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### **Alzheimer's disease**

Impairments in visual memory and visuoconstructive functions commonly occur in patients with Alzheimer's disease (AD). Recently, I reported that external application of electromagnetic fields (EMF) of extremely low intensity (in the picotesla range) and of low frequency (in the range of 5Hz-8Hz) improved visual memory and visuoperceptive functions in patients with Parkinson's disease. The report demonstrates, for the first time, that specific cognitive symptoms of AD are improved by treatment with EMF of a specific intensity and frequency. The rapid improvement in cognitive functions in response to EMF suggests that some of the mental deficits of AD are reversible being caused by a functional (i.e., synaptic transmission) rather than a structural (i.e., neuritic plaques) disruption of neuronal communication in the central nervous system. - International Journal of Neuroscience PMID: 7960477

Repetitive transcranial magnetic stimulation applied to the dlPFC improves naming performance also in the advanced stages of AD. Moreover, in the severe group the effect is not specific for action naming, as in the case of the mild AD group. These findings suggest that rTMS can affect the intrinsic ability of the brain to restore or compensate for damaged function and may represent an useful new tool for cognitive

rehabilitation. - European Journal of Neurology PMID: 19049544

### **Ankle sprain**

Acutely sprained ankles represent a frequent and common injury among active duty troops in training, and are a significant source of morbidity with respect to days lost to training. In a randomized, prospective, double blind study of 50 grade I and II (no gross instability) sprained ankles, a statistically significant decrease in edema was noted following one treatment with pulsed electro magnetic field (PEMF) therapy. The application of this modality in acutely sprained ankles could result in significant decreases in time lost to military training. – Military Medicine PMID: 8441490

### **Back pain**

Back pain and the whiplash syndrome are very common conditions involving tremendous costs and extensive medical effort. A quick and effective reduction of symptoms, especially pain, is required. Magnetic fields appear to have a considerable and statistically significant potential for reducing pain in cases of lumbar radiculopathy and the whiplash syndrome. – Neuro Rehabilitation PMID: 12016348

### **Back pain – low back**

This randomized, double-blind, placebo-controlled clinical trial studied the effectiveness of pulsed electromagnetic therapy (PEMT) in patients with chronic lower back pain. PEMT produced significant pain reduction throughout the observation period compared with baseline values. The percentage change in the NRS score from baseline was significantly greater in the PEMT group than the placebo group at all three time-points measured. The mean revised Oswestry disability percentage after 4 weeks was significantly improved from the baseline value in the PEMT group, whereas there were no significant differences in the placebo group. In conclusion, PEMT reduced pain and disability and appears to be a potentially useful therapeutic tool for the conservative management of chronic lower back pain. - Journal of International Research PMID: 16749411

We evaluate the efficacy and safety of therapeutic electromagnetic fields (TEMF) on chronic low back pain. Secondary objectives included the

investigation of the effects of TEMF on psychometric measures. Both groups improved over time. Although groups were similar during the treatment period, treated subjects (TEMF of 15 mT) improved significantly over sham treatment during the 2-week follow-up period (20.5% reduction in pain); There were no reported serious adverse events. This study demonstrates that TEMF may be an effective and safe modality for the treatment of chronic low back pain disorders. - Pain Practice PMID: 17714104

### **Bone density**

To determine the effect of a 72 Hz pulsating electromagnetic field (PEMF) on bone density of the radii of osteoporosis-prone women, the nondominant forearms of 20 subjects were exposed to PEMF 10 h daily for a period of 12 weeks. The data suggest that properly applied PEMFs, if scaled for whole-body use, may have clinical application in the prevention and treatment of osteoporosis. - The Journal of Bone and Mineral Research PMID: 2195843

### **Cancer – bladder**

The study deals with immune status of patients operated for bladder cancer and exposed postoperatively to alternating magnetic field (MF). MF application was followed by higher T- and B-lymphocyte and CD4+, CD16+ cell levels as well as enhanced T-cell activity; no postoperative complications were registered and tumor relapse rates were relatively low. The effect was likely to be due to antistressor influence of MF. The procedure may substitute drug therapy for immunocorrection and to avoid recurrence of bladder cancer. - Volpr Onkol PMID: 11544830

