerning TNS for acute and chronic pain, respectively, is presented. In addition, advice is given for the choice of apparatus and the technique employed is described. It is concluded that TNS may be tried with advantage in the treatment of a number of acute and chronic painful conditions of neurogenic/nocioceptive nature and that TNS has the advantage over e.g. acupuncture that the patient can administer the treatment himself.

**Country of Publication:** DENMARK

**Publication Type:** English Abstract; Journal Article; Review

**Subject Headings:** [Evaluation Studies as Topic](#)  
[Humans](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Palliative Care/mt \[Methods\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE

**59. Can trials of physical treatments be blinded? The example of transcutaneous electrical nerve stimulation for chronic pain**

**Citation:** American Journal of Physical Medicine and Rehabilitation, February 1990, vol./is. 69/1(6-10), 0894-9115 (Feb 1990)

**Author(s):** Deyo R.A.; Walsh N.E.; Schoenfeld L.S.; Ramamurthy S.

**Institution:** (Deyo, Walsh, Schoenfeld, Ramamurthy) Health Services Research, Seattle VA Medical Center, 1660 South Columbian Way, Seattle, WA 98108, United States

**Language:** English

**Abstract:** Therapeutic trials often attempt to 'blind' patient and investigator to the true nature of treatments received, reducing the influences of conscious or subconscious prejudices. In drug trials, this is accomplished with placebo tablets, but blinding in trials of physical treatments is more problematic. This issue arose in a clinical trial of transcutaneous electrical nerve stimulation (TENS) for patients with chronic low back pain. Several study design features were incorporated to promote blinding: use of sham TENS units visually identical with real units, exclusion of potential subjects with previous TENS experience, avoidance of a crossover design and use of identical visit frequency, instructions and modifications in electrode placement. Subjects were asked not to discuss treatments with the clinicians who performed outcome assessments. Both patients and clinicians were

asked to guess actual treatment assignments at the trial's end. Every patient in the true TENS group believed the unit was functioning properly, but the degree of certainty varied. In the sham TENS group, 84% also believed they had functioning units, but their certainty was significantly less than in the active treatment group. Differences in patient perceptions did not affect compliance, as the two groups had similar dropout rates, appointment compliance, days of TENS use and daily duration of TENS use. Clinicians guessed treatments correctly 61% of the time (as opposed to 50% expected by chance), again suggesting partial success in blinding. These efforts at blinding may partly explain the negative trial results for TENS efficacy. We conclude that complete blinding is difficult to achieve because of sensory difference in treatment and unintended communication between patient and examiner. Nonetheless, trials of physical treatments can achieve partial blinding with the techniques described here, and the success of blinding can be assessed with simple questions at study completion.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [adult](#)  
[article](#)  
[\\*chronic pain](#)  
[\\*clinical trial](#)  
[controlled study](#)  
[female](#)  
[human](#)  
[\\*interpersonal communication](#)  
[\\*low back pain](#)  
[major clinical study](#)  
[male](#)  
[methodology](#)  
[priority journal](#)  
[psychological aspect](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

#### 60. Chronic pain patient's beliefs about their pain and treatment outcomes

**Citation:** Archives of Physical Medicine and Rehabilitation, 1990, vol./is. 71/2(128-132), 0003-9993 (1990)

**Author(s):** Shutty Jr. M.S.; DeGood D.E.; Tuttle D.H.

**Institution:** (Shutty Jr., DeGood, Tuttle) Department of PM and R, School of Medicine, Howard A. Rusk Rehabil. Cent., 1 Hospital Drive, Columbia, MO 65212, United States

**Language:** English

**Abstract:** A novel assessment procedure measuring chronic pain patients' agreement with information presented on a clinic orientation videotape was evaluated as a predictor of short-term treatment outcome. One hundred randomly selected outpatients viewed a 15-minute videotape detailing conservative approaches to pain management and completed a questionnaire measuring factual recall of the videotape presentation and their acceptance or rejection (ie, agreement) of this information. Patient ratings of satisfaction with treatment were assessed one month after treatment. Multivariate analyses revealed that extent of agreement with the videotape content was significantly associated with lower pain ratings, increased ratings of physical ability, and higher treatment satisfaction. Prognostic use of this procedure for identifying patients at risk for nonadherence to treatment is discussed.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [adolescent](#)  
[adult](#)  
[article](#)

\*chronic pain/th [Therapy]  
 \*counseling  
 female  
 human  
 \*low back pain  
 major clinical study  
 male  
 organization and management  
 \*patient compliance  
 \*physical disability  
 priority journal  
 psychological aspect  
 \*self report  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

#### 61. Does antidromic activation of nociceptors play a role in sciatic radicular pain?

**Citation:** Pain, 1990, vol./is. 40/1(77-79), 0304-3959 (1990)

**Author(s):** Xavier A.V.; Farrell C.E.; McDanal J.; Kissin I.

**Institution:** (Xavier, Farrell, McDanal, Kissin) Department of Anesthesiology, University of Alabama, School of Medicine, Birmingham, AL 35294, United States

**Language:** English

**Abstract:** We describe a case where transcutaneous electrical stimulation of the right sciatic nerve in a patient with right L<sub>5</sub> radiculopathy reproduced the patient's pathological pain in the leg. Following a right ankle block with 0.5% bupivacaine, the sciatic nerve stimulation induced pain in the thigh and the calf but not in the foot. Despite an increase in the magnitude of stimulation by 50% (compared with the stimulation before the block) the pain was not perceived below the level of blockade. We suggest that in this case the electrical stimulation generated impulses propagated antidromically into the leg and activated nociceptors in it. The bupivacaine blockade prevented antidromic propagation of impulses into the foot, therefore pain in this region was not perceived.

**Country of Publication:** Netherlands

**CAS Registry Number:** 18010-40-7 (bupivacaine); 2180-92-9 (bupivacaine); 55750-21-5 (bupivacaine)

**Publication Type:** Journal: Article

**Subject Headings:** adult  
 article  
 case report  
 \*chronic pain  
 female  
 human  
 human experiment  
 \*low back pain  
 priority journal  
 \*radiculopathy  
 \*sciatic nerve  
 \*transcutaneous nerve stimulation  
 bupivacaine

**Source:** EMBASE

#### 62. Nociceptive flexion reflexes during analgesic neurostimulation in man.

**Citation:** Pain, November 1989, vol./is. 39/2(145-56), 0304-3959;0304-3959 (1989 Nov)

**Author(s):** Garcia-Larrea L; Sindou M; Manguiere F

**Institution:** Evoked Potentials Unit (EEG Department), Hopital Neurologique, Lyon, France.



<b>Language:</b>	English
<b>Abstract:</b>	Nociceptive flexion reflexes of the lower limbs (RIII responses) have been studied in 21 patients undergoing either epidural (DCS, n = 16) or transcutaneous (TENS, n = 5) analgesic neurostimulation (AN) for chronic intractable pain. Flexion reflex RIII was depressed or suppressed by AN in 11 patients (52.4%), while no modification was observed in 9 cases and a paradoxical increase during AN was evidenced in 1 case. In all but 2 patients, RIII changes were rapidly reversible after AN interruption. RIII depression was significantly associated with subjective pain relief, as assessed by conventional self-rating; moreover, in 2 patients it was possible to ameliorate the pain-suppressing effects of AN by selecting those stimulation parameters (intensity and frequency) that maximally depressed nociceptive reflex RIII. We recorded 2 cases of RIII attenuation after contralateral neurostimulation. AN appeared to affect nociceptive reflexes rather selectively, with no or very little effect on other cutaneous, non-nociceptive responses. Recording of RIII reflexes is relatively simple to implement as a routine paraclinical procedure. It facilitates the objective assessment of AN efficacy and may help to choose the most appropriate parameters of neurostimulation. In addition, RIII behavior in patients could be relevant to the understanding of some of the mechanisms involved in AN-induced pain relief.
<b>Country of Publication:</b>	NETHERLANDS
<b>CAS Registry Number:</b>	0 (Analgesics)
<b>Publication Type:</b>	Journal Article; Research Support, Non-U.S. Gov't
<b>Subject Headings:</b>	<a href="#">Adult</a> <a href="#">Aged</a> <a href="#">Aged, 80 and over</a> <a href="#">*Analgesics/tu [Therapeutic Use]</a> <a href="#">Female</a> <a href="#">Humans</a> <a href="#">Leg/ir [Innervation]</a> <a href="#">Male</a> <a href="#">Middle Aged</a> <a href="#">*Muscle Contraction/de [Drug Effects]</a> <a href="#">Pain, Intractable/pp [Physiopathology]</a> <a href="#">*Pain, Intractable/th [Therapy]</a> <a href="#">*Reflex/de [Drug Effects]</a> <a href="#">*Transcutaneous Electric Nerve Stimulation</a>
<b>Source:</b>	MEDLINE

### 63. Clinical use of nociceptive flexion reflex recording in the evaluation of functional neurosurgical procedures.

<b>Citation:</b>	Acta Neurochirurgica - Supplementum, 1989, vol./is. 46/(53-7), 0065-1419;0065-1419 (1989)
<b>Author(s):</b>	Garcia-Larrea L; Sindou M; Mauguiere F
<b>Institution:</b>	EEG Department Clin. Hopital Neurologique, Lyon, France.
<b>Language:</b>	English
<b>Abstract:</b>	Nociceptive flexion reflexes (RIII) obtained by stimulation of sural nerve were studied in patients with intractable chronic pain before and after functional neurosurgery, either dorsal column stimulation (DCS, n = 15) or posterior selective rhizotomy in the dorsal root entry zone (DREZ, n = 5). Dynamic study of RIII at supraliminal levels provided direct, quantitative and replicable evidence of the inhibition of nociceptive spinal reflexes by DSC. The effects of DSC on the RIII were highly correlated with subjective pain relief. In non-collaborative patients it was still possible to select the best DCS parameters (frequency, intensity) as those providing maximal RIII depression. After posterior selective rhizotomy in the DREZ involving S1-S2 root levels postoperative evidence of selective extralemniscal lesioning could be assessed by the abolition or strong attenuation of nociceptive RIII, whereas preservation of the lemniscal pathways was evidenced by somatosensory evoked potentials. Routine recording of nociceptive reflexes in man

proved to be a useful tool for the objective evaluation of anatomic-physiological effects of functional neurosurgical procedures.

