

# Electrotherapy for Pain Management

## Adjunctive Conservative Treatment



*The benefits of electrotherapy as a conservative treatment approach for chronic and acute pain is more important than ever to consider as cost-effective adjunct to other non-invasive therapies. For over 40 years, patients have been taking control of managing their pain with electrotherapy with no risk of long-term side-effects commonly associated with NSAIDs and narcotics.*

### Electrotherapy: Theories of Pain Control

Electrotherapy devices deliver low level electrical impulses via electrodes placed on the skin. The mechanism for pain relief is defined in two major theories: gate control<sup>(2)</sup> and opiate-mediated control.<sup>(3)</sup>

The **gate control** theory is based on stimulating A-beta fibers to inhibit nociceptive nerve fibers (A-delta, C fibers) from transmitting painful stimuli to the spinal cord.

The **opiate-mediated** control theory is based on stimulation of the sensory nerves at a 10 Hz or less which causes the body to produce endorphins and enkephalins that bind to specific receptor sites in the central and peripheral nervous system blocking the perception of pain.

### Electrotherapy Benefits

Electrotherapy is a convenient and easy way for patients to take control of their pain:

- Decreases pain, improves function, and increases activity
- Deliver as needed: home, work or on the go
- Patient is in charge of their own pain control as needed
- Non-pharmacological option with no side effects may allow return to work and daily activities sooner
- Cost effective, safe and easy to administer
- No risk of drug to drug interaction

### Research Supports Efficacy

#### Efficacy of Electrical Nerve Stimulation for Chronic Musculoskeletal Pain:

##### A Meta-Analysis of Randomized Controlled Trials

*Johnson M, Martinson M. Pain 130 (2007) 157-165*

- The overall results showed a significant decrease in pain with ENS therapy using a random-effects model. These results indicate that ENS is an effective treatment modality for chronic musculoskeletal pain and that previous, equivocal results may have been due to underpowered studies (see abstract on back)

#### Transcutaneous Electrical Nerve Stimulation for Low Back Pain

##### A Comparison of TENS and Massage for Pain and Range of Motion

*Melzack R, Vetere P, Finch L. Physical Therapy, Vol 63 Number 4, 493 April 1983*

- The results show clearly that TENS is an effective modality for the treatment of low back pain. Because of the double-blind, randomized design of the study, the significant effectiveness of TENS cannot be attributed to other factors such as placebo efficiency or other psychological effects (see abstract on back)

### Research Supports home IFC Therapy on post-operative knee patients

- Eighty Seven patients received home IFC following post-operative knee surgery. All subjects reported significantly less pain, greater range of motion and less edema. These findings also indicate that home IFC may reduce medication taken and could result in a quicker return to daily living and athletic activities.

**References:** (1) David A. FishBain, M.D., F.A.P.A., Charles Chabal, M.D., Alice Abbott, B.S.N., M.P.H., Lisa Wiperman Heine, M.Sc., and Robert Cutler, Ph.D. Transcutaneous electrical nerve stimulation treatment outcome in long-term users. The Clinical Journal of Pain, Vol. 12, No. 3, 1996; (2) Melzack R, Wall PD. Pain mechanisms: a new theory. Science. 1965;150:1971-979. (3) Bengt H. Sjolund and Margareta B. E. Eriksson. Endorphins and analgesia produced by peripheral conditioning stimulation. Advances in Pain Research and Therapy, Vol. 3 edited by John J. Bonica et al. Raven Press, New York © 1979 (4) Bjordal JM, Johnson MI, Ljunggreen AE. Transcutaneous electrical nerve stimulation (TENS) can reduce postoperative analgesic consumption. A meta-analysis with assessment of optimal treatment parameters for postoperative pain. European journal of pain 7 (2003) 181-188

# Research Abstracts

## Electrotherapy for Pain Management



### **Efficacy of Electrical Nerve Stimulation for Chronic Musculoskeletal Pain:**

#### **A Meta-Analysis of Randomized Controlled Trials**

Johnson M, Martinson M. *Pain* 130 (2007) 157-165

#### **Abstract**

Previous studies and meta-analyses of the efficacy of electrical nerve stimulation (ENS) for the treatment of chronic pain of multiple etiologies have produced mixed results. The objective of the present study was to determine whether ENS is an effective treatment for chronic musculoskeletal pain by using statistical techniques that permit accumulation of a sample size with adequate power. Randomized, controlled trials published between January 1976 and November 2006 were obtained from the National Libraries of Medicine, EMBASE, and the Cochrane Library. Prospective, placebo-controlled studies using any modality of ENS to treat chronic musculoskeletal pain in any anatomical location were included. The main outcome measure was pain at rest. The use of statistical methods to enhance data extraction and a random-effects meta-analysis to accommodate heterogeneity of ENS therapies permitted an adequate number of well designed trials of ENS to be included in the meta-analysis. A total of 38 studies in 29 papers, which included 335 placebo, 474 ENS, and 418 cross-over (both placebo and at least one ENS treatment) patients, met the selection criteria. The overall results showed a significant decrease in pain with ENS therapy using a random-effects model ( $p < 0.0005$ ). These results indicate that ENS is an effective treatment modality for chronic musculoskeletal pain and that previous, equivocal results may have been due to underpowered studies.

