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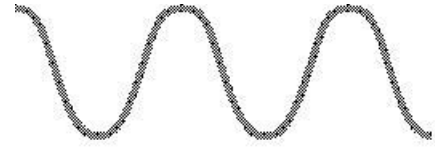
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# Published Studies in Electromedicine

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Appendix D of the

## ***The Rife Handbook of Frequency Therapy and Holistic Health***

*an integrated approach for cancer and other diseases*

5<sup>th</sup> Edition

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## Published Studies in Electromedicine

*Don't worry about people stealing an idea.  
If it's original, you will have to ram it down their throats.*

—HOWARD AIKEN, AMERICAN COMPUTER PIONEER AND PHYSICIST (1900–1973)

There are thousands of articles in medical and scientific journals on the use of electromagnetic fields, electric fields, electrical current, static magnetic fields, pulsed magnetic fields, frequency-induced diathermy (heat) and more, to treat all kinds of conditions, ranging from bone fractures and muscle sprains to Parkinson's and cancer.

Special mention should be made of treating cancer with hyperthermia: a simple, safe, and effective method. During hyperthermia, most of the body or selected smaller areas are safely subjected to high temperatures. The cancerous tissue is either killed directly by the heat, or it becomes so permeable that only minute amounts of locally injected chemicals are needed to destroy it (thus avoiding the chemical poisoning of the entire system). The clinical use of hyperthermia is not new. It was routinely employed seven thousand years ago in Egypt, and has been used by Western physicians for about 200 years. Yet despite the article “Hyperthermia, still experimental, may win place in cancer therapy”—which appeared in a 1981 issue of the *Journal of the American Medical Association*—few people with cancer today are given the option of receiving heat treatments.

My very small sample lists titles of articles from the most recent back to the 1970s, as well as titles of entire books on electromedical modalities that were published over one

hundred years ago. Of the journal articles, I include peer reviewed titles that for the most part are in English. The therapeutic effects of various EM fields is emphasized, as my purpose here is to cite articles examining the *healing potential of electromagnetic therapies that use frequencies in beneficial ranges and amounts*. For literature on the harm of EM fields—such as from cell phone radiation and high tension wires—see Appendix I, “Recent Studies on the Dangers of Harmful Electromagnetic Fields (EMFs).”

The majority of authors write about the practical applications of frequencies to treat disease conditions that include bone breaks, cancer, neurological degeneration, and infections. Other authors discuss how to evaluate or improve the equipment used to disseminate the therapies, while still others address the effects of different frequencies on specific biological functions, such as enzyme and immune cell production. In a few instances, I mention which frequencies were used in the clinical trials. Some are well known to rifiers.

Many of the articles describe Rife's technology without using his name or referring to his research or clinical trials. For example, the abstract of a 2009 paper, “Amplitude-modulated electromagnetic fields for the treatment of cancer: Discovery of tumor-specific frequencies and assessment of a novel therapeutic approach,” states in part:

Because *in vitro* studies suggest that low levels of electromagnetic fields may modify cancer cell growth, we hypothesized that systemic delivery of a combination of tumor-specific frequencies may have a therapeutic effect. We undertook this study to identify tumor-specific frequencies and test the feasibility of administering such frequencies to patients with advanced cancer. . . . Cancer-related frequencies appear to be tumor-specific and treatment with tumor-specific frequencies is feasible, well tolerated and may have biological efficacy in patients with advanced cancer.”<sup>1</sup>

The article also mentions that two of the authors have filed a patent on the use of electromagnetic fields for the diagnosis and treatment of cancer—in other words, Rife’s technology!

Despite the fact that Royal Rife is conspicuously absent in medical literature citations, one very recent article does specifically mention the Rife-Bare device as the equipment used in modern experiments: “Is Victory over Pancreatic Cancer Possible, with the Help of Tuned Non-Invasive Physiotherapy? A Case Study Says Yes.” Appearing in a 2014 issue of the *Journal of Cancer Therapy*, the abstract states in part:

Could the conventional treatment of pancreatic cancer effectively be supplemented by a low level and non-invasive bio-electromagnetic treatment? A case study, based on the regular exposure of a patient to an electromagnetic field, EMF, emitted by a Rife-Bare technology device, suggests so. The plasma confined in a tube of this apparatus emitted radiofrequency solitons. [A *soliton* is a wave or pulse that maintains its shape while transmitting at a constant velocity.] These low level emissions were modulated by an “audio” frequency generator, pre-programmed for the treatment of this disease. After less than two months of exposure to these EMFs, the tumor completely disappeared in approximately two weeks. . . . [The biological mechanism of how the machine operates] is characterized by a critical resonance frequency leading the “unicellular” tumoral cell to adopt a self-destructive behavior. On the other hand, EMFs with low level solitons have no effect on the tissues of complex multicellular organisms.]<sup>2</sup>

Most of the following articles, and thousands more, are at [www.emf-portal.org](http://www.emf-portal.org), which links to other sites that display the entire articles or their abstracts.

Note that some of the books are from the 19th century, before antibiotics were invented and became profitable.