**Country of Publication:** AUSTRIA

**Publication Type:** Journal Article; Research Support, Non-U.S. Gov't

**Subject Headings:** [Electric Stimulation](#)  
[\\*Electric Stimulation Therapy/mt \[Methods\]](#)  
[Humans](#)  
[\\*Microsurgery](#)  
[Muscle Contraction](#)  
[Muscles/ir \[Innervation\]](#)  
[\\*Nociceptors/pp \[Physiopathology\]](#)  
[\\*Pain, Intractable/su \[Surgery\]](#)  
[\\*Postoperative Complications/pp \[Physiopathology\]](#)  
[\\*Reflex/ph \[Physiology\]](#)  
[Signal Processing, Computer-Assisted](#)  
[Spinal Cord/pp \[Physiopathology\]](#)  
[\\*Spinal Nerve Roots/su \[Surgery\]](#)  
[Sural Nerve/pp \[Physiopathology\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE

#### 64. Management of chronic pain

**Citation:** Canadian Family Physician, 1989, vol./is. 35/FEB.(315-319), 0008-350X (1989)

**Author(s):** Clarke I.M.C.

**Institution:** (Clarke) Pain Relief Clinic, Foothills Hospital, Calgary, Alta. T2N 2T9 Canada

**Language:** English

**Country of Publication:** Canada

**CAS Registry Number:** 50-48-6 (amitriptyline); 549-18-8 (amitriptyline); 52-86-8 (haloperidol); 113-52-0 (imipramine); 50-49-7 (imipramine); 23095-84-3 (morphine sulfate); 35764-55-7 (morphine sulfate); 64-31-3 (morphine sulfate); 52-26-6 (morphine); 57-27-2 (morphine); 58-39-9 (perphenazine); 36322-90-4 (piroxicam)

**Publication Type:** Journal

**Subject Headings:** [adult](#)  
[case report](#)  
[\\*chronic pain/dt \[Drug Therapy\]](#)  
[female](#)  
[human](#)  
[short survey](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*amitriptyline/dt \[Drug Therapy\]](#)  
[\\*benzodiazepine derivative/dt \[Drug Therapy\]](#)  
[\\*haloperidol/dt \[Drug Therapy\]](#)  
[\\*imipramine/dt \[Drug Therapy\]](#)  
[\\*morphine/dt \[Drug Therapy\]](#)  
[morphine sulfate](#)  
[\\*perphenazine/dt \[Drug Therapy\]](#)  
[\\*piroxicam/dt \[Drug Therapy\]](#)

**Source:** EMBASE

**Full Text:** Available in *fulltext* at [Highwire Press](#)  
 Available in *fulltext* at [National Library of Medicine](#)

**65. Transcutaneous electrical nerve stimulation and spinal cord stimulation for pain relief in reflex sympathetic dystrophy**

<b>Citation:</b>	Stereotactic and Functional Neurosurgery, 1989, vol./is. 52/1(53-62), 1011-6125 (1989)
<b>Author(s):</b>	Robaina F.J.; Rodriguez J.L.; De Vera J.A.; Martin M.A.
<b>Institution:</b>	(Robaina, Rodriguez, De Vera, Martin) Department of Neurosurgery, Hospital Ntra. Sra. de Candelaria, Santa Cruz de Tenerife, Canary Islands Spain
<b>Language:</b>	English
<b>Abstract:</b>	35 patients with the diagnosis of reflex sympathetic dystrophy in a late stage have been treated with transcutaneous electrical nerve stimulation (TENS). 6 out of the 35 were also submitted to spinal cord stimulation (SCS). The follow-up was from 10 to 36 months. The results obtained were TENS group: 25% excellent, 45% good, 10% fair, 20% poor; in the SCS group: 16.6% excellent, 66.6% good and 16.6% fair. In the long run these results are better than those obtained with sympathetic blocks and sympathectomy. TENS and SCS have no effect on osteoporosis or ankylosis.
<b>Country of Publication:</b>	Switzerland
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	*chronic pain clinical article female human male priority journal *spinal cord *sympathetic dystrophy *transcutaneous nerve stimulation
<b>Source:</b>	EMBASE

**66. The use of transcutaneous electric nerve block on traumatized muscles**

<b>Citation:</b>	Schmerz Pain Douleur, 1988, vol./is. 9/3 A(201-203), 0174-4895 (1988)
<b>Author(s):</b>	DeMar E.A.
<b>Institution:</b>	(DeMar) NASA Ames Research Center, San Mateo, CA 94403 United States
<b>Language:</b>	English
<b>Country of Publication:</b>	Germany
<b>Publication Type:</b>	Journal
<b>Subject Headings:</b>	*chronic pain/th [Therapy] clinical article *electrostimulation human methodology *myalgia/th [Therapy] *nerve block *pain/th [Therapy] *transcutaneous nerve stimulation
<b>Source:</b>	EMBASE

**67. Experience with transcutaneous electrical nerve stimulation (TENS) for relief of pain**

<b>Citation:</b>	Pain Clinic, 1988, vol./is. 2/2(91-95), 0169-1112 (1988)
<b>Author(s):</b>	Choudhury K.J.; Ffoulkes-Crabbe D.J.O.

**Institution:** (Choudhury, Ffoulkes-Crabbe) Department of Anaesthesia, College of Medicine, University of Lagos, Lagos Nigeria

**Language:** English

**Abstract:** Forty adult patients with various conditions giving pain scores on the visual analogue scale of 3 to 10, and who had tried other forms of pain relief without success, were treated with TENS. Pulsed high-frequency (4000-6000 Hz) TENS was provided to most patients by means of the MRL pain control system II HF. A minimum of one and a maximum of 12 sittings of an average duration of 30 minutes each were required to result in impressive drops in pain scores. The results were assessed as excellent in 45 per cent, very good in 30 per cent and good in about 12.5 per cent of patients.

**Country of Publication:** Netherlands

**Publication Type:** Journal

**Subject Headings:** [adult](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical article](#)  
[female](#)  
[human](#)  
[male](#)  
[priority journal](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**68. Experiment with the transcutaneous electric nerve stimulation for the treatment of acute and chronic conditions of pain. With 1 figure [German] ERFAHRUNGEN MIT DER TRANSKUTANEN ELEKTRISCHEN NERVENSTIMULATION ZUR BEHANDLUNG AKUTER UND CHRONISCHER SCHMERZZUSTANDE. MIT 1 ABBILDUNG**

**Original Title:** ERFAHRUNGEN MIT DER TRANSKUTANEN ELEKTRISCHEN NERVENSTIMULATION ZUR BEHANDLUNG AKUTER UND CHRONISCHER SCHMERZZUSTANDE. MIT 1 ABBILDUNG

**Citation:** Zeitschrift fur Physiotherapie, 1988, vol./is. 40/6(389-396), 0003-9357 (1988)

**Author(s):** Heidenreich E.-M.; Hentschel R.; Lange A.

**Institution:** (Heidenreich, Hentschel, Lange) Medizinische Akademie 'Carl Gustav Carus', Zentrale Hochschulpoliklinik, Abteilung fur Physiotherapie, Dresden, DDR-8019 German Democratic Republic

**Language:** German

**Abstract:** The transcutaneous electric nerve stimulation was used by means of battery-operated microstimulators in 264 patients. The subdivision of 213 patients with chronic pains was carried out according to the diagnosis into the following groups: 1. amputation pains, 2. neuralgias, 3. pains in degenerative diseases of the locomotor system, 4. other pain syndromes. In the 51 patients of group 5 acute pains in the region of the locomotor system were present. In another group of 25 patients with chronic pains there was no significant difference in the comparison of the effect between transcutaneous electric nerve stimulation and diadynamic current in application at home. On the other hand, from the investigation resulted a statistically ascertained superiority in contrast to the placebo treatment, which particularly in the 3rd decennium of a 30-day period of treatment clearly appeared. In a distribution of 63% positive and 37% negative results no principal differences of the effect of the transcutaneous nerve stimulation could be established in the various groups of diagnosis, however, peculiarities in the therapeutic strategy in various clinical pictures among this group are the result for the user. New possibilities, when the conventional (high frequency) transcutaneous electric nerve stimulation failed opened the application of the acupuncture-like (low frequency) transcutaneous electric nerve stimulation.

**Country of Publication:** German Democratic Republic

**Publication Type:** Journal

**Subject Headings:** [adult](#)  
[\\*age](#)  
[\\*amputation](#)  
[\\*backache](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[clinical trial](#)  
[controlled study](#)  
[\\*diadynamotherapy](#)  
[human](#)  
[major clinical study](#)  
[\\*neuralgia](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**69. Transcutaneous nerve stimulation in the ambulance for pain: Clinical practice [German] TENS IN DER SCHMERZAMBULANZ: KLINISCHE PRAXIS**

**Original Title:** TENS IN DER SCHMERZAMBULANZ: KLINISCHE PRAXIS

**Citation:** Akupunktur, 1988, vol./is. 16/1(18-23), 0340-3130 (1988)

**Author(s):** Kossmann B.; Bowdler I.

**Institution:** (Kossmann, Bowdler) Zentrum für Anesthesiologie, Klinikum der Universität Ulm, Ulm Germany

**Language:** German

**Country of Publication:** Germany

**Publication Type:** Journal

**Subject Headings:** [adult](#)  
[\\*cervical spine](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[female](#)  
[human](#)  
[\\*low back pain](#)  
[major clinical study](#)  
[male](#)  
[\\*pain/th \[Therapy\]](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**70. Remedial exercises and physical therapy for patients with chronic pain treated at Mainz pain center [German] DIE BEDEUTUNG DER KRANKENGYMNASTISCHEN UND PHYSIKALISCHEN THERAPIE BEI PATIENTEN MIT CHRONISCHEN SCHMERZEN IM SCHMERZZENTRUM MAINS**

**Original Title:** DIE BEDEUTUNG DER KRANKENGYMNASTISCHEN UND PHYSIKALISCHEN THERAPIE BEI PATIENTEN MIT CHRONISCHEN SCHMERZEN IM SCHMERZZENTRUM MAINS

**Citation:** Krankengymnastik, 1988, vol./is. 40/1(14-16), 0023-4494 (1988)

**Author(s):** Geil M.

**Institution:** (Geil) Schmerzzentrum Mainz, Physikalische Therapie, 6500 Mainz Germany

**Language:** German

**Country of Publication:** Germany

**Publication Type:** Journal

**Subject Headings:** [\\*autogenic training](#)

\*chronic pain/di [Diagnosis]  
 education  
 \*feedback system  
 human  
 \*kinesiotherapy  
 \*physiotherapy  
 psychological aspect  
 short survey  
 \*social psychology  
 therapy  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

#### 71. A small randomized comparative trial of acupuncture versus transcutaneous electrical neurostimulation in postherpetic neuralgia

