

A Brief History of

# Pulsed Electro- Magnetic Field Therapy

## Background

Five hundred years ago, Paracelsus, a Swiss physician and alchemist, wondered if diseases could be manipulated by magnets, using lodestones as the best magnets available then. But natural lodestones are quite weak and few people paid much attention to his ideas until the discovery of carbon steel magnets in the 1700's.

During the 1800's, most of the discoveries relating electricity to magnetism were made by the early pioneers of our modern technical world by men such as Gauss, Weber, Faraday and Maxwell.

One of the more interesting magnetic theories postulates a "Magnetic Field Deficiency Syndrome."

It is offered as an explanation of bio-magnetic effects by Dr. Kyochi Nakagawa of Japan. The Earth's magnetic field is not fixed in position or strength. In the last hundred years, it has weakened on average by about 6 percent. In the last thousand years it has fallen nearly 30 percent. Dr. Nakagawa argues that since humans evolved in a magnetic field, it is necessary for proper health. A falling magnetic field puts us at risk and magnetic therapy can make up the deficit.

In truth, no one really understands the mechanisms by which magnetic fields effect human health. There are many theories and very little consensus. It is a problem as complicated as the construction of the human being, concerning dozens of organs and thousands of different molecules.

However, just because you can't explain something, doesn't mean it can't happen.

For two hundred years, electro-magnets have been built from coils of wire powered by electricity. Such devices can be pulsed to produce rapidly changing magnetic fields. This opens a whole new world of medical applications since changing magnetic fields can induce tiny electrical currents in human tissue.

As far back as 1890, the American Electro-Therapeutic Association conducted annual conferences on the therapeutic use of electricity and electrical devices by physicians on ailing patients.

Today, Pulsing Electro-Magnetic therapy is approved by the FDA to promote the healing of non-healing bone unions.

Powerful electro-magnets are also used in brain and muscle research to generate currents strong enough to fire nerves that trigger sensations and flex muscles.

There have been thousands of research studies and clinical trials on Pulsed Electro-Magnetic Field Therapy.

Inside you will find samples from over 2,000 University level double-blind studies concerning ailments ranging from Arthritis to Vision, along with a brief synopsis on the different types of magnetic therapies.



## Pioneers in the field of PEMF

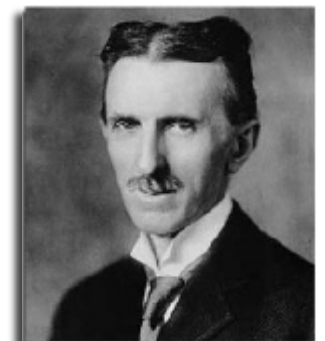
### Nikola Tesla

In 1895, through the genius of Nikola Tesla, the Niagara Falls Power Company began sending alternating current (AC) to Buffalo, NY, twenty-five miles away. Cities throughout the world followed suit and made

commercial AC power available to the general public, even miles from the power generating station. As a result, Tesla's high voltage coil devices, which were powered by AC, started to become widely known and applied.

In 1898, Tesla published a paper that he read at the eighth annual meeting of the American Electro-

Therapeutic Association in Buffalo, NY. He states that one of the early observed and remarkable features of pulsed magnetism was its apparent harmlessness, which made it possible to pass relatively great amounts of electrical energy through the body of a person. Coils up to three feet in diameter



*Continued on page 7*

# There have been 2,000 university

## Evolution of magnetic therapy from alternative to traditional medicine

Vallbona C, Richards T.; Department of Family and Community Medicine, Baylor College of Medicine, Houston, Texas, USA.

## Equipment design for magnetic therapy and "Polus" devices

Viktorov VA, Malkov IuV.

## Beneficial effects of electro-magnetic fields

Bassett CA., Bioelectric Research Center, Columbia University, Riverdale, New York 10463.

## Clinical effectiveness of magnetic field therapy--a review of the literature

Quittan M, Schuhfried O, Wiesinger GF, Fialka-Moser V.; Universitätsklinik für Physikalische Medizin und Rehabilitation, Wien.

## Theoretical and practical aspects of general magnetotherapy

[Article in Russian] Ulashchik VS.