## 2018

“Underlying Signaling Pathways and Therapeutic Applications of Pulsed Electromagnetic Fields in Bone Repair.” Yuan J, Xin F, Jiang W. *Cellular Physiology and Biochemistry* 2018; 46(4):1581–1594.

“Electrochemotherapy in the treatment of melanoma.” Wichtowski M, Murawa D. *Contemporary Oncology*; 22(1):8–13.

“Effects of pulsed electromagnetic field therapy at different frequencies and durations on rotator cuff tendon-to-bone healing in a rat model.” Hochsprung A, Escudero-Uribe S, Ibáñez-Vera AJ, Izquierdo-Ayuso G. *Journal of Shoulder and Elbow Surgery*, March 2018; 27(3):553–560.

“Effectiveness of monopolar dielectric transmission of pulsed electromagnetic fields for multiple sclerosis-related pain: A pilot study.” Hochsprung A, Escudero-Uribe S, Ibáñez-Vera AJ, Izquierdo-Ayuso G, *Neurologia*, May 8, 2018

## 2017

“Role of pulsed electromagnetic fields (PEMF) on tenocytes and myoblasts-potential application for treating rotator cuff tears.” Liu M, Lee C, Laron D, Zhang N, Waldorff EI, Ryaby JT, Feeley B, Liu X. *Journal of Orthopedic Research*, May 2017; 35(5):956–964.

“Pulsed electromagnetic field therapy improves tendon-to-bone healing in a rat rotator cuff repair model.” Tucker JJ, Cirone JM, Morris TR, Nuss CA, Huegel J, Waldorff EI, Zhang N, Ryaby JT, Soslowsky LJ. *Journal of Orthopedic Research*, April 2017; 35(4):902–909.

“Effects of pulsed electromagnetic fields on postmenopausal osteoporosis.” Zhu S, He H, Zhang C, Wang H, Gao C, Yu X, He C. *Bioelectromagnetics*, September 2017; 38(6):406–424.

“Pulsed magnetic field enhances therapeutic efficiency of mesenchymal stem cells in chronic neuropathic pain model.” Mert T, Hakan Kurt A, Altun I, Celik A, Baran F, Gunay I. *Bioelectromagnetics*, May 2017; 38(4):255–264.

“Pulsed magnetic field treatment as antineuropathic pain therapy.” Mert T, *Reviews in the Neurosciences*, October 26, 2017; 28(7):751–758.

“Effects of local vibration and pulsed electromagnetic field on bone fracture: A comparative study.” Bilgin HM, Çelik F, Gem M, Akpolat V, Yildiz I, Ekinçi A, Özerdem MS, Tunik S. *Bioelectromagnetics*, July 2017; 38(5):339–348.

## 2016

“Noninvasive neurostimulation methods for migraine therapy: The available evidence.” Schoenen J, Roberta B, Magis D, Coppola G. *Cephalalgia*, October 2016 t;36(12):1170–1180.

“Electrical stimulation enhances the acetylcholine receptors available for neuromuscular junction formation.” Lozano R, Gilmore KJ, Thompson BC, Stewart EM, Waters AM, Romero-Ortega M, Wallace GG. *Acta Biomaterialia*, November 2016; 45:328–339.

“Efficacy and Safety of Treating Glioblastoma With Tumor-Treating Fields Therapy.” Saria MG, Kesari S. *Clinical Journal of Oncology Nursing*, October 1, 2016;20(5 Suppl):S9–S13.

[From Abstract: “Nonbiochemical and nonablative, TTFields use frequency-specific, low-intensity, alternating electric fields to disrupt structures within the cancer cell during mitosis [cell division], leading to apoptosis [cell death]. Specifically, TTFields technology takes advantage of the special characteristics, geometric shape, and the rate of dividing cancer cells, which make them susceptible to the effects of TTFields. TTFields alter tumor cell polarity at an intermediate frequency (100–300 kHz). The frequency used for TTFields is specific to the target cell type (e.g., 200 kHz for gliomas).”]

## 2015

“Frequency-dependent effects of sequenced pulsed magnetic field on experimental diabetic neuropathy.” Mert T, Gisi G, Celik A, Baran F, Mehdi Uremis M, Gunay I. *International Journal of Radiation Biology*, 91(10):833–842.

“Modulation of cytokine levels in ameliorative effects of pulsed magnetic field on an experimental model of Chronic Constriction Injury.” Mert T, Altun I, Celik A, Sürer T, Gunay I. *International Journal of Radiation Biology*, July 2015; 91(7):596–602.

“Pulsed electromagnetic field therapy promotes healing and microcirculation of chronic diabetic foot ulcers: a pilot study.” Kwan RL, Wong WC, Yip SL, Chan KL, Zheng YP, Cheing GL. *Advances in Skin and Wound Care*. May 2015;28(5):212–219.

## 2014

“Effect of pulsed electromagnetic field (PEMF) on infarct size and inflammation after cerebral ischemia in mice.” Pena-Philippides JC, Yang Y, Bragina O, Hagberg S, Nemoto E, Roitbak T. *Translational Stroke Research*, August 2014; 5(4):491–500.

