ChiroACCESS Article

Evidence Supporting Interferential Electrotherapy

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Subsequent to the development of the gate theory of pain by Melzack and Wall in 1965 followed a new and more positive perspective on the potential value of electrotherapy. There are many devices in use today and the more common include interferential, diathermy, ultrasound, laser, and magnetic therapy. The Job Analysis of Chiropractic suggests that 77% of the chiropractic profession uses electrical stimulation in their patient care.

Knowledge of the research supporting the effectiveness of these interventions becomes extremely important in order to deliver the best patient care. The literature also aids in the fight for fair reimbursement in the evidence-based health care environment. The following are abstracts from some of the research supporting interferential electrotherapy. A meta-analysis published in September 2010 reviewed evidence supporting interferential therapy and other studies conclude that it "is effective in reducing inflammatory pain and should be considered primarily for use in the control of acute inflammatory pain" and may reduce swelling, stiffness and the need for medications.

A previous update on ultrasound **electrotherapy** was posted here: Ultrasound Therapy: 2010 Research Support and a more extensive article on ultrasound can be found here: Ultrasonic Therapy

Note: *These mini-reviews are designed as updates and direct the reader to the full text of current research. The abstracts presented here are no substitute for reading and critically reviewing the full text of the original research. Where permitted we will direct the reader to that full text.*

Effectiveness of interferential current therapy in the management of musculoskeletal pain: a systematic review and meta-analysis. [Link]

Phys Ther. 2010 Sep;90(9):1219-38. Epub 2010 Jul 22.

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BACKGROUND: Interferential current (IFC) is a common electrotherapeutic modality used to treat pain. Although IFC is widely used, the available information regarding its clinical efficacy is debatable.

PURPOSE: The aim of this systematic review and meta-analysis was to analyze the available information regarding the efficacy of IFC in the management of musculoskeletal pain. DATA

SOURCES: Randomized controlled trials were obtained through a computerized search of bibliographic databases (ie, CINAHL, Cochrane Library, EMBASE, MEDLINE, PEDro, Scopus, and Web of Science) from 1950 to February 8, 2010.

DATA EXTRACTION: Two independent reviewers screened the abstracts found in the databases. Methodological quality was assessed using a compilation of items included in different scales related to **rehabilitation** research. The mean difference, with 95% confidence interval, was used to quantify the pooled effect. A chi-square test for heterogeneity was performed.

DATA SYNTHESIS: A total of 2,235 articles were found. Twenty studies fulfilled the inclusion criteria. Seven articles assessed the use of IFC on joint pain; 9 articles evaluated the use of IFC on muscle pain; 3 articles evaluated its use on soft tissue shoulder pain; and 1 article examined its use on postoperative pain. Three of the 20 studies were considered to be of high methodological quality, 14 studies were considered to be of moderate methodological quality, and 3 studies were considered to be of poor methodological quality. Fourteen studies were included in the meta-analysis.

CONCLUSION: Interferential current as a supplement to another intervention seems to be more effective for reducing pain than a control treatment at discharge and more effective than a placebo treatment at the 3-month follow-up. However, it is unknown whether the analgesic effect of IFC is superior to that of the concomitant interventions. Interferential current alone was not significantly better than placebo or other therapy at discharge or follow-up. Results must be considered with caution due to the low number of studies that used IFC alone. In addition, the heterogeneity across studies and methodological limitations prevent conclusive statements regarding analgesic efficacy.

Interferential therapy produces antinociception during application in various models of inflammatory pain. [Link]

Phys Ther. 2006 Jun;86(6):800-8.

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BACKGROUND AND PURPOSE: Although interferential therapy (IFT) is used widely in the management of many painful conditions, the effectiveness and the mechanism of action of IFT in animal models of inflammatory pain have not been evaluated. The aim of this study was to evaluate the effectiveness of IFT in reducing inflammatory pain and edema in rats.