## Possible therapeutic applications of pulsed magnetic fields

[Article in Czech] Navratil L, Hlavaty V, Landsingerova E.

## Pulsed magnetotherapy in Czechoslovakia--a review.

Jerabek J. National Institute of Public Health, Praha, Czech Republic.

## Electro-Magnetic fields and magnets.

## Investigational treatment for musculoskeletal disorders

Trock DH.; Yale University School of Medicine, New Haven, Connecticut, USA.

## **ARTHRITIS**

A study of the effects of Pulsed Electro-Magnetic Field Therapy with respect to serological grouping in rheumatoid arthritis.

Ganguly KS, Sarkar AK, Datta AK, Rakshit A. National Institute for the Orthopaedically Handicapped (NIQH), Calcutta.

## A case of congenital pseudarthrosis of the tibia treated with Pulsing Electro-Magnetic Fields. 17-year follow-up.

Ito H, Shirai Y, Gembun Y. Department of Orthopaedic Surgery, Nippon Medical School, Tokyo, Japan.

## A double-blind trial of the clinical effects of electro-magnetic fields in osteoarthritis.

Trock DH, Bollet AJ, Dyer RH Jr, Fielding LP, Miner WK, Markoll R. Department of Medicine (Rheumatology), Danbury Hospital, CT 06810.

## The effect of Pulsed Electro-Magnetic Fields in the treatment of osteoarthritis of the knee and cervical spine. Report of randomized, double blind, placebo controlled trials.

Trock DH, Bollet AJ, Markoll R. Department of Medicine, Danbury Hospital,

## Magnetic pulse treatment for knee osteoarthritis: a randomised, double-blind, placebo-controlled study.

Pipitone N, Scott DL. Rheumatology Department, King's College Hospital (Dulwich), London, UK.

## Electro-Magnetic fields for the treatment of osteoarthritis.

Hulme J, Robinson V, DeBie R, Wells G, Judd M, Tugwell P.

Cochrane Collaborating Center, Center for Global Health, Institute of Population Health - University of Ottawa, 1 Stewart Street, Ottawa, Ontario, Canada, K1N 6N5.

## Modification of osteoarthritis by Pulsed Electro-Magnetic Field--a morphological study.

Ciombor DM, Aaron RK, Wang S, Simon B.; Department of Orthopaedics, Brown Medical School, Providence, RI 02906.

## Pulsed magnetic field therapy for osteoarthritis of the knee--a double-blind sham-controlled trial.

Nicolakis P, Kollmitzer J, Crevenna R, Bittner C, Erdogmus CB, Nicolakis J. Department of Physical Medicine and Rehabilitation, AKH Wien, University of Vienna, Vienna, Austria.

## Therapeutic effects of pulsed magnetic fields on joint diseases

Riva Sanseverino E, Vannini A, Castellacci P., Università di Bologna, Italy

## **CELL REGENERATION**

## Effect of external Pulsing Electro-Magnetic Fields on the healing of soft tissue.

Glassman LS, McGrath MH, Bassett CA. Division of Plastic Surgery, Montefiore Medical Center, Albert Einstein College of Medicine, New York, NY.

## Pulsing Electro-Magnetic field therapy in nerve regeneration: an experimental study in the cat.

Orgel MG, O'Brien WJ, Murray HM.

## Effect of Pulsed Electro-Magnetic Fields (PEMF) on osteoblast-like cells.

Satake T. Department of Oral Biochemistry, Kanagawa Dental College

## **CIRCULATION**

## Microcirculatory effects of Pulsed Electro-Magnetic Fields.

Smith TL, Wong-Gibbons D, Maultsby J. Department of Orthopaedic Surgery, Wake Forest University School of Medicine, Medical Center Blvd., Winston-Salem, NC 27157-1070, USA.

# level double-blind medical studies

## DEPRESSION

Influence of electro-magnetic fields on the emotional behaviour of rats

[Article in Russian] Semenova TP, Medvinskaia NI, Bliskovka GI, Akoev IG. Institute of Cell Biophysics, Russian Academy of Sciences, Pushchino, Moscow region, 142290 Russia.

