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SCIENTIFIC, MEDICAL AND CLINICAL STUDIES

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On the effect of "Pulsating Electromagnetic Fields" (PEMF). Also known as "Pulsating Energy Resonance Therapy" (PERTH). Summary of documents available at the "Institut für Energie-Medizinische Systeme e.V." - EMS Berlin International. Institute of Medical Energy Systems (BERLIN - GERMANY)

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INTRODUCTION

More than 10,000 scientific papers have been published about the effect of PEMF. Many of the studies have been carried out in Russia and Eastern Europe, which is the centre of the international research on Pulsating Electro-Magnetic Fields (PEMF).

Many original publications of these studies are in the Russian language only and have been presented and published at Eastern European conferences.

Russian research teams have been using low frequency Pulsed Electromagnetic Fields similar to the systems studied and endorsed by EMS (Institut für Energie-Medizinische Systeme e.V. - Institute of Energy-Medical Systems) in Berlin, Germany. Some of the research team are well known to EMS. We have therefore used the terminology PERTH for some of these studies.

Some of the enclosed studies were presented at the Second World Congress for Electricity and Magnetism in Biology and Medicine, June 1997, Bologna, Italy. Several of the studies were published in Western Medical Journals such as the Lancet and on the PubMed website.

The double blind, placebo controlled study of the "Therapeutic Efficiency Of Pulsating Energy Resonance Therapy (PERTH) In Patients With Vertebral Diseases" by Assoc. Prof. Marin Marinkev, MD, Assoc. Prof. Todor Kraev, MD, Dr. Stojan Kamenov and Dr. Antoaneta Georgieva of Physical Medicine, Higher Medical Institute, Plovdiv is enclosed in full.

Also enclosed is the summary of a study of the effect of PERTH on blood parameters by Prof. Dr. G. Schauf, Dr. Med. Schara, Dr. Med. Sell, Bergische Universität Wuppertal, Fachb. Medizintechnik, published 12/1994.

The overall effect of PERTH is best summarized by the foreword from the book "Energy Medicine" by Josef A. Plattner and Dr. Reinhard Werner, MD and by 2 abstracts of papers by C.A. Bassett; Bioelectric Research Centre, Columbia University, New York, of his publication "Fundamental and practical aspects of therapeutic uses of pulsed electromagnetic fields (PEMFs)" and "Beneficial effects of electromagnetic fields".

The terminology PERTH has widely been used in Germany for fields which are similar to the bodies own electric force fields, created when muscle tissue and bone structures are exercised. Dr. Bassett and American literature describes the same fields as PEMFs.

General Effect of PEMF or PERTH

- **Foreword from the book "Energy Medicine" by Josef A. Plattner and Prof. Dr. Reinhard Werner, MD, PhD.**

Pulsating electromagnetic fields can be a blessing and a curse to human life. They definitely have a large influence on all forms of life on earth.

There are more than 10,000 scientific publications plus numerous books

written about the effects of electromagnetic fields on the human body. More than 1,000 dissertations have been written about the subject and more than 300 Professors are doing research in this wide field of science, which includes Biology, Physiology, Biophysics, Genetic Science and Medicine. In the last few years it has become evident that electromagnetic fields can be used for many therapeutic applications. Systems have been developed on the basis of scientific research, which use electromagnetic fields to stimulate the body's own biological energy production. This inductive stimulation of the body's own energy has become a new medical specialty resulting in the term "Energy Medicine". Energy Medicine explains many phenomena, like the effect of the psyche on our health, as well as healing through the mind or even spontaneous healing.

Past literature was written by specialists for other specialists and for a small groups of interested physicians. Most doctors know little about these alternative medical therapies due to a lack of communication between biologists, physicists and medical personnel.

Energy Medicine is however an important component in Russian space medicine. Eastern Europe is the centre of scientific research and wide spread medical application of this modern therapy. In one institute in Sofia, Bulgaria alone there have been more than 100,000 successful treatments carried out during 1993 - 1996.

Recently PERTH became accepted in Germany. Following a period of close scrutiny by traditional medicine, many progressive doctors now use this form of therapy, which has been developed by modern medical technology using sophisticated computer supported systems.

The individual person has the largest advantage from using PERTH. It allows many people to take the initiative and be more responsive in preventing a health crisis. It is best to use PERTH on a regular basis, as prevention before any disease occurs.

New Energy Medicinal Diagnostic Systems can recognise the formation of a pathological condition in its early stages, much earlier than any other diagnostic method. This is a big step towards avoiding disease.

In the last several years we have been involved in the research and development of the medical uses of optimised PEMF. We are closely linked with several international universities. The audience response to countless lectures and seminars has made us realise that the time is ripe for educated people to take charge of their own personal well-being. The era of prevention of health, rather than cure of disease, has started.

- **Bassett CA. Orthopedic Surgery, Columbia University, NY. Fundamental and practical aspects of therapeutic uses of pulsed electromagnetic fields (PEMFs).**

The beneficial therapeutic effects of selected low-energy, time-varying magnetic fields, called PEMFs, have been documented with since 1973. Initially, this form of energy was used mainly as salvage for patients with long-standing nonunions. Many of these individuals were candidates for amputation. Their resistance to the usual forms of surgical treatment, including bone grafting, served as a reasonable control in judging the efficacy of this new therapeutic method. More recently, the biological effectiveness of this approach in augmenting bone healing has been confirmed by several highly significant double blind and controlled studies. Furthermore, double blind evidence of therapeutic effects in other clinical disorders has emerged. These data, coupled with well-controlled laboratory findings on pertinent mechanisms of action, have begun to place PEMFs on a therapeutic par with surgically invasive methods but at considerably less risk and cost.

Over the past decade, the number of publications has risen exponentially. They now include textbooks, speciality journals, regular reviews by government agencies, in addition to individual articles, appearing in the wide spectrum of scientific sources. In a recent review of the frontiers of biomedical engineering Dr. Garfield chose PEMFs from among other biomedical engineering efforts as an example of a rapidly emerging discipline.

This review focuses on the principles and practice behind the therapeutic use of "PEMFs". This term is restricted to time-varying magnetic field characteristics that induce voltage waveform patterns in bone similar to those resulting from mechanical deformation. These asymmetric, broad-band pulses affect a number of biologic processes athermally. Many of these processes appear to have the ability to modify selected pathologic states in the musculoskeletal and other systems. PubMed.

- **C.A. Bassett; "Beneficial effects of electromagnetic fields".**

Selective control of cell function by applying specifically configured, weak, time-varying electromagnetic fields has added a new, exciting dimension to biology and medicine. Field parameters for therapeutic, pulsed electromagnetic field (PEMFs) were designed to induce voltages similar to those produced, normally, during dynamic mechanical deformation of connective tissues. As a result, a wide variety of challenging musculoskeletal disorders have been treated successfully over the past two decades. More than a quarter million patients with chronically ununited fractures have benefited, worldwide, from this surgically non-invasive method, without risk, discomfort, or the high costs of operative repair. Not only is efficacy supported by these basic studies but by a number of double blind trials. As understanding

of mechanisms expands, specific requirements for field energetics are being defined and the range of treatable ills broadened. These include nerve regeneration, wound healing, graft behaviour, diabetes, and myocardial and cerebral ischemia (heart attack and stroke), among other conditions. Preliminary data even suggest possible benefits in controlling malignancy. PMID: 8496242 PubMed

CONDITIONS

AIDS

- Cossarizza et al.: 'Effects of PEMF on the Proliferation of Lymphocytes from AIDS-Patients, HIV Sero-Positive Subjects, and Seronegative Drug Users,' Department of Disease, University of Modena, Italy, J. Bio-electrics (USA) 1989. - The effect of PEMF on the replication of mitogen-stimulated lymphocytes in AIDS patients and a controlled group was investigated. It was found that cell division remained unchanged in the group of healthy subjects. In the AIDS patient group, an increase in active T lymphocytes was observed.
- Wallach: 'Electromagnetic Therapy - A New Medical Discipline,' California Institutional Review Board, Canoga Park, California, 1998. - This article reviews various documented by studies, in addition to the traditional indications involving the motor system, mainly new possibilities such as supportive treatment by PEMF in the area of immunology and AIDS.
- M.R. Cho et al.: 'Regulation of Electric Field-Induced Macrophage Migration by Extra cellular Matrix,' Harvard Medical School and Brigham & Women's Hospital, Boston. University of Chicago School of Medicine, Chicago. 1998. - This study has shown that phagocytes are stimulated by PEMF to much greater activity than was the case in the control group without PEMF
- Rodin et al.: 'Use of Low-Intensity Eddy Magnetic Field in the treatment of Patients with Skin Lymphomas', Voen Med Zh, 317 (12), 1996, pp. 32-34

Acne

- R.A. Drolet: 'Thumart Therapy: A non-Invasive Cell Regeneration Ion and Anti-Inflammatory Therapy Using Electromagnetic Fields,' Bioelectromagnetics Society, 4th Annual Meeting, Los Angeles. - The positive anti-inflammatory, cell-regenerating, sedative and pain-relieving effects of PEMF are described.

Allergies

- V.I. Kovalchuk, et al., 'Use of Extremely Low Frequency Magnetic Fields in Clinical Practice,' *Fizicheskaia Medtizona*, 4 (1-2), 1994, p. 87.
- The anti-inflammatory and pain-relieving effects of PEMF are emphasized.

Alzheimer's Disease

- R. Sandyk et al.: 'Age-Related Disruption of Circadian Rhythms: Possible Relationship to Memory Impairment and Implications for Therapy with Magnetic Fields,' *International Journal of Neuroscience*, 59 (4), August 1991, pp. 259-262. - The circadian rhythm seems to be causally related to memory loss in the elderly and possibly also to Alzheimer's disease. PEMF can probably improve memory performance in elderly patients by resetting the biological clock.
- R. Sandyk: 'Alzheimer's Disease: Improvement of Visual Memory and Visuoconstructive Performance by Treatment with low intensity PEMF in Picotesla intensity ' *International Journal of Neuroscience*, 76 (3-4), June 1994, pp. 185ff. - Two Alzheimer's patients showed a definite improvement after treatment with PEMF, especially in the visual memory and their drawing abilities. There were also improvements in other cognitive functions, in the ability of these patients to orient themselves in space, their mental/emotional condition, their ability to make social contact and their short-term memory.

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Amyotrophic Lateral Sclerosis

- R. Bellosei, Berget: 'Pulsating Electromagnetic Fields offer a Glimmer of Hope for Patients Suffering from Amyotrophic Lateral Sclerosis,' *Second World Congress for Electricity and Magnetism in Biology and Medicine*, June 8-13, 1997, Bologna, Italy. - This investigation reports on three patients with amyotrophic lateral sclerosis who responded positively to with PEMF. Definite clinical improvements were observed in these patients.

Anaemia

- T.V Golovacheva: PEMF in Complex Treatment of Cardiovascular Diseases, "mm Waves in Medicine and Biology", 10th Russian Symposium with International Participation, April 24-26, 1995, Moscow, pp. 29-31

Aneurysm

- V.M. Bogoliubov, L.A. Skurikhina: "Therapeutic Application of Constant and Low-frequency Electromagnetic Fields," - this review of various studies documented positive effects in the treatment of arterial aneurisms.

Angina Pectoris

- L.L. Orlov et al.: "Evaluation of Anti-anginal Effects of PEMF and Drug Therapy on the Physical Working Capacity and Hemodynamics in Patients with Stable Angina Pectoris," *Kardiologiia*, February 1992.
- In this study the effect of PEMF and medication against angina pectoris and the combination therefore was investigated on 60 patients with stable first through third degree angina. A monotherapy (just one medication) with MDT had a good anti-anginal action on patients with class 1-2 angina pectoris. The efficacy of the treatment increased definitely when combined with several drugs.
- T.A. Kniazeva, R. Artutiunian: "The Effect of PEMF and General Iodobromide Baths with the Presence of Molecular Iodine on the Blood Coagulation Processes and the Central Hemodynamics of Patients after an Aortocoronary Bypass," *Zeitschrift fur Kur- und Physiotherapie [Journal for Cure Therapy and Physical Therapy]*, 1990.
- L.D. Makoeva et al., "PEMF in Treating Stenocardia," *Biofizika* July-August, 1996, pp. 949-952. - This article reports on the use of PEMF in treatment of angina pectoris in combination with and without medication. The flow properties of the blood, the cardiac output and clinical symptoms were investigated. It was found that PEMF has a definite anti-anginal action on class 1 and 2 angina patients. With the combination with several drugs on class 3 angina patients, a stronger and better effect of the medications was observed. The incidence of heart attacks was clearly reduced.

Apoplexy

- G. Grantet et al.: "Protection Against Focal Cerebral Ischemia Following Exposure to a Pulsed Electromagnetic Field," Department of Neurosurgery, Stanford University, California, Bioelectromagnetics 1994. - This study shows that electromagnetic stimulation leads to more rapid healing and repair of damage to cerebral arteries. Studies on rats have shown a positive effect of pulsating electromagnetic fields in the treatment of strokes.
- F.E. Gorbunov et al.: "The Effect of Combined Trans-cerebral Magnetic and PEMF on the Cerebral and Central Hemodynamic Status of Stroke Patients in the Early Rehabilitation Period," Vopr Kurortol Fizioter Lech Fiz Kult (3), May-June 1996, pp. 21-24. - These study results prove that treatment of apoplexy patients with PEMF in combination with a stimulus current in the early phase of rehabilitation yields the best results.
- B. Baychev et al.: "Evaluating the Effect of PEMF on Vasculo-Vegetative and Motor Disorders in Stroke Patients," Kurortol-Fizioter. 27/3 1990. - Thirty-five stroke patients were examined on the basis of various clinical test methods. After 15 days of treatment with PEMF an improved blood supply in both halves of the brain and a clinical improvement especially in the area of the hemiplegia were found. Motor abilities were restored more rapidly and the tendency to spastic symptoms was definitely reduced. PEMF was tolerated very well by the patients and proved to be quite beneficial both in the acute and subacute phases after a stroke.
- R. Cadossi: "Protective Effect of Electro-magnetic Field Exposure on Acute Soft Tissue Ischemic Injury," Second World Congress for Electricity and Magnetism in Biology and Medicine, June 8-13, 1997, Bologna, Italy. - Pulsating electromagnetic fields develop a protective mechanism against necrosis in acute ischemia. This experiment was proven on the brains of rats.

