Technology Assessment Program
Office of Patient Care Services

Bibliography*: Transcutaneous Electrical Nerve Stimulation

*Selective, quality filtered, not subject to external review

Issue: The Chief Consultant of the VA Prosthetics and Sensory Aids Service (PSAS) Strategic Healthcare Group requested the VA Technology Assessment Program (VATAP) to provide an overview of the available evidence on the effectiveness of transcutaneous electrical nerve stimulation (TENS) units. TENS units are battery-powered, noninvasive electrical stimulation devices commonly used in physiotherapy to manage both acute and chronic pain arising from various conditions. The information would be used by the VHA Prosthetic Clinical Management Program (PCMP) to establish clinical practice recommendations for use of TENS in the veteran population.

Methods: To provide the PCMP with evidence of effectiveness within a shortened, negotiated timeframe, VATAP confined its preliminary search done in November 2000 to completed or ongoing reviews of TENS for all indications (excluding labor pain) sourced in the The Cochrane Library Issue 4, 2000 (Oxford: Update Software Ltd.). VATAP updated its search in November 2001 using The Cochrane Library Issue 4, 2001 (Oxford: Update Software Ltd.). Using a MeSH single term "transcutaneous electric nerve stimulation" the searches retrieved a total of 270 citations. VATAP identified 11 reviews (nine completed systematic reviews, one narrative review, one review protocol) that were tabulated in Table 1.

Results: The current medical literature is inconclusive regarding the effectiveness of TENS units for pain management. The quality and scope of the evidence is generally insufficient, or results with TENS were equivocal with respect to alternative modalities.

PCMP recommendations[1]: Individual practitioners should judge appropriate application of TENS units for pain management on an individual basis. Appropriate use of TENS should result in improved mood or quality of life, improved physical or functional capacity, or diminished use of other analgesics. For centralized prosthetic funding of TENS units, programs utilizing TENS units as part of treatment programs are required to incorporate use of a formal outcome assessment tool to measure these changes such as the McGill Pain Questionnaire, SF-36V, etc.

Follow up: A national contract with BioMedical Life Systems, Inc. (Vista, California) was established in 2002. VHA spends approximately $1.7 million annually on TENS units at an average unit cost of $52.[2]

[1] http://vaww.appc1.va.gov/prosthetics/docs/TENS_Draft_Directive.doc
[2] http://vaww.appc1.va.gov/prosthetics/docs/TENS_Compliance_FY03_Q1.xls

Table 1. Systematic Reviews of TENS for Managing Pain for Conditions Relevant to the Veteran Population (ie use of TENS for labor pain excluded)

Source: Cochrane Library Issue 4, 2000 and Issue 4, 2001 (Oxford: Update Software Ltd.).

