

Kailo | Scientific Articles

Title: "The Body Electric"

Source: *Skin Inc. Magazine*

Author: Suzuki, D.

Link: <https://www.skininc.com/skinscience/physiology/17969919.html>

Excerpt: People are consistently absorbing energy from the environment. . . The body utilizes these outside sources of energy to create its own form of power via the mitochondria of each cell, known as adenosine triphosphate (ATP). ATP is known as the energy of life or molecular currency, as it is responsible to power the cells. The cells, in turn, generate a measurable level of electrical current that allows all functions and basis of life, including current of injury and regeneration.

...with the use of microcurrent, studies indicate that the most dominant levels of ATP synthesis—300–500% increase in ATP—occurred when using values less than 400 μ A, 14,15 which follows the Arnold Shultz law that states small doses stimulate cell activity, larger doses hinder it.

Low levels of microcurrent with specific frequencies are very interesting in that the body can actually utilize these small amounts of currents in lieu of its own, allowing for maximum cellular function while simultaneously allowing the body to take a breather. Additionally, strategically designed microcurrent devices and accessories allow the practitioner to apply the energy directly to the area where the effect is desired, opposed to relying on the brain to send the appropriate stimulation to the area for regenerative purposes.

Title: "Electrodermal activity in low back pain patients with and without co-morbid depression."

Source: *International Journal of Psychophysiology*

Author: Bonnet, A., Navateur, J.

Link: <https://www.ncbi.nlm.nih.gov/pubmed/15172134>

Excerpt: Electrodermal activity was examined at rest and during a series of pure innocuous tones in two groups of chronic low back pain patients, one of which consisted of patients suffering also from depression. A group of healthy participants and a group of patients suffering from depression unrelated to pain served as control groups. The non-depressed patients presented an increased electrodermal activity, especially a higher frequency of non-specific fluctuations, as compared to the three other groups. Skin conductance level also appeared lower in the two groups of depressed participants than in the healthy control group. These data show that the EDA recorded in chronic pain patients with and without co-morbid depression must advantageously be analysed separately.

Title: "The Basis for Micro Current Electrical Therapy in Conventional Medical Practice"

Source: *Journal of Advancement in Medicine*

Author: Mercola, J.M.

Link: <https://pdfs.semanticscholar.org/2c89/f160f61da8265b4f49069c4a6b92793079a9.pdf>

Excerpt: Electrotherapy, especially micro current electrical therapy (MET) is useful for a variety of clinical conditions. Indeed, it may be the best treatment for many pain-related disorders, providing fast relief of symptoms and quickly promoting healing. It has significantly less side effects than drugs in chronic conditions. The more advanced MET devices can often demonstrate effectiveness with a simple two-minute office procedure, allowing validity to be quickly assessed.

The Interagency Committee of New Therapies for Pain and Discomfort estimates that chronic pain affects more than 40 million Americans and costs the US economy over \$65-\$70 billion annually. At least 10% of Americans suffer chronic, handicapping pain. The average chronic pain patient has suffered for seven years and has had 3 to 5 surgical operations, spending \$50,000 to \$100,000 or more. Lost productivity due to pain is estimated at over 700 million workdays per year.

MET works because of its ability to stimulate cellular physiology and growth. One classic study (10) showed that it could increase ATP generation by almost 500%. Increasing current actually decreased the results. This study also demonstrated its ability to enhance amino acid transport and protein synthesis. One can see an illustration of the true therapeutic effect of MET through the mechanism in which trauma affects the electrical potential of damaged cells (11). The injured area has a higher electrical resistance than the surrounding tissue. This results in decreased electrical conductance through the injured area and decreased cellular capacitance (12), leading to impairment of the healing process and inflammation.

One of the greatest values of MET is in pain control (8,9,12). It also reduces inflammation, edema and swelling, increases range of motion, strength, and muscle relaxation, and accelerates wound healing (13,14). It is exceptionally useful in soft tissue injuries, such as sprains (15,16), wounds, post-surgical trauma, and particularly in treatment of long-term residual pain due to post-surgical scars. It is effective for treatment of headaches, temporomandibular joint syndrome, neuropathies, arthritis, bursitis and tendinitis. Clinical experience indicates that it is an adjunctive therapy in earaches, sore throats, toothache, sinus congestion, viral or allergic conjunctivitis, post-herpetic neuralgia, skin ulcers, post-CVA spasticity, and compression neuropathies such as carpal tunnel syndrome. It has also proven useful in preventing the delayed muscle soreness that is common after heavy exercise (17). Improvement in post-exercise muscle fatigue was achieved by applying the current over the exercise muscles for twenty minutes after exercise. In a minority of patients MET does not work or only provides brief palliative relief. Its full potential is yet to be defined.