Arrhythmia

- L.N. Budkar et al.: 'Manetolaser Therapy in Treatment of Ischemic Heart Disease and Heart Rhythm Disorders,' Doktor Lending, 4(3), 1996, pp. 10-13.
- E.M. Vasi?eva et al.: 'The Effect of Low-Frequency Magnetic Field on Erythrocyte Membrane Function and on the Prostanoid Level in the Blood Plasma of Children with Parasystolic Arrhythmia,' vopr Kurortol Fizioter Lech Fiz Kult (2), March-April 1994, pp. 18-20. - This study reports on the results obtained on 23 children with parasystolic arrhythmia who experienced an improvement with PEMF in both humoral and cellular processes which are involved in the regulation of the heart rhythm.
- F. Petrossi: 'The Effect f Low-Frequency Magnetic Field on Erythrocyte Membrane Function and on the Prostanoid Level in the Blood Plasma of Children with Parasytolic Arrhythmia,'

Arteriosclerosis

- C. Wallach: "Electromagnetic Therapy. A New Medical Discipline," California Institutional Review Board, Canoga Park, California, 1998.
- This author shows that new areas of use for PEMF are opening up and more and more biological effects are being studied and documented by scientists. In addition to the known broad spectrum in injuries current studies on arteriosclerosis patients are showing a positive effect on atherosclerotic plaques.
- R.T. Gor et al.: "Selective Resolution of Plaques and Treatment of Arteriosclerosis Biophysical Alteration of Cellular and Intracellular Properties," *Medical Hypotheses*, 7(2) February 1981, p. 217. - In this article the new possibility of treatment arteriosclerosis by PEMF is discussed. Some of the atherosclerotic plaques that have already formed can be dissolved again without injuring the vessels.

Arthritis

- Jacobson JI, Gorman R, Yamanashi WS, Saxena BB, Clayton L.

Institute of Theoretical Physics and Advanced Studies for Biophysical Research, Perspectivism Foundation, 2006 Mainsail Cir, Jupiter, USA.

Placebo-controlled, randomised, double blind clinical study to determine the effectiveness of low-amplitude, extremely low frequency magnetic fields on patients with knee pain due to osteoarthritis. 176 patients were randomly assigned to 1 of 2 groups, the placebo group (magnet off) or the active group (magnet on). INTERVENTION: 6-minute exposure to each magnetic field signal using 8 exposure sessions for each treatment session, the number of treatment sessions totalling 8 during a 2-week period, yielded patients being exposed to uniform magnetic fields for 48 minutes per treatment session 8 times in 2 weeks. The range of magnetic field amplitudes used was from 2.74×10^{-7} to 3.4×10^{-8} G, with corresponding frequencies of 7.7 to 0.976 Hz. RESULTS: Reduction in pain after a treatment session was significantly ($P < .001$) greater in the magnet-on group (46%) compared to the magnet-off group (8%). CONCLUSION: Low-amplitude, extremely low frequency magnetic fields are safe and effective for treating patients with chronic knee pain due to osteoarthritis. PMID: 11565402 PubMed

- E. Riva Sanseverino, A. Vannini, P. Castellacci: "Therapeutic effects of pulsed electromagnetic fields on joint diseases," *Panminerva Medica* 34(4), October-December 1992, pp. 187-196. - This study characterizes PEMF as an excellent physical measure for the treatment of joint diseases. The authors of this study report that PEMF, when used correctly and repeated periodically, can stop the disease process of the effected joints, with regard to the clinical condition. The best results are

achieved in the treatment of pain.

- T. Zizic et al.: "The treatment of rheumatoid arthritis of the hand with pulsed electromagnetic fields," World Congress for Electricity and Magnetism in Biology and Medicine, June 1997, Bologna, Italy. - This double blind, placebo-controlled study investigates the effects of pulsating fields for a period of four weeks in the treatment of arthritis of the hand. The results show a definite clinical improvement in patients receiving magnetic field therapy in comparison with the control group without PEMF.
- V.D. Grigor'eva et al.: "Therapeutic use of physical factors in complex therapy of patients with psoriatic arthritis," Vopr Kurortol Fizioter Lech Fiz Kult (6), 1995, pp. 48-51. - This study presents a review of the treatment of patients with psoriatic arthritis with low-frequency pulsed electromagnetic fields. It demonstrates a definite improvement in the clinical condition of the effected joints.

Arthrosis

- D.H. Trock et al.: "A double blind Trial of the Clinical Effects of PEMF in Osteoarthritis," Journal of Rheumatology, 1993:20, pp. 456-460. - This double blind randomised study with 27 patients (primary arthrosis of the knee) is one of the most important research studies conducted in the field of PEMF. Six clinical parameters were investigated at different times during the treatment and an evaluation was carried out after one month. These results show a definite improvement in clinical parameters (such as mobility) in the group treated with PEMF in comparison with the group treated without PEMF. An important conclusion in this study is that for more than 17 years, more than 200,000 patients have already been treated in Eastern Europe with pulsating electromagnetic fields in clinical trials without any mentionable side effects. Observations in Eastern Europe on 861 patients with painful rheumatic changes have shown an improvement in symptoms in 70-80%.
- F. Pezzetti et al.: "Effect of Pulsed Electromagnetic Field Exposure of Human Chondrocytes in Vitro," University of Ferrara, Italy, November 1998. - This study investigated the influence of pulsating electromagnetic fields on cartilage cells and demonstrated a definite increase in cartilage reconstruction under the influence of PEMF.
- H. Lieu et al.: "PEMF Influences Hyaline Cartilage Extracellular Matrix Composition without Affecting Molecular structure," Osteoarthritis and Cartilage 4, 1996, pp. 63-76. - This study represents an important step in scientific research into the positive effects of magnetic fields on arthrosis. It shows that PEMF influences cartilage metabolism and can prevent the degradation of glucosamine glycanes. In some individual cases, cartilage mass has been regenerated.
- L. Yarkiv et al.: "The use of Changeable Magnetic Field in Treatment of Osteoarthritis," European Bioelectromagnetics Association, 3rd International Congress, February 29 - March 3, 1996, Nancy, France. - This controlled study on arthrosis patients has shown a definite improvement

in the disease condition of patients treated with PEMF.

- D.H. Trock et al.: "The Effect of PEMF in the Treatment of Osteoarthritis of the Knee and Cervical Spine. Report of Randomised, Double blind, Placebo-controlled Trials," *Journal of Rheumatology*, 1994:21, pp. 1903-1911. - This study on 86 patients with arthrosis in the knee and 81 patients with arthrosis in the cervical spine has shown a definite difference between the PEMF group and the control group. The patients treated with PEMF show an improvement with a statistically significant difference in almost all clinical parameters.
- The Herder Clinic in Bremen reports of four years of experience with PEMF in diseases and injuries of the supporting system and the motor system - An evaluation of 650 cases of arthrosis of the spinal column and peripheral joints found a reduction in pain in 60-70% of the cases.

Artificial Joints

- K. Konrad et al.: "Therapy with PEMF in Aseptic Loosening of Total Hip Prostheses: A Prospective Study," Budapest, Hungary, *Clin. Rheumatol.*, July 1996. - PEMF was used on 24 patients with a loosened hip prosthesis. Follow-up examinations were performed after six months and after one year, showing that the patients treated with PEMF had experienced pain relief and a definite improvement in hip movements. The isotope scan and ultrasonic tests confirmed these positive results.
- W.F. Kennedy et al.: "Use of PEMF in Treatment of Loosened Hip Prostheses. A Double blind Study," *Clin Orthop.*, January 1993 (286), pp. 198-205. - This study with 37 patients with cemented hip prostheses demonstrates that 53% of the loosened hip prostheses had fused again after six months of PEMF, whereas only 11% in the control group had a similarly positive effect.
- Studies are currently carried out at three renowned German University Clinics. The studies were initiated after extremely positive preliminary.
- G. Gualtieri et al.: "The Effect of PEMF Stimulation on Patients Treated of Hip Revisions with Trans-femoral Approach," *Second world Congress for Electricity and Magnetism in Biology and Medicine*, June 8-13, 1997, Bologna, Italy. - This double blind study investigated the effect of PEMF on patients with loosened hip prostheses. The results demonstrate an increase in bone density with a stabilising effect on the prostheses in all patients treated with PEMF, whereas only about half those in the control group showed an increase in bone density.

Back Pain

- " D. Foley-Nolan et al.: "Low Energy High Frequency Therapy

for Persistent Neck Pain. Double blind Placebo-controlled Trial," Bioelectromagnetics Society, 12th Annual, June 10-14, 1990, San Antonio, p. 73. - In this double blind, placebo-controlled study, the effects of low-energy pulsating electromagnetic electric fields on persistent back pain were investigated. Clearly positive results were demonstrated.

Bekhterev's Disease - refer also to "Rheumatic Diseases"

- D.C. Laycock: "Biological Effects of Natural and Pulsed Magnetic Fields," MBES. - This study describes the pain-relieving effects of PEMF.

Blood Parameters

- G. Schauf, Schara, G. Sell, Bergische Universität Wuppertal, Fachb. Medizintechnik, published 12/1994

The purpose of the study was to determine if regular use of Pulsating Energy Resonance Therapy has a physiological effect on the human body. In a multi-local clinical study, 700 patients were treated with PERTH for several months. In a frequent and extensive analysis any change in the blood parameters of the patients was recorded.

The results proved that the diseased (acidity start parameters) human organism responds to frequent and long-term use of PERTH with a clearly noticeable and beneficial change of important blood parameters, such as: the acidity of the blood reduces within a period of 1 week, the LDL level reduces within 8-12 weeks while the HDL (good lipids) increase and the calcium content of the blood increases. This study paved the way for the extensive therapeutic use of PEMF in Germany.

Blood Pressure

- S.G. Ivanov et al.: 'Use of PEMF in the Treatment of Hypertensive Disease,' Vopr. Kurortol Fizioter Lech Fiz Kult (3), 1993, pp. 67-69. - This placebo-controlled study found a very positive effect in the

treatment of hypotension (stage 2) with pulsating magnetic fields (supportive effect in 78%), whereas only 30% in the control group showed an equivalent improvement.

- N.N Bogdanov et al.: 'Optimization of the Effects of Physical and Health Resort Factors in Ischemic Heart Disease and Arterial Hypertension,' Ter-arkh 1986, pp. 108-111. This author presents the positive results when using PEMF in prevention and rehabilitation of 300 patients with arterial hypertension.
- S.G Ivanov: 'The Comparative effect of Non-drug and Drug Methods of Treating Hypertension,' Ter Arkh, 65 (1) 1003, p.44f. - This double blind, placebo-controlled study has shown that PEMF is very effective in the treatment of symptoms of stage 2 hypertension patients (headaches, dizziness, etc).
- G.A. Pochechueva et al: 'Effect of PEMF on Certain Humoral Indicators and Physical Ability to Work in Patients with Neuro-circulatory Hypotension and Hypertension,' Biofizika 1995. - This study is concerned with the influence of PEMF on patients with hypertension and hypotension. These effects that have been observed and documented have shown on the average a drop in blood pressure in patients with hypertension and an increase in blood pressure and patients with hypotension. In addition, an improvement in physical endurance, general condition and concentration was observed in both groups.
- L.L Orlov et al.: 'Effect of a PEMF on some Humoral Indices and Physical Capacity in Patients with Neuro-circulatory Hypotension and Hypertension,' Biofizika 41 (4), 1996, p. 944ff. - This controlled study shows the positive effects of PEMF in patients suffering from blood pressure that is either too high or too low. Patients with high blood pressure showed a definite improvement in symptoms such as headaches, chest pain, numbness of extremities, systolic and diastolic blood pressure and capacity for work.
- T.A. Kniazeva: 'The Efficacy of Low-Intensity Exposures in Hypertension,' Vopr. Kurortol Fizioter Lech Fiz Kult 1, 1994, p. 8-9. -This double blind placebo-controlled study with low frequency and low intensity electromagnetic fields has shown that PEMF can help to normalize blood pressure in patients with high blood pressure.

Bone Fracture

- C.A. Basset: "Beneficial Effects of Electromagnetic Fields," Journal of Cellular Biochemistry 51 (4), April 1993, pp. 387-393. - This study investigated among other things the effect of PEMF on complicated bone fractures that would not heal as part of the natural recovery process.
- G. Fischer "Improved Fracture Healing and Changes in Biochemical Blood Parameters in Rabbits After Artificial Femurosteotomy in a Low Frequency Magnetic Field," University of Graz, 1998. - This single-blind study on rabbits has shown that development of callus was greatly improved in comparison with the control group (observation of alkaline phosphatase,

creatinine kinase and development of callus under CT).