“Electrotherapy modalities for adhesive capsulitis (frozen shoulder).” Page MJ, Green S, Kramer S, Johnston RV, McBain B, Buchbinder R. *The Cochrane Database of Systematic Reviews*, October 1, 2014;(10):CD011324.

[The authors discuss a number of different electromedical modalities: Low Level Laser Therapy (LLLT), therapeutic ultrasound, pulsed electromagnetic fields (PEMF), continuous short wave diathermy, Iodex phonophoresis, Iodex iontophoresis, continuous short wave diathermy, and transcutaneous electrical nerve stimulation (TENS).]

## 2013

“Effects of pulsed electromagnetic field on knee osteoarthritis: a systematic review.” Ryang We S, Koog YH, Jeong KI, Wi H. *Rheumatology (Oxford)*, May 2013;52(5):815–824.

“Pulsed electromagnetic field therapy for management of osteoarthritis-related pain, stiffness and physical function: clinical experience in the elderly.” Iannitti T, Fistetto G, Esposito A, Rottigni V, Palmieri B. *Clinical Interventions in Aging* 2013;8:1289–1293.

## 2012

“Cancer cell proliferation is inhibited by specific modulation frequencies.” Zimmerman JW, Pennison MJ, Brezovich I, Yi N, Yang CT, Ramaker R, Absher D, Myers RM, Kuster N, Costa FP, Barbault A, Pasche B. *British Journal of Cancer* 106, 307–313.

“Treating cancer with amplitude-modulated electromagnetic fields: a potential paradigm shift, again?” C.F. Blackman, *British Journal of Cancer* 106, 241–242.

“Low-level laser therapy vs. pulsed electromagnetic field on neonatal rat calvarial osteoblast-like cells.” Emes YI, Akça K, Aybar B, Yalçın S, Çavusoglu Y, Baysal U, Isever H, Atalay B, Vural P, Ergüven M, Çehreli MC, Bilir A. *Lasers in Medical Science*, May 2013; 28(3):901–909.

## 2011

“Treatment of advanced hepatocellular carcinoma with very low levels of amplitude-modulated electromagnetic fields.” Costa FP, de Oliveira AC, Meirelles R, Machado MCC, Zanesco T, Surjan R, Chammas MC, de Souza Rocha M, Morgan D, Cantor A, Zimmerman J, Brezovich I, Kuster N, Barbault A, Pasche B. *British Journal of Cancer* 105, 640–648.

## 2010

“Effect of 99 GHz continuous millimeter wave electro-magnetic radiation on E. coli viability and metabolic activity.” Cohen I, Cahan R, Shani G, Cohen E, Abramovich A. *International Journal of Radiation Biology* 86(5): 390–399.

“Electromagnetic field treatment protects against and reverses cognitive impairment in Alzheimer’s disease mice.” Arendash GW, Sanchez-Ramos J, Mori T, Mamcarz M, Lin X, Runfeldt M, Wang L, Zhang G, Sava V, Tan J, Cao C. *Journal of Alzheimers Disease* 19(1): 191–210.

“Medical applications of electromagnetic fields.” Henry C Lai and Narendra P Singh. *IOP Conference Series: Earth and Environmental Science*, Volume 10, Number 1.

“Neurobiological effects of pulsed magnetic field on diabetes-induced neuropathy.” Tufan Mert, Ismail Gunay, Isil Ocal. *Bioelectromagnetics*, January 2010 ;31(1):39–47.

## 2009

“Amplitude-modulated electromagnetic fields for the treatment of cancer: Discovery of tumor-specific frequencies and assessment of a novel therapeutic approach.” Barbault A, Costa FP, Bottger B, Munden RF, Bomholt F, Kuster N, Pasche B. *Journal of Experimental and Clinical Cancer Research* 28:51.

“Alterations in adenylate kinase activity in human PBMCs after in vitro exposure to EMF: comparison between extremely low frequency electromagnetic field (ELF) and therapeutic application of a musically modulated electromagnetic field (TAMMEF).” Albanese A, Battisti E, Vannoni D, Aceto E, Galassi G, Giglioni S, Tommassini V, Giordano N. *Journal of Biomedicine and Biotechnology*, 2009

“Amplitude-modulated electromagnetic fields for the treatment of cancer: discovery of tumor-specific frequencies and assessment of a novel therapeutic approach.” Barbault A, Costa FP, Bottger B, Munden RF, Bomholt F, Kuster N, Pasche B. *Journal of Experimental and Clinical Cancer Research* 28(1): 51.

“Electromagnetic field at 15.95-16 Hz is cardio protective following acute myocardial infarction.” Barzelai S, Dayan A, Feinberg MS, Holbova R, Laniado S, Scheinowitz M. *Annals of Biomedical Engineering* 37(10): 2093–2104.

“Frequency-modulated electromagnetic neural stimulation enhances cutaneous microvascular flow in patients with diabetic neuropathy.” Conti M, Peretti E, Cazzetta G, Galimberti G, Vermigli C, Pola R, Scionti L, Bosi E. *Journal of Diabetes and Its Complications* 23(1): 46–48.