**Citation:** Pain Clinic, 1988, vol./is. 2/2(87-9) (1988)  
**Author(s):** Rutgers MJ; Van Romunde LK; Osman PO  
**Language:** English  
**Publisher:** Pain Clinic  
**Publication Type:** Journal Article  
**Subject Headings:** Pain intractable  
 Transcutaneous electric nerve stimulation  
 Acupuncture  
 Therapy  
 Research design

**Source:** AMED

#### 72. Occurrence and treatment of pain after brachial plexus injury

**Citation:** Clinical Orthopaedics and Related Research, 1988, vol./is. 237/(87-95) (1988 Dec)  
**Author(s):** Bruxelle J; Travers V; Thiebaut JB  
**Language:** English  
**Publication Type:** Journal Article  
**Subject Headings:** Peripheral nerves  
 Pain  
 Transcutaneous electric nerve stimulation  
 Therapy  
 Etiology  
 Injuries  
 Pain intractable

**Source:** AMED

**Full Text:** Available in *fulltext* at [Ovid](#)  
 Available in *fulltext* at [Ovid](#)

#### 73. Dorsal column stimulation (DCS) in chronic pain: report of 31 cases.

**Citation:** Annals of the Royal College of Surgeons of England, May 1987, vol./is. 69/3(104-9), 0035-8843;0035-8843 (1987 May)  
**Author(s):** Mittal B; Thomas DG; Walton P; Calder I  
**Language:** English  
**Abstract:** Thirty-one patients of chronic pain treated with dorsal column stimulation (DCS) are reported. All of them had been treated previously with drugs and multiple procedures including injections and frequently several operations. After a trial of percutaneous DCS,

permanent implantations were carried out. The patients have been followed for up to eight years. Overall, sixty per cent of patients had good to fair relief of pain with DCS. Some of them had a good response for five years and more.

**Country of Publication:** ENGLAND

**Publication Type:** Comparative Study; Journal Article; Research Support, Non-U.S. Gov't

**Subject Headings:** [Adult](#)  
[Aged](#)  
[Back Pain/th \[Therapy\]](#)  
[Electric Stimulation Therapy/ae \[Adverse Effects\]](#)  
[\\*Electric Stimulation Therapy](#)  
[Female](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Transcutaneous Electric Nerve Stimulation/ae \[Adverse Effects\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)

**Source:** MEDLINE

**Full Text:** Available in *fulltext* at [National Library of Medicine](#)

#### 74. Neurosurgical approaches to the management of chronic pain syndromes.

**Citation:** Orthopaedic Nursing, January 1987, vol./is. 6/1(23-9), 0744-6020;0744-6020 (1987 Jan-Feb)

**Author(s):** Lamb S; Barbaro NM

**Language:** English

**Country of Publication:** UNITED STATES

**Publication Type:** Journal Article

**Subject Headings:** [\\*Electric Stimulation Therapy](#)  
[Humans](#)  
[\\*Nerve Block](#)  
[Neurosurgery](#)  
[\\*Pain, Intractable/su \[Surgery\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)

**Source:** MEDLINE

#### 75. Acupuncture and TENS in rats and humans

**Citation:** Acupuncture and Electro-Therapeutics Research, 1987, vol./is. 12/3-4(256), 0360-1293 (1987)

**Author(s):** Pomeranz B.

**Institution:** (Pomeranz) University of Toronto, Toronto, Ont. M5S 1A1 Canada

**Language:** English

**Country of Publication:** United States

**CAS Registry Number:** 28805-76-7 (4 aminobutyric acid); 56-12-2 (4 aminobutyric acid); 60118-07-2 (endorphin); 16590-41-3 (naltrexone); 16676-29-2 (naltrexone)

**Publication Type:** Journal: Article

**Subject Headings:** [abstract report](#)  
[\\*chronic pain/th \[Therapy\]](#)  
[controlled study](#)  
[\\*electroacupuncture](#)  
[\\*heat](#)  
[human](#)



\*spinal cord  
 \*tail flick test  
 \*transcutaneous nerve stimulation  
 \*4 aminobutyric acid  
 \*endorphin  
 naltrexone

**Source:** EMBASE

#### 76. Chronic pain: Use of TENS in the elderly

**Citation:** Geriatrics, 1987, vol./is. 42/12(75-82), 0016-867X (1987)  
**Author(s):** Thorsteinsson G.  
**Institution:** (Thorsteinsson) Department of Physical Medicine and Rehabilitation, Mayo Medical School, Rochester, MN 55905 United States  
**Language:** English  
**Abstract:** Transcutaneous electrical nerve stimulation (TENS) can be an important adjunct to the management of pain in elderly patients. Chronic neuropathy and postfracture recovery are the leading indications for using the portable stimulative device, although it has also been applied successfully in relieving low-back pain, postherpetic neuralgia, myofascial pain, phantom-limb pain, and advanced, painful malignancies. However, TENS is rarely used alone in pain relief, but instead should be part of a larger management program that may include other modalities.  
**Country of Publication:** United States  
**Publication Type:** Journal: Article  
**Subject Headings:** \*aged  
 \*chronic pain/th [Therapy]  
 human  
 \*low back pain/th [Therapy]  
 \*myofascial pain/th [Therapy]  
 \*neuropathy/th [Therapy]  
 \*phantom pain/th [Therapy]  
 short survey  
 \*transcutaneous nerve stimulation  
**Source:** EMBASE

#### 77. Transcutaneous electrical nerve stimulation (TNS) and its relationship to placebo therapy: A review

**Citation:** New Zealand Medical Journal, 1987, vol./is. 100/821(215-217), 0028-8446 (1987)  
**Author(s):** Langley G.B.; Sheppeard H.  
**Institution:** (Langley, Sheppeard) Medical Research Laboratory, Palmerston North Hospital, Palmerston North New Zealand  
**Language:** English  
**Country of Publication:** New Zealand  
**Publication Type:** Journal: Review  
**Subject Headings:** \*chronic pain  
 human  
 peripheral nervous system  
 review  
 therapy  
 \*transcutaneous nerve stimulation  
**Source:** EMBASE

#### 78. The place of the pain clinic

**Citation:** Bailliere's Clinical Rheumatology, 1987, vol./is. 1/1(123-153), 0950-3579 (1987)

**Author(s):** Wells J.C.D.

**Institution:** (Wells) Centre for Pain Relief, Walton Hospital, Liverpool United Kingdom

**Language:** English

**Abstract:** Chronic pain is a debilitating and degrading condition. Its aetiology is largely multifactorial, and only proper appreciation of the various factors which can combine to produce the patient's misery will allow appropriate therapies. If the mechanisms of chronic pain were better taught and the therapies available were better used by medical practitioners, then the standard of alleviation of pain would increase greatly. There is an urgent need for greatly improved facilities for treating chronic pain by multidisciplinary groups in specialized clinics, a fact which has been realized for over 30 years. However, in spite of this there is a great delay in the setting up of such units. There is also an urgent need for proper training of doctors in pain relief, and a need for a much larger amount of money to be spent on research into the causes and treatment of human pain. It is disturbing to me that so much money goes on research into possible cures of malignant disease in the future, which is all very well, but which does not help the sufferer from severe pain at the present time; whereas these poor unfortunates, dying with their misery unassuaged, must suffer unnecessarily because of lack of information amongst physicians, and lack of proper facilities for treatment. Likewise, our own unit and many others have extremely long waiting lists, making even more difficult the treatment of an already complex problem. In spite of this, more than 50% of patients who attend multidisciplinary pain clinics obtain long-term benefit from their therapy. The fact that facilities do not exist for many sufferers is not only disgraceful, but also very expensive both from social security payments and from inappropriate use of health care facilities as these patients wander from clinic to clinic in search of a cure which is not available. Chronic pain should be recognized for what it is-a severe and debilitating condition-and proper steps should be taken to provide the treatment within the health service for its alleviation.

**Country of Publication:** United Kingdom

**Publication Type:** Journal: Review

**Subject Headings:** autonomic nervous system  
cancer  
\*chronic pain  
clinical article  
drug efficacy  
etiology  
\*facetectomy  
human  
\*intrathecal drug administration  
joint  
low back pain  
\*mental disease  
muscle  
musculoskeletal system  
myofascial pain  
nerve injury  
nervous system  
\*pain clinic  
\*percutaneous cordotomy  
peripheral nervous system  
\*physical disease  
psychological aspect  
rhizotomy  
\*social aspect  
\*sympathetic blocking  
sympathetic dystrophy  
therapy  
\*transcutaneous nerve stimulation

treatment  
trigeminal neuralgia  
\*analgesic agent  
\*anticonvulsive agent  
\*antidepressant agent  
\*psychotropic agent  
\*tranquilizer

**Source:** EMBASE

#### 79. Surgical management of benign intractable pain

**Citation:** International Disability Studies, 1987, vol./is. 9/1(27-30), 0259-9147 (1987)

**Author(s):** Thomas D.G.T.

**Institution:** (Thomas) Institute of Neurology, The National Hospital for Nervous Diseases, London WC1 3BG United Kingdom

**Language:** English

**Abstract:** A multidisciplinary approach to chronic pain will usually obtained reasonable results, but in some selected patients with non-malignant disease a surgical solution may be sought with benefit. A variety of techniques used are described in detail, including the treatment of trigeminal neuralgia, post-herpetic neuralgia, and the pain associated with avulsion injury of the brachial plexus.

**Country of Publication:** Switzerland

**Publication Type:** Journal: Review

**Subject Headings:** \*brachial plexus injury  
\*brachialgia  
central nervous system  
\*chronic pain  
\*chronic patient  
diagnosis  
\*dorsal rhizotomy  
human  
injury  
\*microvascular surgery  
nervous system  
peripheral nervous system  
\*postherpetic neuralgia  
short survey  
\*thalamus  
therapy  
\*thermocoagulation  
\*transcutaneous nerve stimulation  
\*trigeminal neuralgia

**Source:** EMBASE

#### 80. [Percutaneous epidural stimulation of the spinal cord in the treatment of chronic pain]. [Spanish] Estimulacion percutanea epidural del cordon espinal para el tratamiento del dolor cronico.

