

## **Arthritis Research Studies**

<http://www.micronauts.com/magnetic.htm>

A formal study was reported at a Madras conference. Patients with arthritis, spondylosis, and malunion of fractures were treated with pulsed magnetic fields from .01 to 1 Hz.. The polarity and strength was not specified. Near 80% to 85% of the patients recovered and recurrence occurred in only two patients after a two year period.

## **Other Arthritis Research Studies**

PEER-REVIEWED SCIENTIFIC STUDY

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This study found that 3 hours of exposure to a 50-Hz magnetic field significantly inhibited experimentally induced inflammation and suppressed arthritis in rats.<sup>5</sup>

A noteworthy American double-blind, placebo-controlled study on the effects of static magnets on the treatment of arthritis was recently published in the *MDBR Journal of Rheumatology* (November 1997, p. 1200). The study confirms the effectiveness of magnets in relieving the pain of arthritis. Another scientific study of similar rigor is being carried out by Dr. Zimmerman, and is looking at the effects of fixed magnets on low back pain. There is good reason to expect confirmation of what users have been claiming for years--that magnets are an excellent aid to pain relief.

This double-blind, placebo-controlled study examined the effects of pulsed electrical fields administered over a period of 4 weeks in the treatment of arthritis of the hand. Results showed significant clinical improvement in patients receiving the therapy relative to controls.<sup>7</sup>

In this general review article on the treatment of patients with psoriatic arthritis with magnetic fields, the authors state that an alternating low-frequency magnetic field (30-40 mT) from such generators as "Polius-1" and "Polius-101" improves the clinical state of afflicted joints. Such treatments are normally carried out for 30 minutes per day over a period of 15 to 20 days.<sup>8</sup>

This study examined the effects of magnetolaser therapy either itself or in combination with conventional drugs in patients suffering from rheumatoid arthritis. Magnetolaser therapy involved the use of an AMLT-01 device and consisted of 6-minute exposures daily over a total of 14 days. Results showed a marked improvement following the first 3 days of magnetolaser therapy, with the strongest positive effects experienced by patients characterized as suffering from mild to moderate levels of the disease. At the end of the magnetolaser therapy course, 90 percent of patients showed improvement.<sup>9</sup>

This study examined the effects of low-frequency magnetic fields (from a "Polius-1" device) in patients 7 to 14 years old suffering from juvenile rheumatoid arthritis. Treatment consisted of 10 daily exposures of 10 to 12 minutes each. Results showed beneficial effects in 58, 76, and 37 percent of patients in each of three experimental groups.<sup>10</sup>

This study examined the effects of low-frequency and constant magnetic fields in patients suffering from rheumatoid arthritis and osteoarthritis. Low-frequency magnetic fields were shown to produce beneficial effects in patients with both stage I and II rheumatoid arthritis and with osteoarthritis deformans, especially with respect to the wrists, knees, and ankles.<sup>11</sup>

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# **Low Back Pain and Other Forms of Chronic Pain**

From: <http://www.tnp.com/encyclopedia/therapy/1/5/>

A double-blind, placebo controlled crossover trial of 54 individuals with knee or back pain compared an alternating polarity static magnet against a sham magnet.<sup>38</sup> Participants used either the real or sham device for 24 hours; then, after a 7 day rest period, used the opposite therapy for another 24 hours.

Evaluations showed that use of the real magnet was associated with greater improvements than the sham treatment.

A double-blind placebo-controlled crossover study used alternating-pole magnets (defined in section on How to Use Magnet Therapy) on 20 individuals who had chronic low back pain for at least 6 months duration; the average length of time the participants had suffered with back pain was 19 years.<sup>6</sup> The study found no improvement relative to the placebo group.

## **Pelvic Pain**

A double-blind placebo-controlled study of 14 women with chronic pelvic pain found no significant benefit when magnets were applied to abdominal trigger points for 2 weeks.<sup>7</sup> However, statistical analysis showed that a larger study would have been necessary to show whether magnet therapy was effective.