“Pulse low-intensity electromagnetic field as prophylaxis of heterotopic ossification in patients with traumatic spinal cord injury.” Durovic A, Miljkovic D, Brdareski Z, Plavsic A, Jevtic M. *Vojnosanitetski Pregled* 66(1): 22–28.

“Cell proliferation induction: healing chronic wounds through low-energy pulsed radiofrequency.” Frykberg R, Tierney E, Tallis A, Klotzbach T. *International Journal of Lower Extremity Wounds* 8(1): 45–51.

“Differentiation of human adult cardiac stem cells exposed to extremely low-frequency electromagnetic fields.” Gaetani R, Ledda M, Barile L, Chimenti I, De Carlo F, Forte E, Ionta V, Giuliani L, D’Emilia E, Frati G, Miraldi F, Pozzi D, Messina E, Grimaldi S, Giacomello A, Lisi A. *Cardiovascular Research* 82(3): 411–420.

“In vivo electrical conductivity measurements during and after tumor electroporation: conductivity changes reflect the treatment outcome.” Ivorra A, Al-Sakere B, Rubinsky B, Mir LM. *Physics in Medicine and Biology* 54(19): 5949–5963.

“Radiofrequency energy delivery to the anal canal: is it a promising new approach to the treatment of fecal incontinence?” Kim DW, Yoon HM, Park JS, Kim YH, Kang SB. *American Journal of Surgery* 197(1): 14–18.

“Increased c-fos immunoreactivity in the spinal cord and brain following spinal cord stimulation is frequency-dependent.” Maeda Y, Ikeuchi M, Wacnik P, Sluka KA. *Brain Research* 1259: 40–50.

“Circumference reduction and cellulite treatment with a TriPollar radiofrequency device: a pilot study.” Manuskiatti W, Wachirakaphan C, Lektrakul N, Varothai S. *Journal of the European Academy of Dermatology and Venereology* 23(7): 820–827.

“A new pulsed electric field therapy for melanoma disrupts the tumor’s blood supply and causes complete remission without recurrence.” Nuccitelli R, Chen X, Pakhomov AG, Baldwin WH, Sheikh S, Pomicter JL, Ren W, Osgood C, Swanson RJ, Kolb JF, Beebe SJ, Schoenbach KH. *International Journal of Cancer* 125(2): 438–445.

“Growth inhibition of *Staphylococcus aureus* induced by low-frequency electric and electromagnetic fields.” Obermeier A, Matl FD, Friess W, Stemberger A. *Bioelectromagnetics* 30(4): 270–279.

“Radiotherapy with 8-MHz radiofrequency-capacitive regional hyperthermia for stage III non-small-cell lung cancer.” Ohguri T, Imada H, Yahara K, Morioka T, Nakano K, Terashima H, Korogi Y. *International Journal of Radiation Oncology Biology Physics* 73(1): 128–135.

“Transcutaneous electrical stimulation of urinary bladder in patients with spinal cord injuries.” Radziszewski K, Zielinski H, Radziszewski P, Swiecicki R. *International Urology and Nephrology* 41(3): 497–503.

“Evidence-based use of pulsed electromagnetic field therapy in clinical plastic surgery.” Strauch B, Herman C, Dabb R, Ignarro LJ, Pilla AA. *Aesthetic Surgery Journal* 29(2): 135–143.

“Static magnetic fields impair angiogenesis and growth of solid tumors in vivo.” Strelczyk D, Eichhorn ME, Luedemann S, Brix G, Dellian M, Berghaus A, Strieth S. *Cancer Biology and Therapy* 8(18): 66–72.

“Low-frequency pulsed electromagnetic field therapy in fibromyalgia: a randomized, double-blind, sham-controlled clinical study.” Sutbeyaz ST, Sezer N, Koseoglu F, Kibar S. *Clinical Journal of Pain* 25(8): 722–728.



**2008**

“Effects of biophysical stimulation in patients undergoing arthroscopic reconstruction of anterior cruciate ligament: prospective, randomized and double blind study.” Benazzo F, Zanon G, Pederzini L, Modonesi F, Cardile C, Falez F, Ciolli L, La Cava F, Giannini S, Buda R, Setti S, Caruso G, Massari L. *Knee Surgery Sports Traumatology Arthroscopy* 16(6): 595–601.

“Percutaneous pulsed radiofrequency in the treatment of cervical and lumbar radicular pain.” Chao SC, Lee HT, Kao TH, Yang MY, Tsuei YS, Shen CC, Tsou HK. *Surgical Neurology* 70(1): 59–65.

“Changes of leukocyte adherence ability under the influence of magnetic field in the course of a treatment of patients with laryngeal and pharyngeal carcinoma.” Cocek A, Hahn A, Ambrus M, Dohnalova A, Jandova A, Pokorny J. *Electromagnetic Biology and Medicine* 27(3): 277–288.

“Electromagnetic fields alter the expression of estrogen receptor cofactors in breast cancer cells.” Girgert R, Gründker C, Emons G, Hanf V. *Bioelectromagnetics* 29(3): 169–176.

“Quick recovery of orientation after magnetic seizure therapy for major depressive disorder.” Kirov G, Ebmeier KP, Scott AI, Atkins M, Khalid N, Carrick L, Stanfield A, O’Carroll RE, Husain MM, Lisanby SH. *British Journal of Psychiatry* 193(2): 152–155.