**Original Title:** Estimulacion percutanea epidural del cordon espinal para el tratamiento del dolor cronico.

**Citation:** Revista Espanola de Anestesiologia y Reanimacion, May 1985, vol./is. 32/3(119-21), 0034-9356;0034-9356 (1985 May-Jun)

**Author(s):** Muriel Villoria C; Hernandez Arbeiza J; Fernandez VD

**Language:** Spanish

**Country of Publication:** SPAIN

**Publication Type:** English Abstract; Journal Article

**Subject Headings:** [Adult](#)  
[\\*Electric Stimulation Therapy/mt \[Methods\]](#)  
[Humans](#)  
[Middle Aged](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE

**81. [Percutaneous epidural electrical stimulation of the spinal cord for intractable pain--with special reference to deafferentation pain].**

**Citation:** No Shinkei Geka - Neurological Surgery, April 1985, vol./is. 13/4(409-15), 0301-2603;0301-2603 (1985 Apr)

**Author(s):** Tsuda T; Tasker RR

**Language:** Japanese

**Abstract:** In a study of 44 patients with different types of chronic pain, mostly associated with deafferentation, chronic percutaneous epidural spinal stimulation has proved useful treatment achieving an initial 52% incidence of pain amelioration overall. Long-term result showed at six months in 86%, at 1 year in 90%, although technical problems, which included electrode displacement and required minor operative readjustment, affected 48% of those permanently implanted. No other complications were seen. Success bore no relationship to quality of pain reported by the patients or to duration of pain. The patients with denervation caused by nerve or root lesions responded better than those with cord lesions even though electrical paresthesia were delivered to the area of pain in each case. A decline in effectiveness with time was noted in small numbers of our cases despite persistence of paresthesia in the area of pain. It is suggested that late failure reflects plasticity of the nervous system in adapting to new inputs. Morphine study was carried out in some of these patients. Morphine did not help to ameliorate the pain in many cases with deafferentation pain. And also Naloxone was administered during successful pain-relieving stimulation. This did not result in recurrence of pain. The Somato Sensory Responses were recorded in 25 patients before and during neurostimulation. When stimulation was applied the late component was suppressed in most of those who enjoyed a good result. The early component was not changed in those patients even during stimulation. These results suggest that spinal cord stimulation would suppress the denervative hypersensitivity of dorsal horn in the patients with deafferentation pain.(ABSTRACT TRUNCATED AT 250 WORDS)

**Country of Publication:** JAPAN

**Publication Type:** English Abstract; Journal Article

**Subject Headings:** [Adult](#)  
[Aged](#)  
[\\*Electric Stimulation Therapy/mt \[Methods\]](#)  
[Epidural Space](#)  
[Evaluation Studies as Topic](#)  
[Female](#)  
[Follow-Up Studies](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Spinal Cord/ph \[Physiology\]](#)  
[Transcutaneous Electric Nerve Stimulation/ae \[Adverse Effects\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE

**82. [Progress in pain therapy: acupuncture (including acupuncture anesthesia and percutaneous electrotherapy)].**

**Citation:** Kango Gijutsu - Japanese Journal of Nursing Art, April 1985, vol./is. 31/5(579-85), 0449-752X;0449-752X (1985 Apr)

**Author(s):** Sato T; Oda H

**Language:** Japanese

**Country of Publication:** JAPAN

**Publication Type:** Journal Article

**Subject Headings:** [\\*Acupuncture Therapy](#)  
[\\*Anesthesia](#)  
[\\*Electric Stimulation Therapy](#)  
[Humans](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Skin/ir \[Innervation\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)

**Source:** MEDLINE

**83. [Transcutaneous electrostimulation--method leading to a permeation system of electroanalgesia in oncological practice]. [Russian] Chreskoznaia elektrostimuliatsiia--put' k "skvoznoi" sisteme elektroobezbolivaniia v onkologicheskoi praktike.**

**Original Title:** Chreskoznaia elektrostimuliatsiia--put' k "skvoznoi" sisteme elektroobezbolivaniia v onkologicheskoi praktike.

**Citation:** Voprosy Onkologii, 1985, vol./is. 31/8(33-6), 0507-3758;0507-3758 (1985)

**Author(s):** Dil'din AS; Tikhonova GP; Kozlov SV

**Language:** Russian

**Abstract:** Analgetic transcutaneous electrostimulation with the newly-designed Soviet-made ELIMAN-101 installation was used for treatment of tumor-induced pain in 84 cases (as a component of general intraoperative anesthesia--in 29, for postoperative pain--54, for analgesia in cases of advanced tumor--in 11 patients). Intraoperative application of the said procedure resulted in a 2.4-fold decrease in phentanyl consumption. In early postoperative period, pain was relieved in 65.6% and alleviated in 34.5% of patients, the latter requiring non-narcotic drugs as an adjunct to electroanalgetic treatment. Transcutaneous electrostimulation offered an adequate means for management of chronic cancer pain. The procedure did not involve resistance development and ensured a nearly 6-fold decrease in opiates consumption.

**Country of Publication:** USSR

**Publication Type:** English Abstract; Journal Article

**Subject Headings:** [Adult](#)  
[Aged](#)  
[Electric Stimulation Therapy/is \[Instrumentation\]](#)  
[\\*Electric Stimulation Therapy](#)  
[Female](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[Neoplasms/su \[Surgery\]](#)  
[\\*Neoplasms/th \[Therapy\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Pain, Postoperative/th \[Therapy\]](#)  
[Transcutaneous Electric Nerve Stimulation/is \[Instrumentation\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)

**Source:** MEDLINE

**84. Changes in CSF endorphins and monoamine metabolites related to treatment with high frequency transcutaneous electrical nerve stimulation**

**Citation:** Nordisk Psykiatrisk Tidsskrift, 1985, vol./is. 39/SUPPL. 11(83-90), 0029-1455 (1985)

**Author(s):** Von Knorring L.; Almay B.G.L.; Johansson F.

**Institution:** (Von Knorring, Almay, Johansson) Department of Psychiatry, University of Umea, S-901 85 Umea Sweden

**Language:** English

**Country of Publication:** Sweden

**CAS Registry Number:** 534-82-7 (4 hydroxy 3 methoxyphenylethylene glycol); 1321-73-9 (5 hydroxyindoleacetic acid); 54-16-0 (5 hydroxyindoleacetic acid); 60118-07-2 (endorphin); 306-08-1 (homovanillic acid); 33507-63-0 (substance P)

**Publication Type:** Journal

**Subject Headings:** [cerebrospinal fluid](#)  
[\\*chronic pain](#)  
[clinical article](#)  
[human](#)  
[nervous system](#)  
[peripheral nervous system](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*4 hydroxy 3 methoxyphenylethylene glycol](#)  
[\\*5 hydroxyindoleacetic acid](#)  
[\\*endorphin](#)  
[\\*homovanillic acid](#)  
[monoamine](#)  
[\\*substance P](#)

**Source:** EMBASE

**85. Long-term high frequency transcutaneous electrical nerve stimulation (hi-TNS) in chronic pain. Clinical response and effects on CSF-endorphins, monoamine metabolites, substance P-like immunoreactivity (SPLI) and pain measures**

**Citation:** Journal of Psychosomatic Research, 1985, vol./is. 29/3(247-257), 0022-3999 (1985)

**Author(s):** Almay B.G.L.; Johansson F.; Von Knorring L.

**Institution:** (Almay, Johansson, Von Knorring) Department of Neurology, Umea University, S-901 85 Umea Sweden

**Language:** English

**Abstract:** Eighteen patients with chronic pain syndromes of organic origin were treated by means of high frequency transcutaneous stimulation (hi-TNS). The CSF levels of receptor-assayable Fraction I and II endorphins, substance P-like immunoreactivity (SPLI), and the monoamine metabolites 5-HIAA, HVA and MOPEG were measured before and after one week of daily treatment. Furthermore, the effects on experimental pain measures were determined. The therapeutic effect was evaluated after 30 days and 3 months of treatment. Patients with low initial concentrations of endorphins in CSF, lower than those observed in healthy volunteers, tended to have the best response to hi-TNS. There were significant increases in Fraction I endorphins and SPLI in CSF, most pronounced in the patients who responded. There were no significant changes in 5-HIAA, HVA or MOPEG in CSF. However, in early responders, the serotonin metabolite 5-HIAA tended to decrease as contrasted to an increase in non-responders. The difference between the groups was statistically significant. Confirming our earlier studies, the therapy induced changes in pain measures showed a significant, positive correlation with increasing Fraction I endorphins in CSF. Our results suggest that hi-TNS induces central changes in the endorphinergic, serotonergic and possibly substance P-ergic systems.

**Country of Publication:** United Kingdom

**CAS Registry Number:** 1321-73-9 (5 hydroxyindoleacetic acid); 54-16-0 (5 hydroxyindoleacetic acid); 306-08-1 (homovanillic acid); 33507-63-0 (substance P)

**Publication Type:** Journal: Article

**Subject Headings:** cerebrospinal fluid  
 \*chronic pain  
 clinical article  
 diagnosis  
 \*diathermy  
 \*endorphin cerebrospinal fluid level  
 human  
 nervous system  
 therapy  
 \*transcutaneous nerve stimulation  
 \*5 hydroxyindoleacetic acid  
 \*homovanillic acid  
 \*substance P

**Source:** EMBASE

#### 86. Pain in avulsion of the brachial plexus.

**Citation:** Neurosurgery, December 1984, vol./is. 15/6(960-5), 0148-396X;0148-396X (1984 Dec)

**Author(s):** Parry CB

**Language:** English

**Abstract:** The author reviews the diagnosis and treatment of avulsion injuries of the brachial plexus. He discusses the nature of the pain and the use of transcutaneous nerve stimulation for its relief.

**Country of Publication:** UNITED STATES

**Publication Type:** Journal Article

**Subject Headings:** Arm/ir [Innervation]  
 \*Brachial Plexus/in [Injuries]  
 \*Electric Stimulation Therapy  
 Humans  
 Pain, Intractable/et [Etiology]  
 \*Pain, Intractable/th [Therapy]  
 Paralysis/th [Therapy]  
 Splints  
 \*Transcutaneous Electric Nerve Stimulation

**Source:** MEDLINE

#### 87. Transcutaneous electrical nerve stimulation: its role in the control of chronic pain.

**Citation:** Archives of Physical Medicine & Rehabilitation, May 1984, vol./is. 65/5(228-31), 0003-9993;0003-9993 (1984 May)

**Author(s):** Fried T; Johnson R; McCracken W

**Language:** English

**Abstract:** An assessment was made of the effectiveness of long-term transcutaneous electrical nerve stimulation (TENS) in the treatment of chronic posttraumatic pain. Compensation Board files showed that 846 patients received TENS from 1975 to 1979, with more than 70% having intractable back pain. Of this group using TENS, 44.6% were free of disability, and an additional 36.2% were capable of modified work. Questionnaire responses were obtained from 563 of 637 patients receiving TENS in 1978 or 1979. At the six-month follow-up, most respondents (472, 83.8%) reported continuing benefit from TENS, including a reduction of pain (418, 74.2%), less need for medication (322, 57.2%), and improved sleep patterns (331, 58.8%). Only 13.6% of those who had returned to work reported no benefit from TENS, while 18.4% of those still unemployed reported no benefit. Among those who had returned to work (264 cases, 46.9% of respondents), benefit was reported equally by those with back injuries and by those with other injuries.