- K.L. Grace et al.: "The Effects of PEMF on Fresh Fracture Healing: Osteochondral Repair in the Rate Femoral Groove," Department of Orthopaedics, UMDS, London Orthopaedics, March 1998, 21 (3), pp. 297-302. - This study shows that PEMF causes an early vascular reaction in bone and wound healing and thus promote bone growth.
- G. Borsalino et al.: "Electrical Stimulation of Human Femoral Interochanteric Osteotomies. Double blind Study," Department of Orthopaedics and Traumatology, Montecchio Hospital, Reggio Emilia, Italy. *Klin Orthop* (237), pp. 256-263. PEMF yielded a significant improvement in bone healing (even after surgery) in this double blind study on 32 patients with x-ray monitoring and measurement of callus density.
- Pienkowski D., Pollack S.R., Brighton C.T., Griffith N.J., University of Pennsylvania, Philadelphia 19104. Placebo controlled double blind study to determine the effect of symmetrical-waveform electromagnetic on the stiffness of fracture sites in a rabbit fibular-osteotomy model. Dose-response studies of pulse amplitude and pulse width were performed by cont. application of repetitive 15 Hz, bursted (five-msec) symmetrical, rectangular electromagnetic stimulus waveforms. Significant increase of callus bending stiffness was produced by pulse widths of 5 - 7 msec and pulse amplitudes of 50 to 100 mV. PMID: 8150816 PubMed
- G.B. Holmes Jr.: "Treatment of Delayed Unions and Non-unions of the Proximal Fifth Metatarsal with Pulsed Electromagnetic Fields," University of Orthopaedics, Chicago. *Foot-Ankle-Int.* 1994. - This study shows that pulsating electromagnetic fields are an effective alternative in supportive treatment of poorly healing bone fractures.
- A.T. Barker: "Pulsed Magnetic fields Therapy of Tibial Non-union. Interim Results of a Double blind Trial," Sheffield University, 1984, *Lancet*. - The active magnetic field group had an 87% success rate.
- M. Quittan et al.: "A good indication for Pulsating Electromagnetic Field," University Clinic for Physical Medicine and Rehabilitation, AKH Vienna, 1998, *ÖZPMR*. - The author analysed 22 randomised controlled double blind studies in conjunction with disturbed and normal bone healing. The result: with regard to bone healing, the efficacy of therapeutic pulsed magnetic field can be regarded as proven.
- V. Mooney, Orthopaedic Surgery, University of California, Irvine. A randomized double blind prospective study of PEMF for lumbar interbody fusions was performed on 195 subjects. There were 98 subjects in the active group and 97 subjects in the placebo group. A brace containing equipment to induce an electromagnetic field was applied to patients undergoing interbody fusion in the active group, and a sham brace was used in the control group. In the active group there was a 92% success rate, while the control group had a 65% success rate (P greater than 0.005). The effectiveness of bone graft stimulation with the device is thus established. 2218718 PubMed

Burns and Sunburn

- R.A. Drolet: 'Rhumart Therapy: A Noninvasive Cell Regeneration Ion and Anti-Inflammatory Therapy Using LF-EM Fields,' Bioelectromagnetics Society, 4th Annual Meeting. -A variety of applications of PEMF were listed in several international studies. The pain-relieving effects, improved circulation in the skin, improved wound healing and the soothing effect are especially important.

Bursitis

- Weinberger et al.: "Treatment of Experimental Inflammatory Synovitis with Continuous Magnetic Field," 1st Journal of Med Sci, 32(12), December 1996, pp. 1197-1201. - This study investigates the effects of PEMF on inflammation of the joint capsule in rats. The result shows a definite anti-inflammatory effect of PEMF. A.A. Pilla: "State of the Art in Pulsed Electromagnetic Therapeutics: soft Tissue Applications," Second World Congress for Electricity and Magnetism in Biology and Medicine, June 8-13, 1997, Bologna, Italy. - This study provides information on the positive influence on pain and swelling in the area of the joints and bursa using PEMF.

Cardiac Insufficiency

- Z. Omura: 'Basic Electrical Parameters for Safe and Effective Electrotherapeutics for Pain, Neuromuscular Skeletal Problems, and Circulatory Disturbances,' Heart Disease Research Foundation, Brooklyn, 1987. In this study, a wide variety of physical therapy measures are investigated with respect to cardiovascular diseases and their effects on the body are described.
- F. Petrossi: 'The Effect of Combined Treatment with the Use of Magnetotherapy on the Systemic Hemodynamics of Patients with Ischemic Heart Disease and Spinal Osteochondrosis,'

Carpal Tunnel Syndrome

- M.J. McLean et al.: "Treatment of Wrist Pain in the Workplace with a Static Magnetic Device - Interim Report of a Clinical Trial," Second World Congress for Electricity and magnetism in biology and Medicine, June 8-23, 1997, Bologna, Italy. - This double blind, placebo-controlled study investigates the effects of PEMF in carpal tunnel syndrome. The results show a definite improvement in pain without any side effects.

Cervical Syndrome

- L.L. Butenko: "The Use of PEMF in Spinal Osteochondrosis," Mechanisms of biological action of electro-magnetic fields, USSR Academy of Sciences, Research Centre for Biological Studies, Institute of Biological physics, October 27-31, 1987, coordination Council of Comecon Countries and Yugoslavia for Research in the fields of Biological Physics, p. 183. This study investigated patients with osteochondrosis of the spinal column comparing conservative therapy with combined treatment with PEMF. The results show that 95% of the patients receiving this combination treatment (i.e., with PEMF) experienced an improvement in symptoms, whereas only 30% of those receiving the conservative treatment alone achieved the desired effect.

Circulation Disorders

- A.P. Dovganiuk, A.A. Minenkov: "The Use of Physical Factors in Treating Chronic Arterial Insufficiency of the Lower Limbs," Vopr Kurortol Fizioter Lech Fiz Kult (5), 1996, pp. 7-9. - The study investigates the effects of PEMF on 450 patients and shows positive results in almost 87%.
- Y.B. Kirillov et al.: "Magnetotherapy in Obliterating Vascular Diseases of the Lower Extremities," Vopr Kurortol Fizioter Lech Fiz Kult (3), May-June 1992, pp. 14-17. - In this study the authors report on the positive results of PEMF in patients with occlusive diseases of the smallest arteries. This positive effect is especially marked in pre-gangrene patients. The success rate is 75-82%.
- University Clinic Funfkirchen, Surgical Department, Dr. Peter Horvath, M.D. Fifteen patients. Diagnosis: sympathectomy with arterial obstruction (occlusion) in the lower extremities, including one patient in whom the big toe had been amputated because of a wound that would not heal. Results of PEMF therapy: Positive influence on circulation in the lower extremities. The ankle pressure increased and circulation improved. The wound on the amputated toe caused tingling during the treatment. After three weeks, the healing process began, the wound developed a scab, which became smaller and regenerated. PEMF is the only positive alternative for distal vascular occlusions.
- N. Haimovici: "PEMF in Clinic and Research," Herder Clinic,

Bremen, Therapiewoche [Therapy week], 31, 1981 pp. 7317-7330. - Of the 2081 patients treated with low-frequency pulsating magnetic fields in this clinic and as outpatients, 253 cases involved arterial and venous circulation disorders. These tests yielded positive results.

- L.G. Vassilenko: "PEMF in Treatment of Obliterating Diseases of Inferior Limb Vessels," Second world Congress for Electricity and Magnetism in Biology and Medicine, June 8-13, 1997, Bologna, Italy.

Common Cold

- Khomenko et al.: 'Use of PEMF in Complex Therapy for Pulmonary Tuberculosis,' Millimetrovie Volni v Biologii I Medicine (3), 1994, pp. 53-61. - Shows the supportive effect of PEMF in the treatment of patients who had tuberculosis of the lungs and received the usual therapeutic medication. There was no effect on the bacterium itself, but there was more rapid regeneration of the patient in the recovery phase.
- M.R. Scarfi et al.: 'Exposure to 100Hz Pulsed Electromagnetic Fields Increases Micronucleus Frequency and Cell Proliferation in Human Lymphocytes,' Bioelectrochem. - Bioenerg. 43/1 (77-81) 1997. - The experimental research on which this article is based shows the increased lymphocyte activity in fighting off infections and also proves at the same time that there is no genetic damage.
- M. B. Mritskhulava et al.: 'The Action of Pulsed Electromagnetic Fields on the Antiviral Protection of Cells,' Vopr-Kurortol-Fizioter Lec Fiz Kult. 1991 September - October (5): 3-5. - This study investigates and documents the virus-protective effect of the magnetic fields.
- L.V. Iashchenko: 'Low-Frequency Magnetic Fields in the Combined Therapy of Inflammatory Lung Disease,' Prob Tuberk, 3, 1988, pp. 53-56. Shows the positive effect of low-frequency PEMF in combination with conventional therapy measures on rats with various inflammatory lung diseases. A group of 165 with the same diseases received the same treatment and showed a definite reduction in the risk of complications such as a pulmonary abscess.
- G.A. Mozhaev et al.: 'The Prevention and Treatment of Suppurative Inflammatory Complications in the Broncho-pulmonary System During Prolonged Artificial Ventilation,' Anesteziol Reanimatol., 1992 (4). - Study shows the positive results when using PEMF in combination with increased lung ventilation in purulent inflammations of the respiratory tract. Improved production of mucus, optimised operation of the phagocytes. An improved immune defense has been demonstrated.
- V.M. Iurlov et al.: 'The Efficacy of the Use of PEMF in Chronic Bronchitis,' Voen Med The, 3, 1989, pp. 35-36. -This double blind, placebo-controlled study show that treatment with PEMF has a very good effect on patients suffering from chronic bronchitis. Treatment with the usual medications

was continued during the study.

- E.A Gaidashev et al.: 'An Evaluation of the effect of PEMF and Laser Therapy on External Respiratory Function in Complicated Forms of Acute Pneumonia in Children,' Vopr Kurortol Fizioter Lech Fiz Kult. - Study proves that PEMF in combination with laser can significantly reduce the risk of severe complications in children between the ages of 1 to 12 with acute infections of the respiratory tract.
- V.M. Bogoliubov, L.A. Skurikhina: 'Thearpeutic Application of Constant and Low-Frequency Electromagnetic Fields,' Vopr Kurortol Fizioter Lech Fiz Kult (2). - Review of the possibilities of pert in treatment of a number of different diseases. Positive results were found in treatment of a number of different diseases including bronchial asthma.

Coronary Heart Disease

- N.N. Bogdanov et al.: 'Optimization of the Effects of Physical and Health Resort Factors in Ischemic Heart Diseases and Arterial Hypertension,' Ter-Arkh 1986, p. 108-111., Presents and discusses the results of PEMF in prevention and rehabilitation in 280 patients with coronary heart disease. A very good result when PEMF is combined with drugs.

Dental Diseases

- L.C. Thodes, 'The Adjunctive Utilization of Diapulse Therapy (Pulsed High Peak Power Electromagnetic Energy) in Accelerating Tissue Healing in Oral Surgery,' Q Nation Dental Association, 40 (1), pp. 4-11. -This controlled study shows the effects of supportive electromagnetic treatment after oro-facial surgery. The study proves that the treatment helps achieve faster healing in patients treated with PEMF.
- Chr. Hermann, 'The Influence of the Electromagnetic Field on Orthodontic Treatment.' Deutsche Zeitschrift für Biologische Zahn-Medizin [German Journal for biological Dentistry]. - The use of PEMF opens up new possibilities in therapy by influencing the metabolism.
- Zaffe et al.: 'PEMFs Improve Bone Adaptation in Orthodontically Treated Rabbits,' Second World Congress for Electricity and Magnetism in Biology and Medicine, 8-13 June 1997, Bologna, Italy. This study shows that PEMF is capable of therapeutically influencing bone formation in orthodontic problems.
- M.A. Darendeliler et al.: 'Light Maxillary Expansion Forces with the Magnetic Expansion Device. A Preliminary Investigation,' European Journal of Orthodontistry, 16 (6), December 1994, pp. 479-490. - This study shows the possibilities of PEMF in orthodontic regulatory measures.

- A.A. Kunin et al.: 'Magnetolaser Therapy in Complex Treatment of Periodontal Diseases,' *Fiz Med*, 4 (1-2), 1994, pp. 103-104. - This study shows the possible uses of PEMF in diseases of the gingiva.
- T. Satake et al.: 'Effect of Pulsed Electromagnetic Fields (PEMF) on Human Periodontal Ligament in Vitro. Alterations of Intracellular Ca²⁺,' Department of Oral Biochemistry, Kantaw Dental College, Knaagaw Shigaku 1990 March 24 (4): 735-742. -The use of PEMF in dentistry is scientifically well founded. It has been observed that PEMF can increase the calcium concentration in the periodontal connective tissue cells resembling osteoblasts.

Diabetes

- I.B. Kirillov et al.: 'Magnetotherapy in the Comprehensive Treatment of Vascular Complications of Diabetes Mellitus,' *Klin Med*, 74 (5), 1996, pp. 39-41. - In this study 320 diabetics were treated with PEMF, while 100 diabetics as a control group received only conservative therapy. These results show a positive effect, especially in the area of vascular complications, with 74% of the patients with PEMF achieving positive results but only 28% in the comparative group achieving these results.
- Lau et al.: 'Effect of Low Frequency Low Intensity Electromagnetic Field on Diabetic Neuropathy,' Dept. of Microbiology, School of Medicine, Loma Linda University, USA. Scientific Report. - 76% of the patients achieved a definite reduction in symptoms compared to only 17% in the control group. The pain, numbness, itching and tingling sensations subsided.
- E. Petrossi: 'The Effect of the Physical Factors of Treatment on Lipid Peroxidation in Surgical Infection in Patients with Diabetes Mellitus,' Internet: Medline
- L.G Vassilenko: 'EHF electromagnetic Radiation in treatment of Obliterating Diseases of Inferior Limb Vessels,' Second World Congress for Electricity and Magnetism in Biology and Medicine, 8-13 June 1997, Bologna, Italy. - This study shows the advantage of PEMF in treatment of diabetes patients with occlusive vascular complications in the extremities.
- M.I. Shved, A.P. Dudnik: 'The Medical Effect of Magnetic-Laser Therapy in Patients with Diabetic Angiopathies of the Lower Extremities,' *Lik Sprava* (10-12), October - December 1996, pp. 155-158. - This study investigates the effects of PEMF on vascular complication of diabetes patients. The results show a definite reduction in diabetes related complications.
- P.O. Milch et al.: 'Electromagnetic Stimulation of the Rat Pancreas and the Lowering of Serum Glucose Levels,' *Trans Am Soc Artif Intern Organs*. - In this animal experiment, the blood sugar levels of diabetic rats receiving PEMF were definitely reduced in comparison with those of rats who were not exposed to PEMF and whose sugar level was elevated.
- V.A. Lebedev: 'Treatment of Neurogenic Dysfunction of the Bladder and Enuresis in Children,' *Vopr Kurortol Fizioter Lech Fiz Kult* (4),

1995, pp. 25-26.

- R.A. Kuliev, R.F. Babaev: 'PEMF combined with conventional treatment of suppurative Wounds in Diabetes Mellitus,' Vestn Khir Im I I Grek, 148 (1), January 1992, pp. 33-36. - This study shows that PEMF can significantly accelerate healing in 72 diabetics with purulent wound infections.