## **Bone Fracture Research Studies**

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This study examined the effects of bone grafting and pulsed electromagnetic fields on a group of 83 adults with ununited fractures. Results showed a successful healing rate of 87 percent in the 38 patients originally treated with bone grafts and PEMF for ununited fractures with wide gaps, synovial pseudarthrosis, and malalignment. A healing rate of 93 percent was shown among the 45 patients who had initially been unsuccessfully treated with PEMF alone and had bone-grafting and were re-treated with pulsing electromagnetic fields.14

This study examined the effects of pulsing electromagnetic fields on 125 patients suffering from ununited fractures of the tibial diaphysis. Results showed a healing rate of 87 percent.15

Results of this study showed treatment with pulsed electromagnetic fields resulted in an overall success rate of at least 75 percent in patients suffering from tibial lesions.16

This review article makes the following observations with respect to the use of pulsed electromagnetic fields in treating ununited fractures, failed arthrodeses, and congenital pseudarthroses. The treatment has been shown to be more than 90 percent effective in adult patients. In cases where union does not occur with PEMFs alone after approximately four months, PEMF treatment coupled with fresh bone grafts ensures a maximum failure rate of only 1 to 1.5 percent. For those with delayed union three to four months following fracture, PEMFs appear to be more successful than in patients treated with other conservative methods. For more serious conditions, including infected nonunions, multiple surgical failures, long-standing atrophic lesions, failed knee arthrodeses after removal of infected prostheses, and congenital pseudarthroses, PEMF treatment has exhibited success in most patients.17

Results of this study found that 35 of 44 nonunited scaphoid fractures 6 months or older healed in a mean time of 4.3 months during pulsed electromagnetic field treatment using external coils and a thumb spica cast. 18

This double-blind, placebo-controlled study examined the effects of pulsed electromagnetic fields in femoral neck fracture patients undergoing conventional therapy. PEMF treatment was started within two weeks of fracture, and patients were instructed to make use of the electromagnetic device for 8 hours per day over a 90-day period. Results showed beneficial effects relative to controls after 18 months of follow-up.19

This review article on pulsing electromagnetic fields in the treatment of bone fracture observes that the surgically noninvasive outpatient method approved by the FDA in 1979 produced confirmed end results in 1007 ununited fractures and 71 failed arthrodeses, with an overall success rate at Columbia-Presbyterian Medical Center of 81 percent; an international success rate of 79 percent, and a success rate with other patients in the U.S. of 76 percent.22

Results of this double-blind study showed significant healing effects of low-frequency pulsing electromagnetic fields in patients treated with femoral intertrochanteric osteotomy for hip degenerative arthritis.25

In this study, 147 patients with fractures of the tibia, femur, and humerus who had failed to benefit from surgery received treatment with external skeletal fixation in situ and pulsed electromagnetic fields. Results indicated an overall success rate of 73 percent. Femur union was seen in 81 percent and tibia union in 75 percent.26

This study examined the effects of extremely-low-frequency electromagnetic fields (1-1000 Hz, 4 gauss) on new bone fractures of female patients. Results led the authors to suggest that EMF treatment accelerates the early stages of fracture healing.27

This study examined the preventive effects of low-frequency pulsing electromagnetic fields against delayed union in rat fibular osteotomies and diaphyseal tibia fractures in humans. Results indicated such treatment modulated and accelerated fracture union in both groups.29

This article discusses the cases of two children with bone malunion following lengthening of congenitally shortened lower legs. Pulsed sinusoidal magnetic field treatment was beneficial for both patients.30

Results of this study showed that 13 of 15 cases of long-bone nonunion treated with pulsed electromagnetic fields in combination with Denham external fixator united within several months.31

Results of this study found electromagnetic field stimulation to be an effective treatment for nonunion among a group of 37 French patients.32

Results of this study found treatment induced pulsing to be beneficial in patients suffering from nonunions unresponsive to surgery.33

In this interview with Dr. C. Andrew L. Bassett, a physician researching the use of pulsed electromagnetic fields for the past 30 years at Columbia University's Orthopedic Research Lab, Dr. Bassett notes that approximately 10,000 of the 12,000-plus orthopedic surgeons in the U.S. have used pulsed electromagnetic fields on at least one patient. Many such surgeons have incorporated the therapy on a more regular basis. He estimates that a total of at least 65,000 patients nationwide have received the treatment, with a probable success rate of between 80 and 90 percent. Use of the treatment has been primarily in patients suffering from nonunited fractures, fusion failures, and pseudoarthrosis.<sup>34</sup>

Results of this study showed pulsed electromagnetic fields to have beneficial healing effects in patients suffering from difficult to treat and surgically resistant bone nonunions.<sup>35</sup>

