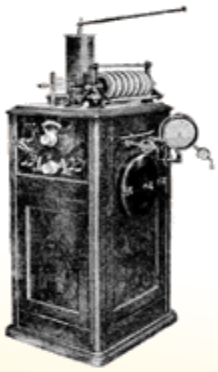
A Brief History Of Pulsed Electro Magnetic Field Therapy

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, men such as Gauss, Weber, Faraday and Maxwell among others
One of the more interesting magnetic theories postulates something called "Magnetic Field Deficiency Syndrome." It is offered as an explanation of biomagnetic 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 the 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 makes up the deficit.
The truth is, no one really understands the mechanisms by which magnetic fields affect human health. There are many theories but very little agreement. It is a problem as complicated as a human being, concerning dozens of organs and thousands of different molecules. Just because you can't explain something, doesn't mean it can't happen.

For two hundred years, it has been possible to build magnets from coils of wire powered by electricity called electromagnets. Such devices can be pulsed to produce magnetic fields that change very rapidly. This opens a whole new world of medical applications since changing magnetic fields can induce tiny electrical currents in human tissue. Pulsing electromagnetic therapy is approved by the FDA to promote the healing of serious bone fractures. And powerful electromagnets are used in brain and muscle research to generate currents strong enough to fire nerves that trigger sensations and flex muscles. To date, there have been many basic research studies and many clinical trials of Pulsed Electromagnetic Field Therapy .
Historically, 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. Some involved current flow through the patient, while others were electrically powered devices. At first, only direct current (DC) devices were utilized in the medical doctor's office for relieving pain.

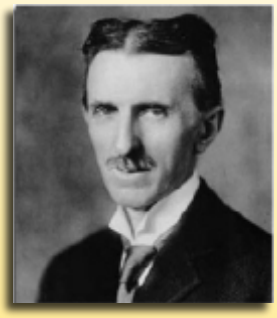


Pioneers in the field of PEMF

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 their 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 were used for magnetically treating the body without contact, though ten



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 electromagnetic 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 electromagnetic therapy may indeed offer therapeutic benefits for several disorders. These findings have escalated research interest in magnet therapy.

Pulsed Electromagnetic Energy

Pulsed Electromagnetic Field Therapy is non-static, unlike therapy with magnets, which is static.

Pulsed Electromagnetic Field Therapy is used in two main ways: Pulsed Electromagnetic 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 is an accepted use, which 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 electromagnetic 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.

Pioneers in the field of PEMF continued

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.

A short overview of the many PEMF studies.

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 electromagnetic 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.; Universitatsklinik fur 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.

Electromagnetic 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 Electromagnetic Field Therapy with respect to serological grouping in rheumatoid arthritis.
Ganguly KS, Sarkar AK, Datta AK, Rakshit A.
National Institute for the Orthopaedically Handicapped (NIOH), Calcutta.

A case of congenital pseudarthrosis of the tibia treated with pulsing electromagnetic 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 pulsed electromagnetic 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 electromagnetic 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, CT.

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.

Electromagnetic 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, KIN 6N5.

Modification of osteoarthritis by pulsed electromagnetic field--a morphological study
Ciombor DM, Aaron RK, Wang S, Simon B.; Department of Orthopaedics, Brown Medical School, Providence, RI 02906, USA.

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., Universita di Bologna, Italy

Pioneers

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

A short overview continued.

CIRCULATION

Microcirculatory effects of pulsed electromagnetic 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.

DEPRESSION

Influence of electromagnetic 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 electromagnetic 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 electromagnetic field effects on serotonin (5HT1A) 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.

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.

HEALING

Magnetic fields in physical therapy. Experience in orthopedics and traumatology rehabilitation
[Article in Italian], Borg MJ, Marcuccio F, Poerio AM, Vangone A.

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

Therapeutic effects of electromagnetic fields in the stimulation of connective tissue repair
Aaron RK, Ciombor DM., Department of Orthopaedics, Brown University, Providence, Rhode Island 00928.

Effects of static magnetic and pulsed electromagnetic fields on bone healing.
Darendeliler MA, Darendeliler A, Sinclair PM. Discipline of Orthodontics, Faculty of Dentistry, University of Sydney, Australia.

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.

Pulsed electromagnetic fields in experimental cutaneous wound healing in rats.
Patino O, Grana D, Bolgiani A, Prezzavento G, Mino J, Merlo A, Benaim F. Department of Postgraduate Reconstructive and Plastic

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

Pulsed electromagnetic fields for the treatment of bone fractures.
Satter Syed A, Islam MS, Rabbani KS, Talukder MS. Industrial Physics Division, BCSIR Laboratories, Dhaka.