Digestive Disorders

- C.A. Bassett: 'Beneficial Effects of Electromagnetic Fields,' Journal of Cell Biochem., April 1993. - This article summarizes various studies of the positive influence of PEMF. Nerve regeneration in the gastrointestinal tract is emphasised in addition to well-known diseases of the motor system.
- A.M. Begue-Simon, R.A. Drolet: 'Clinical Assessment of the Rhumart System Based on the Use of Low Frequency PEMF,' International Journal of Rehabil Research, 199.

Dizziness

- S.G. Ivanov: 'The Comparative Efficacy of Non-drug and Drug Methods of Treating Hypertension,' Ter Arkh, 1993 - This double blind, placebo-controlled study reports on successful treatment of dizziness caused mainly by hypertension with PEMF.

Earaches

- V.V. Sunstov: 'Treatment of Acute Diffuse Otitis External by PEMF,' Vestn Otorinolaringol, 6, 1991, pp. 35-38. - This study shows the possibilities of PEMF in combined treatment with conventional therapy measures in inflammations of the external auditory canal. The group receiving supportive PEMF recovered much faster.

Endocrine Disorders

- Department of Psychiatry, University of Mainz, Neuro-endocrinology 10; 67 (2): 139-44, 1998. Effects of Pulsed High-Frequency Electromagnetic Fields on the Neuro-endocrine System,
- Tomsk Medical Institute, Moscow, Russia, Bjulleten Eksperimental Noj Biologi I Mediciny 86, 11, 544-546. Influence of Industrial Frequency of the Alternating Magnetic Field on the Thyroid Gland Functional Activity and 131 J Thyroxin Binding by Tissues of Albino Rat Organs,'
- Bakos: 'Sinusoidal 50Hz 500mT Magnetic Fields has No Acute Effect on Urinary 6-Sulphatoxymelatonin in Wistar Rats,' Bioelectromagnetics, 16 (5), 377-80, 1995.
- Udintsev et al.: 'Response of the Pituitary-Adrenal System to PEMF,' Department of Biochemistry, Tomsk Medical Institute, Moscow, USSR, Bulletin of Experimental Biology and Medicine 77, 641-642.
- B.W. Wilson et al.: 'Effects of Eclectic 60Hz Fields on the Melatonin Rhythm of the Pineal Gland: Onset and Recovery over Time,' Bioelectromagnetics 7, 239-42.

Epilepsy

- R. Sandyk, P.A., Annionos: 'Attenuation of Epilepsy with Application PEMF: a Case Report,' International Journal of Neuroscience', 66 (1-2), September 1992, pp. 75-85. - This article reports on a patient with extremely severe epilepsy and very severe behavior disorders. The attacks could not be brought under control even with medication. This patient experienced a definite improvement in his condition through the use of PEMF.
- S. Pavlakis; 'Epilepsy 'cure', Department of Neurology, Cornell University Medical College, New York, Science 246/4932 (874) 1989. - This study describes treatment of various forms of epilepsy with the help of pulsating electromagnetic fields.
- G.D. Antimonii et al.: 'Pulsed Electromagnetic Field on Experimentally Induced Epileptiform Brain Activity in Rats,' Bull Exp Biol Med. The epileptic potentials before and after PEMF were measured on rats. In 41% of the cases, PEMF completely stopped epileptic activity, in 23% of the cases, PEMF decreased it; in 25% epileptic activity remained in its original form, and in 10% it increased slightly.
- M.A. McLean et al.: 'Therapeutic Efficacy of Static Magnetic Device in Three Animal Seizure Models: Summary of Experience,' Second World Congress for Electricity and Magnetism in Biology and Medicine, 8-13

June 1997, Bologna, Italy. - This article showed that PEMF can significantly retard experimentally induced epileptic seizures in mice.

Eye Disease

- Tsisel-skii-luV: 'The Effect of a PEMF on Ocular Hydrodynamics in Open-Angle Glaucoma,' *Oftalmol Zh* 1990 (2). -Investigates the influence of pulsating electromagnetic fields on the hydrodynamic situation in patients with open-angle glaucoma. 150 patients were examined, and it was found that PEMF is capable of improving the drainage of aqueous humor and reducing Becker's coefficient. In 25% of the cases, fluid drainage was normalized. The authors recommend this method as additional therapy in this disease.
- L.V. Zobina et al.: 'Effectiveness of PEMF in Optic Nerve Atrophy. A Preliminary Study,' *Vestn Oftalmo* 106 (5), September - October 1990, pp. 54-57. - This study investigated the effect of PEMF in patients with atrophy of the optic nerve. It was found that the vision of these patients could be improved by about 50%, and that circulation in the eye in the area of the optic nerves was increased.
- Bisvas Shutanto Kumar: 'Possibilities of PEMF in Stabilization of Visual Function in Patients with Glaucoma,' *Journal Article* 1996. - 31 patients with open-angle glaucoma and compensated intra-ocular pressure were examined in conjunction with PEMF. The patients were checked before the treatments and again five months after the treatments. Seeing contrasts showed a definite improvement in almost 90% of the patients. The field of vision deficiency was much lower among the patients who received PEMF than in the control group.
- Bisvas et al.: 'Possibilities of PEMF in Stabilization of Visual Function in Patients with Glaucoma,' *Vestn Oftalmol*, 112 (1), January - March 1996. pp. 6-8. - In this study, patients with open-angle glaucoma were examined in conjunction with PEMF. An improvement in vision was documented in 29 of 30 eyes.
- Jerabek: 'Pulsed Magneto therapy in Czechoslovakia - A Review,' *Rev Environ Health*, 10 (2), April - June 1994, pp. 127-134., This article describes clinical use of PEMF in Czechoslovakia. A positive effect on degenerative diseases of the retina was found.
- T. U. Gorgiladze, B.M. Kogan: 'A New Method of Treatment of a Dry Kerato-Conjunctivitis in Sjögren's syndrome,' *Oftalmol Zh* (1), 1996, pp. 38-40. - This study reports on the success of treatment with PEMF in dry conjunctivitis as part of the autoimmune disease Sjögren's syndrome.
- V.A. Machekhin et al.: 'A New Method for Treating Chronic Blepharitis Using Magnetic Compounds and Alternating Magnetic Field,' *Vestn Oftalmol*, 109 (4), July-September 1993, pp. 16-18. - This study shows that the use of PEMF in combination with iron powder can significantly improve the condition of patients with blepharitis.

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Fibromyalgia

- A.A. Pilla: "State of the Art in Electromagnetic Therapeutics: soft Tissue Applications," Second World Congress for Electricity and Magnetism in Biology and Medicine, June 8-13, 1997, Bologna, Italy. - This review article points out that treatment with pulsed electromagnetic fields manifests its effect relatively rapidly in injuries involving the connective tissue and muscles.

Gastritis, Gastroenteritis and Peptic Ulcer

- O.V. Bukanovich et al.: 'Sinusoidally Modulated Currents in the Therapy of Chronic Gastro-duodenitis in Children,' Vopr Durortol Fizioter Lech Fiz Kult, 2, 1996, pp22-26. - This controlled study investigates the effects of electromagnetic fields on children suffering from chronic Gastro-duodenitis. The results show that after treatment, the signs of inflammation in the gastric mucosa have disappeared in 72% of the cases and reflux into the oesophagus or reflux from the duodenum into the stomach is eliminated in 77% of the cases. This was the case in only 29% of the children in the control group.

Gastroenterology - Intestinal Disease, Gastric Mucosa Injuries

- A.M. Begue-Simon, R.A. Drolet: 'Clinical Assessment of the Rhumart System based on the use of Low Frequency PEMF with,' International Journal of Rehabil Research, 16 (4), 1993, pp. 323-327. - The effects of PEMF on various diseases are discussed, including gastro-enterological problems. The study shows positive effects in stress-related diseases of the gastrointestinal tract.
- B. Bulent-Mentes et al.: Department of Surgery, Gazi University Medical School et al., Diseases of the colon and rectum, 1996. - Influence of PEMF on the mechanical strength and collagen content (connective tissue

fibers) of uncomplicated anastomoses (suture connections of two portions of the intestine separated by surgery) in the intestine of rats. Connective tissue becomes more stable under PEMF and the suture can be more durable.

- L. Navratil et al.: *Cas Lek Cesk*, 132 (19), October 11, 1993, pp. 590-594. - Possible Therapeutic Applications of PEMF. The study shows the success of PEMF in treating inflammatory disorders of the gastrointestinal tract.
- R.A. Drolet: *Rhumart Therapy: Noninvasive Cell Regeneration and Anti-Inflammatory Therapy Using LF-EM Fields*, 'Bio - electromagnetics Society, 4th Annual Meeting, Los Angeles. This article describes the effect of a low-frequency electromagnetic therapy on a variety of applications. Additional to pain reduction, the calming and anti-inflammatory effects are emphasized.
- O.V. Bukanovich et al.: 'Sinusoidally Modulated Currents in the Therapy of Chronic Gastro-duodenitis in Children,' *Vopr Durorto Fizioter Lech Fiz Kult* 2, 1996 pp. 22-26. This placebo-controlled study shows the effect of PEMF on children suffering from chronic gastro-duodenitis. In 72% of the cases signs of inflammation in the gastric mucosa subsided after PEMF.
- T. Krantzova et al.: 'Efficiency of PEMF Treatment of Patients with Duodenal Ulcers,' *Dr Lending*, 4 (13), 1996, pp 22-24. 2,642 patients with duodenal ulcers were tested. A complete closure of the wound in the mucous membrane being detectable in 80%, and the pain disappearing in almost 100%.
- M.V. Poslavsky et al.: 'Application of Millimeter-Range Radiation for Treatment and Prophylaxis of Stomach and Duodenal Ulcer,' *Vopr Kurortol Fizioter Lech Fiz Kult* (4), 1998 pp. 31-36. - The effect of PEMF on 317 patients suffering from peptic and duodenal ulcer. A complete closure of the wound in the mucus membrane was achieved in 95% of the cases (control group 78%). 54% of the patients were still free of relapses after one year. (much lower in the control group).
- S. Comorosan et al.: 'The Effect of Diapulse Therapy on the Healing of Duodenal Ulcer,' *Klin Med*, 1991, pp. 74-77. - This placebo-controlled study shows a very positive effect of PEMF with gastro-duodenal ulcers.
- T. Kravtsova et al.: 'The use of PEMF in Patients with Duodenal Peptic Ulcer,' *Vopr Kurortol Fizioter Lech Fiz Kult* (1), 1994, pp. 22-24. - The study reports on definitely positive experience in supportive treatment of peptic and duodenal ulcers with PEMF.

Gout

- V.I. Kovalchuk et al.: 'Use of Extremely Low Frequency Electromagnetic Fields in Clinical Practice,' *Fizicheskaja Meditzina*, 4(1-2), 1994, p. 87. - The effect of PEMF on 650 patients who were suffering from metabolic diseases such as gout was studied. Most of these patients experienced a significant improvement in clinical symptoms.

Haemorrhage

- V.V. Aleschenko, I.O. Pisanko: 'EHF Therapy for Hemophilic Arthropathy and Hemarthroses of the Knee Joint,' Millimetre Waves in Medicine and Biology, Digest of Papers, April 1995, Moscow. - In this study, hemophiliacs who have hemorrhaging into the joints are treated with pulsating electromagnetic fields. All the results indicate that treatment with PEMF clearly has a positive supportive supporting effect on all other forms of treatment.

Hair Loss

- W.S. Maddin et al.: 'The Biological Effects of a Pulsed Electrostatic with Specific Reference to Hair: Electrotrichogenesis,' International Journal of Dermatology, 29 (6), 1990, pp. 446-50. - This double blind, placebo-controlled study investigated men with alopecia to determine the effect of PEMF. After 36 weeks of treatment, it was found that the hair loss was stopped and new hair growth was promoted.

Headache - Migraine

- R. Sandyk: 'The Influence of the Pineal Gland on Migraine and Cluster Headaches and Effects of Treatment with Picotesla Magnetic Fields' International Journal of Neurosci. 67 (1-4), November-December 1992, pp. 145-171. - This article reports on a migraine patient with acute attacks who was treated and cured with external pulsating electromagnetic fields.
- Prusinki et. al.: PEMF in the Treatment of Headaches, Hungarian Symposium on Magnetic Therapy, 2nd Symposium, May 16-17, 1987. - This study investigates the effect of PEMF on Patients suffering from chronic headaches. Positive results were achieved in 88% of the cases with stress headaches, in more than 60% of those with classical migraines and in 68% of those with so-called cervical migraines.
- B.M. Popov, T.A Al'Shanskaya: 'Use of Traditional and Non-traditional Methods in the Treatment of Headache," Millimetre Waves in Medicine

and Biology. Digest of Papers of the 11th Russian Symposium with International

Participation, 21-24 April 1997, Zvenigoro, Moscow Region, pp. 68f -

This study investigates the effect of therapy in the treatment of 107 patients who suffered from headaches of a wide variety of causes. Acupuncture points were stimulated electromagnetically. More than 80% of the patients had a positive experience.

- J. Gicze, A. Guseo: 'Treatment of Headache [with] Pulsating Electromagnetic Field, a Preliminary Report,' Hungarian Symposium on Magnetic therapy, 2nd Symposium, May 1987.- This study shows the efficacy of PEMF in prophylactic and therapeutic use on migraine patients.
- Pelka, Jaenicke, Gruenwald. Uni. Bundeswehr München Germany.

This double blind, placebo-controlled study assessed the efficacy of 4 weeks of impulse magnetic-field therapy (16 Hz, 5 Mikrot Tesla), delivered through a small device, for different types of headache and migraine. Eighty-two patients were randomly assigned to receive either active treatment or placebo (n = 41 each) and were characterized according to one of seven diagnoses (migraine, migraine combined with tension, tension, cluster, weather-related, posttraumatic, or other). Efficacy was assessed in terms of duration, severity, and frequency of migraine and headache attacks, as well as ability to concentrate. Data for 77 patients were analysed. In the active-treatment group, all assessed criteria were significantly improved at the end of the study (P < .0001 vs baseline and placebo). Seventy-six percent 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. PMID: 11571822 PubMed

Hearing Loss

- Zaslavskii et al.: 'Clinical Experience with the Use of Pulsed Electromagnetic Fields for Treatment of Hypoacusis and Otalgia in Children,' Med Tekh (2), 1995, pp. 40-41. - These studies show the therapeutic benefit of PEMF in children with acute sudden hearing loss.