SUBJECTS: Sixty-nine male Wistar rats were used in the study.

METHODS: The effect of IFT application (4,000-Hz carrier frequency, 140-Hz amplitude-modulated beat frequency, pulse duration=125 milliseconds, current intensity=5 mA) for 1 hour on the formalin-induced nociceptive response and edema and on carrageenan-induced mechanical hyperalgesia and edema was evaluated.

RESULTS: Interferential therapy significantly reduced the formalin-evoked nociceptive response when applied to the paw immediately after but not before the formalin injection. Interferential therapy application at 2 hours after the carrageenan injection significantly prevented a further increase in carrageenan-induced mechanical hyperalgesia only immediately after discontinuation of the electrical current application. The antinociception induced by IFT was not attributable to a reduction in inflammation because IFT did not significantly reduce the edema induced by either formalin or carrageenan.

DISCUSSION AND CONCLUSION: The results suggest that, despite its short-duration effect, IFT is effective in reducing inflammatory pain and should be considered primarily for use in the control of acute inflammatory pain.

Evaluating the benefits of patterned stimulation in the treatment of osteoarthritis of the knee: a multi-center, randomized, single-blind, controlled study with an independent masked evaluator. [Link]

Osteoarthritis Cartilage. 2008 Aug;16(8):865-72. Epub 2008 Feb 8.

Burch FX, Tarro JN, Greenberg JJ, Carroll WJ.
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OBJECTIVE: This study investigated the benefits of the combination of interferential (IF) and patterned muscle stimulation in the treatment of osteoarthritis (OA) of the knee.

DESIGN: This was a multi-center, randomized, single-blind, controlled study with an independent observer. The study randomized 116 patients with OA of the knee to a test or control group. The test group received 15 min of IF stimulation followed by 20 min of patterned muscle stimulation. The control group received 35 min of low-current transcutaneous electrical nerve stimulation (TENS). Both groups were treated for 8 weeks. Subjects completed questionnaires at baseline and after 2, 4 and 8 weeks. Primary outcomes included the pain and physical function subscales of the Western Ontario MacMaster (WOMAC) OA Index and Visual Analog Scales (VAS) for pain and quality of life.

RESULTS: Compared to the control group, the test group showed reduced pain and increased function. The test group showed a greater decrease in the WOMAC pain subscale (P=0.002), function subscale (P=0.003) and stiffness subscale (P=0.004). More than 70% of the test group, compared to less than 50% of the control group, had at least a 20% reduction in the WOMAC pain subscale. When analyzing only patients who completed the study, the test group had a nominally significant greater decrease in overall pain VAS. No significant between-group differences were observed in incidence of adverse events.

CONCLUSIONS: In patients with OA of the knee, home-based patterned stimulation appears to be a promising therapy for relieving pain, decreasing stiffness, and increasing function.

A comparison of true and premodulated interferential currents. [Link]

Arch Phys Med Rehabil. 2004 Mar;85(3):409-15.

Ozcan J, Ward AR, Robertson VJ.
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OBJECTIVE: To compare true and premodulated interferential currents (IFCs) in terms of sensory, motor, and pain thresholds; maximum electrically induced torque (MEIT); and comfort.

DESIGN: Repeated-measures design.

SETTING: Laboratory setting. PARTICIPANTS: University student and staff volunteers.

INTERVENTIONS: Participants were exposed to 4 different conditions, chosen to evaluate 2 fundamental differences between true and premodulated IFCs. The conditions were different combinations of (1) premodulated or constant-amplitude currents applied at the skin and (2) crossed or parallel current paths.

MAIN OUTCOME MEASURES: Sensory, motor, and pain thresholds; MEIT; and subjective reports of relative discomfort were recorded for each of the 4 conditions. Motor to sensory threshold ratios were subsequently calculated to assess depth efficiency of stimulation.