The effect of pulsed electromagnetic fields on flexor tendon healing in chickens.

Pioneers

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 electromagnetic 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 animals...funded by the French Government. Complete remission of the treated diseases was obtained. In addition, the animals' immune systems were also restored to normal.

Antoine Priore began working in 1944-45, right after the war, to develop an electromagnetic 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.

A short overview continued.

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

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.

Pulsed magnetic and electromagnetic 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.

Effects of static magnetic and pulsed electromagnetic fields on bone healing.
Darendeliler MA, Darendeliler A, Sinclair PM. Discipline of Orthodontics, Faculty of Dentistry, University of Sydney, Australia.

Effect of magnetic fields on skin wound healing. Experimental study [Article in Spanish] Patino O, Grana D, Bolgiani A, Prezzavento G, Merlo A. Facultad de Medicina, Universidad del Salvador, Buenos Aires.

Pulsed electromagnetic fields in experimental cutaneous wound healing in rats.
Patino O, 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 electromagnetic fields on rat skin metabolism. De Loecker W, Delport PH, Cheng N. Afdeling Biochemie, Katholieke Universiteit te Leuven, Belgium.

Effect of low frequency pulsing electromagnetic 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

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.

Pseudarthrosis after lumbar spine fusion: nonoperative salvage with pulsed electromagnetic fields.
Simmons JW Jr, Mooney V, Thacker I. UTMB, Galveston, Texas, USA.

HYPERTENSION

The treatment of hypertension patients with electromagnetic 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 electromagnetic 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 electromagnetic fields: a double-blind, placebo-controlled study.
Sherman RA, Acosta NM, Robson L. Orthopedic Surgery Service, Madigan Army Medical Center, Tacoma, WA 98431, USA.

Pioneers

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 trypansome, 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 electromagnetically to the immune system of the rabbits such that they were able to fight off a lethal disease, which would normally kill them in 72 hours!

A short overview continued.

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 electromagnetic 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 frenquency) 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

Pretreatment of rats with pulsed electromagnetic 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 electromagnetic field (Diapulse) on nerve repair.
Raji AM.

Effect of weak, pulsing electromagnetic fields on neural regeneration in the rat.
Ito H, Bassett CA.

Effect of pulsed electromagnetic 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.

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

Pioneers

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's experiences with bioelectromagnetics.

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.

A short overview continued.

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 electromagnetic 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.

OSTEOPOROSIS

The effect of long-term pulsing electromagnetic 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 electromagnetic 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 electromagnetic 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 electromagnetic 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 electromagnetic medicine
Ouellette EA., University of Miami School of Medicine, Department of Orthopaedics and Rehabilitation, Florida, USA.

Electrochemical therapy of pelvic pain: effects of pulsed electromagnetic 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 electromagnetic 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. Democrition University of Thrace, Department of Medical Physics and Polytechnic School, Alexandroupolis and Xanthi, Greece.

VISION

The effect of a pulsed electromagnetic 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, Orlovskaia LS, Sokov SL, Sabaeva GF, Konde LA, Iakovlev AA.

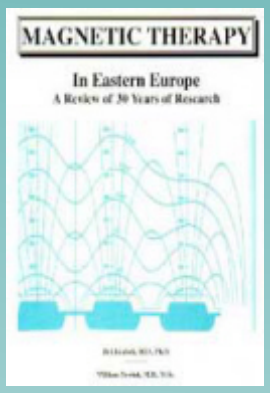
Possibilities of magnetotherapy in stabilization of visual function in patients with glaucoma
[Article in Russian] Bisvas Shutanto Kumar, Listopadova NA.

Pioneers

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."

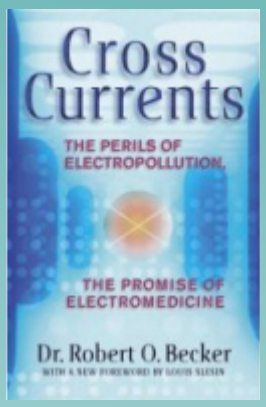
Additional Reading Resources



Magnetic Therapy A Review of 30 Years of Research in Eastern Europe

Jiri Jerabek, M.D., Ph.D.