Heel Spur

- " C.A. Bassett, Fitton-Jackson: "The Response of Skeletal Tissues to Pulsed Magnetic Fields," CAL (Oxford), 1980.

Hematomas

- A.M. Begue-Simon, R.A Drolet: 'Clinical Assessment of the Rhumart System Based on the Use of PEMF with Low Frequency,' International Journal of Rehabil Research, 1993. - The research results of these extensive studies have shown positive effects on all traumatic events in the body.

Herpes

- Kusaka et al.: 'Pulse Magnetic Treatment and Whole-Body, Pulsed Electromagnetic Treatment for Post-Herpetic Neuralgia,' Journal of Japanese Biomagnetism Bio-electromagnetics Society, 8 (2), 1995, pp. 29-38. This study shows that PEMF can be used very effectively in the treatment of post-therapeutic neuralgia in elderly patients.

Hydrarthrosis

- L. Kloth et al.: "Effect of PEMF on Edema in Ankle Sprains: A Multilocal Double Blind Clinical Study," Second World Congress for Electricity and Magnetism in Biology and Medicine, June 8-13, 1997, Bologna, Italy, p. 300. - The results of this double blind, placebo-controlled study showed that treatment with pulsating electromagnetic fields is very effective in reducing swelling with lateral hydrarthrosis on the ankle.
- A. Pilla: "State of the Art in Electromagnetic Therapeutics: Soft Tissue Applications," Second World Congress for Electricity and magnetism, June 8-13, 1997, Bologna, Italy. -Treatment with electromagnetic fields manifests its effect relatively rapidly in injuries involving connective tissue and muscles. It notes an especially big effect on pain and oedema in the joints.

Impotency

- PEMF for erectile dysfunction: Pelka RB, Jaenicke C, Gruenwald J. Universitat der Bundeswehr, Neubiberg/Munich, Germany. This double blind, placebo-controlled study assessed the efficacy of 3 weeks of PEMF for erectile dysfunction (ED). Twenty volunteers who suffered from ED or orgasmic disturbances were randomly assigned to either active treatment or placebo (n = 10 each). Efficacy was assessed in terms of intensity and duration of erection, general well-being, sexual activity, and warm sensation in the genital area. In the active-treatment group, all efficacy endpoints were significantly improved at study end (P < or = .01), with 80% reporting increases in intensity and duration of erection, frequency of genital warmth, and general well-being. The remaining 20%, who experienced minor improvements, were found to have an influenza-like infection after the study that may have influenced their results. Only 30% of the placebo group noted some improvement in their sexual activity; 70% had no change. No side effects were reported. PMID: 12008861 PubMed
- I.V. Karpukhin & V.A. Bogomol'nii: 'Local Vacuum Magnetotherapy of Impotency Patients,' Vopr Kurotol Lech Fiz Kult (2), 1996, of combination of PEMF and vacuum therapy in treatment of impotency. With concomitant use of both forms of therapy, an improvement in the erectile dysfunction was observed in more than 80% of the patients, only 17% reported no change. The control group received vacuum therapy alone, only 50% experienced an improvement.
- Petrossi, 'The Local Vacuum Magnetotherapy of Patients with Impotence,'
- I.I. Gorpinchenko: 'The Use of PEMF in Treating Sexual Disorders in Men,' Lik Sprava (3-4), March-April 1995, pp. 95-97. - This double blind placebo-controlled study has shown that PEMF has positive effects on blood flow in the penis in erectile sexual dysfunction. 38% of the patients were cured of their impotency and a definite improvement was observed in 42%.
- Gorpinchenko II. The effect of PEMF on the sexual function of 105 men presenting with sexual problems. A total of 96 sexological patients were examined in a placebo-controlled study. The PEMF 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. PMID: 8819933 PubMed

Influenza, Viral Infections

- M.B. Mirtskhulava et al. (ISSN: 0442-8787) study published in 1991 discusses the antiviral effect of pulsating electromagnetic fields.

Injuries and Injury Rehabilitation

- M. Begue-Simon, R. A. Drolet: "Clinical Assessment of the Rhumart System based on the Use of Pulsed Electromagnetic Fields with Low Frequency,"
International Journal of Rehabilitation Research, 16(4), 1993, pp. 323-327.
- This study documents the positive effect of magnetic field therapy on various injury-related problems. Definite improvements were observed, especially in soft tissue injuries and in injuries involving bones and joints.
- S. A. Schastnyi et al.: "A Contact-free, Biologically Adequate Electromagnetic Stimulation of Repair and Regeneration of Osseous, Cartilaginous, and Muscular Tissues in Children," Vestn Ross Akad Med Nauk (3), 1994. - This article reports on 508 patients who were treated with PEMF mostly after traumatic injuries. The treatment was effective in 75% of the cases.

Insomnia

- Pelka RB, Jaenicke C, Gruenwald J., Universität der Bundeswehr Neubiberg/Munich, Germany. This 4-week double blind, placebo-controlled study assessed the efficacy of impulse magnetic-field therapy for insomnia. One hundred one patients were randomly assigned to either active treatment (n = 50) or placebo (n = 51) and allocated to one of three diagnostic groups: (1) sleep latency; (2) interrupted sleep; or (3) nightmares. Efficacy endpoints were intensity of sleep latency, frequency of interruptions, sleepiness after rising, daytime sleepiness, difficulty with concentration, and daytime headaches. In the active-treatment group, the values of all criteria were significantly lower at study end ($P < .00001$). The placebo group also showed significant symptomatic improvement ($P < .05$), but the differences between groups were highly significant ($P < .00001$). Seventy percent (n = 34) of the patients given active treatment experienced substantial or even complete relief of their complaints; 24% (n = 12) reported clear improvement; 6% (n = 3) noted a slight improvement. Only one placebo patient (2%) had very clear relief; 49% (n = 23) reported slight or clear improvement; and 49% (n = 23) saw no change in their symptoms. No adverse effects of treatment were reported. PMID: 11697020 PubMed

Kidney Disease

- A.A. Li, et al., 'PEMF in the Combined Therapy of Patients with Stone Fragments in the Upper Urinary Tract,' *Vopr Kurortol Fizioter Lech Fiz Kult* (3), 1994. -PEMF is a supportive in the treatment of kidney stones. Passing of stones or fragments was found to be much less complicated and associated with less pain.
- V.E. Rodoman et al.: 'The Effect of PEMF and Laser Therapy in the Course of an Experimental Inflammatory Process in the Kidneys', *Urol Nefrol (Mosk)* (2), March -April 1993, pp. 17-20. - Successful use of PEMF in inflammatory diseases of the kidneys lead to an uncomplicated course of the primary illness.
- V.Y. Kiyatkin: 'Use of PEMF in Patients with Secondary Chronic Pyelonephritis,' *Second World Congress for Electricity and Magnetism in biology ad Medicine*, 1997, Bologna, Italy. - This article reports positive results in the treatment of secondary chronic pyelonephritis (inflammation of the renal pelvis) with PEMF. Numerous further double blind controlled studies are cited in this article as the basis for the conclusion.

Knee Injuries

- Klagenfurt District Hospital, This study has shown a definite improvement in pain symptoms in patients with knee injuries.
- G. Annaratone et al.: "Magnetotherapy in Clinical and Ambulatory Practice," *Minerva Med*, April 1983, pp. 823-833. - A review on more than 350 patients over the last 10 years demonstrates the positive effects of PEMF in various orthopaedic problems.

Laryngitis

- L.D. Dorogaia, G.R. Uchaikin: 'Use of Microwave Resonance Therapy in Complex Treatment of Laryngo-tracheitis in Children,' *Pediatria* (1), 1995, pp. 55-57. - In this study, children with laryngitis and tracheitis were additionally treated with PEMF. It was found that the duration of the disease was greatly shortened.
- Tarasov et al.: 'Effectiveness of Pulsed Electromagnetic Field of the Acoustic Frequency in the Treatment of Patients with Acute Inflammatory Diseases of Larynx,' *Vestn Otorionolaringol*, (6), Nov-Dec 1995. 11ff. - The results of this study prove that PEMF is an effective treatment for acute inflammations of the larynx.

Liver Disease

- A.D. Deineka, A.M. Pozdniakov: 'Magnetolaser Therapy of Constitutional Hyperbilirubinemia,' *Fiz Med*, 4 (1-2), 1994, pp. 104-105. - This study shows a supportive effect of PEMF on a variety of patients with hyperbilirubinemia.
- V.V. Kransnov, A.I. Shilenok: 'Magnetotherapy of Hepatitis A and B in Children,' *Paediatric* 10, 1991, pp. 54-57. - This study investigated the effect of PEMF on children suffering from various forms of viral hepatitis. The results show a positive effect of PEMF, the liver functions recovered faster and without complications.
- Bellossi et al.: 'The Effect of PEMF and of Methyl-Silane Triol on Galactosamine induced Hepatitis Among Rats', *Laboratory of Biophysics, Faculty of Medicine, Rennes, Panminerva-Med.* 1996 September, 38 (3). - This study conducted on rats showed a protective effect of PEMF on liver cells due its influence on the calcium metabolism (intracellular).
- A.A. Shul'diakov et al.: 'PEMF in the Treatment of Children with Acute Viral Hepatitis,' *Millimetre Waves in Medicine and Biology*, April 1995, Moscow. - This double blind placebo-controlled study investigated the effects of PEMF in combination with conventional methods in the treatment of viral hepatitis in children. The results show an improved success of the combined therapy compared to conventional therapy. Rapid restoration of liver function is typical.

Lupus Erythematosus

- I.V. Khamaganova et al.: 'The Use of a PEMF in the treatment of Lupus Erythematosus,' *Ter Arkh*, 67 (10), 1995, pp. 84-87. -The study shows that the anti-inflammatory, pain-relieving and immuno-stimulating effects of PEMF have a positive influence on microcirculation.
- V.D. Siroov, S.B Pershin: 'Immunomodulation Effect of Microwaves and Ultrahigh Frequency Electric Fields in Patients with Systemic Lupus Erythematosus,' *Bioelectrochem Bioenergy*, 20, 1993, pp. 327-30. - This double blind, placebo-controlled study investigated the effects of high-frequency magnetic fields in the treatment of patients with systemic lupus erythematosus.
26 patients were treated with PEMF, 11 patients served as the control group. In 66% of the patients treated with PEMF, there was an improvement or a complete cure of muscle pain, painful contractions and joint pain.

Menstrual and Menopausal Disorders

- W.A. Jorgensen et al.: 'Electrochemical Therapy of Pelvic Pain: Effects of PEMF on Tissue Trauma,' European Journal of Surgery. Supplement (574) 1994, p. 83-86. - this study performed in one of the largest pain Centres in the world investigated the effect of PEMF on patients with pain in the gynecological area due to a wide variety of causes. Most of these women were suffering from dysmenorrheal, endometriosis, ovarian cysts, as well as infections of the lower urinary tract. 90% of the patients experienced a big improvement to complete freedom from pain, usually without additional medication.
- Ruckhäberle: 'Use of PEMF in Treatment-Resistant Patients with Chronic Recurrent Lower Abdominal Pain,' University gynecological Clinic Leipzig, 1996. - Seventy-three female patients with various gynecological conditions were examined, including functional dysmenorrheal and lower abdominal complaints of unclear etiology. In 85% of the patients, the symptoms were improved or disappeared completely after a few treatments.
- Damirov et al.: 'Treatment of Patients with Endometriosis by PEMF and Infrared Laser,' Vrach, 12, 1994, pp. 17-19. - This study shows that a combination of PEMF with an infrared laser brings definite relief to patients with endometriosis combined with conventional medication therapy.

Multiple Sclerosis

- R. Sandyk: 'Rapid Normalization of Visual Evoked Potentials, Picotesla Range Magnetic Fields in Chronic Progressive Multiple Sclerosis,' International Journal of Neurosci, 77 (3-4), August 1994. - This article reports on the case of a 55-year-old woman with chronic progressive multiple sclerosis. Treatment with PEMF led to a rapid improvement in various areas, such as sleep, bladder function, movement, speech and emotional condition.
- R. Sandyk: 1994 and 1997, reported on the treatment of various syndromes in conjunction with multiple sclerosis. Improvement of speech and language disorders, reading problems, chronic ataxia (movement disorders), the acute Parkinsonism syndrome, trembling, word flow, visual memory, disturbances in sensitivity and motor action have been documented in various case reports published in the well known journal International Journal of Neurosci. Low frequency, pulsating magnetic fields with extremely low intensities (picotesla) led to definite improvements.
- Zix et al.: 'Effect of PEMF on Cell Volume and Phagocytosis Activity in Multiple Sclerosis and Migraine,' Neurology Department, University of Rostock, Psychiatr Neurol Med Psychol (Leipzig) 1990 August. - This study investigates the effect of PEMF on the activity of macrophages in ten patients with multiple sclerosis.

- Sieron et al.: 'PEMF in the Complex Treatment of Neurological Diseases,' European Bioelectromagnetics Association, 3rd International Congress, 29 February - 3 March 1996, Nancy, France. - The results of this double blind, placebo-controlled study shows that treatment with pulsed electromagnetic fields has positive clinical effects on patients with multiple sclerosis.
- R. Sandyk: 'Treatment with PEMF alters the Clinical Course of Chronic Progressive Multiple Sclerosis - a Case Report,' International Journal of Neurosci, 88 (1-2), November 1996. The author reports on the case of a 36-year-old man with serious partial paralysis and coordination problems with progressive multiple sclerosis. PEMF treatments over a period of one year brought a number of improvements involving mainly the areas of balance, intestinal and bladder control, sleep, vision and emotional attitude. There was no progression of the symptoms of multiple sclerosis.
- Guseo: 'Double blind study of use of PEMF in multiple sclerosis,' Hungarian Symposium on Magnetotherapy, 2nd Symposium, 16-17 May 1987, Szekesfehervar, Hungary. - The results of this double blind, placebo-controlled study show that PEMF represented a positive form of treatment for reducing spastic symptoms and incontinence in conjunction with multiple sclerosis when used daily for fifteen days.