Author/ Source	Subject of Review	Review type	Details of primary research reviewed	Evidence for effectiveness of TENS
McQuay et al NHS HTA Programme report 1997;1(6):1-137. http://www.hta.nhsweb.nhs.uk/	Outpatient services for chronic pain control	Systematic		??Post-operative and labor pain- not effective ??Chronic pain-effectiveness increases slowly, and large doses need to be used ??Lack of evidence of effectiveness
Van Tulder et al Spine 1997; 22(18): 2128-2156. www.spinejournal.com	Conservative treatments for acute and chronic nonspecific low back pain (LBP)	Systematic	??150 RCTs: 68 for acute LBP; 81 for chronic LBP; one for both acute and chronic LBP ??n~10, 000 although n not reported in all studies	??Acute LBP-no evidence to show that TENS was more effective than other conservative treatments ??Chronic LBP-not apparent that TENS was more effective than waiting list, placebo, or other conservative treatments
Reeve et al. CCOHTA publications 1995:64	TENS in various applications TENS utilization patterns in Canada and methods of payment	Structured narrative review	Clinical trials Details not specified	??Acute pain-equivocal results ??Labor pain-not effective ??No cost-effectiveness data published to date. ??Wide variations in reimbursement across Canada and in utilization rates
Puett et al. Annals of Int Med 1994;121 (2): 133-140.	Nonmedicinal, noninvasive therapies in knee and hip osteoarthritis	Systematic	3 RCTs n=98 examined TENS	??Knee osteoarthritis-all studies reported superior pain control with active TENS treatment but all exhibited a strong placebo effect; more data required to evaluate role of TENS ??Hip arthritis-no data addressed role of any therapies studied
AETS, Madrid Spain www.isciii.es/aets in Spanish and English	TENS and PENS	Systematic	In progress	
Cochrane Reviews and protocols				
Osiri et al. Cochrane review In: The Cochrane Library, Issue 4, 2000. Oxford: Update software.	TENS for knee osteoarthritis	Systematic (thru Dec 1999)	7 trials (4 RCTs, 3 cross-over studies): 6 used active TENS, 1 used acupuncture like TENS n=148 received treatment v. n=146 received placebo	??TENS and AL-TENS shown to be effective in pain control over placebo ??Heterogeneity of included studies was observed, which might be due to different study designs and outcome variables used ??More well-designed studies with standardized protocol and adequate study sizes are needed to draw firm conclusions

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Author/ Source	Subject of Review	Review type	Details of primary research reviewed	Evidence for effectiveness of TENS
Price et al Cochrane review In: The Cochrane Library, Issue 4, 2000. Oxford: Update software.	Electrical Stimulation (ES) for preventing and treating post-stroke shoulder pain, including functional ES, TENS or other	Systematic (thru Apr 1999)	4 RCTs n=170	??No appearance of negative effects of ES ??Shoulder pain-equivocal for effect on pain incidence or change in pain intensity compared to control; significant effect of ES on pain-free severity of glenohumeral subluxation, but no significant effect on upper limb motor recovery or upper limb spasticity. ??Further studies are required ??Note from authors: Study design and ES technique varied considerably, often precluding combination of studies
Moore KN, Cody DJ, Glazener CMA in: Cochrane Library 2001 Issue 4. Oxford Update software	Conservative management for post prostatectomy urinary incontinence, including TENS	Systematic (thru Jan 2001)	RCTs of TENS vs. no active treatment through Jan 2001	??No RCTs found. ??The value of various approaches to conservative management of post prostatectomy incontinence is uncertain. ??Further well designed trials needed.
Milne S, Welch V, Brosseau L, Saginur M, Shea B, Tugwell P, Wells G in: Cochrane Library 2001 Issue 4. Oxford Update software	TENS for chronic low back pain	Systematic	5 RCTs with n=170	??Results of the meta-analysis present no evidence to support the use of TENS in the treatment of chronic low back pain. ??This review lacked data on how TENS effectiveness is affected by four important factors: type of applications, site of application, treatment duration of TENS, optimal frequencies and intensities. ??Researchers should consistently report the characteristics of the TENS device and application techniques used. ??New trials on TENS should make use of standardized outcome measures.
Carroll D, Moore RA, McQuay HJ, Fairman F, Tramèr M, Leijon G in: Cochrane Library 2001 Issue 4. Oxford Update software	Effectiveness of TENS in chronic pain.	Systematic	??Active TENS versus sham TENS controls, no treatment controls or active TENS controls (for instance High Frequency TENS vs Low Frequency TENS) ??19 RCTs included	??Results are inconclusive. ??RCTs do not provide information on the stimulation parameters which are most likely to provide optimum pain relief, nor do they answer questions about long-term effectiveness. ??Large multi-centre randomized controlled trials of TENS in chronic pain are urgently needed.
Auriacombe M, Pascale F, Notz N in: The Cochrane Library, Issue 4, 2001. Oxford: Update Software.	Neuroelectric stimulation for the management of opioid withdrawal [protocol for a Cochrane Review]	Systematic review		??Review expected to be published in: Issue 1, 2002

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Report released: November 2001