### **Cancer – breast tumors**

The study was concerned with effect of alternating magnetic field (AMF) on immunobiological characteristics of lymphocytes from patients with locally-advanced breast tumors. Patients received infusions of treated autoblood and changes in their immunological status were followed up. Stimulation of T-, B- and NK- cells was observed. Immuno-regulating effect was apparent when autoblood was treated with 50 H/25 mT1 and 100 H/50 mT1. - Volpr Onkol PMID: 15088521

### **Cancer - cells**

PEMF promotes the growth of undifferentiated cells but progressively suppresses the growth of more differentiated cells, i.e., PEMF controls cell growth depending on the degree of cell differentiation. This study also shows the potentiality of PEMF as an adjunctive treatment method for malignant tumors. – Bioelectromagnetics PMID: 10653622

No adverse side-effects were reported in an investigation of the antitumor effect of turbulent magnetic field (TMF) carried out as a component of preoperative chemoradiotherapy for breast cancer at the Center's Clinic. The study group included 114 patients with locally advanced tumors(T3, N1-N3, M0). According to the clinical, roentgenological and histological evidence on the end-results, the procedure was highly effective. Also, it was followed by shorter and less extensive postoperative lymphorrhea. – Volpr Onko PMID: 14976921

**Carpal Tunnel Syndrome** PEMF exposure in refractory carpal tunnel syndrome provides statistically significant short and long-term pain reduction and mild improvement in objective neuronal functions. Neuromodulation appears to influence nociceptive-C and large A-fiber functions, probably through ion/ligand binding. - Pain Medicine PMID: 18777606

### **Cartilage**

Severe joint inflammation following trauma, arthroscopic surgery or infection can damage articular cartilage, thus every effort should be made to protect cartilage from the catabolic effects of pro-inflammatory cytokines and stimulate cartilage anabolic activities. Previous pre-clinical studies have shown that pulsed electromagnetic fields (PEMFs) can protect articular cartilage from the catabolic effects of pro-inflammatory cytokines, and prevent its degeneration. The percentage of patients who used NSAIDs was 26% in the active group and 75% in the control group. At 3 years follow-up, the number of patients who completely recovered was higher in the active group compared to the control group. Treatment with I-ONE aided patient recovery after arthroscopic surgery, reduced the use of NSAIDs, and also had a positive long-term effect. - Knee Surgery, Sports Traumatology, Arthroscopy PMID: 17333120

### **Chronic pain**

Specific pulsed electromagnetic fields (PEMFs) have been shown to induce analgesia (antinociception) in healthy human volunteers. These findings provide some initial support for the use of PEMF exposure in reducing pain in chronic pain populations and warrants continued investigation into the use of PEMF exposure for short-term pain relief. - Pain Research & Management PMID: 16770449

### **Dental pain**

Two hours of exposure to a weak, oscillating magnetic fields induced a significant decrease in three parameters (dental sensory and cutaneous pain and tolerance thresholds), whereas the other two parameters showed a similar tendency. When the same subjects were exposed to a sham treatment, only marginal, nonsignificant variations in all parameters were observed. These results represent the first piece of evidence that weak alterations of the magnetic field may induce hyperalgesia in humans. – Bioelectromagnetics PMID: 8554630

### **Diabetic neuropathy/angipathy**

Significant improvement of symptoms, and of all registered parameters of peripheral circulation was established after the therapy. High-frequency pulsating electromagnetic field is recommended for the treatment of diabetic angiopathy. In patients with neuropathic changes it can be used as an introduction procedure. - Srpski arhiv za celokupno lekarstvo PMID: 7725151