Myocardial Infarction

- C.A Basset: 'Beneficial Effects of Electromagnetic Fields,' Journal of Cell Biochem, April 1993.- This summary report shows that already more than a quarter of a million people worldwide with chronic non-healing factors have been treated successfully with PEMF. In addition, the author reports on the good effect of this treatment in other diseases including myocardial infarction and apoplexy.
- J. Jerabek: 'PEMF in Czechoslovakia - A Review," Rev Environ Health, April-June 1994, pp. 127-134. - In this article, the author describes the use of PEMF in Czechoslovakia. He reports that PEMF has been used successfully in his country for more than 10 years in treatment of rheumatism and ischemic diseases.
- E.I. Sorokina et al.: 'Use of PEMF in the Combined Treatment of Middle-aged and Elderly Patients with Ischemic Heart Disease and Osteochondrosis of the Cervical-thoracic Spine,' Vopr Kurortol Fizioter Lech Fiz Kult 1989 (2), pp. 18-22. - In this study, the effect of low-frequency magnetic fields on coronary heart disease is discussed. The results show a definite improvement in autonomic heart regulation and prevention is ischemic heart damage.

Myogelosis, Ischialgia, Lumbago and Muscle Strain

- V.I. Kovalchuk et al.: "Use of Extremely Low-frequency Magnetic Fields in Clinical Practice," *Fizicheskaja Meditzina*, 4(1-2), 1994, p.87. - This study investigated the effects of extremely low-frequency magnetic fields in the treatment of 650 patients suffering from various symptoms. The analgesic effect of the magnetic field is especially emphasized with muscle pain.
- F. Petrossi: "Physician Perceptions of the Value of Physical Modalities in the Treatment of Musculoskeletal Disease."
- Binder et al.: "Pulsed Electromagnetic Field Therapy of Persistent Rotator Cuff Tendinitis. A Double blind Controlled Assessment," *Lancet*, 1 (839), March 31, 1984, pp. 695-698. - Results of study: definite improvement with a statistical significance in the treatment of patients with tendinitis with PEMF.
- D. Foley-Nolan et al.: "Low Energy High Frequency Therapy for Persistent Neck Pain. Double blind Placebo-controlled Trial," *Bio-electromagnetics Society*, 12th annual meeting, July 10-14, 1990, San Antonio. - This double blind, placebo-controlled study investigated the effect of low energy pulsating electromagnetic fields on patients with persistent back pain. The results show a definite improvement after a three-week period of treatment.

Necrosis of the Bones

- C.A. Basset: "Beneficial Effects of Electromagnetic Fields, " *Journal of Cellular Biochemistry* 51 (4) April 1993, pp. 387-393. - In this extensive review study, numerous double blind studies are summarized and the possibilities of influencing osteonecrosis by using PEMF are discussed. An extremely positive effect was found.

Nerve Damage

- O. Vassilenko, N.F. Vassilenko: 'Use of Extremely High Frequency Electromagnetic Radiation for Treating Peripheral Neuritis,' *Second World Congress for Electricity and Magnetism in Biology and Medicine*, 8-13 June 1997, Bologna, Italy. - Patients suffering from peripheral neuritis received electromagnetic therapy on acupuncture points. In 87% of the case, this treatment yielded a complete recovery of the patients.

- Ito, C.A. Bassett: 'Effect of Weak, Pulsing Electromagnetic Fields on Neural Regeneration in the Rat,' Clin Orthop (181), December 1983, pp. 283-290. This controlled study demonstrates that the rate and extent of regeneration of the peripheral nerves is greatly improved by using pulsating electromagnetic fields.
- F.M. Longo et al.: 'PEMF Influences NGF Activity and Levels Following Sciatic Nerve Transection,' Journal of Neuroscience Research, 55, pp. 230-237, 1999. -The nerve growth factor (NGF) is stimulated by PEMF.
- C.A Bassett: 'Beneficial Effects of Electro Magnetic Fields,' Journal of Cell Biochem, 51 (4), April 1993. -Bassett describes the clinical benefits of PEMF in various diseases and emphasizes the positive effect on nerve regeneration in particular.
- Ito, C.A Bassett: 'Effect of Weak, Pulsing Electromagnetic Fields on Neural Regeneration in the Rat,' Clin ORthop (181), December 1983, pp. 283-290. - This controlled study reports on the use of pulsating electro magnetic fields in the treatment of peripheral nerve injuries and shows that PEMF has proven to be a suitable means of supportive therapy.

Neurodermatitis

- V.P. Adaskevich: 'Effectiveness of the Use of Millimeter-Range Electromagnetic Radiation in Complex Treatment of Atopic Dermatitis Patients,' Millimetrovie Volni v Biologii I Medicine (3), 1994 pp. 78-81. - PEMF in combination with conventional treatment methods on patients with neuro-dermatitis was tolerated very well by all patients and an improvement in redness could be seen after 7-8 treatments. 78% of the patients treated with the combination therapy showed a lasting improvement in the disease. After two years of treatment with PEMF only 23% a relapse, whereas 54% in the control group had a relapse.

Obesity

- Bellossi et al.: 'Effect of PEMF on Cholesterol and Tryglyceride Levels in Rats Study of Field intensity and Length of Exposure,' Laboratory of Biophysics, School of Medicine, Rennes. Z Naturforsch C. 1996, July-August, 51 (7-8), pp. 603-606. - This study shows that PEMF can lead to a reduction in cholesterol and triglyceride levels in the blood of rats.
- H.G. Klingenberg et al.: 'The Influence of Electromagnetic Fields on Oslability, Neutral Fat and Cholesterol Level,' Zbl. Bakt. Hyg., I Abt. Orig. B. 161, 146-52.

Osteochondrosis

- L.L. Butenko: "The Use of PEMF in Spinal Osteochondrosis," Mechanisms of Biological Action of Electromagnetic Fields, October 27-31, 1987, Pushchino, USSR, USSR Academy of Sciences, Research Centre for Biological Studies. - This study investigates the effects of PEMF compared and combined with conservative treatment in patients suffering from osteochondrosis of the spine. In 95% of the cases, the combined variant was successful, whereas with conservative therapy alone, only 30% of the cases showed a positive reaction.

Osteomyelitis

- T. Takano-Mamamoto: "Effect of PEMF on Demineralized Bone Matrix Induced Bone Formation in a Bony Defect in the Premaxilla of Rats," Osaka University.
- J. Barovic, G. Fischer: "PEMF in Idiopathic Necrosis of the Head of the Femur," Marburg/Graz, Osteologie, Vol. 6, 1997, Supplement 1. - Eighty-one patients were tested; despite the severe course of the disease, 48 of these patients experienced a definite reduction in pain, greater mobility and increased bone density according to x-rays.

Osteoporosis

- Zati et al. "Effects of PEMF in the Therapy of Osteoporosis Induced by Ovariectomy in the Rat," Boll Soc Ital Biol Sper, 69 (7-9), July-August 1993, pp. 469-475. - This study shows that bone loss in women is reduced by 10% on the average and bone mass degradation is decreased under the influence of PEMF.
- Tabrah et al. demonstrated an increase in bone density with single-photon densitometry monitoring. 1990.
- John et al. treated a group of patients with PEMF; a higher bone density was found four months after the start of treatment (quantitative CT). 1990.

- C. T. Rubin et al.: "Prevention of Osteoporosis by Pulsed Electromagnetic Fields," journal of Bone Joint Surgery, 71 (3), March 1989, pp. 411-417.
- F. L. Tabrah et al.: "Clinical Reports on Long-term Bone Density After short-term EMF Application," University of Hawaii School of Medicine, Department of Physiology, Straub Clinic and Hospital, Honolulu. Bioelectromagnetics 1998, 19 (2), pp. 75-78. - This article resulted from the observation of patients who were treated with PEMF for three months ten years previously. The bone parameters had definitely improved immediately after this treatment period but were not upheld. The scientists argue that the effect has disappeared ten years after the treatment because PEMF was not continued for a long enough period of time.
- W. Wang et al.: " Comparison of Dose-response and Mechanism(s) of Capacitive Coupling, Combined Fields and Inductive Coupling in the Proliferative Stimulated Bone Cells," Departments of Orthopaedic Surgery and Bioengineering, University of Pennsylvania, Philadelphia, 1998. - This study was presented by the author himself under the moderator Michael Cho of the Harvard Medical School. The increase in bone cell mitosis activity was investigated and it was found that pulsed electromagnetic fields can increase this activity.
- J.A. Spadaro, W. H. Bergstrom: "Evidence that a PEMF Inhibits PTH-mediated Calcium Release From Bone in Vivo," Departments of Orthopaedic Surgery and Paediatrics, State University of New York, Health Sciences Centre, Syracuse, November 1998. - This study shows that the definite influence of PEMF on bone calcium metabolism is due to the inhibiting influence on parathyroid hormone (PTH) and the related lower degradation of calcium.
- R.J. Fitzimmons et al.: "Combined Electromagnetic Fields Increased net Calcium Flux in Bone Cells," Department of Medicine, Loma Linda University, California. Calcif-Tissue-Int November 1994, Vol. 55 (5). - This investigation revealed a definite influence on calcium uptake in bone cells while using PEMF.

Ovarian Inflammations and Cysts

- K. Dikova et al.: 'Effect of PEMF in Chronic Non-specific Inflammatory Gynaecologic Disease,' Institute for Gynaecology and Obstetrics, Sophia (Bulgaria) Akuserstvo I ginekologija. - 40 women with inflammatory gynaecological problems were treated 15 times. Fourteen of these women showed a total remission in symptoms, and 23 other patients showed a significant improvement.
- V.S. Yasnogordodsky et al.: 'The Effect of Sinusoid Modulated Currents on Circulation in the Small Pelvic Organs in Patients with Chronic Salpingo-Oophoritis,' Vop. Kurotol. Fizioterapii Lech Fiz. Kult. 6, p. 41f.- An influence of PEMF on circulation in the pelvic organs was detected by thermography

method. PEMF can reduce the vascular tonus of arterioles and capillaries in the minor pelvis while normalizing venous tone, improving blood flow to the organs, which greatly reduces vascular disturbance.

Pain

- F. Sartucci et al.: "Human Exposure to Pulsating Electromagnetic Fields Produces Changes in Pain Perception and Pain-related Somatosensory Evoked Potentials," Second World Congress for Electricity and Magnetism in Biology and Medicine, 8-13 June 1997, Bologna, Italy. - This double blind placebo-controlled study investigates the effects of low intensity pulsating magnetic fields on pain patients. A definite reduction in the perception of pain. Measurements have shown that fewer pain stimuli are relayed to the brain.
- V.I. Kovalchuk et al.: "Use of Extremely Low Frequency PEMF in Clinical Practice," Fizicheskaia Meditzina, 4(1-2), 1994, p.87.
- The analgesic effect of the pain treatment was investigated on more than 650 patients treated with PEMF.

Pancreatitis with PEMF

- V.V. Kents et al.: 'The Efficacy of the Combined Use of 5-Fluorouracil Electrophoresis and Magnetotherapy in Experimental Pancreatitis,' Vopr Kurortol Fizioter Lech Fiz Kult (3), 1994. - This study documents the positive effects of PEMF on patients with chronic pancreatitis.
- O.G Savina et al.: Vopr Kurortol Fizioter Lech Fiz Kult (2), 1995.
- This placebo controlled study investigates the effects of PEMF in combination with conventional treatment methods in Acute Pancreatitis. The results show a superior advantage of the combined therapy in comparison with the individual methods.

Paralysis

- B.F. Siskin et al.: 'Acute Treatment with PEMF and its Effect on fast Axonal Transport in Normal and Regenerating Nerve, ' Centre for Biomedical Engineering, University of Kentucky. J Neuroscience Res. 42/5, 1995.
- This study investigates how low-frequency electromagnetic fields can

stimulate the growth and regeneration of peripheral nerves after a serious injury. It was found in experiments on rats that regeneration was faster after severing the sciatic nerve, but the reason for this was not accelerated axonal transport.

- J. Walker et al.: 'Enhancement of Functional Recovery Following a Crush Lesion to the Rat Sciatic Nerve by Exposure to Pulsed Electromagnetic Fields,' Division of Orthopedic Surgery, University of Kentucky College of Medicine, Shriners Hospitals for Crippled Children, Lexington. *Exp Neurol*, 1994 February, 125 (2): 302-5. - This study showed that pulsating electromagnetic fields are capable of improving regeneration of the nerve axon by 22%. This study confirms that PEMF is an appropriate method for functional recovery after a nerve injury.
- M. Kanje et al.: 'Pretreatment of Rats with Pulsed Electromagnetic Fields Enhances Regeneration of the Sciatic Nerve,' Department of Animal Physiology, University of Lund. *Bioelectromagnetics*, 1993. - In this study, regeneration of an injured sciatic nerve was investigated in rats under the influence of electromagnetic fields. Regeneration of axons of the sciatic nerve was evaluated with various tests. It was found that nerve cells are regenerated much faster under PEMF.
- R.A. Zienowicz et al.: 'A Multivariate Approach to the Treatment of Peripheral Nerve Transection Injury: the role of electromagnetic field therapy,' University of Massachusetts Medical School, Berkshire Medical Centre, Pittsfield, *Plast Reconstr Surg* 1991 January, 87 (1): 122-9. - In this study, various combinations with PEMF were investigated. The results were so impressive that the author concluded that PEMF should be included in the fixed treatment programs after nerve injuries and surgery.