The responses observed in this trial seem larger and more long-lasting than could be obtained by a placebo effect, and further attempts at a controlled trial may be warranted. However, there are major practical difficulties to such an investigation, and the resulting controversy could reduce the therapeutic effectiveness of TENS in conditions where alternative treatments are either ineffective or undesirable.

**Country of Publication:** UNITED STATES  
**Publication Type:** Journal Article  
**Subject Headings:** [Back Pain/th \[Therapy\]](#)  
[Disability Evaluation](#)  
[\\*Electric Stimulation Therapy](#)  
[Humans](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation](#)  
[Unemployment](#)  
**Source:** MEDLINE

#### 88. Deep brain stimulation--a contemporary methodology for chronic pain.

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**Citation:** Journal of Neurosurgical Nursing, February 1984, vol./is. 16/1(1-9), 0047-2603;0047-2603 (1984 Feb)  
**Author(s):** Williams AE  
**Language:** English  
**Country of Publication:** UNITED STATES  
**Publication Type:** Case Reports; Journal Article  
**Subject Headings:** [\\*Brain](#)  
[\\*Electric Stimulation Therapy/mt \[Methods\]](#)  
[Electrodes, Implanted](#)  
[Humans](#)  
[Male](#)  
[Middle Aged](#)  
[Nerve Compression Syndromes/pp \[Physiopathology\]](#)  
[Nociceptors/pp \[Physiopathology\]](#)  
[Pain/pp \[Physiopathology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Peripheral Nerves/in \[Injuries\]](#)  
[Sympathetic Nervous System/pp \[Physiopathology\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)  
**Source:** MEDLINE

#### 89. Employment of local transcutaneous electrical stimulation in treatment of pain syndromes

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**Citation:** Vrachebnoe Delo, 1984, vol./is. NO. 9/(101-104) (1984)  
**Author(s):** Macheret E.L.; Artemenko A.V.; Lyseniuk V.P.  
**Institution:** (Macheret, Artemenko, Lyseniuk) Kievskij Institut Usovershenstvovaniya Vrachey, Kiev Ukraine  
**Language:** Russian  
**Country of Publication:** Russia  
**Publication Type:** Journal  
**Subject Headings:** [analgesia](#)  
[central nervous system](#)  
[\\*chronic pain](#)  
[clinical article](#)  
[electroencephalography](#)  
[human](#)

nervous system  
therapy  
\*transcutaneous nerve stimulation

**Source:** EMBASE

**90. [Electrical stimulation for pain relief--spinal cord stimulation].**

**Citation:** No Shinkei Geka - Neurological Surgery, December 1983, vol./is. 11/12(1225-36), 0301-2603;0301-2603 (1983 Dec)

**Author(s):** Tanikawa T

**Language:** Japanese

**Country of Publication:** JAPAN

**Publication Type:** Journal Article

**Subject Headings:** Adult  
Aged  
\*Electric Stimulation Therapy/mt [Methods]  
Electrodes, Implanted  
Female  
Humans  
Male  
Middle Aged  
\*Pain, Intractable/th [Therapy]  
Phantom Limb/th [Therapy]  
Spinal Cord/pp [Physiopathology]  
Transcutaneous Electric Nerve Stimulation/is [Instrumentation]  
\*Transcutaneous Electric Nerve Stimulation/mt [Methods]

**Source:** MEDLINE

**91. [Management of chronic pain conditions--anesthesiologic aspects]. [German] Behandlung chronischer Schmerzzustände--Anaesthesiologische Aspekte.**

**Original Title:** Behandlung chronischer Schmerzzustände--Anaesthesiologische Aspekte.

**Citation:** Chirurg, December 1983, vol./is. 54/12(785-8), 0009-4722;0009-4722 (1983 Dec)

**Author(s):** Noisser HO; Peter K

**Language:** German

**Country of Publication:** GERMANY, WEST

**CAS Registry Number:** 55-65-2 (Guanethidine)

**Publication Type:** Journal Article

**Subject Headings:** Anesthesia, Caudal/mt [Methods]  
\*Anesthesia, Conduction/mt [Methods]  
Anesthesia, Epidural/mt [Methods]  
Autonomic Nerve Block/mt [Methods]  
\*Electric Stimulation Therapy/mt [Methods]  
Guanethidine  
Humans  
\*Hypothermia, Induced/mt [Methods]  
\*Nerve Block/mt [Methods]  
\*Pain, Intractable/th [Therapy]  
\*Transcutaneous Electric Nerve Stimulation/mt [Methods]

**Source:** MEDLINE

**92. Spinal stimulation: statistical superiority of monophasic stimulation of narrowly separated, longitudinal bipoles having rostral cathodes.**

**Citation:** Applied Neurophysiology, 1983, vol./is. 46/1-4(129-37), 0302-2773 (1983)

**Author(s):** Law JD

**Language:** English

**Abstract:** A prospective study of a large number of spinal stimulating electrodes permitted a statistical comparison of stimulus parameters, including phase, polarity and orientation of bipolar electrodes. For the treatment of pain, the technical grade of a stimulator is proportional to the range of stimulation, which was found to be significantly greater under the conditions listed in the title.

**Country of Publication:** SWITZERLAND

**Publication Type:** Journal Article

**Subject Headings:** [\\*Electric Stimulation Therapy/mt \[Methods\]](#)  
[Epidural Space](#)  
[Evoked Potentials](#)  
[Functional Laterality/ph \[Physiology\]](#)  
[Humans](#)  
[Muscles/ir \[Innervation\]](#)  
[Nociceptors/pp \[Physiopathology\]](#)  
[Pain, Intractable/pp \[Physiopathology\]](#)  
[\\*Pain, Intractable/th \[Therapy\]](#)  
[Sensory Thresholds](#)  
[\\*Spinal Cord/pp \[Physiopathology\]](#)  
[\\*Transcutaneous Electric Nerve Stimulation/mt \[Methods\]](#)

**Source:** MEDLINE

### 93. Treatment of chronic pain: Anesthesiologic aspects [German] BEHANDLUNG CHRONISCHER SCHMERZZUSTANDE: ANAESTHESIOLOGISCHE ASPEKTE

**Original Title:** BEHANDLUNG CHRONISCHER SCHMERZZUSTANDE: ANAESTHESIOLOGISCHE ASPEKTE

**Citation:** Chirurg, 1983, vol./is. 54/12(785-788), 0009-4722 (1983)

**Author(s):** Noisser H.O.; Peter K.

**Institution:** (Noisser, Peter) Institut für Anaesthesiologie der Ludwig Maximilians Universität, D 8000 München 70 Germany

**Language:** German

**Country of Publication:** Germany

**CAS Registry Number:** 23964-57-0 (articaine); 23964-58-1 (articaine); 18010-40-7 (bupivacaine); 2180-92-9 (bupivacaine); 55750-21-5 (bupivacaine); 52485-79-7 (buprenorphine); 53152-21-9 (buprenorphine); 30388-07-9 (caffeine); 58-08-2 (caffeine); 55-65-2 (guanethidine); 60-02-6 (guanethidine); 645-43-2 (guanethidine); 37187-54-5 (heparin); 8057-48-5 (heparin); 8065-01-8 (heparin); 9005-48-5 (heparin); 8013-38-5 (imipletol); 137-58-6 (lidocaine); 24847-67-4 (lidocaine); 56934-02-2 (lidocaine); 73-78-9 (lidocaine); 1722-62-9 (mepivacaine); 96-88-8 (mepivacaine); 52-26-6 (morphine); 57-27-2 (morphine); 51-05-8 (procaine); 59-46-1 (procaine); 76-25-5 (triamcinolone acetonide)

**Publication Type:** Journal

**Subject Headings:** [\\*analgesia](#)  
[autonomic nervous system](#)  
[central nervous system](#)  
[\\*chronic pain](#)  
[\\*cryoanesthesia](#)  
[drug administration](#)  
[\\*drug efficacy](#)  
[\\*drug therapy](#)  
[\\*electroanesthesia](#)

\*electrostimulation  
 human  
 intravenous drug administration  
 \*nerve block  
 nervous system  
 peripheral nervous system  
 prevention  
 review  
 therapy  
 \*transcutaneous nerve stimulation  
 \*anesthetic agent  
 \*articaine  
 \*bupivacaine  
 \*buprenorphine  
 \*caffeine  
 \*ganglion blocking agent  
 \*guanethidine  
 \*heparin  
 \*imipletol  
 \*lidocaine  
 \*mepivacaine  
 \*morphine  
 \*procaine  
 \*triamcinolone acetonide  
 unclassified drug

**Source:** EMBASE

#### 94. Neuroelectric medicine

**Citation:** Journal of Bioelectricity, 1983, vol./is. 2/2-3(159-180), 0730-823X (1983)  
**Author(s):** Bauer W.  
**Institution:** (Bauer) Medical Plaza Suite 204, 58 Hospital Road, Newman, GA 30263 United States  
**Language:** English  
**Country of Publication:** United States  
**Publication Type:** Journal  
**Subject Headings:** auditory system  
 central nervous system  
 \*chronic pain  
 \*electromagnetic field  
 \*hearing impairment  
 human  
 \*multiple sclerosis  
 \*nerve cell membrane  
 nervous system  
 \*neurophysiology  
 peripheral nervous system  
 short survey  
 therapy  
 \*tinnitus  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

#### 95. Electroacupuncture and electrostimulation for relief of chronic intractable pain

**Citation:** American Journal of Acupuncture, 1983, vol./is. 11/2(143-147), 0091-3960 (1983)  
**Author(s):** Man P.L.; Ning T.L.