This study demonstrates that pulsed electromagnetic fields are able to accelerate wound healing under diabetic and normal conditions by up-regulation of FGF-2-mediated angiogenesis. They also prevented tissue necrosis in response to a standardized ischemic insult, suggesting that noninvasive angiogenic stimulation by pulsed electromagnetic fields may be useful to prevent ulcer formation, necrosis, and amputation in diabetic patients. – Plastic and Reconstructive Surgery PMID: 18176216

### **Erectile dysfunction**

Combined treatment with local negative pressure and pulsating magnetic field conducted in 116 patients with erectile dysfunction aged 20-60 years produced optimal treatment results. Recovery and

improvement of the erectile function were achieved in 85.7% patients given local vacuum magneto-therapy. - Vopr Kurortol Fizioter Lech Fiz Kult PMID: 17882824

An effect was studied of appliances for magneto-therapy on sexual function of 105 men presenting with sexual problems. A total of 96 sexological patients were examined according to a general program, to study placebo-effect. The magnetic field beneficial effect was recordable in 70-80 % of the patients, that of placebo in 33 % men. It is suggested that augmentation of sexual activity is associated with an increase in cavernous blood flow. – Lik Sprava PMID: 8819933

### **Fibromyalgia**

Exposure to a specific pulsed electromagnetic field (PEMF) has been shown to produce analgesic (antinociceptive) effects in many organisms. In a randomized, double-blind, sham-controlled clinical trial, patients with either chronic generalized pain from fibromyalgia (FM) or chronic localized musculoskeletal or inflammatory pain were exposed to a PEMF (400 microT) through a portable device fitted to their head during twice-daily 40 min treatments over seven days. PEMF may be a novel, safe and effective therapeutic tool for use in at least certain subsets of patients with chronic, nonmalignant pain. - Pain Research & Management PMID: 18080043

### **Heart rate variability**

Exposure to PEMF for 20 minutes resulted in more rapid recovery of heart rate variability, especially in the very low frequency range after physical strain. The study also showed the moderating influence of the subjects' constitutional VLF power on their response to PEMF treatment. These findings have since been replicated in a clinical study and should be taken into consideration when PEMF treatment is chosen. - European Journal of Applied Physiology PMID: 17674028

### **Inflammation**

It is well known that electromagnetic fields (EMFs) can induce repair of non-healing bone fractures. It is generally believed that non-invasive, EMF therapy might have a broad, albeit currently unrecognized clinical potential. Since T cells are key modulators of inflammation, the

development of EMF based therapeutic devices to regulate their activity can be expected to provide important tools to treat numerous human inflammatory diseases such as psoriasis and arthritis. - Biomedical Sciences Instrumentation PMID: 10834201

### **Knee pain**

Low-amplitude, extremely low frequency magnetic fields are safe and effective for treating patients with chronic knee pain due to osteoarthritis. Reduction in pain after a treatment session was significantly greater in the magnetic field-on group (46%) compared to the magnetic field-off group (8%). - Alternative Therapies in Health and Medicine PMID: 11565402

### **Knee arthritis**

In patients with symptomatic osteoarthritis of the knee, PMF treatment can reduce impairment in activities of daily life and improve knee function. – Wiener Klinische Wochenschrift PMID: 12602111

### **Lumbar fusion**

Sixty-one randomly selected patients who underwent lumbar fusion surgeries for discogenic low back pain between 1987 and 1994 were retrospectively studied. All patients had failed to respond to preoperative conservative treatments. Forty-two patients received adjunctive therapy with pulsed electromagnetic field (PEMF) stimulation, and 19 patients received no electrical stimulation of any kind. Average follow-up time was 15.6 months postoperatively. Fusion succeeded in 97.6% of the PEMF group and in 52.6% of the unstimulated group. The use of PEMF stimulation enhances bony bridging in lumbar spinal fusions. Successful fusion underlies a good clinical outcome in patients with discogenic low back pain. - Advances in Therapy PMID: 11010056