Combining high and low frequencies in rTMS antidepressive treatment: preliminary results.

Conca A, Di Pauli J, Beraus W, Hausmann A, Peschina W, Schneider H, Konig P, Hinterhuber H. Departments of Psychiatry I and II, Regional Hospital, 6830 Rankweil, Austria.

Effect of Pulsed Electro-Magnetic Fields (PEMF) on late-phase osteotomy gap healing in a canine tibial model.

Inoue N, Ohnishi I, Chen D, Deitz LW, Schwardt JD, Chao EY.

Department of Orthopaedic Surgery, The Johns Hopkins

Autoradiographic evaluation of electro-magnetic field effects on serotonin (5HT<sub>1A</sub>) receptors in rat brain.

Johnson MT, McCullough J, Nindl G, Chamberlain JK. Terre Haute Center for Medical Education, Indiana University School of Medicine, Terre Haute, IN 47809, USA.

## DIABETES

The use of Pulsed Electro-Magnetic Fields with complex modulation in the treatment of patients with diabetic polyneuropathy

Science Research Institute of Medical Rehabilitation, Baku, Azerbaidzhan

## EDEMA

Low frequency and low intensity Pulsed Electro-Magnetic Field exerts its antiinflammatory effect through restoration of plasma membrane calcium ATPase activity.

Selvam R, Ganesan K, Narayana Raju KV, Gangadharan AC, Manohar BM, Puvanakrishnan R. Department of Pharmacology and Toxicology, Madras Veterinary College, Vepery, Chennai, India.

Protection against focal cerebral ischemia following exposure to a Pulsed Electro-Magnetic Field.

Grant G, Cadossi R, Steinberg G. Department of Neurosurgery, Stanford University, California 94305

## ENDOMETRITIS

A low-frequency alternating magnetic field, a supersonic-frequency current and interference currents in the combined treatment of chronic nonspecific endometritis

Strugatskii VM, Popovich LS.

## FIBROMYALGIA

Exposure to a specific pulsed low-frequency magnetic field: a double-blind placebo-controlled study of effects on pain ratings in rheumatoid arthritis and fibromyalgia patients.

Lawson Health Research Institute, St. Joseph's Health Care, London, Ontario N6A 4V2.

## GLAUCOMA

The effect of a Pulsed Electro-Magnetic Field on the hemodynamics of eyes with glaucoma.

Tsisel'ski IuV, Kashintseva LT, Skrinnik AV. Russian

## HEALING

Magnetic fields in physical therapy.

Experience in orthopedics and traumatology rehabilitation

[Article in Italian], Borg MJ, Marcuccio F, Poerio AM, Vangone A.

Therapeutic effects of electro-magnetic fields in the stimulation of connective tissue repair

Aaron RK, Ciombor DM., Department of Orthopaedics, Brown University, Providence, Rhode Island 00928.

## BONE HEALING

Pseudarthrosis after lumbar spine fusion: nonoperative salvage with Pulsed Electro-Magnetic Fields.

Simmons JW Jr, Mooney V, Thacker I. UTMB, Galveston, Texas, USA.

Effects of static magnetic and Pulsed Electro-Magnetic Fields on bone healing.

Darendeliler MA, Darendeliler A, Sinclair PM. Discipline of Orthodontics, Faculty of Dentistry, University of Sydney, Australia.

Pulsed Electro-Magnetic Fields for the treatment of bone fractures.

Satter Syed A, Islam MS, Rabbani KS, Talukder MS.

Industrial Physics Division, BCSIR Laboratories, Dhaka.

Effects of pulsed magnetic energy on a microsurgically transferred vessel.

Roland D, Ferder M, Kothuru R, Faierman T, Strauch B. Department of Plastic and Reconstructive Surgery at the Albert Einstein College of Medicine, Bronx, NY, USA.

Exposure to pulsed magnetic fields enhances motor recovery in cats after spinal cord injury.

Crowe MJ, Sun ZP, Battocletti JH, Macias MY, Pintar FA, Maiman DJ. Neuroscience Research Laboratories, The Clement J. Zablocki VA Medical Center, Milwaukee, WI 53295, USA. mcrowe@mcw.edu

Treatment of non-union of bone fractures by pulsing electro-magnetic fields.