This review article notes that the use of pulsed electromagnetic fields began in 1974, and that 250,000 nonunion patients have received the treatment since. The author argues that success rates are comparable to those of bone grafting, and that PEMF treatment is more cost-effective and free of side effects. The FDA approved PEMF use in 1982, although it remains widely unused due to physician misunderstanding and lack of knowledge concerning the treatment.<sup>36</sup>

This 7-year study examined data on more than 11,000 cases of nonunions treated with pulsed electromagnetic fields for up to 10 to 12 hours per day. Results indicated an overall success rate of 75 percent.<sup>37</sup>

This study examined the effects of low-frequency electromagnetic fields (1-1000 Hz) on middle-aged female patients suffering from fresh radius fractures. Results showed significant increases in scintimetric activity surrounding the fracture area after two weeks of EMF treatment relative to controls.<sup>38</sup>

This study examined the effects of constant magnetic fields in patients suffering from fractures. Results showed that magnetic exposure reduced pain and the onset of edema shortly after trauma. Where edema was already present, the treatment exhibited marked anti-inflammatory effects. The strongest beneficial effects occurred in patients suffering from fractures of the ankle joints.<sup>39</sup>

Results of this study found that 10 hours per day of electromagnetic stimulation (1.0-1.5 mV) produced complete union in 23 of 26 patients receiving the treatment for nonjoined fractures.<sup>40</sup>

This review article looks at the history of pulsed electromagnetic fields as a means of bone repair. The author argues that success rates have been either superior or equivalent to those of surgery, with PEMF free of side effects and risk.<sup>41</sup>

# **Cancer Studies**

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Results of this study found that prolonged exposure to a 7-tesla uniform static magnetic field for a period of 64 hours inhibited growth of three human tumor cell lines in vitro.<sup>43</sup>

This study examined the effects of a rotational magnetic field on a group of 51 breast cancer patients. Results showed a significant positive response in 27 of them.<sup>44</sup>

Results of this study indicated that exposure to a rotational magnetic field inhibited Walker's carcinoma tumor growth as much as 90 percent in some cases.<sup>45</sup>

Results of this study indicated that pulsed magnetic field stimulation increased the incorporation of antitumor agents into cells, and thus increased antitumor activity shifting the cell cycle to a proliferative from a nonproliferative phase.<sup>46</sup>

Results of this study found that 20-30 sessions of magnetotherapy administered preoperatively exhibited antitumor effects in patients suffering from lung cancer.<sup>47</sup>

This study examined the effects of microwave resonance therapy (MRT) in patients suffering from various forms of cancer. Results showed that MRT treatment prior to surgery reduced the spread of cancer-associated conditions and reduced the risk associated with surgery in 87 percent of patients. MRT applied postoperatively had beneficial effects in 68 percent.<sup>50</sup>

Results of this study proved that the combination of weak pulsed electromagnetic fields with antioxidant supplementation is beneficial in the treatment of patients suffering from tongue cancer, improving speech, pain control, and tolerance to chemotherapy.<sup>51</sup>

Results of this controlled study indicated that treatment with a constant magnetic field significantly improved long-term (3-year) survival time in patients undergoing radiation therapy for cancer of the throat. Constant magnetic field therapy consisted of the application of 300 mT for 30 minutes to tumor and metastasizing regions immediately prior to each irradiation.<sup>52</sup>

Results of this Russian study indicated that the use of whole body eddy magnetic fields, coupled with more conventional cancer therapies (including magnetotherapy) is effective in the treatment of patients suffering from a variety of different malignancies.<sup>53</sup>

This article reports on the case of a 48-year-old-woman with breast cancer who was treated successfully with magnetotherapy. Infiltration showed a marked decrease following 30 whole body exposures to an eddy magnetic field for 60 minutes. One metastatic node disappeared while the size of others was reduced following 60 such exposures. A total regression of tumor and metastases was seen following the completion of a course of 110 exposures.<sup>54</sup>

This study examined the effects of whole body magnetic fields (16.5-35 G, 50-165 Hz) on patients suffering from different forms of cancer. Treatment consisted of 15 cycles, each 1-20 minutes in duration, and was coupled with more traditional cancer therapies. Results showed that the magnetotherapy had overall beneficial effects, particularly with respect to improved immune status and postoperative recovery.<sup>55</sup>