Parkinson's Disease

- Bardasano et al.: 'Extracranial Device for Noninvasive Neurological Treatments with PEMF, 'Second World Congress for Electricity and Magnetism in Biology and Medicine, 1997, Bologna, Italy. -This study shows that the use of pulsed electromagnetic fields in the Pikotesla range yielded a definite clinical improvement in patients suffering from Parkinson's disease and multiple sclerosis.
- R. Sandyk: 'Parkinsonian Micrographia Reversed by Treatment low intensity Electromagnetic Fields,' *International Journal of Neurosci*, 81 (1-2), March 1995, pp. 83-93. - Two Parkinsonian patients experienced a definite improvement in their symptoms in the area of movement after using extremely low frequency and low-intensity pulsed electromagnetic fields.
- R. Sandyk: 'Low intensity Magnetic Fields in the Treatment of Parkinson's Disease with the 'On-Off Phenomenon', 'International Journal of Neurosci', 66 (1-2), September 1992, pp. 97-106. - This article reports on the case of an 87 year old man who suffered from Parkinson's disease and so-called 'on-off phenomenon'. PEMF brought a definite relief from symptoms.
- R. Sandyk: 'Brief Communication: Electromagnetic Fields Improve Visuo-spatial

Performance and Rivers Agraphia in a Parkinsonian patient,' *International Journal of Neurosci*, 87 (3-4), Nov. 1996. - In this case a 73-year-old man suffering tremors and other Parkinsonian symptoms was treated successfully with pulsating electromagnetic fields in the picotesla range (!).

- M.S. George et al.: 'Trans-cranial Magnetic Stimulation: A neuro-psychiatric Tool for the 21st Century,' *Journal of Neuropsychiatry Clin neurosci*, 8 (4), Fall 1996, pp. 373-382. -Trans-cranial magnetic stimulation leads to definite improvements in symptoms of Parkinsonian patients, especially depression.

Peripheral Occlusive Vascular Disease

- L.G. Vassilenko: 'PEMF in the Treatment of Obliterating Diseases of Interior Limb Vessels,' *Second World Congress for Electricity and Magnetism in Biology and Medicine*, June 8-13, 1997, Bologna, Italy. - This study shows a definitely positive effect on atherosclerotic obstructions of vessels and the related symptoms.

Perthes' Disease

- S.D. Schevchenko et al.: "Experience with Treating Some Orthopaedic Diseases with Millimetre Range Radiation of Non-thermal Intensity," *Millimetre Waves in Medicine and Biology*, Moscow 1997. - This study investigated Perthes' disease in children and found a significant improvement in complaints.
- S. A. Schastnyi et al.: "A Contact-free, Biologically Adequate Electromagnetic Stimulation of Repair Regeneration of Osseous, Cartilaginous and Muscular Tissues in Children," *Vestn Ross Akad Med Nauk* (3), 1994, pp. 38-42. - This article reports on the efficacy of pulsed electromagnetic fields in the treatment of Perthes' disease and describes the good results.
- M.H.M. Harrison et al., "The Results of a Double blind Trial of PEMF in the Treatment of Perthes' Disease," *Royal Orthopaedic Hospital Birmingham, Journal of Paediatric Orthopaedics*, 1997. - This double blind study investigated the treatment of Perthes' disease with pulsating electromagnetic fields. Twenty-one boys with Perthes' disease were divided into two groups, with one group being treated with PEMF. The time until reconstruction of the head of the femur was recorded. The healing time in the group receiving PEMF as 12 months, and in the second group was 12.5 months.

Phantom Pain

- V. M. Bogliubov, L. A. Skurikhina; 'Therapeutic Application of Constant and Low Frequency Magnetic Fields," Vopr Kurortol Fizioter Lech Fiz Kult (2). - This review article investigates the efficiency of low-frequency electromagnetic fields in treatment of various diseases including phantom pain and it demonstrates the positive results.

" E. Kucherenko, V. I Shevchuk: "Treatment of Diseases of Limb Stumps with Alternating Current Magnetic Field," Klin. Khir. 7, pp 47-49

Polyneuropathy

- A.G. Shiman et al.: 'Use of Combined Methods of PEMF in the Treatment for Polyneuropathies,' Vopr Kurortol Fizioter Lech Fiz Kult (5), 1993, pp. 38-41. - The results of this study show that PEMF has a positive effect in almost 93% of the cases with poly-neuropathy complaints.

Prolapsed Disk

- J. Barovic, G. Fischer: "Increased Mobility and Pain Relief in Diseases of the Motor System Due to PEMF," Maribor District Hospital and University of Graz. - A group of 25 male and female patients with prolapsed disk (diagnosed by myelography) was treated with PEMF in the period from February 1, 1995 through September 1, 1995. In addition to measuring the finger-to-floor distance, a ten-point pain scale was used. Highly significant positive results were obtained.
- Dr. Manfred Walzl, M.D. (neurologist) in Graz Austria. In two comparative groups, 40 patients with nerve root irritation due to disk problems were investigated. One group was treated with the usual medication, and the second group was additionally treated with PEMF. The study investigated the days until the patients became clinically pain free, the improvement in the flexion angle according to Lasague and the subjective pain perception of the patient. Healing occurred two days faster in the group with PEMF (9 days versus 11 days in the second group). Mobility was definitely improved and the subjective pain perception was also greatly reduced.

Prostate

- S.P. Seregin & A.V. Panov: 'The Correction of Prostatic Hemodynamics in Chronic Prostatitis,' Vopr Kurortol Fizioter Lech Fiz Kult (2), March-April 1997, pp. 20-21. -PEMF had a positive influence of good circulation in the prostate and confirms good success in supportive treatment of on chronic prostatitis.

Psoriasis

- R. Castelpietra et al.: 'Initial Experiences in the Treatment of Psoriasis with Pulsating Magnetic Fields,' Ospedale die Bambini [Children's Hospital]. V. Buzzi, Milan. Minerva Med. -The therapeutic success of PEMF in psoriasis was investigated on 110 patients. The best results were achieved in the area of the head and hair (100%) good results, in the typical locations/joints:
73.7% in men and 75% in women. The best results were achieved by people in the 2nd, 5th and 6th decades of life. The prospects for success were better, the longer the disease had been in existence in a given patient. The results showed the best results when treatment was performed in the period of March/April. No side effects were reported.
- Y.L Arzumano: 'An Overview of the Third Workshop 'Use of Millimeter Wave in Medicine.' Millimetrovie Volini v Bilogii I Medicine (3), 1994, pp. 104-107. - This review article emphasizes the excellent effect of PEMF on psoriasis.

Psychological Disease

- M.E. O'Connor et al.: 'The Magnetic Field Treatment of Depression and Anxiety Associated with Substance Abuse Withdrawal,' The University of Tulsa, USA. - In this article, thirteen studies are analyzed statistically. The author's emphasis the provability of the effect of the pulsed electromagnetic field (trans-cranial electromagnetic stimulation) in treatment of anxiety states and depression. Treatment of anxiety states in particular yielded definite positive results in comparison with the placebo group in both groups, namely in the patient group and in the group of medical advisors.

- Grunner: 'Differential Effects of Electromagnetic Fields in the Therapy of Neurosis and Depressions,' *Activ ner. Super. Praha*
- Dr Christoph Scherer, M.D., Dr Christian Thuile, M.D., Centre for Energy Medicine in Vienna: 'Influence of Magnetic Resonance Systems on Autonomic, Stress-Related Parameters,' *ENERMED 1998, 2nd International Congress for Energy Medicine, Seefeld in Tirol.* - The influence of PEMF on important clinical parameters was evaluated. A definite reduction in measurable stress-related parameters, a reduction in systolic blood pressure and skin conductance and an increase in temperature with a relatively constant pulse and respiration were found.
- B.V. Morozov et al.: 'Treatment of Neurotic Depression with the Help of Extremely High Frequency Electromagnetic Fields,' *Zh Nevropatol Psikhiatr Im S S Korsakova*, 96 (6), 1996, pp. 28-31. - PEMF is a supportive form of therapy in patients suffering from depression. In 50% of mild to moderately mild cases of depression, a complete cure was achieved; some improvement in depression was achieved in another 40%.
- Graha et al.: 'Nocturnal Melatonin Levels in Human Volunteers Exposed to Intermittent 60Hz magnetic field,' *Bioelectromagnetics*, 17 (4), 1996, pp 263-274.
- Rogers et al.: 'Brief Communication: Rapid Onset/Offset, Variably Scheduled 60Hz Electric and Magnetic Field exposure Reduces Nocturnal Serum Melatonin Concentration in Nonhuman Primates,' *Bioelectromagnetics*, Suppl. 3, 1995, pp. 119-122.
- L.S. Baker-Price: 'Weak but Complex Pulsed Magnetic Field Application: A Noninvasive Treatment for Depression Following Traumatic Brain Injury,' *Laurentian University, Behavioral Neuroscience Program*, 1997. - Depression occurring after a head injury is often resistant to therapy and fails to respond to an antidepressant medication. In this study, 16 depressed patients after head injuries were treated with low intensity PEMF. The results show that treatment with magnetic fields in depression can be an alternative when treatment with medication is unsuccessful.
- Haag et al.: 'Trans-cranial Magnetic Stimulation. A Diagnostic Means from Neurology as Therapy in Psychiatry,' *Nervenarzt*, 68 (3) March 1997, pp. 274-278. - This scientific article describes the use of trans-cranial magnetic stimulation in depressed patients and shows the anti-depressive effect of magnetic fields acting at deep levels of the brain.
- M.R. Kirkcaldie et al.: 'Trans-cranial Magnetic Stimulation as Therapy for Depression and Other Disorders,' *Aust N Z J Psychiatry*, 31 (2) April 1997, pp. 264-272. - This scientific article investigates the use of PEMF in depression. High-frequency trans-cranial electromagnetic stimulation is an effective treatment for depression with a low incidence of side effects.
- Lee et al.: 'Melatonin and Puberty in Female Lambs Exposed to PEMF: A Replicate Study,' *Bioelectromagnetics*, 16 (2), 1995, pp. 119-123.
- V.A. Lebedev: 'Treatment of Neurogenic Dysfunction of the Bladder and Enuresis in Children with a SKENAR Apparatus,' *Vopr Kurortol Fizioter Lech Fiz Kult* (4), 1995, pp. 25-26. - In this article, we find evidence of successful treatment of children who are bed wetters with PEMF.
- T. Zyss: 'Deep Magnetic Brain Stimulation - the end of Psychiatric Electroshock Therapy?' *Medical Hypotheses*, 43 (2), 1994, pp. 69-74. - In this article, the theoretical basis of electromagnetic stimulation

in psychiatric therapy is discussed. The author sees the advantage of PEMF as having a better effect on deep areas of the brain, in the lack of pain associated with the treatment itself and the lack of side effects.

- Guilleminault, B. Pasche: 'Clinical Effects of Low Energy Emission Therapy,' Bioelectromagnetics Society, 15th Annual Meeting, June 13-17, 1993, Los Angeles, CA, p. 84. - This scientific report shows that low-frequency forms of electromagnetic energy are an effective form of treatment for chronic insomnia and can also be helpful in generalized anxiety states.
- Higgs et al.: 'Subjective and Objective Relaxation Effects of Low Energy Emission Therapy, 'The New York Hospital, Cornell Medical Centre, STRESS-MED'. 10/1 (5-13), 1994. -The effectiveness of PEMF in treatment of stress-related diseases is impressive. Findings include a drop in systolic blood pressure, a feeling of warmth and muscle relaxation. These results suggest that low energy PEMF are a new therapeutic option in the large field of stress reduction.
- R. Hajdukovic et al.: 'effects of Low Energy Emission Therapy on Sleep Structure, 'First World Congress for Electricity and Magnetism in Biology and Medicine', June 14-19, 1992, Lake Buena Vista, FL, p. 92. - This double blind, placebo-controlled study indicates that low-energy PEMF can have an extremely positive effect on the sleep habits of patients with sleep disorders.
- Erman et al.: 'Low-Energy Emission Therapy Treatment for Insomnia,' Bioelectromagnetics Society, 13th Annual Meeting, 23-27 June 1991, Salt Lake city, p. 69. - This double blind, placebo-controlled study shows a significant increase in total sleep time in chronic sleep disorders with a definite difference in comparison with the placebo group.
- Lercher et al.: 'Proof that ELF Ca²⁺ cyclotron Resonance Suppresses Synthesis of Pineal Melatonin in Vitro,' Neuroscience Letters, 124, 1991, pp. 213-215.

Rheumatic Diseases - See also Arthritis, Arthrosis, Fibromyalgia.

- W. Kobinger, G. Fischer, J. Barovic et al.: "Pain Relief and Increasing Mobility in Diseases of the Motor Apparatus through the Use of PEMF," Hygiene Institute of the University of Graz and the Marburg teaching Hospital, AMA Acta Medica Austriaca, 1995. - Twenty-eight patients suffering from various diseases of the motor apparatus and supporting system were treated exclusively with magnetic resonance. A highly significant improvement was achieved.

Scoliosis

- M. Marinkev, T. Kraev, S. Kamenov and A. Georgieva - of Physical Medicine, Higher Medical Institute Plovdiv 1995: "Therapeutic Effects of PERTH in Vertebrogenic Diseases -- The result of this study demonstrates that well-being, physical endurance and sleep can all be improved with the regular, long-term use of PERTH, and the perception of pain decreases. Clinical conditions improve significantly in 40 % of the patients.

Shingles

- Jankovic et al.: 'Peripheral Nerve Regeneration Stimulated by PEMF and Laser,' Second World Congress for Electromagnetism in Biology and Medicine (8-13 June 1997 in Bologna). - This study describes the results of PEMF in treatment (alone or in combination with a laser) of nerve damage and nerve inflammations and improved wound healing in comparison with an untreated control group.

Sinusitis

- " Jerabek: 'PEMF in Czechoslovakia - A Review,' Rev environ Health, 10 (2), April-June 1994, pp. 127-134. - The author gives a review of the possible applications of PEMF, derived from experience from the last ten years in the clinics of Czechoslovakia. Sinusitis is listed among the best treatment results.
- " M.P. Nikolaev et al.: 'The Clinico-Immunological Assessment of the Effectiveness of PEMF in Patients with Chronic Maxillary Sinusitis,' Vesn Otorinolaringol (2), March-April 1994, pp. 27-31. - This study shows that the use of pulsed electromagnetic fields in the area of the para-nasal sinuses on both sides leads to a definite relief form chronic sinusitis.