“Pulsed radio frequency energy in the treatment of complex diabetic foot wounds: two cases.” Larsen JA, Overstreet J. *Journal of Wound Ostomy and Continence Nursing* 35(5): 523–527.

“Recovery of motor disability and spasticity in post-stroke after repetitive transcranial magnetic stimulation (rTMS).” Mally J, Dinya E. *Brain Research Bulletin* 76(4): 388–395.

“Anti-inflammatory effects of electronic signal treatment.” Odell Jr RH, Sorgnard RE. *Pain Physician* 11(6): 891–907.

“A pilot study with very low-intensity, intermediate-frequency electric fields in patients with locally advanced and/or metastatic solid tumors.” Salzberg M, Kirson E, Palti Y, Rochlitz C. *Onkologie* 31(7): 362–365

“Extremely low frequency electromagnetic field enhances human keratinocyte cell growth and decreases proinflammatory chemokine production.” Vianale G, Reale M, Amerio P, Stefanachi M, Di Luzio S, Muraro R. *British Journal of Dermatology* 158(6): 1189–1196 [50 Hz].

**2007**

“Can electrons act as antioxidants? A review and commentary.” Oschman JL. *The Journal of Alternative and Complementary Medicine*, Volume 13, Number 9, 955–967.

“The influence of extremely low frequency magnetic fields on cytoprotection and repair.” Robertson JA, Thomas AW, Bureau Y, Prato FS. *Bioelectromagnetics* 28(1): 16–30.

“Computational feasibility of deformable mirror microwave hyperthermia technique for localized breast tumors.” Arunachalam K, Udpa SS, Udpa L. *International Journal of Hyperthermia* 23(7): 577–589.

“Static magnetic fields enhance skeletal muscle differentiation in vitro by improving myoblast alignment.” Coletti D, Teodori L, Albertini MC, Rocchi M, Pristera A, Fini M, Molinaro M, Adamo S. *Cytometry Part A* 71(10): 846–856.

“Carbon nanotube-enhanced thermal destruction of cancer cells in a noninvasive radiofrequency field.” Gannon CJ, Cherukuri P, Jakobson BI, Cognet L, Kanzius JS, Kittrell C, Weisman RB, Pasquali M, Schmidt HK, Smalley RE, Curley SA. *Cancer* 110(12): 2654–2665 [13,560,000 Hz].

“The biologic effects and the therapeutic mechanism of action of electric and electromagnetic field stimulation on bone and cartilage: new findings and a review of earlier work.” Haddad JB, Obolensky AG, Shinnick P. *Journal of Alternative and Complementary Medicine* 13(5): 485–490.

“Prospective, randomized, single-blind, sham treatment-controlled study of the safety and efficacy of an electromagnetic field device for the treatment of chronic low back pain: a pilot study.” Harden RN, Remble TA, Houle TT, Long JF, Markov MS, Gallizzi MA. *Pain Practice* 7(3): 248–255.

“Pulsed radiofrequency: a novel treatment for chronic cervical radicular pain?” Jensen TS. *Pain* 127(1–2): 3–4.

“Alternating electric fields arrest cell proliferation in animal tumor models and human brain tumors.” Kirson ED, Dbaly V, Tovarys F, Vymazal J, Soustiel JF, Itzhaki A, Mordechovich D, Steinberg-Shapira S, Gurchich Z, Schneiderman R, Wasserman Y, Salzberg M, Ryffel B, Goldsher D, Dekel E, Palti Y. *Proceedings of the National Academy of Sciences USA* 104(24): 10152–10157.

“Pulsed radiofrequency for the treatment of chronic ilioinguinal neuropathy.” Mitra R, Zeighami A, Mackey S. *Hernia* 11(4): 369–371.

“Low frequency and low intensity pulsed electromagnetic 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. *Life Sciences* 80(26): 2403–2410.

“A randomized, double-blind, placebo-controlled clinical trial using a low-frequency magnetic field in the treatment of musculoskeletal chronic pain.” Thomas AW, Graham K, Prato FS, McKay J, Forster PM, Moulin DE, Chari S. *Pain Research and Management* 12(4): 249–258



“Effectiveness of pulsed electromagnetic field therapy in lateral epicondylitis.” Uzunca K, Birtane M, Tastekin N, *Clinical Rheumatology* 26(1): 69–74.

“Effects of pulsed electromagnetic fields on patients’ recovery after arthroscopic surgery: prospective, randomized and double-blind study.” Zorzi C, Dall’Oca C, Cadossi R, Setti S, *Knee Surgery Sports Traumatology Arthroscopy* 15(7): 830–834.

## 2006

“Use of a static magnetic field to promote recovery after peripheral nerve injury.” Kelleher MO, Al-Abri RK, Lenihan DV, Glasby MA, *Journal of Neurosurgery* 105(4): 610–615.

“Efficacy of pulsed electromagnetic therapy for chronic lower back pain: a randomized, double-blind, placebo-controlled study.” Lee PB, Kim YC, Lim YJ, Lee CJ, Choi SS, Park SH, Lee JG, Lee SC, *Journal of International Medical Research* 34(2): 160–167.