**Institution:** (Man, Ning) Northville Reg. Psychiatr. Hosp., Northville, MI 48167 United States

**Language:** English

**Country of Publication:** United States

**Publication Type:** Journal

**Subject Headings:** [\\*acupuncture](#)  
[\\*chronic pain](#)  
[human](#)  
[peripheral nervous system](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**96. The comparative assessment of the analgesic action of two regimens of skin electrostimulations of the nervous fibres**

**Citation:** Anesteziologiya i Reanimatologiya, 1983, vol./is. No. 2/(54-57), 0201-7563 (1983)

**Author(s):** Starobinetz Kh. M.; Volkova L.D.; Ionova O.M.

**Institution:** (Starobinetz Kh., Volkova, Ionova) Gor. Bol'n. I, Petrozavodsk Russia

**Language:** Russian

**Country of Publication:** Russia

**Publication Type:** Journal

**Subject Headings:** [\\*acupuncture](#)  
[\\*chronic pain](#)  
[clinical article](#)  
[human](#)  
[peripheral nervous system](#)  
[\\*postoperative pain](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**97. Notes from a local out-patients' unit regarding antalgic therapy using transcutaneous electrostimulation [Italian]  
 IL CONTRIBUTO DI UN AMBULATORIO DIVISIONALE DI TERAPIA ANTALGICA MEDIANTE  
 ELETTROSTIMOLAZIONE TRANSCUTANEA**

**Original Title:** IL CONTRIBUTO DI UN AMBULATORIO DIVISIONALE DI TERAPIA ANTALGICA MEDIANTE ELETTROSTIMOLAZIONE TRANSCUTANEA

**Citation:** Minerva Anestesiologica, 1983, vol./is. 49/4(245-257), 0375-9393 (1983)

**Author(s):** Pantaleoni M.; Marzocchi L.; Fabbri M.

**Institution:** (Pantaleoni, Marzocchi, Fabbri) Serv. Anest. Rianim., Osp. Porretta Terme e Vergato, Porretta Terme Italy

**Language:** Italian

**Country of Publication:** Italy

**Publication Type:** Journal: Article

**Subject Headings:** [\\*chronic pain](#)  
[human](#)  
[\\*outpatient](#)  
[peripheral nervous system](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**98. Naloxone does not affect pain relief induced by electrical stimulation in man**

<b>Citation:</b>	Pain, 1983, vol./is. 17/2(189-195), 0304-3959 (1983)
<b>Author(s):</b>	Freeman T.B.; Campbell J.N.; Long D.M.
<b>Institution:</b>	(Freeman, Campbell, Long) Dep. Neurosurg., Johns Hopkins Univ. Sch. Med., Baltimore, MD 21205 United States
<b>Language:</b>	English
<b>Abstract:</b>	We wished to determine if pain relief that resulted from transcutaneous (TNS) or spinal cord electrical stimulation in patients with chronic pain was due to activation of an endogenous opiate-related pain control system. Naloxone (0.4 - 10 mg) or saline was injected in double-blind fashion intravenously into opiate-naïve subjects with chronic pain who achieved 30% or greater pain relief with spinal cord stimulation (4 patients) or TNS (9 patients). Subjects rated their pain during stimulation and 2, 5, 10 and 15 min after the injection. Two days or more later the procedure was repeated using the alternate agent (naloxone or saline). Naloxone did not decrease the pain relief induced by stimulation, and therefore the effects of stimulation are probably not mediated by the endogenous opiates.
<b>Country of Publication:</b>	Netherlands
<b>CAS Registry Number:</b>	357-08-4 (naloxone); 465-65-6 (naloxone)
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	<a href="#">*analgesia</a> <a href="#">central nervous system</a> <a href="#">*chronic pain</a> <a href="#">clinical article</a> <a href="#">*clinical study</a> <a href="#">controlled study</a> <a href="#">*electrostimulation</a> <a href="#">human</a> <a href="#">intravenous drug administration</a> <a href="#">peripheral nervous system</a> <a href="#">*spinal cord stimulation</a> <a href="#">therapy</a> <a href="#">*transcutaneous nerve stimulation</a> <a href="#">*naloxone</a>
<b>Source:</b>	EMBASE

**99. Psychiatric factors influencing the treatment of pain with peripheral conditioning stimulation**

<b>Citation:</b>	Pain, 1982, vol./is. 13/4(365-371), 0304-3959 (1982)
<b>Author(s):</b>	Nielzen S.; Sjolund B.H.; Eriksson M.B.E.
<b>Institution:</b>	(Nielzen, Sjolund, Eriksson) Dep. Psychiatry, Univ. Lund, S22362 Lund Sweden
<b>Language:</b>	English
<b>Abstract:</b>	Sixty-six patients treated with transcutaneous nerve stimulation (TNS) for pain symptoms were studied with respect to the incidence of different psychiatric factors and physical disorders in relation to success or failure of the treatment. In a blind screening procedure, mental illness and pathological personality traits were negative in relation to treatment success, while a state of reactive decompensation was not. Patients without any relevant physical cause of their pain were generally treatment failures and they had an excess of pathological personality traits, mostly of a hysterical nature.
<b>Country of Publication:</b>	Netherlands
<b>Publication Type:</b>	Journal: Article
<b>Subject Headings:</b>	<a href="#">*chronic pain</a> <a href="#">*mental disease</a>

peripheral nervous system  
 psychological aspect  
 therapy  
 \*transcutaneous nerve stimulation

**Source:** EMBASE

**100. Pain and electrotherapy [French] DOULEUR ET ELECTROTHERAPIE: APPORT DE LA NEUROSTIMULATION TRANSCUTANEE**

**Original Title:** DOULEUR ET ELECTROTHERAPIE: APPORT DE LA NEUROSTIMULATION TRANSCUTANEE

**Citation:** Annales de Medecine Physique, 1981, vol./is. 24/3(229-237), 0402-4621 (1981)

**Author(s):** Boureau F.; Luu M.; Orsini A.

**Institution:** (Bureau, Luu, Orsini) Lab. Neurophysiol., Hop. St-Antoine, 75012 Paris France

**Language:** French

**Abstract:** 20 chronic patients were treated with transcutaneous nerve stimulation and low frequency electrotherapy (Bernard's current). Pain intensity was evaluated with visual analogic scale. Statistical analysis of the data failed to reveal any significant differences between immediate of after effects of both stimulation procedures. These results indicate that both methods may act similarly by large diameter inhibition, without implicating morphine-like substances, since the effects are not modified by the narcotic antagonist naloxone. Advantages of transcutaneous nerve stimulation is the use of more suitable electrical parameters which permit reduction of size of stimulators and self-administration by patients.

**Country of Publication:** France

**CAS Registry Number:** 357-08-4 (naloxone); 465-65-6 (naloxone)

**Publication Type:** Journal

**Subject Headings:** \*acupuncture  
 central nervous system  
 \*chronic pain  
 \*electrostimulation  
 major clinical study  
 peripheral nervous system  
 therapy  
 \*transcutaneous nerve stimulation  
 \*naloxone

**Source:** EMBASE

**101. The use of electrical transcutaneous nerve stimulations in chronic pain syndromes. Method and preliminary results in 28 cases [French] UTILISATION DES STIMULATIONS NERVEUSES TRANSCUTANEEES DANS LE TRAITEMENT DES SYNDROMES DOULOUREUX CHRONIQUES. METHODE ET RESULTATS PRELIMINAIRES OBTENUS DANS 28 CAS**

**Original Title:** UTILISATION DES STIMULATIONS NERVEUSES TRANSCUTANEEES DANS LE TRAITEMENT DES SYNDROMES DOULOUREUX CHRONIQUES. METHODE ET RESULTATS PRELIMINAIRES OBTENUS DANS 28 CAS

**Citation:** Annales de Medecine Interne, 1981, vol./is. 132/6(377-380), 0003-410X (1981)

**Author(s):** Bergego C.; Philippon J.; Gazengel J.

**Institution:** (Bergego, Philippon, Gazengel) Serv. Reeducat. Neurol., Hop. Salpetriere, F 75651 Paris Cedex 13 France

**Language:** French

**Abstract:** The analgesic effect of conventional transcutaneous nerve stimulation has been studied in 28 patients, all having a chronic pain caused by peripheral neurological disease. As already reported in the literature, half of patients were improved on a short-term basis.



Long-term improvement was observed mainly in patients with traumatic nerve lesions; such cases thus appear to be the best indication for this method. It should be emphasised that whatever the etiology, the delay between the onset of pain and the beginning of transcutaneous stimulation was a critical factor. Nine out of ten patients suffering for less than one year were satisfactorily improved. This suggests that transcutaneous stimulations should be used as early as possible after the onset of neurological pain.

**Country of Publication:** France  
**Publication Type:** Journal  
**Subject Headings:** \*chronic pain  
 major clinical study  
 nervous system  
 \*neurologic disease  
 peripheral nervous system  
 therapy  
 \*transcutaneous nerve stimulation  
**Source:** EMBASE

### 102. Clinical evaluation of analgesic efficacy of an apparatus for electroanalgesia by transcutaneous stimulation [Italian] VALUTAZIONE CLINICA DEL POTERE ANALGESICO DI UN APPARECCHIO PER ELETTRONALGESIA DI STIMOLAZIONE TRANSCUTANEA. (PARTE PRIMA)

**Original Title:** VALUTAZIONE CLINICA DEL POTERE ANALGESICO DI UN APPARECCHIO PER ELETTRONALGESIA DI STIMOLAZIONE TRANSCUTANEA. (PARTE PRIMA)  
**Citation:** Riabilitazione, 1981, vol./is. 14/4(217-241), 0557-9430 (1981)  
**Author(s):** Zelaschi F.; Galii M.; Maini M.  
**Institution:** (Zelaschi, Galii, Maini) Div. Recupero Rieduc., Funz., Cent. Riab., Montescano Italy  
**Language:** Italian  
**Abstract:** In this paper, the authors set out to evaluate the analgesic power of a transcutaneous stimulation electroanalgesia equipment used in various types of disease. They illustrate the worksheet established for the trial and assess the therapeutic action on the basis of maximum, mean and minimum painfulness, the rate of pain regression, and the persistence of the analgesic effect over time. From the statistically processed results it is evidenced that the treatment was effective for groups classifiable as due to input increase or decrease. The results were nil in cases of excess output or disordered regulation of the central mechanism modulating nociception.

**Country of Publication:** Italy  
**Publication Type:** Journal  
**Subject Headings:** \*analgesia  
 central nervous system  
 \*chronic pain  
 major clinical study  
 methodology  
 musculoskeletal system  
 peripheral nervous system  
 therapy  
 \*transcutaneous nerve stimulation  
**Source:** EMBASE

### 103. Chronic pain: Principles of management

**Citation:** Journal of Pediatrics, 1981, vol./is. 98/2(180-189), 0022-3476 (1981)  
**Author(s):** Newburger P.E.; Sallan S.E.