Hutchings J.

## SKIN WOUND HEALING

The influence of pulsed electrical stimulation on the wound healing of burned rat skin.

Castillo E, Sumano H, Fortoul TI, Zepeda A. Department of Physiology and Pharmacology, School of Veterinary Medicine, National Autonomous University of Mexico, Mexico, D.F.

Effect of low frequency Pulsing Electro-Magnetic Fields on skin ulcers of venous origin in humans: a double-blind study.

Ieran M, Zaffuto S, Bagnacani M, Annovi M, Moratti A, Cadossi R. Department of Medical Angiology, Arcispedale S. Maria Nuova, Reggio Emilia, Italy

Pulsed Electro-Magnetic Fields in experimental cutaneous wound healing in rats.

Patino D, Grana D, Bolgiani A, Prezzavento G, Mino J, Merlo A, Benaim F. Department of Postgraduate Reconstructive and Plastic Effects of pulsed extremely-low-frequency magnetic fields on skin wounds in the rat.

Ottani V, De Pasquale V, Govoni P, Franchi M, Zaniol P, Ruggeri A. Istituto di Anatomia Umana Normale, Bologna, Italy. Effects of magnetic fields on skin wound healing.

Experimental study.

[Article in Spanish]

Patino D, Grana D, Bolgiani A, Prezzavento G, Mino J, Merlo A, Benaim F. Department of Postgraduate Reconstructive and Plastic Surgery, Universidad del Salvador and Fundacion del Quemado.

Effects of Pulsed Electro-Magnetic Fields on rat skin metabolism.

De Loecker W, Delpont PH, Cheng N.

Afdeling Biochemie, Katholieke Universiteit Leuven, Belgium.

## HEMATOMA

Electrochemical therapy of pelvic pain: effects of Pulsed Electro-Magnetic Fields (PEMF) on tissue trauma.

Jorgensen WA, Frome BM, Wallach C. International Pain Research Institute, Los Angeles, California.

## HYPERTENSION

The treatment of hypertension patients with electro-magnetic and magnetic fields.

Orzheshkovskii VV, Chopchik DI, Paramonchik VM, Fastykovskii AD, Kovalenko VP.

## LYMPHOCYTES

Effect of bioresonance therapy on antioxidant system in lymphocytes in patients with rheumatoid arthritis.

Islamov BI, Balabanova RM, Funtikov VA, Gotovskii YV, Meizerov EE. Institute of Theoretical and Experimental Biophysics, Russian Academy of Sciences, Pushchino, Russia.

The effect of exposure to high flux density static and pulsed magnetic fields on lymphocyte function.

Aldinucci C, Garcia JB, Palmi M, Sgaragli G, Benocci A, Meini A, Pessina F, Rossi C, Bonechi C, Pessina GP; Department of Physiology, University of Siena, Siena, Italy.

## MIGRAINE

Initial exploration of Pulsing Electro-Magnetic Fields for treatment of migraine.

Sherman RA, Robson L, Marden LA. Service of Orthopedic Surgery, Madigan Army Medical Center, Tacoma, Wash. 98431, USA.

Treatment of migraine with Pulsing Electro-Magnetic Fields: a double-blind, placebo-controlled study.

Sherman RA, Acosta NM, Robson L. Orthopedic Surgery Service, Madigan Army Medical Center, Tacoma, WA 98431, USA.

Impulse magnetic-field therapy for migraine and other headaches: a double-blind, placebo-controlled study. Pelka RB, Jaenicke C, Gruenwald J. Universitat der Bundeswehr Munchen Munich, Germany.

## MULTIPLE SCLEROSIS

Therapy of day time fatigue in patients with multiple sclerosis.

Zifko UA.; Sonderkrankenanstalt fur Neurologie, Klinik Pirawarth, Kurhausstrasse 100, A-2222 Bad Pirawarth, Austria

Effects of a Pulsed Electro-Magnetic therapy on multiple sclerosis fatigue and quality of life: a double-blind, placebo controlled trial.

