

INTERFERENTIAL CURRENT THERAPY

CLINICAL RESEARCH OUTCOMES

At a time of heightened awareness of the adverse effects of opiate treatment modalities, new clinical research findings demonstrate that interferential (IFC) current therapy is an effective alternative and/or adjunct for acute, chronic and post-operative pain. Research findings also indicate that IFC has additional benefits over transcutaneous electrical nerve stimulation (TENS) and other forms of electrotherapy. These benefits include more effective pain reduction, improved function, increased range of motion, relaxed muscle spasms and increased blood circulation.

INTERFERENTIAL CURRENT THERAPY AND RISK-FREE PAIN MANAGEMENT

In the pursuit of optimal pain management and best practices in patient care, IFC therapy is a treatment option practitioners have embraced in various forms for decades. Its clinical efficacy stems from the use of high frequency currents that penetrate deep into the body.

Unlike TENS, IFC technology has additional clinical indications that extend beyond pain reduction. These indications include increased circulation and reduced muscle spasms, as well as increasing or maintaining range of motion. Interferential therapy involves two medium frequency (>2500Hz) currents that cross over the area to be treated. Medium frequency current overcomes the skin's resistance easier and penetrates deeper into the body than lower frequency devices like TENS.¹ Additionally, IFC can increase circulation – an essential component in recovery – and decreases muscle spasms, which often impair rehabilitative progress. This results in faster recovery times and positive clinical outcomes.

As demonstrated through clinical research and studies, pain is modulated by two mechanisms: 1) The Gate Control Theory and 2) Opiate-mediated pain control. According to the Gate Control Theory by Melzack and Wall, pain sensations from slower nociceptive (pain) nerve fibers are inhibited at the spinal cord by the faster sensory nerve fibers that are stimulated with electrotherapy.² In this way, the pain fibers are “gated” or “blocked out” by the sensory stimulation of the device. Additionally, IFC therapy can stimulate the release of endorphins which decreases the perception of pain.³

STUDY SYNOPSIS: IFC Reduces Pain, Edema and Medication while Increasing Range of Motion Following Knee Surgery

KEY TAKEAWAYS:

- ACL patients had 220% less pain at 24 hours.
- Chondroplasty patients had 248% less pain at 24 hours.
- Meniscectomy patients had 211% less pain at 24 hours.

Recovery from knee surgery can be painful and often frustrating for patients, as swelling and inflammation cause immobility and tenderness. Dissipation of soreness optimizes recovery and the use of IFC therapy can aid in reconstituting the knee joint to advance healing. In this study, the effects of IFC on postoperative pain, range of motion, and edema was observed. In a randomized, double-blind placebo-controlled prospective study, 87 subjects undergoing anterior cruciate ligament (ACL) reconstruction, meniscectomy, or knee chondroplasty were the focus of the research project. They were separated into three groups based on their type of knee surgery and within each group randomized into a treatment or placebo group. They utilized home IFC units and those randomized to a treatment group received a working IFC unit. Placebo subjects used units that were previously set to deliver no current.

MEASUREMENTS TAKEN: 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 pain medication taken at days 1-10 were compared between treatment and placebo groups.

1. Poitras S and Brosseau L. Evidence-informed management of chronic low back pain with transcutaneous electrical nerve stimulation, interferential current, electrical muscle stimulation, ultrasound, and thermotherapy. *Spine J* 2008; 8: 226-233.

2. Melzack R, Wall PD. *Pain Mechanisms: A New Theory.* Science 1965;150(3699):971-9.

3. *Physical Agents in Rehabilitation: From Research to Practice.* Cameron MH (Ed). W.B. Saunders Company, Philadelphia, Pennsylvania: 1999.

The IFC subjects experienced less pain and had improved range of motion at all post-operative time points. As well, ACL and meniscectomy IFC subjects reported significantly less edema at all time points. Chondroplasty subjects also experienced significantly less edema until four weeks following surgery.

Jarit GJ, Mohr KJ, Waller R, Glousman RE. The effects of home interferential therapy on post-operative pain, edema, and range of motion of the knee. *Clin J Sport Med.* 2003 Jan;13(1):16-20.

STUDY SYNOPSIS: IFC for Acute Low Back Pain Results in Less Pain at Discharge and Greater Treatment Outcome Satisfaction

KEY TAKEAWAYS:

- Subjects using IFC had less acute low back pain at discharge.
- They expressed greater satisfaction with treatment outcome than those in placebo group.
- This randomized double-blind controlled study demonstrates that IFC is effective in alleviating both pain and disability in patients with chronic low back pain.

Subjects in this study were 110 patients seeking treatment for intense low back pain at the Accident and Emergency Department of a local hospital. The experimental group received early physiotherapy intervention that included pain management options, mobility training, interferential therapy, and ambulation assistive devices as needed. The control group was provided with walking training and aids to support ambulation. All participants were given medical and outpatient physiotherapy intervention.