<b>Institution:</b>	(Newburger, Sallan) Div. Hematol. Oncol., Child. Hosp. Med. Cent., Boston, Mass. United States
<b>Language:</b>	English
<b>Abstract:</b>	<p>Pain is an essential part of human sensory experience and the ability to sense acute pain is essential. Chronic pain, however, has many psychological and physical manifestations which present a frustrating problem. Cutaneous and visceral stimuli accelerate the rate of firing of unmyelinated and small myelinating fibers and this is processed in the substantia gelatinosa. Projections to the brain are highly complexed. The processing of pain involves multiple neurotransmitters. Studies suggest an association of serotonergic activity with analgesia. Substance P appears associated with nociceptive pathways in the system. Recently opiate receptors have been identified in the brain, the substantia gelatinosa of the spinal cord, the periaqueductal gray matter, the medial thalamus, and the limbic system. There is evidence for the activity of cyclic nucleotides in the control of pain. The gate control theory, although not universally accepted, helps to explain the psychological effects on nociception. The sensation of pain is an emotional experience which can cause depression and in turn this depression can aggravate the pain. Cultural background has a profound influence on pain. The authors have an excellent table indicating the relative potencies of analgesics commonly employed in pain, and their major differences compared with morphine. They believe that propoxyphene (Darvon) is little better than a placebo. The authors make a distinction between physical dependence and addiction. A good analgesic regimen uses adequate doses at intervals as determined by patient response. The relief may not be complete but should allow the patient to function in a balance between pain and sedation. It is believed that the classic 'prn' method of administration makes a drug a positive reinforcer and promotes a drug dependent behavior. Surgical treatment has utilized lesions at almost every point in the anatomical pain pathways. Peripheral neurectomy is rarely used since severe dysesthesia is common. In the past, cordotomy has been the main procedure used in neurosurgical relief of cancer pain. Acupuncture has proved effective for acute pain and transcutaneous stimulation has been effective in between 30 to 50% of patients. It would appear that the most successful management of chronic pain has been achieved by pain clinics which use a multidisciplinary approach.</p>
<b>Country of Publication:</b>	United States
<b>CAS Registry Number:</b>	64-17-5 (alcohol); 561-78-4 (alphaprodine); 77-20-3 (alphaprodine); 58786-99-5 (butorphanol tartrate); 42408-82-2 (butorphanol); 76-57-3 (codeine); 1639-60-7 (dextropropoxyphene); 469-62-5 (dextropropoxyphene); 1502-95-0 (diamorphine); 561-27-3 (diamorphine); 32266-35-6 (dibutyl cyclic GMP); 466-99-9 (hydromorphone); 71-68-1 (hydromorphone); 125-72-4 (levorphanol); 77-07-6 (levorphanol); 1095-90-5 (methadone); 125-56-4 (methadone); 23142-53-2 (methadone); 297-88-1 (methadone); 76-99-3 (methadone); 52-26-6 (morphine); 57-27-2 (morphine); 357-08-4 (naloxone); 465-65-6 (naloxone); 124-90-3 (oxycodone); 76-42-6 (oxycodone); 357-07-3 (oxymorphone); 76-41-5 (oxymorphone); 359-83-1 (pentazocine); 64024-15-3 (pentazocine); 64336-56-7 (percodan); 28097-96-3 (pethidine); 50-13-5 (pethidine); 57-42-1 (pethidine); 108-95-2 (phenol); 3229-70-7 (phenol)
<b>Publication Type:</b>	Journal: Review
<b>Subject Headings:</b>	*acupuncture *analgesia central nervous system *chronic pain drug therapy neuroanatomy review therapy *transcutaneous nerve stimulation *alcohol *alphaprodine *butorphanol butorphanol tartrate

[\\*codeine](#)  
[\\*dextropropoxyphene](#)  
[\\*diamorphine](#)  
[\\*dibutyl cyclic GMP](#)  
[dorphanol](#)  
[\\*hydromorphone](#)  
[\\*levorphanol](#)  
[\\*methadone](#)  
[\\*morphine](#)  
[\\*naloxone](#)  
[\\*oxycodone](#)  
[oxymorphone](#)  
[\\*pentazocine](#)  
[percodan](#)  
[periocet](#)  
[\\*pethidine](#)  
[\\*phenol](#)  
[\\*placebo](#)  
[unclassified drug](#)

**Source:** EMBASE

#### 104. Failure of naloxone to reverse analgesia from transcutaneous electrical stimulation in patients with chronic pain

**Citation:** Anesthesia and Analgesia, 1981, vol./is. 60/2(81-84), 0003-2999 (1981)  
**Author(s):** Abram S.E.; Reynolds A.C.; Cusick J.F.  
**Institution:** (Abram, Reynolds, Cusick) Dept. Anesthesiol. Neurosurg., Med. Coll. Wisconsin, Milwaukee, Wis. 53226 United States  
**Language:** English  
**Abstract:** To investigate the possible role of endogenous opiates in the mediation of analgesia produced by low intensity, high frequency transcutaneous electrical stimulation in the presence of chronic pain, an attempt was made to reverse stimulation-induced analgesia with naloxone. Fifteen patients with chronic pain who were consistently relieved of pain by low intensity, high frequency transcutaneous stimulation were studied. During stimulation at 58 Hz, patients were recorded before stimulation, after stimulation, and after naloxone and saline injections. No reversal of analgesia was seen after naloxone or saline. These results suggest that transcutaneous stimulation at low intensity and high frequency may provide analgesia that is not associated with release of endogenous opiates in patients with chronic pain.  
**Country of Publication:** United States  
**CAS Registry Number:** 60118-07-2 (endorphin); 357-08-4 (naloxone); 465-65-6 (naloxone)  
**Publication Type:** Journal: Article  
**Subject Headings:** [\\*analgesia](#)  
[\\*chronic pain](#)  
[major clinical study](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*endorphin](#)  
[\\*naloxone](#)  
[\\*placebo](#)  
**Source:** EMBASE  
**Full Text:** Available in *fulltext* at [Ovid](#)

#### 105. Patients with chronic pain treatment by transcutaneous electrical nerve stimulation: Comparison of F = 250 Hz or less versus F = 1,000 Hz

**Citation:** International Journal of Rehabilitation Research, 1981, vol./is. 4/2(230-231), 0342-5282 (1981)

**Author(s):** Griffin J.E.; Kraft G.

**Institution:** (Griffin, Kraft) Phys. Ther. Program, Ball State Univ., Muncie, IN 47306 United States

**Language:** English

**Abstract:** A series of 25 patients with chronic pain, usually in the low back area were treated with commercially available battery powered TENS stimulators with an operating frequency range of 50-250Hz. None had significant pain relief. All were then treated with stimulators with an operating frequency of 1000 Hz. All patients who did not have a useful response at the low frequency did perceive lasting pain relief when treated with the higher frequency.

**Country of Publication:** Germany

**Publication Type:** Journal

**Subject Headings:** [central nervous system](#)  
[\\*chronic pain](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

#### 106. The effects of non-painful transcutaneous electrical nerve stimulation on cutaneous pain threshold and muscular reflexes in normal men and in subjects with chronic pain

**Citation:** Pain, 1981, vol./is. 11/1(49-63), 0304-3959 (1981)

**Author(s):** Francini F.; Maresca M.; Procacci P.; Zoppi M.

**Institution:** (Francini, Maresca, Procacci, Zoppi) Catt. Fisiol. Gen., Serv. Algol., Univ., I-50134 Florence Italy

**Language:** English

**Abstract:** In healthy subjects and in subjects with chronic myofascial pain of one lower limb, the following was measured in both lower limbs: (i) sequential Hoffman (H) reflex, (ii) sequential Achilles tendon (T) reflex, (iii), cutaneous pain threshold determined with electrical stimuli, before, during and after transcutaneous electrical nerve stimulation (TENS). In healthy subjects no significant differences were observed between the pain thresholds of the two limbs. During and after TENS, changes of the reflexes were related to the pain thresholds. In the pathological subjects a significant difference of pain threshold was present between the affected limb and the contralateral one. An important difference between healthy and pathological subjects is not the quality but the quantity of the changes induced by TENS, in the sense that the levels of inhibition and facilitation of the reflexes are more evident in patients with pain. Indeed, TENS induces a reset of sensory and of motor system and a parallel long lasting effect both on sensory and on muscular function, with concomitant pain relief in the pathological subjects.

**Country of Publication:** Netherlands

**Publication Type:** Journal: Article

**Subject Headings:** [\\*chronic pain](#)  
[major clinical study](#)  
[\\*muscle](#)  
[\\*pain threshold](#)  
[\\*reflex](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

#### 107. Examination of electrode placements and stimulating parameters in treating chronic pain with conventional transcutaneous electrical nerve stimulation (TENS)

**Citation:** Pain, 1981, vol./is. 11/1(37-47), 0304-3959 (1981)

**Author(s):** Wolf S.L.; Gersh M.R.; Rao V.R.

**Institution:** (Wolf, Gersh, Rao) Dept. Rehab. Med., Emory Univ. Sch. Med., Atlanta, Ga. 30322 United States

**Language:** English

**Abstract:** Conventional transcutaneous electrical nerve stimulation was applied to 114 patients diagnosed as having peripheral neuropathy (N=18), peripheral nerve injury (N=21), radiculopathy (N=36) and musculoskeletal disorders (N=39) to determine optimal electrode placements and stimulation parameters for pain relief. Treatment outcomes were assessed primarily through evaluation of the present pain intensity (PPI) rating scale. Immediate improvements in PPI scores occurred in patients in all these diagnostic categories. One month follow-up data on 25 subjects showed that improvement was of limited duration. No clear correlation between stimulation parameters or electrode placements and pain relief was ascertained. In certain instances (subjects with radiculopathy or peripheral nerve injury) a positive relationship existed between higher intensity stimulation and amelioration of pain. Greater pain relief was reported among patients with minimal previous medical or surgical treatment in every diagnostic group.

**Country of Publication:** Netherlands

**Publication Type:** Journal: Article

**Subject Headings:** [central nervous system](#)  
[\\*chronic pain](#)  
[locomotor disease](#)  
[major clinical study](#)  
[methodology](#)  
[nerve injury](#)  
[nerve root compression](#)  
[nervous system](#)  
[neuropathy](#)  
[\\*pain threshold](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

#### 108. Clinical methods of pain treatment [German] KLINISCHE METHODEN DER SCHMERZTHERAPIE

**Original Title:** KLINISCHE METHODEN DER SCHMERZTHERAPIE

**Citation:** Arztezeitschrift fur Naturheilverfahren, 1981, vol./is. 22/5(256-273), 0720-6003 (1981)

**Author(s):** Kossmann B.

**Institution:** (Kossmann) Zent. Anasth., Univ. D-7900 Ulm Germany

**Language:** German

**Abstract:** Contrary to the acute pain for which analgetics are mainly indicated, in case of chronic pains alternative therapy should be used. Here correct diagnosis is required for any successful therapy. From the great number of therapeutic methods such methods are described in detail that are most common at the Centre for Anaesthesiology of the University Hospital Ulm laying emphasis on the nerves and blocking the conveyance of impulses by the nerves.