Caution is advised during pregnancy because electrical stimulation can affect the endocrine control systems and can theoretically cause miscarriage, although this has never been reported. Micro Current, or any other electrical stimulus should not be used on patients with demand-type cardiac pacemakers. Other than these two conditions, there are no known significant adverse side effects to MET.

Title: "Anti-inflammatory effects of electronic signal treatment."

Source: *Pain Physician*

Author: Odell, R.H., Sorgnard, R.E.

Link: <https://www.ncbi.nlm.nih.gov/pubmed/19057635>

Excerpt: ...those who directly use electricity for treatment know of its anti-inflammatory effects. Electronic signal treatment (EST), as an extension of presently available technology, may reasonably have even more anti-inflammatory effects. EST is a digitally produced alternating current sinusoidal electronic signal with associated harmonics to produce theoretically reasonable and/or scientifically documented physiological effects when applied to the human body. These signals are produced by advanced electronics not possible even 10 to 15 years ago. The potential long-lasting anti-inflammatory effects of some electrical currents are based on basic physical and biochemical facts listed in the text below, namely that of stimulating and signaling effective and long-lasting anti-inflammatory effects in nerve and muscle cells.

Title: "Frequency-Specific Microcurrent"

Source: *Cleveland Clinic*

Author:

Link: <https://my.clevelandclinic.org/health/treatments/15935-frequency-specific-microcurrent>

Excerpt: A frequency is the rate at which a sound wave or electronic pulse is produced. This measurement is registered in hertz (Hz). In using FSM to treat pain, it's been found that various frequencies can be used to potentially reduce inflammation (swelling), repair tissue, and reduce pain.

One of the ways FSM works is by potentially increasing the production of the substance ATP in injured tissues. ATP is the major source of energy for all cellular reactions in the body. Because treatment with FSM can increase ATP production by as much as 500% in damaged tissues, this may help with the recovery process. Depending on the condition, treatment with FSM can "loosen" or soften the muscles, which can help relieve pain and/or stiffness.

Treatment with FSM is non-invasive and painless. The currents used in FSM are so low that the patient often does not feel them. During FSM treatment, patients may notice certain effects, including warmth and a softening of affected tissues.

Title: "The Effects of Microcurrents on Inflammatory Reaction Induced Ultraviolet Irradiation"

Source: *Department of Physical Therapy, Kwang-Ju Women's University*

Author: Lee, J.W., Yoon, S.W., Kim, T.H., Park, S.J.

Link: https://www.jstage.jst.go.jp/article/jpts/23/4/23_4_693/pdf

Excerpt: This study found that microcurrents increased wound contraction and reduced the inflammatory reaction activities such as erythema and pigmentation. Thus, we consider that

microcurrents help to accelerate the inflammatory reaction induced by ultraviolet irradiation, enhance recovery, and foster an anti-inflammatory reaction.

Title: "Cytokine changes with microcurrent treatment of fibromyalgia associated with cervical spine trauma"

Source: *Journal of Bodywork and Movement Therapies*

Author: McMakin, C.R., Gregory, W.M., Phillips, T.M.

Link: [https://www.bodyworkmovementtherapies.com/article/S1360-8592\(05\)00008-2/abstract](https://www.bodyworkmovementtherapies.com/article/S1360-8592(05)00008-2/abstract)

Excerpt: A total of 54 consecutive patients meeting the ACR diagnostic criteria for fibromyalgia were treated with microamperage current.

Five patients did not tolerate treatment. The remaining 49 patients reported reduction in pain on a 10-point visual analog scale (VAS) from an average baseline score of 7.3 ± 1.2 to 1.3 ± 1.1 with the first treatment. Thirty-one patients reported symptomatic relief from fibromyalgia following an average of eight treatments. Median time to improvement was 2 months and the actuarial recovery curve reached 100% at 4.5 months. Interleukin-1, Interleukin-6 and substance P levels were all reduced from 330 to 80pg/ml, from 239 to 76pg/ml, and from 180 to 54pg/m, respectively, in the first 90-min treatment. Tumor necrosis factor was also reduced from 305 to 78pg. During the same time period, beta-endorphin and cortisol both increased from an average of 8.2 to 71.1pg/ml respectively.