### **Migraine/Headaches**

In the active-treatment group, all assessed criteria were significantly improved at the end of the migraine/headache study. 76% of active-treatment patients experienced clear or very clear relief of their complaints. Only 1 placebo-patient (2.5%) felt some relief; 8% noted slight and 2% reported significant worsening of symptoms. No side

effects were noted. - Advances in Therapy PMID: 11571822

Ten of the 22 subjects who had actual exposure received 2 additional weeks of actual exposure after their initial 1-month follow-up. All showed decreased headache activity (50% good, 38% excellent). Thirteen subjects from the actual exposure group elected not to receive additional exposure. Twelve of them showed decreased headache activity by the second month (29% good, 43% excellent). Eight of the subjects in the placebo group elected to receive 2 weeks of actual exposure after the initial 1-month follow-up with 75% showing decreased headache activity (38% good, 38% excellent). In conclusion, exposure to pulsing electromagnetic fields for at least 3 weeks is an effective, short-term intervention for migraine, but not tension headaches. – Headache PMID: 11279973

### **Multiple Sclerosis**

There is a growing literature on the biological and clinical effects of pulsed electromagnetic fields. Some studies suggest that electromagnetic therapies may be useful in the treatment of chronic illnesses. This study is a follow-up to a placebo controlled pilot study in which multiple sclerosis (MS) patients exposed to weak, extremely low frequency pulsed electromagnetic fields showed significant improvements on a composite symptom measure. Evidence from this randomized, double-blind, placebo controlled trial is consistent with results from smaller studies suggesting that exposure to pulsing, weak electromagnetic fields can alleviate symptoms of MS. - Alternative Therapies in Health and Medicine PMID: 12868251

Fatigue is the most common symptom of multiple sclerosis. 75%-90% of patients with multiple sclerosis report having fatigue, and 50%-60% describe it as the worst symptom of their disease. Fatigue is significantly associated with reduced quality of life and is also a major reason for unemployment, especially for patients with otherwise minor disability. There is evidence that pulsing electromagnetic fields may improve fatigue associated with multiple sclerosis. - Wien Med Wochenschr. PMID: 12658965

Recent clinical reports have suggested that treatment with extremely



weak magnetic fields (MF) in the picoTesla range is an efficacious modality for the symptomatic therapy in patients with multiple sclerosis (MS) during the remission and exacerbation periods of the disease. The report attests to the unique efficacy of extremely weak MF in the symptomatic treatment of patients with MS including those patients with a chronic progressive course of the disease and supports the hypothesis that dysfunction of synaptic conductivity due to neurotransmitter deficiency specifically of serotonin rather than demyelination underlies the neurologic deficits of the disease. - International Journal of Neuroscience PMID: 8063544

We performed a double-blind study to measure the clinical and subclinical effects of an alternative medicine magnetic device on disease activity in multiple sclerosis (MS). there was a significant improvement in the performance scale (PS) combined rating for bladder control, cognitive function, fatigue level, mobility, spasticity, and vision (active group  $-3.83 \pm 1.08$ ,  $p < 0.005$ ; placebo group  $-0.17 \pm 1.07$ , change in PS scale). There was also a significant change between pretreatment and posttreatment in alpha EEG magnitude during the language task recorded at various electrode sites on the left side. - Journal of Alternative and Complementary Medicine PMID: 9395691

### **Myofascial pain**

The repetitive magnetic stimulation (rMS) group showed a significant improvement in VAS, NPDVAS, algometry, as well as in the characteristics of the therapy device after conclusion of treatment. Improvements in the ROM were also present in rotation and controlateral bending. This improvement persisted after 1 month. On the other hand, the placebo group did not show any significant improvement in the tests considered. The results of this study show that peripheral repetitive magnetic stimulation (rMS) may have positive short- and medium-term therapeutic effects on myofascial pain. - Clinical Neurophysiology PMID: 12559244