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# **Cardiovascular/Coronary Heart Disease**

PEER-REVIEWED SCIENTIFIC STUDY

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Results of this study found that the addition of magnetotherapy to the treatment of patients suffering from ischemic heart disease and osteochondrosis led to clinical improvements.<sup>57</sup>

Results of this study involving 23 parasystolic children found that low-frequency magnetic field exposure improved humoral and cellular processes involved in the regulation of cardiac rhythm.<sup>58</sup>

The authors of this study report on their development of a polymagnetic system called Avrova-MK-01 used to administer impulse magnetic fields to diseases of the leg vessels. Results indicated positive effects on peripheral capillaries in 75-82 percent of patients receiving the treatment at a pre-gangrene stage.<sup>59</sup>

Results of this study showed exposure to low-frequency alternating magnetic fields had beneficial effects in children with primary arterial hypertension, as seen in the attenuation of sympathetic and vagotonic symptoms.<sup>60</sup>

This study demonstrated that traveling pulsed magnetic field and magnetic laser treatment produced beneficial effects in patients suffering from the initial stages of essential hypertension.<sup>61</sup>

In this article, the authors propose a new approach to treating atherosclerosis through the alteration of biophysical properties both intracellularly and extracellularly. Citing their own preliminary data, they suggest atherosclerotic lesions might be selectively resolved without harming normal blood vessels allowing the lesions to take up the magnetically excitable submicron particles and then applying an external alternating electromagnetic field.<sup>62</sup>

This study examined the effects of constant MKM2-1 magnets on essential hypertension patients. Results indicated the treatment decreased arterial pressure in stage II patients, with magnetotherapy being shown to produce beneficial effects on the central hemodynamics and microcirculation.<sup>63</sup>

Results from several recent studies conducted the author are reviewed. Conclusions are that pulsed electromagnetic fields exhibit protective effects against necrosis from acute ischemia in rats, cerebral infarcts in rabbits, and myocardium infarcts in rats.<sup>64</sup>

This study examined the effects of extremely high frequency electromagnetic radiation (EHF EMR) in 93 patients suffering ischemic heart disease. EHF treatment consisted of 10 to 15 exposures of the lower end of the sternum from a 'Yav'-1-7,1 device. Treatment was performed five times weekly for a total of 30 minutes per day, with drug therapy being maintained during this period. Positive results tended to occur after 5 to 6 treatment sessions, with a good or satisfactory response being reported in 82 of 93 patients, and lasting as long as 11 months after hospital release.<sup>65</sup>

This review article concerning the clinical application of electromagnetic fields notes that microwave therapy has been shown to improve local circulation and vascular tone, increase the volume of functional capillaries, lower hypertension, stimulate protein and carbohydrate metabolism, stimulate the pituitary-adrenal system, produce anti-inflammatory effects, and improve digestive organ function. Studies have shown decimeter wave therapy capable of stimulating the secretory function of the stomach, as well as blood circulation, respiratory function, and the immune system. Side effects have been reported in both human and animal studies.<sup>67</sup>

In this study, 30 myocardial infarction patients received millimeter-wave (MW) therapy in the form of 10 exposures of 30 minutes per day, with a 2-day interruption after the fifth exposure. Patients continued conventional drug treatment during the MW therapy period. Better results were seen in those patients exposed to the MW therapy relative to an equal number of patients receiving conventional treatment only.<sup>68</sup>

This study examined the effects of millimeter wave therapy in approximately 450 patients suffering from a variety of diseases, including those of the musculoskeletal, digestive, pulmonary, and nervous systems. Treatment consisted of 25-30 minutes per day using the "Porog-1" apparatus and generally lasted for a period of up to 10 days. Results showed positive effects in over 87 percent of the patients.<sup>69</sup>

Results of this study found that the use of magnetophore therapy (constant magnets applied to adrenal regions 10 hours per day for 15 days) significantly improved symptoms associated with hypertension in about 35 percent of patients studied, with mild improvement seen in 30 percent, and no improvement in 35 percent. Patients receiving decimeter-band waves (460 MHz, field intensity of 35-45 W, for 10-15 minutes per day for a total of 15 days) experienced similar results.<sup>70</sup>