Lappin MS, Lawrie FW, Richards TL, Kramer ED. Energy Medicine Developments, (North America), Inc., Burke, Va., USA

Effect of extremely low frequency (correction of frequency) magnetic field on brain ischemic reaction in rats.

Zhao L, Wei J, Yan G, Wang Y, Huang Z, Zhao D.; Institute of Space Medico-Engineering, Beijing, China.

Theory of multichannel magnetic stimulation: toward functional neuromuscular rehabilitation.

Ruohonen J, Ravazzani P, Grandori F, Ilmoniemi RJ.; BioMag Laboratory, Helsinki University Central Hospital, Finland.

## NERVE REPAIR

Pre-treatment of rats with Pulsed Electro-Magnetic Fields enhances regeneration of the sciatic nerve.

Kanje M, Rusovan A, Sisken B, Lundborg G. Department of Animal Physiology, University of Lund, Sweden.

An experimental study of the effects of Pulsed Electro-Magnetic Field (Diapulse) on nerve repair.

Raji AM.

Effect of weak, Pulsing Electro-Magnetic Fields on neural regeneration in the rat.

Ito H, Bassett CA.

Effect of Pulsed Electro-Magnetic stimulation on facial nerve regeneration.

Byers JM, Clark KF, Thompson GC.

Department of Otorhinolaryngology, University of Oklahoma Health Sciences Center, Oklahoma City, USA.

A comparative study of the effects of magnetic stimulation and electric stimulation on peripheral nerve injury in rat.

Bannaga A, Guo T, Ouyang X, Hu D, Lin C, Cao F, Dun Y, Guo Z. Department of Orthopedic Surgery, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030.

Electro-Magnetic Fields influence NGF activity and levels following sciatic nerve transection.

Longo FM, Yang T, Hamilton S, Hyde JF, Walker J, Jennes L, Stach R, Sisken BF. Department of Neurology, UCSF/VAMC, San Francisco, California, USA.

Enhancement of functional recovery following a crush lesion to the rat sciatic nerve by exposure to Pulsed Electro-Magnetic Fields.

Walker JL, Evans JM, Resig P, Guarnieri S, Meade P, Sisken BS. Division of Orthopaedic Surgery, University of Kentucky College of Medicine, Shriners Hospitals for Crippled Children, Lexington.

Stimulation of rat sciatic nerve regeneration with Pulsed Electro-Magnetic Fields.

Sisken BF, Kanje M, Lundborg G, Herbst E, Kurtz W. Center for Biomedical Engineering, University of Kentucky, Lexington 40506.

Effects of high-peak Pulsed Electro-Magnetic Field on the degeneration and regeneration of the common peroneal nerve in rats.

Raji AR, Bowden RE.

A multivariate approach to the treatment of peripheral nerve transection injury: the role of electro-magnetic Field Therapy

Zienowicz RJ, Thomas BA, Kurtz WH, Orgel MG. University of Massachusetts Medical School, Berkshire Medical Center, Pittsfield.

## NERVOUS SYSTEM

Magnetic and electrical stimulation in the rehabilitative treatment of patients with organic lesions of the nervous system

Tyshkevich TG, Nikitina VV; A. L. Polenov Russian Science Research Neurosurgical Institute, St. Petersburg.

History of magnetic stimulation of the nervous system.

Geddes LA.; William A. Hillenbrand Biomedical Engineering Center, Purdue University, West Lafayette, Indiana 47907.

Evaluation of treatment with a Pulsed Electro-Magnetic Field on wound healing, clinicopathologic variables, and central nervous system activity of dogs.

Scardino MS, Swaim SF, Sartin EA, Steiss JE, Spano JS, Hoffman CE, Coolman SL, Peppin BL. Scott-Ritchey Research Center, College of Veterinary Medicine, Auburn University, AL 36849, USA.

## NEUROPATHY

Pulsed magnetic field therapy in refractory neuropathic pain secondary to peripheral neuropathy: electrodiagnostic parameters--pilot study.

Weintraub MI, Cole SP. New York Medical College, Briarcliff Manor, New York 10510, USA

## OSTEOPOROSIS

The effect of long-term pulsing electro-magnetic field stimulation on experimental osteoporosis of rats.