### **Neck pain**

Patients' with chronic neck pain preferences were for pulsed electro magnetic field (PEMF). At 6 months, in the PEMF group, 33 patients were improved, 5 not improved and 4 lost to follow-up. In the spa therapy

group, 24 patients were improved, 14 not improved and 6 lost to follow-up, for significantly greater improvement in the PEMF than spa therapy group ( $p=0.02$ ). Significant improvement was seen in both groups in terms of pain score, Copenhagen scale score and score on some dimensions of the MOS SF-36 survey. PEMF seems to be superior to standard spa therapy group without massage in control of neck pain. The difference between groups, although perhaps biased, seems to suggest the importance of our conclusions. - *Annales de Readaptation et de Medecine Physique* PMID: 17229483

### **Neuralgia**

Pulsed radiofrequency treatment has been described as a minimal invasive alternative to radio-frequency thermocoagulation for the management of chronic pain syndromes. We present here our first five high-risk patients with idiopathic trigeminal neuralgia who were treated with pulsed radiofrequency after multidisciplinary assessment; with a mean follow-up of 19.2 months (range 10-26). These patients were at high risk due to age, co-morbidities or previous interventional and surgical treatments. An excellent long-term effect was achieved in three of the five patients, a partial effect in one patient and a short-term effect in one patient. No neurological side effects or complications were reported. - *International Association for the Study of Pain* PMID: 12927617

### **Neuropathy**

Ilioinguinal neuropathy is a rare but disabling condition. The condition may arise spontaneously or in the setting of pelvic surgery. To date, most therapeutic options have been limited to neuropathic pain medications, anti-inflammatory medications, nerve blocks with local anesthetics, or neurectomy. Long-term results of non-surgical interventions are fair at best. Pulsed radiofrequency lesioning may be a good treatment for chronic ilioinguinal neuropathy in cases refractory to conservative management. - *Journal of Hernias and Abdominal Wall Surgery* PMID: 17273814

The largely unsatisfactory results reported for the pharmacological treatment of diabetic neuropathy has spurred the search for alternative therapies. Frequency-modulated electromagnetic neural stimulation

(FREMS) induced a significant reduction in daytime and night-time VAS pain score (all  $p < 0.02$ ). Furthermore, FREMS induced a significant increase in sensory tactile perception, as assessed by monofilament; a decrease in foot vibration perception threshold, as measured by a biothesiometer; and an increase in motor nerve conduction velocity (all  $p < 0.01$ ). No significant changes were observed after placebo. Comparison of measurements at the 4-month follow-up with those at baseline revealed that a significant benefit persisted for all measures that showed an improvement at the end of treatment, with an additional improvement in quality of life (Short Form-36 questionnaire). No significant side effects were recorded during the study. Frequency-modulated electromagnetic neural stimulation (FREMS) is a safe and effective therapy for neuropathic pain in patients with diabetes and is able to modify some parameters of peripheral nerve function. – Diabetologia PMID: 15834546

Clinical and electroneuromyographic studies were performed in 121 patients with diabetic polyneuropathy (DPN) before and after courses of treatment with pulsed electromagnetic fields with complex modulation (PEMF-CM) at different frequencies (100 and 10 Hz). The earliest and most significant electroneuromyographic signs of DPN were found to be decreases in the amplitude of the H reflex and the Hmax/Mmax ratio in the muscles of the lower leg. Application of PEMF-CM facilitated regression of the main clinical symptoms of DPN, improved the conductive function of peripheral nerves, improved the state of Ia afferents, and improved the reflex excitability of functionally diverse motoneurons in the spinal cord. PEMF-CM at 10 Hz was found to have therapeutic efficacy, especially in the initial stages of DPN and in patients with diabetes mellitus for up to 10 years. - Neuroscience and Behavioral Physiology PMID: 14635988

Neuropathic pain (NP) from peripheral neuropathy (PN) arises from ectopic firing of unmyelinated C-fibers with accumulation of sodium and calcium channels. Because pulsed electromagnetic fields (PEMF) safely induce extremely low frequency (ELF) quasirectangular currents that can depolarize, repolarize, and hyperpolarize neurons, it was hypothesized that directing this energy into the sole of one foot could potentially modulate neuropathic pain. These pilot data demonstrate

that directing PEMF to refractory feet can provide unexpected shortterm analgesic effects in more than 50% of individuals. The role of placebo is not known and was not tested. The precise mechanism is unclear yet suggests that severe and advanced cases are more magnetically sensitive. Future studies are needed with randomized placebo-controlled design and longer treatment periods. - Neurorehabilitation and Neural Repair PMID: 15035963

