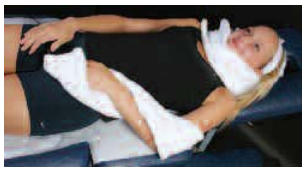
Detailed summary about FSM

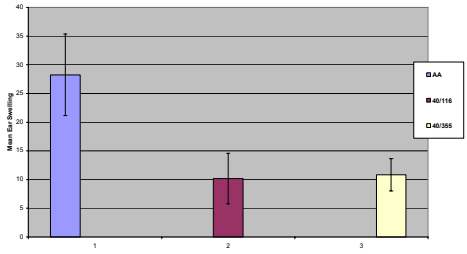
Microcurrent is a battery-operated physical therapy modality that was introduced in the US in 1987. It is an extremely effective treatment for both new injuries and chronic muscle and nerve pain. The current is sub-sensory, hence is painless. Use of certain frequencies can achieve rapid reduction of tissue inflammation and pain, as well as resolution of myofascial trigger points, even at deeper sites (e.g. ilio-psoas).

What is different about microcurrent therapy? It uses only a very tiny electric current, MICRO-current, just millionths of an amp. Yet this is able to have a powerful effect on cell function because it is the same strength current as is operative within body cells. Research published in 1987 by Ngok Cheng, MD showed that microamperage current increases the rate of energy (ATP) production in cells by 500% and increases the rate of protein synthesis and waste product removal by 70%. This is thought to be the mechanism behind the observation that microcurrent therapy accelerates wound healing. Just as importantly, Cheng's study also showed that currents above 1000 micro amps –in the MILLI-amp range-- actually reduced energy production. As every other physical therapy modality (including TENS) delivers current in that range, they would seem to have a different mode of action.

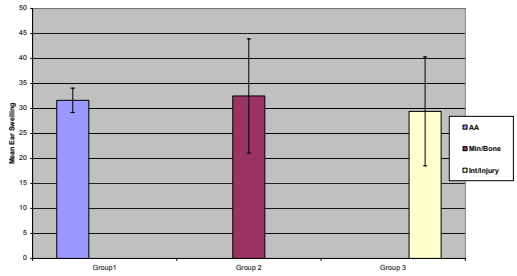




History of Frequency Specific Microcurrent (FSM) development: FSM is a unique form of microcurrent therapy as it uses frequencies that were developed in the early 1900's and used with electromagnetic machines. In 1994, Dr. Carolyn McMakin began using those frequencies with a 2-channel microcurrent device as a frequency generator and with graphite gloves to apply the current through the injured body part. Pairing a frequency for a specific PATHOLOGY with a frequency targeting a specific TISSUE-TYPE creates an interferential pattern. (E.g., using the frequency for "chronic inflammation" on Channel A of the microcurrent device and "tendon" on Channel B). Through clinical use, sequences of such frequency pairs have been developed into protocols for the treatment of muscle and nerve pain. Case reports have been published of their use in the treatment of cervical[1] and lumbar[2] myofascial pain, chronic neuropathic pain[3], and in fibromyalgia following cervical spine trauma[4].

Animal studies: In unpublished research from the University of Sydney (Vivienne Reeve, PhD, Department of Veterinary Science), LOX-mediated inflammation and swelling of mouse ears produced by painting on arachidonic acid (AA) (bar 1 on graph) was reduced by 70% (bar 2) by running the frequencies for "reduce inflammation" in "skin" for four minutes. The frequency pair for "reduce inflammation" in "the immune system" reduced mouse ear swelling by 62% over control (bar 3). By



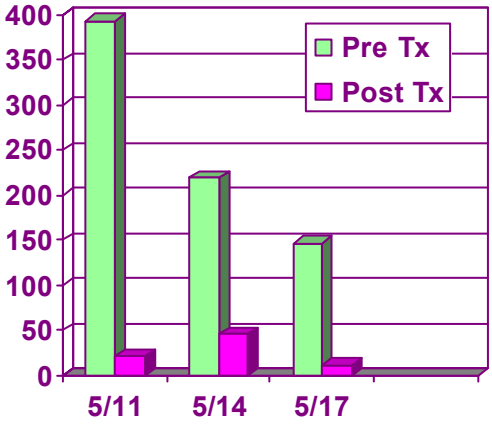
comparison, no NSAID ever tested in this animal model has produced more than a 45% reduction in swelling. And after the application of PMA that activates COX – mediated inflammation, the FSM frequencies reduced swelling by 30%, equivalent to that achieved by the injectable NSAID ketorolac in the same model. This suggests FSM is capable of inhibiting inflammation induced via both LOX and COX pathways. The study was properly blinded, and included a sham frequency as control. The anti-inflammatory effect was seen in every mouse tested, and was also noted to be time-dependent: 50% of the effect was produced after 2 minutes, and 100% after 4 minutes. This has informed the development of timed treatment protocols.



And the specificity of the frequencies was demonstrated by the finding that 2 other frequency pairs (bars 2 & 3) did not reduce the ear swelling at all compared to control (bar 1). This specificity has been noted in clinical use where, if the chosen frequencies do not match the pathology and tissue type, they have no effect.

Clinical study using biological markers[4]**:** Six patients with fibromyalgia following cervical spine trauma had fingerprick blood samples taken during FSM treatment given down the spine. The samples were analyzed by an immunochemist at the NIH in the US, and showed reductions of 10 to 20x in the serum levels of the pro-inflammatory cytokines IL-1, IL-6, and TNF-α, as well as of substance P, during the first treatment session. Such rapid and significant reductions in cytokine levels are unprecedented, and were highly correlated with reductions in the VAS pain score: from an average baseline of 7.3 to 1.3 during the first treatment (*P*<0.0001). Pain relief lasted from 1 hour to 2 weeks after the first treatment session.
In addition, increases in β-endorphin and serum cortisol levels were observed.

In the single patient's data shown here, **IL-1 levels** reduced from 392.8 to 21.4 pg/ml over a 90-minute treatment session. (Normal levels = 0 - 25 pg/ml).
And it reduced at the same rate during 2 subsequent treatment sessions.
Step-wise linear regression demonstrated similar reductions in IL-6, TNF-α and substance P also.
This study's observations suggest that microcurrent therapy reduces pain by reducing pro-inflammatory cytokines and altering pain-associated neuropeptides.



Contra-indications to Use: Demand-type pacemakers, pregnancy. Current not to be run through the brain or eye.
Precautions: Spinal cord stenosis, encapsulated infection: may temporarily increase pain.
Risks and Side Effects: Patients must be well hydrated for optimal current flow and optimal results. The only common side effect occurs following treatment for chronic muscle pain when some patients experience what appears to be a detoxification reaction approximately 90 minutes after treatment. This reaction can be prevented by having an adequate water intake and by taking an anti-oxidant supplement. There are no other known side effects or risks.

References:

1. McMakin, C. (1998). Microcurrent treatment of myofascial pain in the hand neck and face. *Topics in Clinical Chiropractic, 5*, 29-35, 73-75.
2. McMakin, C. (2004). Microcurrent therapy: A novel treatment method for chronic low back myofascial pain. *Journal of Bodywork and Movement Therapies, 8,*143-153.
3. McMakin, C. (2010). Non-pharmacologic therapy of neuropathic pain using frequency specific microcurrent. *The Pain Practitioner, 20* (3), 68-73.
4. McMakin, C., Gregory, W., Phillips, T. (2005). Cytokine changes with microcurrent treatment of fibromyalgia associated with cervical spine trauma. *Journal of Bodywork and Movement Therapies, 9,* 169-176.