Results of this placebo-controlled study demonstrated a 76-percent effectiveness rate for running impulse magnetic field therapy in a group of arterial hypertensive patients. Treatment consisted of two 25-minute exposures per day over a period of 10-20 total exposures, at frequencies of 10 or 100 Hz and magnetic field intensity of 3 or 10 mT.<sup>71</sup>

This study examined the efficacy of the reinfusion of autologous blood following magnetic field exposure in hypertensive patients. Positive effects were found in 92 percent of patients receiving the treatment.<sup>73</sup>

This double-blind, placebo-controlled study examined the effects of magnetotherapy in patients suffering from first- or second-stage hypertension. A magnetic field of 50 Hz, 15-25 mT was applied to acupuncture points He-Gu and Shen'-Men for 15-20 seconds per day for a total of 9-10 days. Results: The treatment improved headaches in 88 percent of patients, dizziness in 89 percent, and irritability in 88 percent. In general, 95 percent of hypertensive patients experienced beneficial effects from the treatment, and the morbidity rate decreased twofold following one course extended over a period of 5-6 months.<sup>74</sup>

This placebo-controlled study examined the effects of constant and of running magnetic fields in patients suffering from stage II hypertension. Results found that constant magnetic fields exhibited benefits in 68 percent of patients treated, and running magnetic fields were helpful in 78 percent. Only 30 percent of controls showed improvement. Constant magnetic field treatment consisted of constant magnets applied to the inner side of the wrist on each hand for 35-40 minutes daily over a period of 7-10 days. Running magnetic field treatment involved the use of a "Alimp-1" apparatus for 20 minutes per day for a total of 12-15 days.<sup>76</sup>

This double-blind, placebo-controlled study found that magnetotherapy was effective in the treatment of symptoms associated with stage II hypertension, such as headache, dizziness, and cardiodynia. The therapy consisted of permanent circular magnets (16 mT) applied to the inner forearm for 30-45 minutes per day over a period of 10 sessions.<sup>77</sup>

This controlled study examined the effects of magnetotherapy in patients suffering from neurocirculatory hypotension (low blood pressure) or hypertension (high blood pressure). Treatment consisted of a running pulsed magnetic field generated an "ALIMP" device (0.5 mT, 300 Hz) administered for 20 minutes per day over a course of 10 days. Patients suffering from hypotension did not benefit significantly from the magnetotherapy. Hypertension patients, however, showed a marked improvement with respect to symptoms including headache, chest pain, extremity numbness, abnormal systolic and diastolic blood pressure, and work capacity.<sup>80</sup>

This double-blind, placebo-controlled study found that low-frequency, low-intensity electrostatic fields (40-62 Hz) administered for 12-14 minutes per day helped normalize blood pressure in patients suffering from hypertension.<sup>81</sup>

This study examined the effects of low-frequency alternating magnetic fields in patients suffering from arteriosclerosis or osteoarthritis deformans. Treatment involved 10-15 minute daily leg exposures over a total of 15 days. Results showed the treatment to be effective in 80 percent of arteriosclerosis patients and 70 percent of those with osteoarthritis deformans.<sup>82</sup>

This study examined the effects of low-frequency magnetic fields (25 mT) in patients suffering atherosclerotic encephalopathy. Treatment involved 10-15 minute daily exposures over a total of 10-15 applications. Results showed clinical improvements with respect to chest pain, vertigo, headache, and other symptoms.<sup>83</sup>

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## **Dental Research Studies**

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This placebo-controlled study examined the effects of micromagnets in the treatment of periodontal disease. Micromagnets were attached to the skin over areas of inflammation for a period ranging from 1 to 8 days, with the number of magnets used at once varying from 1 to 6. The course of treatment lasted as long as 4 weeks. Results indicated that patients receiving the micromagnet therapy experienced earlier and more trouble-free recoveries following oral surgery, as well as less pain relative to controls.<sup>99</sup>

This controlled study examined the effects of adjunctive Diapulse electromagnetic therapy on oral surgery recovery. Patients received the therapy once per day beginning between 3 to 5 days prior to oral surgery. Therapy was maintained until the point of hospital release. Results found the therapy produced significant healing relative to controls, who received conventional treatment only.<sup>100</sup>

This study found that patients suffering from various oral diseases experienced more rapid healing when treated with both conventional therapies and 30 minutes per day of pulsed electromagnetic fields (5 mT, 30 Hz), as opposed to conventional therapies alone.<sup>101</sup>

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