### **Osteoarthritis**

An average improvement of 23-61% occurred in the clinical variables observed with active treatment, while 2 to 18% improvement was observed in these variables in placebo treated control patients. No toxicity was observed. The decreased pain and improved functional performance of treated patients suggests that this configuration of PEMF has potential as an effective method of improving symptoms in patients with OA. This method warrants further clinical investigation. - Journal of Rheumatology PMID: 8478852

### **Osteoarthritis – Knee/Cervical spine**

We conducted a randomized, double blind clinical trial to determine the effectiveness of pulsed electromagnetic fields (PEMF) in the treatment of osteoarthritis (OA) of the knee and cervical spine. Matched pair t tests showed extremely significant changes from baseline for the treated patients in both knee and cervical spine studies at the end of treatment and the one month follow up observations, whereas the changes in the placebo patients showed lesser degrees of significance at the end of treatment. PEMF has therapeutic benefit in painful OA of the knee or cervical spine. - Journal of Rheumatology PMID: 7837158

### **Osteoporosis**

The objective was to understand the effects of low-frequency pulsed electromagnetic fields (PEMFs) on chronic bony pain, bone mineral density (BMD), bone strength and biochemical markers of bone metabolism in the patients of osteoporosis. Low-frequency PEMFs relieves the pain of primary osteoporosis quickly and efficiently, enhances bone formation and increases BMD of secondary osteoporosis. – Chinese Medical Journal PMID: 19080282

**Pain** PEMF exposure in refractory CTS provides statistically significant short- and longterm pain reduction and mild improvement in objective neuronal functions. Neuromodulation appears to influence nociceptive-C and large A-fiber functions, probably through ion/ligand binding. - Pain Medicine PMID: 18777606

**Parkinson's disease** Since brief, extracerebral applications of pico-tesla (pT) range flux intensity electromagnetic fields (EMFs) of low frequency have been shown to produce rapid improvement in motor and cognitive symptoms in PD, it is expected that application these EMFs would lead also to an increase in the amplitude of visual evoked potential (VEP) response. The study demonstrates that in Parkinsonian patients extracerebral application of these EMFs rapidly increases in amplitude of the VEP response and, by inference, cerebral dopamine levels presumably by increasing dopamine release. - International Journal of Neuroscience PMID: 8707479

### **Pelvic pain**

Unusually effective and long-lasting relief of pelvic pain of gynecological origin has been obtained consistently by short exposures of affected areas to the application of a magnetic induction device producing short, sharp, magnetic-field pulses of minimal amplitude to initiate the electrochemical phenomenon of electroporation within a 25 cm<sup>2</sup> focal area. Treatments are short, fast-acting, and economical and in many instances have obviated surgery. - European Journal of Surgery PMID: 7531030

### **Rotator cuff tendonitis**

The value of pulsed electromagnetic fields (PEMF) for the treatment of persistent rotator cuff tendonitis was tested in a double-blind controlled study in 29 patients whose symptoms were refractory to steroid injection and other conventional conservative measures. At the end of the study 19 (65%) of the 29 patients were symptom-less and 5 others much improved. PEMF therapy may thus be useful in the treatment of severe and persistent rotator cuff and possibly other chronic tendon lesions. - The Lancet PMID: 6143039

### **Sacral pain**

Magnetic stimulation of the sacral nerve roots is used for neurologic examination. However, no one has reported therapeutic efficacy of pain relief from pudendal neuralgia with sacral magnetic stimulation. Sacral magnetic stimulation immediately eliminated the pain. The pain relief lasted between 30 minutes and 56 days (median, 24 hours). Adverse effects were not observed. This pilot study indicates that magnetic stimulation of the sacral nerve roots may be a promising therapeutic modality for pain relief from pudendal neuralgia and sciatica. Further studies should be performed to determine the appropriate intensity and frequency, as well as the utility of a second course, of magnetic stimulation treatment. - Diseases of the Colon and Rectum PMID: 11852346