### **Transcutaneous Electrical Nerve Stimulation for Low Back Pain**

#### **A Comparison of TENS and Massage for Pain and Range of Motion**

Melzack R, Vetere P, Finch L. *Physical Therapy*, Vol 63 Number 4, 493 April 1983

#### **Abstract**

Patients with acute or chronic low back pain were treated in a double-blind study that compared transcutaneous electrical nerve stimulation at intense levels and gentle, mechanically administered massage. Transcutaneous electrical nerve stimulation produced significantly greater pain relief, based on two measures of the McGill Pain Questionnaire, and significant improvement in straight leg raising. There were no significant differences between the two groups in back-flexion scores. Pain-relief scores and range-of-motion scores were significantly correlated. The results indicate that pain-relief scores provide valuable information and can easily be obtained from patients for whom pain is a major symptom.

*Clin J Sport Med* 2003 Jan;13(1):16-20.

#### **The effects of home interferential therapy on post-operative pain, edema , and range of motion of the knee.**

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#### **Abstract**

**Objective:** We studied the effects of home interferential current therapy (IFC) on the postoperative pain range of motion , and edema in subjects undergoing anterior cruciate ligament (ACL) reconstruction meniscectomy, or knee chondroplasty . **DESIGN:** Randomized, double-blind, placebo-controlled prospective study. **SETTING:** A tertiary care outpatient orthopaedic clinic/ ambulatory surgery center. **SUBJECTS OR PARTICIPANTS:** Eighty-seven subjects were separated into three groups based on their type of knee surgery and within each group randomized into a treatment or placebo group. **INTERVENTIONS:** All subjects received units that were previously set to deliver no current. **MAIN OUTCOME MEASUREMENTS:** Post-operative edema at 24,48, and 72 hours , and weeks 1-8; range of motion at 1,3,6, and 9 weeks; pain immediately after surgery , at 24,48, and 72, hours , and weeks 1-7; and amount of pain medication taken at days 1-10 were compared between treatment and placebo groups. **RESULTS:** All IFC subjects reported significantly less pain and had significantly greater range of motion at all post-operative time points. ACL and meniscectomy IFC subjects experienced significantly less edema at all time points, while chondroplasty subjects experienced significantly less edema until 4 weeks postoperatively. **CONCLUSIONS:** These findings indicate that home IFC may help reduce pain, pain medication taken, and swelling while increasing range of motion in patients undergoing knee surgery. This could result in quicker return to activities of daily living and athletic activities.

### **Transcutaneous electrical nerve stimulation (TENS) can reduce postoperative analgesic consumption.**

#### **A meta-analysis with assessment of optimal treatment parameters for postoperative pain**

Bjordal JM, Johnson MI, Ljunggreen AE. *European journal of pain* 7 (2003) 181-188

#### **Abstract**

**Aim.** We investigated the literature of randomised placebo-controlled trials to find out if transcutaneous electrical nerve stimulation (TENS) or acupuncture-like transcutaneous electrical nerve stimulation (ALTENS) can reduce analgesic consumption after surgery.

**Results.** Subgroup analysis for adequate treatment (pulse frequency: 1–8 Hz [ALTENS] or 25–150 Hz [TENS], current intensity: “strong, definite, subnoxious, maximal tolerable” or above 15 mA, and electrode placement in the incision area) were performed. Twenty-one randomised, placebo-controlled trials with a total of 1350 patients were identified. For all trials, the mean reduction in analgesic consumption after TENS/ALTENS was 26.5% (range –6 to +51%) better than placebo. Eleven of the trials comprising 964 patients, had reports which stated that a strong, subnoxious electrical stimulation with adequate frequency was administered. They reported a mean weighted reduction in analgesic consumption of 35.5% (range 14–51%) better than placebo. In nine trials without explicit confirmation of sufficient current intensity and adequate frequency, the mean weighted analgesic consumption was 4.1% (range –10 to +29%) in favour of active treatment. The difference in analgesic consumption was significantly ( $p=0.0002$ ) in favour of adequate stimulation. The median frequencies used in trials with optimal treatment was 85 Hz for TENS and 2 Hz in the only trial that investigated ALTENS.