

INTERX[®] THERAPY

What makes it different?

What makes InterX different?

There are four main areas where InterX is different and it requires an awareness of all of them and how they interrelate to really understand why this powerful technology can be so effective. The interactive nature of the stimulation allows for a unique, evidence-based application that optimizes treatment parameters and thus achieves consistently good results across a broad range of conditions.^{1 2 3}

The Technology

The InterX delivers an interactive, damped, bi-phasic, sinusoidal waveform through fixed stainless steel electrodes. The interactivity of the waveform ensures that the device adjusts its output in response to changes in skin resistance/impedance. This means InterX can and is applied without the need for conductive gel and the stimulation is delivered through small closely spaced electrodes without any damage to the skin or discomfort to the patient. This advancement in technology has significant impact on the way neurostimulation can be delivered and subsequently the results that can be achieved.

The Application

As the InterX is impedance sensitive, it can be applied directly to the skin and moved around over the skin without conductive gels. This allows the user to be able to assess the impedance of the skin to identify and target optimal target optimal treatment points. This has led to the development of the three step protocol of almost every InterX treatment: Scan, Target, Dynamic.

SCAN -	Identify optimal treatment points
TARGET -	Deliver focused, high amplitude stimulation
DYNAMIC -	Perform therapeutic exercise while treating points of pain

This protocol system is designed to optimize four important aspects of any neurostimulation treatment to ensure better and more consistent results.

Optimization of Parameters

Research has shown that optimization of various treatment parameters can significantly increase the effectiveness neurostimulation across a broad range of conditions^{4,5,6} Missing any one of these factors could significantly reduce or even nullify any clinical benefit from treatment. This is why previous neurostimulation research has had mixed results^{7 8} and real-life clinical applications often leave therapists disappointed with outcomes from treatment. Correct application of InterX optimizes all of these parameters and offers therapists a way to scientifically apply neurostimulation with evidence-based protocols and achieve excellent results.

1. Optimal Treatment Points:

InterX identifies low impedance points which relate to major nerve branches, trigger points, acupuncture points and localized areas of sympathetic skin response.^{9, 10, 5, 11, 12, 13}

2. High amplitude stimulation:

InterX delivers stimulation safely and comfortably at 3-4 times higher amplitudes than would normally cause muscle contraction with TENS or IFT. The current densities delivered by InterX can be up to 100 times higher than a typical TENS and this has been shown to have significantly greater physiological response. This is made possible by the combination of the interactive waveform and the small, fixed electrodes.^{14, 15, 16, 17, 18, 19}

3. Varying Frequencies:

A range of synergistic, analgesic mechanisms are activated when a wide range of frequencies are used. The InterX ranges from 15-480 pulses per second and the recommended protocol ensures that a broad range is delivered in every single treatment.^{20, 21, 6}

4. Avoiding tolerance/accommodation

Research has shown that repeating treatments too often, treating for too long and using fixed frequencies mean that the body stops responding to neurostimulation after a period of time (sometimes as little as 4x20 minute treatments). By delivering short, infrequent treatments, to multiple treatment points (that change in every treatment), using a wide

range of frequencies, InterX ensures that patients continue to respond to therapy over a course of treatments.^{22,23,5}

The Results:

InterX has been clinically proven to be effective on very complex chronic conditions that had not responded to any other treatment as well acute post-surgical orthopedic pain which has proven very difficult to treat with neurostimulation in the past. While the protocols for each of these applications may be very different, the technology allows for the treatment to be customized for every patient and their condition to ensure optimal results. Many patients are amazed by the results of their treatment and many learned and experienced therapists believe InterX is the most effective and consistent modality they have ever used and benefit from the fact that there is scientific and clinical evidence to support its applications.

“Any sufficiently advanced technology is indistinguishable from magic.”

Arthur C. Clarke, 1962

„Witchcraft to the ignorant.... Simple science to the learned,,

Leigh Brackett, 1942

¹ Gorodetskyi I G, Gorodnichenko A I, Tursin P S, Reshetnyak V K, Uskov, O N: Non-invasive interactive Neurostimulation in the post-operative recovery of patients with a trochanteric fracture of the femur. J Bone Joint Surg [Br]2007;89-B:1488-94.

² Maale G: The effect of the InterX 5000 on pain reduction in the severe chronic orthopedic patient. Presented at International Congress of Technology in Arthroplasty, Kyoto, Japan, September 29-October 2, 2005

³ I. G. Gorodetskyi et al, The effects of non-invasive, interactive Neurostimulation on pain and edema during post-surgical rehabilitation following internal fixation of unstable bi-malleolar ankle fractures, Presented as a poster by Dr James Dillard at the IASP 2008, Glasgow, Scotland. Accepted for publication Dec 2009, Journal of Foot and Ankle Surgery

⁴ Jan Magnus Bjordal, Mark I. Johnson, Anne Elisabeth Ljunggreen; 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

⁵ Melzack R: Prolonged relief of pain by brief, intense transcutaneous somatic stimulation. Pain. 1975;1: 357-373.