Snapping Finger

- Binder et al.: "Pulsed Electromagnetic Field Therapy of Persistent Rotator Cuff Tendinitis. A Double blind Controlled Assessment,"

Lancet, 1 (839), March 31, 1984, pp. 695-698. In this double blind placebo-controlled study, the positive effect of electromagnetic fields on tendinitis in the area of the rotators is discussed.

Spinal Cord Injuries

- E. V. Tkach et al.: 'Characteristics of the Effect of a Constant Electromagnetic Field on Reparative Processes in Spinal Cord Injuries,' Zh Nevropatol Psikhiatr, 89 (5), 1989, pp. 41-44. - This study shows that pulsed electromagnetic fields are capable of significantly improving healing and the improvement tendency after spinal cord injuries.

Spayed Foot or Talipes Equinus

- D. C. Laycock: "Biological Effects of Natural and Pulsed Electromagnetic Fields," Bioelectronic Engineering consultant. - In an analysis of more than 1,000 scientific studies on the topic of PEMF, the definitely positive effect on muscle pain, tendon injuries and bone problems was found.

Spondylolisthesis

- M. Marinkev, T. Kraev, S. Kamenov and A. Georgieva - of Physical Medicine, Higher Medical Institute Plovdiv 1995: "Therapeutic Effects of PERTH in Vertebrogenic Diseases The result of this study has shown that the use of PERTH improves well-being, physical endurance and sleep quality while reducing the perception of pain.

Sports Medicine - Diseases of the Motor Apparatus

- K.R. Robinson: "Endogenous and Applied Electrical Currents," Natural and Applied Voltage in Vertebrae regeneration and healing (New York), 1989. - G.C. Coats: "Pulsed Electromagnetic (Short-Wave) Energy Therapy," British Journal of Sports Medicine, 23 (4), 1989, pp. 213-216. - These studies show a definitely positive influence on acute diseases of the connective tissue and muscle tissue through the use of PEMF.
- G. M. Pennington, D.L. Danley, M.H. Sumko, A. Bucknell, J.H. Nelson: "Pulsed Non-thermal, High-frequency Electromagnetic Energy (Diapulse) in the Treatment of Grade 1 and Grade 2 Ankle Sprains," Mil. Med. 1993 Feb. 158 (2): 101-4, 1993. - This randomised double blind study shows that in first and second degree ankle injuries, the treatment time is significantly shortened under the influence of pulsating PEMF, pain and swelling are eliminated rapidly, so that resumption of training is possible.
- G. Untea, I. Stojan (Department of Sports Medicine, Bucharest, Rumanai), lecture delivered as part of the World Congress on Sports Medicine in Florida (United States) 1998. -PEMF on performance athletes promoted improved sleep, regeneration times were shorter and lactate was degraded more rapidly.
- Binder, G. Parr, B. Hazelman, S. Fitton-Jackson: "PEMF of Persistent Rotator Cuff Tendinitis. A Double blind Controlled Assessment," Lancet, March 31, pp. 695-698, 1984. - Top publication of a double blind study with a very high informational relevance, explaining how PEMF helps to effectively shorten a tedious convalescence procedure involving the rotator cuff (shoulder girdle muscle).
- Mabit, C. Pecout: "Non-union of a Mid-shaft Anterior Tibial Stress Fracture: A Frequent Complication," Knee Surg. Sports Trau-matol. Arthrosc. 2. (1): 60-61, 1994. - In fatigue factors of the tibia, a conservative combination therapy with pulsed PEMF is recommended. Surgery should not be performed unless the fracture resists treatment for a period of more than four to six months.
- Binder, Parr, Hazleman, Fitton-Jackson. Lancet 1984 Mar 31; The value of PEMF for the treatment of persistent rotator cuff tendinitis was tested in a double blind controlled study in 29 patients whose symptoms were refractory to steroid injection and other conventional conservative measures. The treated group (15 patients) had a significant benefit compared with the control group (14 patients) during the first 4 weeks of the study, when the control group received a placebo. In the second 4 weeks, when all patients were on active coils, no significant differences were noted between the groups. This lack of difference persisted over the third phase, when neither group received any treatment for 8 weeks. At the end of the study 19 (65%) of the 29 patients were symptomless and 5 others much improved. PEMF may be useful in the treatment of severe and persistent rotator cuff and possibly other chronic tendon lesions.

Sudeck's Disease

- Salzburg District Hospital, Physical Medicine and Rehabilitation Department
- Patient, female; diagnosis: Sudeck's disease after a fracture of the right forearm, femoral artery occluded more on the right than on the left. Treatment: The patient was treated with the MF mat from July 18, 1996 to August 12, 1996. Results of MRS therapy: "The patient was able to walk only a few meters with severe pain at the time of the initial examination and she also had a definite fist closing deficiency on the right. After 15 treatments (last treatment on August 12, 1996), the distance she could walk had increased to more than one kilometre, and the patient had no pain while walking. She was also able to close her fist.

Surgery Rehabilitation

- D.V. Miasoedov et al.: 'Experience with the Use of Resonance Therapy as a Modifying Factor in Ontological Therapy,' Symposium with International Participation, May 10-13, 1989. - The results show the effects on patients treated with PEMF before and after surgery. It was found that 87% of the patients who had already been treated with PEMF before surgery profited from it, but 68% positive results were also obtained postoperatively.
- V.A. Lebennikov et al.: 'First Experience in Using a PEMF in Treating Cancer Patient.' - This study investigated the effects of a whole-body treatment with PEMF in patients who had cancer and had to have surgery. It found a definite improvement in the immune system and in the postoperative recovery phase.

Torticollis

- I.E. Detlav: "The Influence of Permanent and Pulsed Electromagnetic Fields (PEMF) on Oxidation Processes in Muscle," in I.E. Detlav (ed.), Electromagnetic Therapy of Injuries and Diseases of the Support Motor Apparatus, International Collection of Papers, 1987. - This study shows the accelerated recovery phase in muscle injuries using PEMF.

Tumours

- F: Daudert, physician in Bad Aibling at Rosenheim: Second International Congress for Energy Medicine in Seefeld 1998. People with the following criteria were used for this study: advanced cancer, people who had exhausted the usual resources of traditional medicine and people with greatly reduced immune competent cells (less than 50%). More than 300 patients with epithelial tumors were divided into two groups and treated one of the two groups additionally with PEMF. The treatment was otherwise identical for both groups (vitamin and mineral infusions, immune stimulation, oxygen flooding therapy). The treatment was administered for a period of two weeks with a repetition after three months. Blood tests, which were analysed by an independent clinical laboratory, yielded comparable values between the two groups. It was found that the buildup of the immune system could be significantly accelerated with PEMF.

Ulcers of the Skin

- A.V. Alekseenko et al.: 'Use of PEMF Combined with Galvanization and Tissue Electrophoresis in the Treatment of Trophic Ulcers,' *Klein Khir* (7-8), 1993, pp. 31-34. - PEMF was investigated on 86 patients with skin ulcers. On the basis of the study results, the author recommends the use of PEMF for skin ulcers on the lower extremities.
- R.V. Galimzianov: 'Laser and Electromagnetolaser Therapy for Trophic Ulcers of the Lower Extremities in Chronic Venous Insufficiency,' *Vestn Khir Im I I Grek*, 152 (5-6), 1994, pp. 70-72. - The results of this study show that daily use of PEMF together with the laser shortens healing time for ulcers of the lower extremities to 18 days. By comparison, healing time in the control group was 26 days.
- Y.L. Arzumanov: 'An Overview of the Third Workshop 'Use of Millimeter Waves in Medicine', *Millimetrovie Volni v Biologii I Medicine* (3), 1994, pp. 104-7. This summary of various studies shows that PEMF is very suitable for treatment of chronic furunculosis.
- Comorosan S, Vasilco R, Arghiropol M, Paslaru L, Jieanu V, Stelea

Fundeni Hospital, Bucharest, Romania. *Romania Journal of Physiol.*, 30 (1-2), 1993, pp. 41-45. The effect of PEMF on pressure ulcers has been studied on 20 elderly patients, hospitalized and bearing long-standing pressure ulcers. All were subjected to PEMF 1 -2 times daily parallel to conventional treatment. 5 control group patients underwent only conventional therapy, 5 others conventional + placebo PEMF treatment. After 2-weeks treatment, bulge healing rate was as follows: under PEMF 85% excellent and 15% very good healing; in the placebo group, 80% no improvement and 20% poor improvement; in the control group, 60% no improvement and 40% poor improvement. PEMF is strongly advised as a modern, uninvasive therapy of great efficiency.

- Stiller, Pak, Shupack, Thaler, Kenny, Jondreau; NY University Medical Centre, *British Journal of Dermatology*, 127 (2), 1992. A randomized, double blind, placebo-controlled multi-centre study assessed the clinical

efficacy and safety of PEMF in the healing of recalcitrant, predominantly venous leg ulcers. For 8 weeks a portable device was used at home for 3 h daily as an adjunct to a wound dressing. Wound surface area, ulcer depth and pain intensity were assessed. 50% of the ulcers in the active group healed or markedly improved vs. 0% in the placebo group. 0% of the active group worsened vs. 54% of the placebo group ($P < 0.001$). PEMF is a safe and effective adjunct to non-surgical therapy for leg ulcers.

- Ieran, Zaffuto, Bagnacani, Annovi, Moratti, Cadossi; Medical Angiology, , Reggio Emilia, Italy. Double blind study on the effect of PEMF on the healing of skin ulcers. 44 patients; one-half exposed to active stimulators and the remaining to dummy stimulators (control group). The PEMF therapy lasted 90 days. The success rate in the experimental group was significantly higher after 90 days (p less than 0.02) and in the follow-up period (p less than 0.005). The data suggest that the effect of PEMF lasts even when the stimulation is over. No ulcers worsened in the experimental group, while four worsened in the control group. It is concluded that stimulation with PEMF is a useful adjunctive therapy. PMID: 2303961 PubMed

Urinary Tract Disorders, Bedwetting

- V.A. Lebedev, 'Treatment of Neurogenic Dysfunction of the Bladder and Enuresis in Children,' Vopr Kurortol Fizioter Lech Fiz Kult (4), 1995, pp. 25-26. - This investigation has shown a positive effect on PEMF on urination problems and bedwetting in children.
- M.K. Sheriff, et al., 'Neuromodulation of Detrusor Hyperreflexia Functional Magnetic Stimulation of Sacral Roots,' British Journal of Urology, 78 (1), July 1996, pp. 39-46. -The effects of PEMF on seven men with spinal cord injuries and the consequences of urination problems showed that PEMF is an effective noninvasive method of treatment.

Venous Insufficiency

- E.I. Pasyukov et al.: 'Therapeutic Use of PEMF in the Treatment of Patients with Chronic Diseases of the Veins of the Lower Limbs,' Vopr Kurortol Fizioter Lech Fiz Kult, 5. - This study on 271 patients with chronic venous insufficiency yielded good results.
- A study using PEMF in conjunction with venous insufficiency is currently underway at the University Clinic, Fünfkirchen under the direction of Dr. Halmos, M.D. The preliminary results were clearly positive.
- A.P. Dovganiuk: 'Balneologic and Physical Therapy of Chronic Venous

Insufficiency of Extremities,' Vopr Kurortol fizioter Lech iz Kult, 2, 1995, pp. 48-49. - This article reports that PEMF has been used successfully in a variety of diseases, mainly for treatment of chronic venous insufficiency.

Veterinary

- M.F. Scardino et al.: 'Evaluation of Treatment with PEMF on Wound Healing, Clinico-Pathologic Variables and Central Nervous System in Dogs,' American Journal of Veterinary Research, September 1998. - This study shows the positive effect of PEMF on wound healing in dogs.
- Patino et al.: 'PEMF in Experimental Cutaneous Wound Healing in Rats,' Journal of Burn Care Rehabil, 17 (6 PT 1), 1996, pp. 528-31.
- Bellossi et al.: 'Effect of PEMF on Cholesterol and Triglyceride Levels in Rats Study of Field Intensity and Length of Exposure' Laboratory of Biophysics, School of Medicine, Rennes. Z Naturforsch C. 1996, July-August, 51 (7-8), pp. 603-606. - This study shows that PEMF can lead to a reduction in cholesterol and triglycerides in the blood of rats.
- Endo-Naoto et al.: 'The Effect of PEMF on the Calcium Metabolism in Cultured Rabbit Chondrocytes,' Department of Orthopedic Surgery, Niigata University School of Medicine, Niigata, Japan, Acta Med. Biol. (Niigata), 46:1, 11-15, 1998.- Various experiments of this group of researchers have proven that PEMF inhibit the response of chondrocytes and osteoblasts to parathyroid hormone (PTH) and thus prevent the calcium efflux. This study shows that this effect can probably be attributed to stimulation of chondrocytes (GAG synthesis).
- P.O. Milch et al.: 'PEMF stimulation of Rat Pancreas and the Lowering of Serum Glucose Levels,' Tans Am Soc Artif Intern Organs. - In this animal experiment, the sugar level of diabetic rats was reduced significantly using pulsating magnetic fields in comparison with rats that were not treated with PEMFH.

Wound Healing

- M.S. Scardino et al.: 'Evaluation of Treatment with PEMF on Wound Healing - Clinic-Pathologic Variables and Central Nervous System in Dogs,' American Journal of Veterinary Research, September 1998. - This study on dogs shows the increased epithelialization of wounds under treatment with PEMF.
- S. Moallemi et al.: 'The Effects of Continuous Short Wave Frequency of Electromagnetic Fields on Tissue Healing,' Department of Biophysics / Bioengineering, Department of Pathology, Department EM Lab., Iran

University of Medical Science, Teheran. 1998. - This double blind study has shown some major differences in wound healing between the group treated with an electromagnetic field and the group not treated with an electromagnetic field. The electromagnetic field group had a 26% stronger tissue structure in comparison with the control group.

Yeast Infections

- Y. Mizushima et al.: 'Effects of Magnetic Fields on Inflammation,' Department of Medicine and Physical Therapy, Faculty of Medicine, University of Tokoyo. JAMA, Vol. 248, no. 5, p. 921. - Pulsed electromagnetic fields are capable of influencing and counteracting inflammations such as caused by yeast infections (Candida).

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