RESULTS: The major findings were that crossed currents (true IFC) had no advantage over parallel currents (premodulated IFC) in terms of motor to sensory threshold ratio, MEIT, or comfort, and that premodulated currents produced higher torque values and less discomfort than constant-amplitude currents (true IFC). These results contradict the claimed superiority of true IFC.

CONCLUSIONS: The findings indicate that premodulated IFC, delivered via 2 large electrodes, may be clinically more effective than the traditional true IFC arrangement in terms of depth efficiency, torque production, and patient comfort.

The effect of combined therapy (ultrasound and interferential current) on pain and sleep in fibromyalgia. [Link]

Pain. 2003 Aug;104(3):665-72.

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Multidisciplinary treatment has proven to be the best therapeutic option to fibromyalgia (FM) and physiotherapy has an important role in this approach. Considering the controversial results of electrotherapy in this condition, the aim of this study was to assess the effects of combined therapy with pulsed ultrasound and interferential current (CTPI) on pain and sleep in FM. Seventeen patients fulfilling FM criteria were divided into two groups, CTPI and SHAM, and submitted to pain and sleep evaluations. Pain was evaluated by body map (BM) of the painful areas; quantification of pain intensity by visual analog scale (VAS); tender point (TP) count and tenderness threshold (TT). Sleep was assessed by inventory and polysomnography (PSG). After 12 sessions of CTPI or SHAM procedure, patients were evaluated by the same initial protocol. After treatment, CTPI group showed, before and after sleep, subjective improvement of pain in terms of number (BM) and intensity (VAS) of painful areas (P<0.001, both); as well as objective improvement, with decrease in TP count and increase in TT (P<0.001, both). Subjective sleep improvements observed after CTPI treatment included decrease in morning fatigue and in non-refreshing sleep complaint (P<0.001, both). Objectively, PSG in this group showed decrease in sleep latency (P<0.001) and in the percentage of stage 1 (P<0.001), increase in the percentage of slow wave sleep (P<0.001) and in sleep cycle count (P<0.001). Decrease in arousal index (P<0.001), number of sleep stage changes (P<0.05) and wake time after sleep onset (P<0.05), were also observed and no difference regarding pain or sleep parameters were verified after SHAM procedure. This study shows that CTPI can be an effective therapeutic approach for pain and sleep manifestations in FM.

Analgesic effects of transcutaneous electrical nerve stimulation and interferential currents on heat pain in healthy subjects. [Link]

J Rehabil Med. 2003 Jan;35(1):15-9.

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This study examined whether transcutaneous electrical nerve stimulation or interferential current was more effective in reducing experimentally induced heat pain. Forty-eight young healthy subjects were randomly divided into the following groups: (i) transcutaneous electrical nerve stimulation; (ii) interferential current; and (iii) no stimulation. A multi-function electrical stimulator was used to generate the transcutaneous electrical nerve stimulation or interferential current. A thermal sensory analyser was used to record the heat pain threshold. The stimulation lasted for 30 minutes and the heat pain thresholds were measured before, during and after the stimulation. Transcutaneous electrical nerve stimulation ($p = 0.003$) and interferential current ($p = 0.004$) significantly elevated the heat pain threshold, but "no stimulation" did not. The thresholds of the transcutaneous electrical nerve stimulation and interferential current groups were significantly higher than that of the control group 30 minutes into the stimulation ($p = 0.017$). Both transcutaneous electrical nerve stimulation and interferential current increased the heat pain threshold to a similar extent during stimulation. However, the post-stimulation effect of interferential current lasted longer than that of transcutaneous electrical nerve stimulation.

The effects of home interferential therapy on post-operative pain, edema, and range of motion of the knee. [Link]

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

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OBJECTIVE: We studied the effects of home interferential current therapy (IFC) on postoperative pain, range of motion, and edema in subjects undergoing anterior cruciate ligament (ACL) reconstruction, menisectomy, 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 home IFC units. Subjects randomized to treatment group received a working IFC unit. Placebo 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 menisectomy 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.