Their level of pain was calculated using the Numeric Pain Rating Scale; satisfaction was measured using the Numeric Global Rating of Change Scale at baseline, upon discharge from the hospital, at admission to the Physiotherapy Outpatient Department, and finally at the one-, three- and six-month marks.

For those who received IFC therapy, the results were indicative of pain reduction. The experimental group had 1.6 out of 10 points (97.5% CI 0.8 to 2.3) less pain than the control group on discharge from the Accident and Emergency Department and still had 0.9 points (97.5% CI 0.1 to 1.6) less pain upon admission to the Physiotherapy Outpatient Department. Participants in the experimental group reported greater relief, expressing 2.1 out of 20 points (97.5% CI 1.2 to 2.9) more

satisfaction than the control group upon discharge from the Accident and Emergency Department.

Lau PM, Chow DH, Pope MH. Early physiotherapy intervention in an Accident and Emergency Department reduces pain and improves satisfaction for patients with acute low back pain: a randomised trial. *Australian Journal of Physiotherapy.* 2008 54: 243–249.

STUDY SYNOPSIS: IFC Reduces Pain and Disability in Patients with Chronic Low Back Pain

KEY TAKEAWAYS:

- IFC is effective in alleviating pain and disability in patients with Chronic Low Back Pain (CLBP).

Study participants included 26 men and 94 women whose CLBP was related to either degenerative disk disease or previous vertebral osteoporotic fractures. Participants were randomly assigned to interferential Therapy (IFT), horizontal therapy (HT) or sham HT administered for 10, 40, and 40 minutes, respectively, five days a week for two weeks along with a standard flexion-extension stretching exercise regimen. Blind efficacy assessments were taken at baseline and at weeks two, six and 14. A questionnaire (Backill) was also given, as well as the standard visual analog scale (VAS) and the mean analgesic consumption.

Improvements due to IFC were reported. After just two weeks, all three groups showed improvement in both the VAS and Backill scores. Their Backill scores showed continued improvement only in the two active groups, with changes significantly greater than those observed in control patients after 14 weeks. At weeks six and 14, the pain VAS score returned to baseline in the control group. But in the IFT and HT groups, that score continued to improve ($p < 0.01$ vs. controls). The authors of the study also noted that the use of analgesic medications significantly improved at week 14 versus pretreatment assessment and over control patients only in the HT group. It was also confirmed that the placebo effect is remarkable at the beginning of treatment but vanishes within a few days.

Zambito A, Bianchini D, Gatti D, Viapiana O, Rossini M, Adami S. Interferential and horizontal therapies in chronic low back pain: a randomized, double blind, clinical study. *Clin Exp Rheumatol.* 2006 Sep-Oct; 24(5):534-9.

STUDY SYNOPSIS: IFC Reduces Chronic Low Back Pain in Patients with Multiple Vertebral Osteoporotic Fractures

KEY TAKEAWAYS:

- In a randomized placebo-controlled clinical trial, it was shown that IFC and horizontal therapy (HT) are more effective than placebo for functional improvements.
- IFC therapy is successful in alleviating pain and disability in patients with CBPMF.

Multiple vertebral fractures are known to be associated with chronic low back pain, which often poses a pain management dilemma and physical function hurdle for patients. Electrical nerve stimulation was identified as a viable solution in this research study.

One hundred fifteen women who experienced chronic back pain associated with previous multiple vertebral osteoporotic fractures (CBPMF) were randomly assigned to either interferential currents, HT or sham HT administered for 30 minutes a day, five days a week for two weeks, in conjunction with exercise. Efficacy assessment was obtained at baseline and at weeks two, six and 14. This included a Backill questionnaire, the standard visual analog scale (VAS) and the mean analgesic consumption.

Results were impressive. After two weeks, improvement in VAS and Backill scores was noted in the three groups. Continued improvement was recorded in VAS and Backill scores of the two active groups, with changes ($p < 0.001$) greater than those recorded in control patients at weeks six and 14.

Zambito A1, Bianchini D, Gatti D, Rossini M, Adami S, Viapiana O. Interferential and horizontal therapies in chronic low back pain due to multiple vertebral fractures: a randomized, double blind, clinical study. Osteoporos Int. 2007 Nov; 18(11):1541-5. Epub 2007 Jul 4.

STUDY SYNOPSIS: Adding IFC Therapy to Massage Improves Function, Increases ROM and Reduces Pain Following Shoulder Surgery

KEY TAKEAWAYS:

- Adding IFC electro-massage to standard patient care – including manual therapy and exercises – produced significant positive effects on discomfort, upper limb function and mobility in adults with SAPS after acromioplasty surgical procedures.
- IFC can relieve musculoskeletal pain when used to supplement other interventions.

Researchers sought to investigate the effects of adding Interferential therapy (IFT) electro-massage to standard post surgery care in patients with subacromial pain syndrome (SAPS), a condition that often impairs function. In a randomized, single-blinded, controlled trial, 56 adults with SAPS were observed. In the three months before the study, participants had all experienced an acromioplasty procedure, and were equally distributed into an IFT electro-massage group or a control group.