Mishima S. Department of Orthopedic Surgery, School of Medicine, University of Occupational and Environmental Health, Kitakyushu, Japan.

Pulsed Electro-Magnetic Fields prevent osteoporosis in an ovariectomized female rat model: a prostaglandin E2-associated process.

Chang K, Chang WH. Department of Biomedical Engineering, Chung-Yuan Christian University, Chung-Li, Taiwan, Republic of China.

Bone density changes in osteoporosis-prone women exposed to Pulsed Electro-Magnetic Fields (PEMFs).

Tabrah F, Hoffmeier M, Gilbert F Jr, Batkin S, Bassett CA. University of Hawaii School of Medicine, Straub Clinic and Hospital, Honolulu.

## **PAIN**

Evaluation of electro-magnetic fields in the treatment of pain in patients with lumbar radiculopathy or the whiplash syndrome.

Thuile Ch, Walzl M., International Society of Energy Medicine, Vienna, Austria.

Pain management and electro-magnetic medicine.

Quellette EA., University of Miami School of Medicine, Department of Orthopaedics and Rehabilitation, Florida, USA.

Electrochemical therapy of pelvic pain: effects of Pulsed Electro-Magnetic Fields (PEMF) on tissue trauma.

Jorgensen WA, Frome BM, Wallach C. International Pain Research Institute, Los Angeles, California.

Spine fusion for discogenic low back pain: outcomes in patients treated with or without Pulsed Electro-Magnetic Field stimulation.

Marks RA. Richardson Orthopaedic Surgery, Texas 75080, USA.

Pulsed magnetic field therapy in refractory neuropathic pain secondary to peripheral neuropathy: electrodiagnostic parameters--pilot study.

Weintraub MI, Cole SP. New York Medical College, Briarcliff Manor, New York 10510, USA.

## **PARKINSON'S**

Magnetic fields in the treatment of Parkinson's disease.

Sandyk R, Anninos PA, Tsagas N, Derpapas K. Democriton University of Thrace, Department of Medical Physics and Polytechnic School, Alexandroupolis and Xanthi, Greece.

## **PELVIC PAIN**

Electrochemical therapy of pelvic pain: effects of Pulsed Electro-Magnetic Fields (PEMF) on tissue trauma.

Jorgensen WA, Frome BM, Wallach C. International Pain Research Institute, Los Angeles, California.

## **RANGE OF MOTION**

The effect of Pulsed Electro-Magnetic Fields in the treatment of cervical osteoarthritis: a randomized, double-blind, sham-controlled trial.

Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Turk ocagi S No: 3 Sihhiye, Ankara, Turkey.

Therapy with Pulsed Electro-Magnetic Fields in aseptic loosening of total hip prostheses: a prospective study.

Országos Reumatológiai és Fizioterápiás Intézet, Budapest, Hungary.

## **TENDONITIS**

Pulsed magnetic and electro-magnetic fields in experimental achilles tendonitis in the rat: a prospective randomized study.

Department of Orthopaedics and Traumatology, Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, New Territories, Hong Kong

Pulsed Electro-Magnetic Field therapy of persistent rotator cuff tendinitis. A double-blind controlled assessment.

Binder A, Parr G, Hazleman B, Fitton-Jackson S.

The effect of Pulsed Electro-Magnetic Fields on flexor tendon healing in chickens.

Robotti E, Zimble AG, Kenna D, Grossman JA. Miami Children's Hospital, USA.

Pulsed magnetic and electro-magnetic fields in experimental achilles tendonitis in the rat: a prospective randomized study.

Lee EW, Maffulli N, Li CK, Chan KM. Department of Orthopaedics and Traumatology, Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, New Territories, Hong Kong

## **ULCERS**

A portable Pulsed Electro-Magnetic Field (PEMF) device to enhance healing of recalcitrant venous ulcers: a double-blind, placebo-controlled clinical trial.

Ronald O. Perelman Department of Dermatology, New York University Medical Center, New York.

Treatment of chronic varicose ulcers with Pulsed Electro-Magnetic Fields: a controlled pilot study.

Department of Dermatology, Belfast City Hospital.