⁶ Somers D, Clemente F R, TENS for the management of neuropathic pain: The effects of frequency and electrode position on prevention of allodynia in a rat model of CRPS type II, Phys Ther, Vol. 86, no.5, 2006: pg 698-709

⁷ Breit R, Van der Wall H, Transcutaneous Electrical Nerve Stimulation for Postoperative Pain Relief After Total Knee Arthroplasty, The Journal of Arthroplasty Vol. 19 No. 1 2004

⁸ Carroll D, Tramer M, McQuay H, Nye B, Moore A. Randomization is important in studies with pain outcomes: Systematic review of transcutaneous electrical nerve stimulation in acute postoperative pain. British Journal of Anaesthesia 1996; 77:798-803

⁹ Walsh D. Transcutaneous electrical nerve stimulation. In Acupuncture and Related Techniques in Physical Therapy. Eds. Hopwood V, Lovesey M, Mokone S. New York: Churchill Livingstone; 1997: 111 – 118.

¹⁰ Schultz SP, Driban JB, and Swanik CB. The evaluation of electrodermal properties in the identification of myofascial trigger points. Arch Phys Med Rehabil. 2007;88(6): 780-784.

¹¹ Agatha P. Colbert, Jinkook Yun, Adrian Larsen, Tracy Edinger, William L. Gregory and Tran Thong,, Skin Impedance Measurements for Acupuncture Research: Development of a Continuous Recording System. eCAM 2008 5(4):443-450; doi:10.1093/ecam/nem060

-
- ¹² Korr, I.M., H.M. Wright and J.A. Chace. Cutaneous patterns of sympathetic activity in clinical abnormalities of the musculoskeletal system. *Acta Neuroveg*, 25:589-606, 1964
- ¹³ Zang Hee Cho Ph.D. *Neuro-Acupuncture, Volume 1: Neuroscience Basics* ISBN: 9780970645517; Calif: Q-Puncture Inc; 2001
- ¹⁴ Lee KH, Chung JM, Willis WD. Inhibition of primate spinothalamic tract cells by TENS. *J Neurosurg*. 1985; 62: 276-287
- ¹⁵ Linda S. Chesterton, Nadine E. Foster, Christine C. Wright, G. David Baxter and Panos Barlas Effects of TENS frequency, intensity and stimulation site parameter manipulation on pressure pain thresholds in healthy human subjects
Pain, Volume 106, Issues 1-2, November 2003, Pages 73-80
- ¹⁶ Garrison DW, Foreman RD: Effects of prolonged transcutaneous electrical nerve stimulation (TENS) and variation of stimulation variables on dorsal horn cell activity, *Eur J Phys Med Rehabil* 6:87-94, 1997
- ¹⁷ Reilly JP, *Applied Bioelectricity: From Electrical Stimulation to Electropathology*, 1998 Springer-Verlag NY. pg 130 and 233
- ¹⁸ Christie Q. Huang, Robert K. Shepherd Reduction in excitability of the auditory nerve following electrical stimulation at high stimulus rates: Varying Effects of electrode surface area *Hearing Research* 146 (2000) 57-71
- ¹⁹ G Pyne-Geithman G, Clark J F, InterX elicits significantly greater physiological response than TENS: Lymphocyte metabolism and Cytokine production. Presented as a poster at IASP 2010, Montreal, Canada. Aug. 29th 2010.
- ²⁰ Han J S, Acupuncture: neuropeptide release produced by electrical stimulation of different frequencies. *Trends in Neurosciences*, Vol. 26, No.1, January 2003
- ²¹ Hamza, M.A. et al. (1999) Effect of the frequency of transcutaneous electrical nerve stimulation on the postoperative opioid analgesic requirement and recovery profile. *Anesthesiology* 91, 1232–1238
- ²² Chandran P, Sluka KA. Development of opioid tolerance with repeated transcutaneous electrical nerve stimulation administration. *Pain*. 2003;102:195–201
- ²³ Josimari M. DeSantana, PhD, Valter J. Santana-Filho, MSc, Kathleen A. Sluka, PhD: Modulation Between High- and Low-Frequency Transcutaneous Electric Nerve Stimulation Delays the Development of Analgesic Tolerance in Arthritic Rats *Arch Phys Med Rehabil* Vol 89, April 2008: pg 754-760