“Extremely low frequency 7 Hz 100 microT electromagnetic radiation promotes differentiation in the human epithelial cell line HaCaT.” Lisi A, Foletti A, Ledda M, Rosola E, Giuliani L, D’Emilia E, Grimaldi S, *Electromagnetic Biology and Medicine* 25(4): 269–280 [7 Hz].

“Effect of millimeter wave irradiation on tumor metastasis.” Logani MK, Szabo I, Makar V, Bhanushali A, Alekseev S, Ziskin MC, *Bioelectromagnetics* 27(4): 258–264.

“Nanosecond pulsed electric fields cause melanomas to self-destruct.” Nuccitelli R, Pliquett U, Chen X, Ford W, Swanson RJ, Beebe SJ, Kolb JF, Schoenbach KH, *Biochemical and Biophysical Research Communications* 343(2): 351–360.

“Localized pulsed magnetic fields for tendonitis therapy.” Owegi R, Johnson MT, *Biomedical Sciences Instrumentation* 42: 428–433.

“Electromagnetic therapy for treating venous leg ulcers.” Ravaghi H, Flemming K, Cullum N, Olyaei Manesh A, *Cochrane Database of Systematic Reviews* (2): CD002933.

“Pulsed radiofrequency denervation for the treatment of sacroiliac joint syndrome.” Vallejo R, Benyamin RM, Kramer J, Stanton G, Joseph NJ, *Pain Medicine* 7 (5): 429–434.

## 2005

“Ice and pulsed electromagnetic field to reduce pain and swelling after distal radius fractures.” Cheing GL, Wan JW, Kai Lo S, *Journal of Rehabilitation Medicine* 37(6): 372–377 [50 Hz, pulsed].

“Effect of millimeter waves on natural killer cell activation.” Makar VR, Logani MK, Bhanushali A, Kataoka M, Ziskin MC, *Bioelectromagnetics* 26(1): 10–19.

“Magnetically labeled human natural killer cells, accumulated in vitro by an external magnetic force, are effective against HOS osteosarcoma cells.” Nakashima Y, Deie M, Yanada S, Sharman P, Ochi M, *International Journal of Oncology* 27(4): 965–971.

“Slow transcranial magnetic stimulation can rapidly reduce resistant auditory hallucinations in schizophrenia.” Poulet E, Brunelin J, Bediou B, Bation R, Forgeard L, Dalery J, d’Amato T, Saoud M, *Biological Psychiatry* 57(2): 188–191.

“Do magnetic fields cause increased risk of childhood leukemia via melatonin disruption?” Henshaw DL and Reiter RJ. *Bioelectromagnetics*; Supplement 7: S86–97.

“Transcranial magnetic stimulation accelerates the antidepressant effect of amitriptyline in severe depression: a double-blind placebo-controlled study.” Rumi DO, Gattaz WF, Rigonatti SP, Rosa MA, Fregni F, Rosa MO, Mansur C, Myczkowski ML, Moreno RA, Marcolin MA, *Biological Psychiatry* 57(2): 162–166.

## 2004

“High-frequency pulsed electromagnetic energy in tinnitus treatment.” Ghossaini SN, Spitzer JB, Mackins CC, Zschommler A, Diamond BE, Wazen JJ, *Laryngoscope* 114(3): 495–500.

“Disruption of cancer cell replication by alternating electric fields.” Kirson ED, Gurvich Z, Schneiderman R, Dekel E, Itzhaki A, Wasserman Y, Schatzberger R, Palti Y, *Cancer Research* 64(9): 3288–3295.

“Effects of low-intensity ultrahigh frequency electromagnetic radiation on inflammatory processes.” Lushnikov KV, Shumilina YV, Yakushina VS, Gapeev AB, Sadovnikov VB, Chemeris NK, *Bulletin of Experimental Biology and Medicine* 137(4): 364–366.

“Experimental study of a novel thermotherapy for hepatocellular carcinoma using a magnesium ferrite complex powder that produces heat under a magnetic field.” Muraoka A, Takeda S, Matsui M, Shimizu T, Tohnai I, Akiyama S, Nakao A, *Hepatogastroenterology* 51(60): 1662–1666 .

“A multicenter clinical trial on the use of pulsed electromagnetic fields in the treatment of temporomandibular disorders.” Peroz I, Chun YH, Karageorgi G, Schwerin C, Bernhardt O, Roulet JF, Freesmeyer WB, Meyer G, Lange KP, *Journal of Prosthetic Dentistry* 91(2): 180–187.

“Low electric field enhanced chemotherapy can cure mice with CT-26 colon carcinoma and induce anti-tumour immunity.” Plotnikov A, Fishman D, Tichler T, Korenstein R, Keisari Y, *Clinical and Experimental Immunology* 138(3): 410–416.

“Induction of apoptosis and necrosis in cancer cells by electric fields, electromagnetic fields, and photodynamically active quinoids.” Radeva M, Berg A, Berg H, *Electromagnetic Biology and Medicine* 23(3): 185–200.