## **VISION**

The effect of a Pulsed Electro-Magnetic Field on the hemodynamics of eyes with glaucoma

[Article in Russian] Tsisel'skii IuV, Kashintseva LT, Skrinnik AV.

Effectiveness of magnetotherapy in optic nerve atrophy. A preliminary study [Article in Russian] Zobina LV, Orlovskaya LS, Sokov SL, Sabaeva GF, Konde LA, Iakovlev AA.

Possibilities of magnetotherapy in stabilization of visual function in patients with glaucoma

[Article in Russian] Bisvas Shutanto Kumar, Listopadova NA.

# Types of Magnetic Therapy

## Constant Energy Magnets

Long popular in Japan, magnet therapy has entered public awareness in the United States, stimulated by golfers and tennis players extolling the virtues of magnets in the treatment of sports-related injuries. Magnetic knee, shoulder, and ankle pads, as well as insoles and mattress pads, are widely available.

Magnet therapy has a long history in traditional folk medicine. Reliable documentation tells us that Chinese doctors believed in the therapeutic value of magnets at least 2,000 years ago and probably earlier than that. In 16th century Europe, Paracelsus used magnets to treat a variety of ailments.



Two centuries later, Mesmer became famous for treating various disorders with magnets.

In the middle decades of the 20th century, scientists in various parts of the world began performing studies on the therapeutic use of magnets. From the 1940s on, magnets became increasingly popular in Japan. Yoshio Manaka, one of the influential Japanese acupuncturists of the twentieth century, used magnets in conjunction with acupuncture. Magnet therapy also became a commonly used technique of self-administered medicine in Japan. During the 1970s, both magnets and electro-magnetic machines became popular among athletes in many countries for treating sports-related injuries.

In the United States, it was only in 1997 that properly designed clinical trials of magnets began to be reported. Results of several preliminary studies suggested that both static magnets and electro-magnetic therapy may indeed offer therapeutic benefits for several disorders.

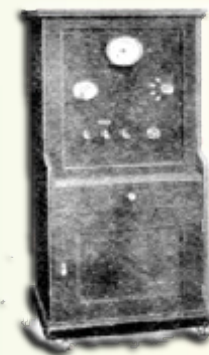
These findings have escalated research interest in magnet therapy.

## Pulsed Electro-Magnetic Energy

Pulsed Electro-Magnetic Field Therapy is non-static, quite unlike therapy with standard magnets, which is static.

Pulsed Electro-Magnetic Field Therapy is used in two main ways: Pulsed Electro-Magnetic Field Therapy (PEMF) or a special version of PEMF called repetitive transcranial magnetic stimulation (rTMS).

PEMF therapy has been used to stimulate bone repair in non-union and other fractures since the 1970s. This use has been approved by the FDA. Although bone has a remarkable capacity to heal from injury, in some cases the broken ends do not join: these are called non-union fractures. PEMF has shown promise for other conditions as well. Now, many studies are showing its benefits in healing soft-tissue wounds; suppressing inflammatory responses at the cell membrane



level to alleviate pain, and increase range of motion.

PEMF is now being investigated experimentally for osteoarthritis, stress incontinence, migraines, and many other conditions.

A special form of Electro-Magnetic therapy, repetitive transcranial magnetic stimulation (rTMS), is also undergoing close study. rTMS is designed specifically to treat the brain with low-frequency magnetic pulses. Many studies suggest that rTMS might be beneficial for depression. It is also being studied for the treatment of Parkinson's disease, epilepsy, schizophrenia, and obsessive-compulsive disorder.

## ...Continued - Pioneers in the field of PEMF

were used for magnetically treating the body without contact, though ten to a hundred thousand volts were present "between the first and last turn". Tesla concludes that bodily "tissues are condensers" in the 1898 paper, which is the basic component (dielectric) for an equivalent circuit only recently developed for

the human body. In fact, the relative permittivity for tissue at any frequency from ELF (10 Hz-100 Hz) through RF (10 kHz-100 MHz) exceeds most commercially available dielectrics on the market.

This unique property of the human body indicates an inherent adaptation and perhaps innate

compatibility toward the presence of high voltage electric fields, probably due to the high transmembrane potential already present in cellular tissue.