### **Spinal cord injury**

The use of oscillating field stimulator treatment in patients with spinal cord injury is safe, reliable, and easy. Compared with the outcomes obtained in compliant National Acute Spinal Cord Injury Study III plegic patients, the results of the present study indicate efficacy, and the FDA has given permission for enrollment of 10 additional patients. - Journal of Neurosurgery: Spine PMID: 15658119

### **Stroke**

New methods of rehabilitation should be introduced in order to reduce disability resulting from stroke. During the twelve months of follow-up, effect of low frequency magnetic field on the course of patient rehabilitation following ischemic stroke was evaluated on in-patient (acute and subacute period of the stroke) and outpatient (chronic period) basis. The results obtained indicate beneficial effects of groups of patients. - Przegląd Lekarski PMID: 17892036

There is evidence that electromagnetic stimulation may accelerate the healing of tissue damage following ischemia. We undertook this study to investigate the effects of low frequency pulsed electromagnetic field (PEMF) exposure on cerebral injury. Exposure to pulsed electromagnetic field attenuated cortical ischemia edema on MRI at the most anterior coronal level by 65%. On histologic examination, PEMF exposure reduced ischemic neuronal damage in this same cortical area by 69% and by 43% in the striatum. Preliminary data suggest that exposure to a PEMF of

short duration may have implications for the treatment of acute stroke. – Bioelectromagnetics PMID: 8074737

### **Tinnitus**

At the end of one week of treatment, each patient noted whether their tinnitus had completely disappeared, was improved, unchanged or made worse by the treatment. 45% of the patients who completed the trial were improved by the active device, but only 9% by placebo). We suggest that electromagnetic stimulation may be an effective treatment in some tinnitus sufferers. - Clinical Otolaryngology and Allied Sciences PMID: 8877185

### **TMJ**

The experimental group showed a significant increase in mouth opening (mean = 34.95 to 41.70 mm,  $p = 0.002$ ), right lateral movement (mean = 7.85 to 10.80 mm,  $p = 0.001$ ) and left lateral movement (mean = 7.65 to 10.85 mm,  $p < 0.0001$ ). No significant ( $p > 0.1$ ) change in the control group occurred for mouth opening (mean = 38.50 to 39.65 mm), right lateral movement (mean = 8.60 to 8.75 mm) and left lateral movement (mean = 8.50 to 8.80 mm). No side effects were reported during the treatment and the two week follow-up. These results suggest strongly that PRFE is a safe and effective treatment for TMJ arthralgia as well as for increasing mandibular range of motion. – Cranio PMID: 14964334

### **Wounds**

Treatment for wounds included two modalities: standard medication and alternating or pulsating magnetic field. Magnetic therapy proved highly effective: wound healing was 3-3.5 times faster while duration of treatment--2-3 times shorter than in standard procedure. Clinically-verified partial adhesion-related intestinal obstruction was eliminated by magnetic procedure in 18 children after combined treatment for lymphosarcoma involving the ileum. - Volpr Onkol PMID: 11147428

Pulsed radio frequency energy was used as an adjunct to basic wound care of 3 large, long-standing (6 years) stage III and IV pressure ulcers that were unresponsive to conventional therapy. The ulcer on the right foot healed within 4 weeks, the left heel ulcer reduced in size by 95% at 7 months, and the large sacral ulcer healed to closure in 11 months.

Conclusion: Pulsed radio frequency energy treatment with basic wound care, if administered early in the course of pressure ulcer therapy, might avoid the lengthy hospitalizations and repeated surgical procedures necessary for treatment of uncontrolled ulcers, reducing the overall cost of treatment and improving the quality of life for chronically ill or injured patients. - Journal of Plastic and Reconstructive Surgery PMID: 19008935