All 56 participated in a two-week intervention, three times a week. The control group was given standard care, including thermotherapy, exercise, manual therapy, and ultrasound. Those in the IFT electro-massage group were given a 15-minute IFT electro-massage in each session. Their level of pain was assessed with a 100-mm visual analogue scale. Their upper limb functionality (Constant-Murley score) was also assessed, as was their pain-free passive range of movement.

The ANOVA affirmed that those who received IFT electro-massage showed improvements in key areas such as pain intensity, upper limb function, and shoulder flexion, abduction, internal and external rotation (all, $p < 0.01$). There were no between-group differences for shoulder extension ($p = 0.531$) and adduction ($p = 0.340$).

Albornoz-Cabello M, Sanchez-Santos JA, Melero-Suarez R, Heredia-Rizo AM, Espejo-Antunez L. Effects of Adding Interferential Therapy ElectroMassage to Usual Care after Surgery in Subacromial Pain Syndrome: A Randomized Clinical Trial. J Clin Med. 2019 Feb 2;8(2).

STUDY SYNOPSIS: IFC Reduces Pain and Improves Function Better than TENS, HVPC or Diadynamic Current in Chronic Low Back Pain Patients

KEY TAKEAWAYS:

- Electrical stimulation with interferential current produces a significant and more efficient elimination of pain, and an improvement of functional ability for patients who live with low back pain.
- IFC penetrates deeper into the tissue, affecting the pain associated with injury and illness.
- Comparatively, TENS currents and high voltage were helpful, but not as effective.

This study investigates the effects of treating low back pain with therapies that utilize the power of interferential currents. Electrotherapeutic treatment modalities were utilized and researchers noted its impact on pain, lower spine range of movement, and enhancement function

and mobility. One hundred twenty-three subjects were assigned to six comparison groups:

- A — using conventional TENS currents,
- B — employing acupuncture-like TENS therapy,
- C — high-voltage electrical stimulation,
- D — use of interferential current stimulation,
- E — diadynamic current, and
- F — control group.

Outcome data revealed that electrical stimulation with deep penetrating IFC stimulation resulted in significant pain reduction and enhanced functional capabilities for patients with low back pain issues. In comparison, TENS currents proved to help, but were not as powerful as IFC treatments. Researchers also found that diadynamic currents were ineffective.

Rajfur J, Pasternok M, Rajfur K, Walewicz K, Fras B, Bolach B, Dymarek R, Rosinczuk J, Halski T, Taradaj J. Efficacy of Selected Electrical Therapies on Chronic Low Back Pain: A Comparative Clinical Pilot Study. Med Sci Monit. 2017 Jan 7;23:85-100.

STUDY SYNOPSIS: Post-Stimulation Effect of IFC Lasts Longer than TENS

KEY TAKEAWAYS:

- The post-stimulation effect of interferential current lasts longer than that of transcutaneous electrical nerve stimulation.

Researchers in this study wanted to determine whether transcutaneous electrical nerve stimulation (TENS) is more effective than interferential current in reducing experimentally induced heat pain.

The 48 subjects were randomly divided into three groups: 1) transcutaneous electrical nerve stimulation, 2) interferential current and 3) no stimulation. To determine efficacy, an electrical stimulator was used to induce the transcutaneous electrical nerve stimulation or interferential current. A thermal sensory analyser recorded the patient's heat pain threshold before, during and after stimulation. Stimulation was initiated and lasted 30 minutes.

Transcutaneous electrical nerve stimulation ($p = 0.003$) and interferential current ($p = 0.004$) dramatically raised the subjects' heat pain threshold, but "no stimulation" did not. Thirty minutes into the stimulation, data indicated that the thresholds of the transcutaneous

electrical nerve stimulation and interferential current groups were higher than that of the control group ($p = 0.017$). Both transcutaneous electrical nerve stimulation and interferential current increased the heat pain threshold to a similar extent during the stimulation phase, but the post-stimulation effect of interferential current lasted longer than that of transcutaneous electrical nerve stimulation.

Cheing GL, Hui-Chan CW. Analgesic Effects of Transcutaneous Electrical Nerve Stimulation and Interferential Current on Heat Pain in Healthy Subjects. J Rehabil Med 2003 Jan;35(1):15-9.

CONCLUSION

Interferential current therapy eases pain, improves function and enhances range of motion for patients who have post-surgery and/or post-injury pain including those with acute low back pain and osteoporosis. IFC treatment can either be used in conjunction with over-the-counter medications to avoid opioids or as an adjunctive treatment to reduce intake and dosage of opioids, which can lead to dependency, addiction, misuse and overdose. IFC has been demonstrated to surpass the efficacy of TENS, HVPC and diadynamic current as well as proven to reduce disability with improved patient outcomes.