### 2003

“Radiofrequency for the treatment of allergic rhinitis refractory to medical therapy.” Lin HC, Lin PW, Su CY, Chang HW, *Laryngoscope* 113(4): 673–678 [465 Hz].

“The use of pulsed electromagnetic fields with complex modulation in the treatment of patients with diabetic polyneuropathy.” Musaev AV, Guseinova SG, Imamverdieva SS, *Neuroscience and Behavioral Physiology* 33(8): 745–752.

“The effect of the pulsatile electromagnetic field in children suffering from bronchial asthma.” Sadlonova J, Korpas J, Salat D, Miko L, Kudlicka J, *Acta Physiologica Academiae Scientiarum Hungaricae* 90(4): 327–334.

“Extended two-year results of radio-frequency energy delivery for the treatment of fecal incontinence (the Secca procedure).” Takahashi T, Garcia-Osogobio S, Valdovinos MA, Belmonte C, Barreto C, Velasco L, *Diseases of the Colon and Rectum* 46(6): 711–715.

“Treatment of chronic pain with millimetre wave therapy (MWT) in patients with diffuse connective tissue diseases: a pilot case series study.” Usichenko TI, Herget HF, *European Journal of Pain* 7(3): 289–294.

“Pulsed radiofrequency treatment of the Gasserian ganglion in patients with idiopathic trigeminal neuralgia.” van Zundert J, Brabant S, Van de Kelft E, Vercruyssen A, Van Buyten JP, *Pain* 104(3): 449–452.

### 2002

“Healing of chronic arterial and venous leg ulcers with systemic electromagnetic fields.” Canedo-Dorantes L, Garcia-Cantu R, Barrera R, Mendez-Ramirez I, Navarro VH, Serrano G, *Archives of Medical Research* 33(3): 281–289.

“The effect of pulsed electromagnetic fields on the osteointegration of hydroxyapatite implants in cancellous bone: a morphologic and microstructural in vivo study.” Fini M, Cadossi R, Cane V, Cavani F, Giavaresi G, Krajewski A, Martini L, Aldini NN, Ravaglioli A, Rimondini L, Torricelli P, Giardino R, *Journal of Orthopaedic Research* 20(4): 756–763.

“Effects of static magnets on chronic knee pain and physical function: a double-blind study.” Hinman MR, Ford J, Heyl H, *Alternative Therapies in Health and Medicine* 8(4): 50–55.

“Radio-frequency energy delivery to the anal canal for the treatment of fecal incontinence.” Takahashi T, Garcia-Osogobio S, Valdovinos MA, Mass W, Jimenez R, Jauregui LA, Bobadilla J, Belmonte C, Edelstein PS, Utley DS, *Diseases of the Colon and Rectum* 45(7): 915–922.

“Evaluation of electromagnetic fields in the treatment of pain in patients with lumbar radiculopathy or the whiplash syndrome.” Thuile C, Walzl M, *NeuroRehabilitation* 17(1): 63–67.

“Functional magnetic stimulation facilitates gastric emptying.” Lin VW, Kim KH, Hsiao I, Brown W, *Archives of Physical Medicine and Rehabilitation* 83(6): 806–810.

### 2001

“Experimental clinical study of the effect of millimeter waves on microbial and inflammatory renal diseases.” Bagdasarova IV, Rudenko AV, Tumanyants EN, *CRC Critical reviews in Biomedical Engineering* 29(5–6): 635–643.

“Mechanical and electromagnetic induction of protection against oxidative stress.” Di Carlo AL, White NC, Litovitz TA, *Bioelectrochemistry* 53(1): 87–95.

“Electromagnetic therapy for the treatment of venous leg ulcers.” Flemming K, Cullum N, *Cochrane Database of Systematic Reviews* (1): CD002933.

“The efficacy of ununited tibial fracture treatment using pulsing electromagnetic fields: relation to biological activity on nonunion bone ends.” Ito H, Shirai Y, *Journal of Nippon Medical School* 68(2): 149–153.

“Effect of a wound healing electromagnetic field on inflammatory cytokine gene expression in rats.” Jasti AC, Wetzel BJ, Aviles H, Vesper DN, Nindl G, Johnson MT, *Biomedical Sciences Instrumentation* 37: 209–214.

“Electromagnetic fields used clinically to improve bone healing also impact lymphocyte proliferation in vitro.” Johnson MT, Vanscoy-Cornett A, Vesper DN, Swez JA, Chamberlain JK, Seaward MB, Nindl G, *Biomedical Sciences Instrumentation* 37: 215–220.

“Transurethral microwave therapy of the prostate.” McEwen DR, Alejos P, *Seminars in Perioperative Nursing* 10(1): 17–23.

“Magnetic field therapy for epilepsy.” McLean M, Engstrom S, Holcomb R, *Epilepsy and Behavior* 2: S81–S89.

“Electromagnetic phased arrays for regional hyperthermia: optimal frequency and antenna arrangement.” Seebass M, Beck R, Gellermann J, Nadobny J, Wust P, *International Journal of Hyperthermia* 17(4): 321–336.