Title: "Electrical Stimulation, Endorphins, and the Practice of Clinical Psychology"

Source: *Journal of Clinical Psychology in Medical Settings*

Author: Ulett, G.A., Wedding, D.

Link: <https://link.springer.com/article/10.1023/A:1023398206223>

Excerpt: Recent studies have demonstrated an alternative to drug treatment for patients presenting with anxiety disorders. This new technique involves electrical stimulation of the peripheral nervous system to induce chemical changes in the brain that can support and promote healing.

Solid evidence from fMRI and neurochemical studies show that a simple office procedure involving electrical stimulation can stimulate the expression of endorphins in the brain. Patients have demonstrated symptom relief from this simple adjunctive treatment with a concomitant reduction in dependency on psychotropic medications.

Title: "The Effect of Microcurrent -Inducing Shoes on Fatigue and Pain in Middle-Aged People with Plantar Fasciitis"

Source: *Journal of Physical Therapy Science*

Author: Cho, M.S., Park, R.J, Cho, Y.H., Cheng, G.A.

Link: https://www.jstage.jst.go.jp/article/jpts/19/2/19_2_165/article/-char/ja/

Excerpt: When a muscle is used repeatedly for a long time, it often leads to muscular fatigue and muscle soreness. In middle-aged and elderly populations, muscular fatigue and pain during

the performance of activities of daily living is a common problem caused by physiological changes in the musculoskeletal system due to the aging process. Microcurrent therapy has been shown to be effective at reducing pain and muscle soreness. For activities such as standing or walking, specially developed shoes (G-man, Busan, South Korea) which are capable of providing microcurrent therapy during the performance of these activities are an advantage as the treatment becomes integrated with the activity being performed. These therapeutic shoes or microcurrent induction shoes could be potentially useful for providing treatment if they were worn during normal activities. The purpose of this study, therefore, was to investigate the effect of these microcurrent induction shoes on pain and muscle fatigue in middle-aged people with plantar fasciitis. Subjects were asked to wear their normal shoes and instructed to walk on a treadmill at 2 and 3 km/hr for 10 minutes each. Subjects were then asked to wear the specially designed microcurrent induction shoes for six weeks for at least 4 hours per day during ADL activities such as standing and walking. During the initial evaluation and at the end of the 6 weeks intervention, the electromyographic (EMG) activity of their right tibialis anterior and soleus muscles were recorded, together with their perceived level of foot pain using a Visual Analogue Scale (VAS). The results showed a significant reduction in their VAS scores ($p < 0.01$), and the change in median power frequency of their tibialis anterior EMG recording ($p < 0.05$). In conclusion, this study demonstrated that microcurrent induction shoes were effective in relieving foot pain and muscle fatigue in subjects with plantar fasciitis.

Title: "Nanotechnology approaches for the regeneration and neuroprotection of the central nervous system"

Source: *Surgical Neurology*

Author: Silva, G.A.

Link: <https://www.deepdyve.com/lp/elsevier/nanotechnology-approaches-for-the-regeneration-and-neuroprotection-of-3ogzA0lqvS?key=elsevier->

Excerpt: Nanotechnology is the science and engineering concerned with the design, synthesis, and characterization of materials and devices that have a functional organization in at least 1 dimension on the nanometer (ie, one-billionth of a meter) scale. The ability to manipulate and control engineered self-assembling (ie, self-organizing) substrates at these scales produces macroscopic physical and/or chemical properties in the bulk material not possessed by the constituent building block molecules alone. This in turn results in a degree of functional integration between the engineered substrates and cellular or physiological systems not previously attainable. Applied nanotechnology aimed at the regeneration and neuroprotection of the central nervous system (CNS) will significantly benefit from basic nanotechnology research conducted in parallel with advances in cell biology, neurophysiology, and neuropathology. Ultimately the goal is to develop novel technologies that directly or indirectly aid in providing neuroprotection and/or a permissive environment and active signaling cues for guided axon growth. In some cases, it is expected that the neurosurgeon will be required to administer these substrates to the patient. As such, in order for nanotechnology applications directed toward neurological disorders to develop to their fullest potential, it will be important for neuroscientists, neurosurgeons, and neurologists to participate and contribute to the scientific process alongside physical science and engineering colleagues. This review will focus

on emerging clinical applications aimed at the regeneration and neuroprotection of the injured CNS, and discuss other platform technologies that have a significant potential for being adapted for clinical neuroscience applications.