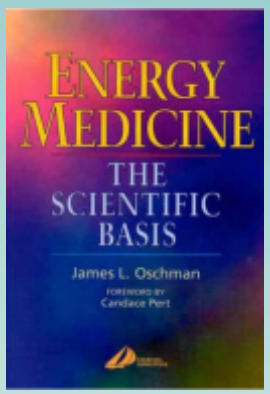
Former Director National Institute of Public Health Czech Republic



Cross Currents, The Perils & Promise of Electromedicine

Robert Becker, MD

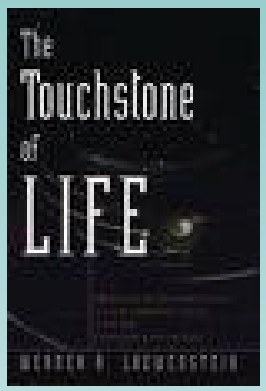
Dr. Becker tells of the emergence of electromagnetic medicine, which promises to unlock the secret of healing. He explains the effectiveness of alternative healing methods that use parts of the body's innate electrical healing systems.



Energy Medicine The Scientific Basis

James L. Oschman, Ph.D.

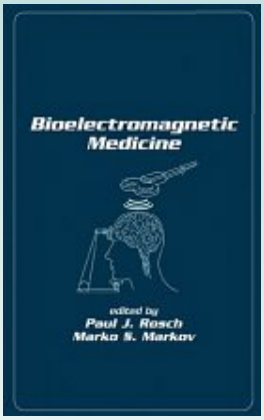
Cellular Biologist and Physiologist
James L. Oschman, PhD is a world authority on energy and complementary medicine. He has initiated a serious discussion of the energy therapies and their potential contribution to patient care. It is focused as much on the scientific basis of energy therapies and what these therapies tell science about how the human body works in health and disease.



The Touchstone of Life Molecular Information, Cell Communication, the Foundations of Life

Werner R. Loewenstein

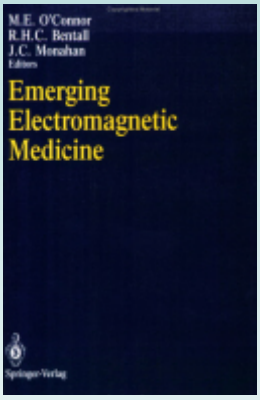
A world-renowned biophysicist at the forefront of science, proposes a revolutionary way of thinking about cell communication. He talks of macromolecules, and sees how they extract order out of the erratic quantum world using electromagnetic fields.



Bioelectromagnetic Medicine

Paul J. Rosch & Marko S. Markov

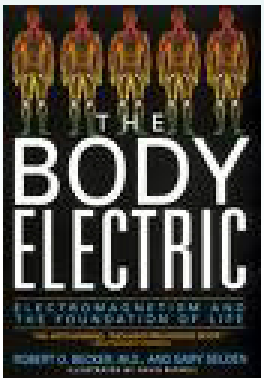
This book emphasizes cutting edge breakthroughs in disorders ranging from cancer, coronary disease and obesity to neuropsychiatric disturbances, including Parkinson's disease; epilepsy; multiple sclerosis; tinnitus; macular degeneration; migraine; musculoskeletal pain syndromes; depression; insomnia; and anxiety.



Emerging Electromagnetic Medicine

M.E. O'Connor, R.H.C. Bentall, J.C. Monahan

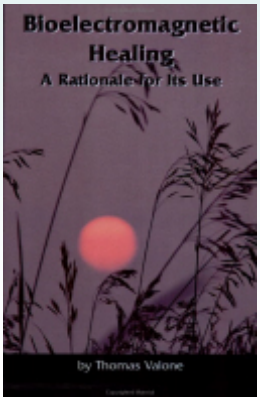
The latest research findings in the field of electromagnetic radiation. The book discusses the use of electromagnetic fields in diagnostic and therapeutic medicine. It describes the theoretical concerns and actual mechanisms involved, current preclinical studies concerning the biological action of the electromagnetic radiation and reports on clinical application of electromagnetic therapy and current machinery used to do so.



The Body Electric

Robert Becker MD

A pioneer in the field of bioelectric science looks at the role electricity plays in healing, challenging the traditional mechanistic model of the body. Engrossing research and breakthrough discoveries offer new possibilities for fighting disease and harnessing the body's healing powers.



Bioelectromagnetic Healing: A Rationale for its Use

Thomas Valone

Author, Scientist, and former U.S. Patent Engineer, Dr. Tom Valone has taken on the extremely difficult task of organizing and explaining the array of alternative medical technologies which have been developed over the years. Many devices described and scientifically documented were remarkably successful in curing otherwise terminal medical conditions. This book is packed full of descriptions, historical details, and technical data on these fascinating healing devices and technologies.