Tesla also indicates that the after-effect from his coil treatment was certainly beneficial.



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## ...Pioneers continued

### Georges Lakhovsky



Georges Lakhovsky's philosophy was that "the amplitude of cell oscillations must reach a certain value, in order that the organism be strong enough to repulse the destructive vibrations from certain microbes." He goes on to say, "The remedy in my opinion, is not

to kill the microbes in contact with the healthy cells but to reinforce the oscillations of the cell either directly by reinforcing the activity of the blood or in producing on the cells a direct action by means of the proper rays." Lakhovsky's Radio-Cellulo-Oscillator (RCO) produced low frequency ELF all the way through gigahertz radiowaves with lots of "extremely short harmonics." His book, *The Secret of Life* was first published in English in 1939. In 1949, a review of Lakhovsky's work was published as *Waves That Heal* by Mark Clement. Lakhovsky's theory is that each cell in the body of an organism—be it a plant, an animal, or a human being—is in itself a little radio receiver and works on its own special little frequency. Each cell, in addition to being tissue, in addition to being biology, is also electricity. On that theory, he held that pathology was a not matter of biological concern or intervention, but one of electrical concern and intervention. The record of his treatment of degenerative disease, with what amounts to an early "energy-medicine" device, was remarkable.

### Antoine Priore



Antoine Priore's electro-magnetic therapy machine was perfected during the 1960's and early 70's as a team of leading French scientists demonstrated conclusive, total remissions of terminal tumors and infectious diseases in hundreds of laboratory anima - all funded by the French Government. Complete remission of the treated diseases was obtained. In addition, the animals' immune systems

were restored to normal. Antoine Priore began working in 1944-45 to develop an electro-magnetic device which cured cancer. He got the backing of some very interesting and courageous people, including the world-famous immunologist Dr. Raymond Pautrizel of the University of Bordeaux II, who did all the animal work. When Dr. Pautrizel arrived on the scene, he decided to take the research in another direction and began to use the machine to treat what he knew best which was sleeping sickness in animals. Sleeping sickness was of primary concern to Dr. Pautrizel because it is a widespread affliction in tropical countries.

When he injected rabbits with the pathogen trypanosome, which causes sleeping sickness, the rabbits would all die within 72 hours. But when exposed to the Priore device, these same rabbits would live. Yet their blood was still teeming with the trypanosomes which could be extracted from the radiated rabbits and injected into other control rabbits, which would then die. This implies that the machine was doing something electro-magnetically to the rabbits' immune systems such that they were able to fight off a lethal disease which would normally kill them in 72 hours!

### Robert Becker



A pioneering medical doctor in the 1960's, Dr. Becker is most famous for his book, *The Body Electric*, which gives an autobiographical account of his life experiences with bioelectro-magnetics. Not only did he establish that the Chinese meridians of the body are skin pathways of decreased electrical resistance, but he discovered a host of other bioelectric

effects within the body as well, such as electrostimulating limb-regeneration in mammals. He also worked on electrically stimulating bone growth with Dr. Andrew Bassett, who along with Dr. Arthur Pilla, developed a very effective PEMF generator to stimulate bone fracture healing, now approved by the FDA with an 80% success rate. Similar PEMF signals recently have been used effectively to prevent osteoporosis even in patients with an ovariectomy.

### Abraham Liboff



A modern-day physicist and inventor, Dr. Abraham Liboff is the discoverer of electric-field and geomagnetic ion cyclotron resonance, which more reliably explains the resonant interaction of static magnetic fields with endogenous AC electric fields in biological systems. A physicist with Oakland University, he has introduced

significant physics principles into the field of bioelectromagnetics. His "Method and Apparatus for the Treatment of Cancer" (US Patent #5,211,622) tunes an alternating magnetic field superimposed on a static magnetic field, to maintain a combined effect that has the proper cyclotron resonance frequency so that the neoplastic tissue containing a preselected ion can be treated to bring about a decrease in the proliferation rate of the cancer cells. It also can be combined with a chemotherapeutic agent for a synergistic effect. However, it is noted in the patent disclosure that "up to 100 days of treatment will provide beneficial results".