**Country of Publication:** Germany

**CAS Registry Number:** 493-53-8 (acetylsalicylic acid); 50-78-2 (acetylsalicylic acid); 53663-74-4 (acetylsalicylic acid); 53664-49-6 (acetylsalicylic acid); 63781-77-1 (acetylsalicylic acid); 17321-77-6 (clomipramine); 303-49-1 (clomipramine); 439-14-5 (diazepam); 50567-35-6 (dipyrone); 5907-38-0 (dipyrone); 68-89-3 (dipyrone); 52-86-8 (haloperidol); 52-26-6 (morphine); 57-27-2 (morphine); 53663-61-9 (opiate); 8002-76-4 (opiate); 8008-60-4 (opiate); 359-83-1 (pentazocine); 64024-15-3 (pentazocine); 28097-96-3 (pethidine); 50-13-5

(pethidine); 57-42-1 (pethidine); 302-41-0 (piritramide); 58-33-3 (promethazine); 60-87-7 (promethazine)

**Publication Type:** Journal

**Subject Headings:** [\\*acupuncture](#)  
[central nervous system](#)  
[\\*chronic pain](#)  
[drug therapy](#)  
[\\*nerve block](#)  
[nervous system](#)  
[\\*pain](#)  
[peripheral nervous system](#)  
[short survey](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*acetylsalicylic acid](#)  
[\\*barbituric acid derivative](#)  
[\\*clomipramine](#)  
[\\*diazepam](#)  
[\\*dipyrone](#)  
[\\*haloperidol](#)  
[\\*local anesthetic agent](#)  
[\\*morphine](#)  
[\\*opiate](#)  
[\\*pentazocine](#)  
[\\*pethidine](#)  
[\\*piritramide](#)  
[\\*promethazine](#)

**Source:** EMBASE

**109. Transcutaneous electrical nerve stimulation (TNS) in the treatment of chronic neurological pain [German]  
 TRANSKUTANE ELEKTRISCHE NERVENSTIMULATION. ERFAHRUNG AN EINEM NEUROLOGISCHEN KRANKENGUT**

**Original Title:** TRANSKUTANE ELEKTRISCHE NERVENSTIMULATION. ERFAHRUNG AN EINEM NEUROLOGISCHEN KRANKENGUT

**Citation:** Nervenarzt, 1981, vol./is. 52/8(477-480), 0028-2804 (1981)

**Author(s):** Klingler D.; Kepplinger B.

**Institution:** (Klingler, Kepplinger) Neurol. Psychiat. Abt., Allg. Offentl. Krankenh., 4020 Linz Austria

**Language:** German

**Abstract:** Transcutaneous electrical nerve stimulation (TNS) tested in 153 patients with chronic pain produced good to very good results in over 50% of the cases, particularly in those with peripheral nerve lesions; especially noteworthy was the fact that an existing drug abuse could be limited with this technique. TNS had a lower effect in all other indications. As the side effects of this technique are almost negligible and since it can be carried out by the patient himself, it provides a valuable addition to the range of therapies against pain. Apart from the ascertained inhibition of pain, the method also appears to have a behavioural therapy effect.

**Country of Publication:** Germany

**Publication Type:** Journal: Article

**Subject Headings:** [analgesia](#)  
[\\*chronic pain](#)  
[electrostimulation](#)  
[major clinical study](#)  
[nerve stimulation](#)  
[nervous system](#)

therapy  
\*transcutaneous nerve stimulation

Source: EMBASE

#### 110. Clinical effects of a new TENS using multiple electrodes and constant energy

**Citation:** Acta Anaesthesiologica Belgica, 1980, vol./is. 31/SUPPL.(239-245), 0001-5164 (1980)

**Author(s):** Birkhan J.; Carmon A.; Meretsky P.; Zinder H.

**Institution:** (Birkhan, Carmon, Meretsky, Zinder) Dept. Anesthesiol., Rambam Med. Cent., Haifa Israel

**Language:** English

**Abstract:** Comparison between constant energy with multiple electrodes apparatus (CEME) and constant current or voltage instruments was done on three levels. The general presence or absence of therapeutic effect, the duration of effect, and the degree of effect. The majority of all patients (85.9%) reported that at least once they felt some relief when CEME was applied. Fewer, but still more than half (53.4%) of the patients, reported also some relief with constant current or voltage devices. The results were not uniform in all patient groups. Marked effect appeared in high incidence in patients with arthropathy and arthritis when treated with CEME. In stump and phantom pain marked effect was slightly higher with constant current devices. In the rest of the diagnostic groups there was around 20% marked effect with CEME as compared to 10% with constant current and constant voltage instruments. Long-term effects were observed most with CEME in all groups, especially in arthropathies, spondylarthrosis, fractures, and peripheral neuropathy where its incidence exceeded 25% of all patients.

**Country of Publication:** Belgium

**Publication Type:** Journal: Article

**Subject Headings:** \*chronic pain  
major clinical study  
therapy  
\*transcutaneous nerve stimulation

Source: EMBASE

#### 111. Phantom limb's pain. Considerations on five cases [Italian] IL DOLORE DA ARTO FANTASMA: CONSIDERAZIONI SU CINQUE CASI CLINICI

**Original Title:** IL DOLORE DA ARTO FANTASMA: CONSIDERAZIONI SU CINQUE CASI CLINICI

**Citation:** Anestesia e Rianimazione, 1980, vol./is. 21/2(221-232), 0570-0760 (1980)

**Author(s):** Movilia P.; Miriano F.; Pincirolì D.

**Institution:** (Movilia, Miriano, Pincirolì) Serv. Anest. Rianim., Osp. Civ., Legnano Italy

**Language:** Italian

**Abstract:** The authors discuss the 'phantom limb phenomenon' and its therapy. The treatment they initially used was the anesthetic block of trigger points, but without good results. five patients treated with a particular method of transcutaneous electrical stimulation with encouraging results are reported.

**Country of Publication:** Italy

**Publication Type:** Journal

**Subject Headings:** case report  
\*chronic pain  
\*phantom pain  
therapy  
\*transcutaneous nerve stimulation

Source: EMBASE



**112. Increased skin temperature during transcutaneous electrical stimulation**

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**Citation:** Anesthesia and Analgesia, 1980, vol./is. 59/1(22-25), 0003-2999 (1980)

**Author(s):** Abram S.E.; Asiddao C.B.; Reynolds A.C.

**Institution:** (Abram, Asiddao, Reynolds) Dept. Anesthesiol., Med. Coll. Wisconsin, Milwaukee, Wis. 53226 United States

**Language:** English

**Abstract:** Conflicting reports have appeared in the literature concerning the effects of transcutaneous electrical nerve stimulation on skin temperature. This report studied 33 patients with chronic pain involving one extremity (13 upper, 20 lower) to determine whether changes in sympathetic tone, as reflected in skin temperature, occurred in response to electrical stimulation of painful areas. Stimulation was carried out for 20 to 45 minutes. Skin temperatures were measured from the thumbs or great toes of stimulated and contralateral extremities before and during stimulation. Skin temperature rose 2.5 +/- 0.7 C (mean +/- SEM) in both the ipsilateral and contralateral extremity in patients who experienced relief of pain during stimulation. There was no significant change in skin temperature in patients who experienced no relief.

**Country of Publication:** United States

**Publication Type:** Journal: Article

**Subject Headings:** [\\*autonomic nervous system](#)  
[\\*chronic pain](#)  
[major clinical study](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**Full Text:** Available in *fulltext* at [Ovid](#)

**113. Treatment of pain by transcutaneous electric nerve stimulation in general practice**

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**Citation:** Medical Journal of Australia, 1980, vol./is. 1/2(70-71), 0025-729X (1980)

**Author(s):** Thurin E.; Meehan P.F.; Gilbert B.S.

**Institution:** (Thurin, Meehan, Gilbert) 1007 Malvern Rd, Toorak, Vic. Australia

**Language:** English

**Abstract:** Sixty patients were treated for pain by transcutaneous electric nerve stimulation in a general practice. The treatment resulted in a complete pain relief in 40%, a significant pain relief in 28.3%, and little or no pain relief in 31.7% of patients. These results are similar to those reported in several hospital series.

**Country of Publication:** Australia

**Publication Type:** Journal: Article

**Subject Headings:** [\\*chronic pain](#)  
[\\*electroanesthesia](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE

**114. Predictors for the outcome of treatment with high frequency transcutaneous electrical nerve stimulation in patients with chronic pain**

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**Citation:** Pain, 1980, vol./is. 9/1(55-61), 0304-3959 (1980)

**Author(s):** Johansson F.; Almay B.G.L.; Von Knorring L.; Terenius L.

**Institution:** (Johansson, Almay, Von Knorring, Terenius) Dept. Neurol. Psychiat., Univ. Umea Sweden

**Language:** English

**Abstract:** Seventy-two patients suffering from chronic pain were treated with high frequency transcutaneous electrical nerve stimulation (hi-TNS). Significant predictors for a positive result were pains of neurogenic origin and pains located mainly in the extremities. CSF endorphin levels were determined for 22 patients with organic pain and the group with positive results from the treatment had somewhat (but not significantly) lower levels of fraction I endorphins. Age, sex or reported severity of pain had no predictive value.

**Country of Publication:** Netherlands

**CAS Registry Number:** 60118-07-2 (endorphin)

**Publication Type:** Journal: Article

**Subject Headings:** [cerebrospinal fluid](#)  
[\\*chronic pain](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)  
[\\*endorphin](#)

**Source:** EMBASE

#### 115. Transcutaneous electrical nerve stimulation for chronic pain

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**Citation:** Anaesthesia, 1980, vol./is. 35/8(817-822), 0003-2409 (1980)

**Author(s):** Bates J.A.V.; Nathan P.W.

**Institution:** (Bates, Nathan) MRC, Nat. Hosp. Nerv. Dis., London WC1N 3BG United Kingdom

**Language:** English

**Abstract:** The results of 7 years experience in treating pain with transcutaneous electrical stimulation are reported. It was used on a group of 74 patients with postherpetic neuralgia and on a mixed group of 161 patients with chronic pain due to other conditions for which other forms of treatment had been unsatisfactory. The patients were lent stimulators and electrodes of various kinds. A half of the patients returned their stimulators after one month, but a quarter of the patients were still using transcutaneous stimulation after two years. No particular disease responded better or less well than any other; no particular kind of pain responded particularly well or badly. One third of the patients with postherpetic neuralgia started improving from the commencement of stimulation.

**Country of Publication:** United Kingdom

**Publication Type:** Journal: Article

**Subject Headings:** [\\*chronic pain](#)  
[\\*postherpetic neuralgia](#)  
[therapy](#)  
[\\*transcutaneous nerve stimulation](#)

**Source:** EMBASE