“Therapeutic electromagnetic field effects on angiogenesis and tumor growth.” Williams CD, Markov MS, Hardman WE, Cameron IL, *Anticancer Research* 21 (6A): 3887–3891.

“A historical perspective of the popular use of electric and magnetic therapy.” Basford JR, *Archives of Physical Medicine and Rehabilitation* 82(9): 1261–1269.

“Electrochemical treatment of mouse Ehrlich tumor with direct electric current.” Cabrales LB, Ciria HC, Bruzon RP, Quevedo MS, Aldana RH, De Oca LM, Salas MF, Od Pena, *Bioelectromagnetics* 22(5): 316–322.

“Low-amplitude, extremely low frequency magnetic fields for the treatment of osteoarthritic knees: a double-blind clinical study.” Jacobson JI, Gorman R, Yamanashi WS, Saxena BB, Clayton L, *Alternative Therapies in Health and Medicine* 7(5): 54–64, 66–69.

“Effect of a wound healing electromagnetic field on inflammatory cytokine gene expression in rats.” Jasti AC, Wetzel BJ, Aviles H, Vesper DN, Nindl G, Johnson MT, *Biomedical Sciences Instrumentation* 37: 209–214.

“A study of millimeter wave’s clinical and immunological effects on oral lichen planus patients.” [not in English] Jin Z, Lin M, Xia J, Zhuang J, Yang R, Li X, He Y, *Hua Xi Kou Qiang Yi Xue Za Zhi (West China Journal of Stomatology)* 19(6): 366–368.

“Electromagnetic fields used clinically to improve bone healing also impact lymphocyte proliferation in vitro.” Johnson MT, Vanscoy-Cornett A, Vesper DN, Swez JA, Chamberlain JK, Seaward MB, Nindl G, *Biomedical Sciences Instrumentation* 37: 215–220.

“Magnetic field therapy for epilepsy.” McLean M, Engstrom S, Holcomb R, *Epilepsy and Behavior* 2: S81–S89.

## 2000

“Hyperthermia and radiotherapy for inoperable squamous cell carcinoma metastatic to cervical lymph nodes from an unknown primary site.” Amichetti M, Romano M, Cristoforetti L, Valdagni R, *International Journal of Hyperthermia* 16(1): 85–93.

“Blood-specific whole-body electromagnetic hyperthermia.” Babincova M, Sourivong P, Leszczynska D, Babinec P, *Medical Hypotheses* 55(6): 459–460.

“Minimally invasive treatment of malignant hepatic tumors: at the threshold of a major breakthrough.” Dodd 3rd GD, Soulen MC, Kane RA, Livraghi T, Lees WR, Yamashita Y, Gillams AR, Karahan OI, Rhim H, *Radiographics* 20(1): 9–27.

“Transcranial magnetic stimulation and auditory hallucinations in schizophrenia.” Hoffman RE, Boutros NN, Hu S, Berman RM, Krystal JH, Charney DS, *Lancet* 355(9209): 1073–1075.

“Damage induction by direct electric current in tumoural target cells.” Holandino C, Veiga VF, Capella MM, Menezes S, Alviano CS, *Indian Journal of Experimental Biology* 38(6): 554–558.

“Static magnetic field therapy for pain in the abdomen and genitals.” Holcomb RR, Worthington WB, McCullough BA, McLean MJ, *Pediatric Neurology* 23(3): 261–264.

“Development of inductive regional heating system for breast hyperthermia.” Kotsuka Y, Watanabe M, Hosoi M, Isono I, Izumi M, *IEEE Transactions on Microwave Theory and Techniques* 48(11): 1807–814.

“The use of millimeter wavelength electromagnetic waves in cardiology.” Lebedeva AY, *CRC Critical reviews in Biomedical Engineering* 28(1–2): 339–347.

“Experiments showing that electromagnetic fields can be used to treat inflammatory diseases.” Nindl G, Balcavage WX, Vesper DN, Swez JA, Wetzel BJ, Chamberlain JK, Fox MT, *Biomedical Sciences Instrumentation* 36: 7–13.

## 1999

“An imposed oscillating electrical field improves the recovery of function in neurologically complete paraplegic dogs.” Borgens RB, Toombs JP, Breur G, Widmer WR, Waters D, Harbath AM, March P, Adams LG, *Journal of Neurotrauma* 16(7): 639–657.

“A pilot study on the extremely low frequency (ELF) pulsing magnetic field (PMF) effect on soft tissue injuries: a preliminary analysis of the results.” Baldi E, Lithgow B, Heath B, Cohen M, Cosic I, Grace RJ, *Medical and Biological Engineering and Computing* 37: 103–104.

“Electroporation therapy: a new approach for the treatment of head and neck cancer.” Hofmann GA, Dev SB, Dimmer S, Nanda GS, *IEEE Transactions on Biomedical Engineering* 46(6): 752–759.

“Using a direct current electrical field to promote spinal-cord regeneration.” Shen NJ, Wang SC, *Journal of Reconstructive Microsurgery* 15(6): 427–431.

“Low-frequency repetitive transcranial magnetic stimulation improves intractable epilepsy.” Tergau F, Naumann U, Paulus W, Steinhoff BJ, *Lancet* 353(9171): 2209.

“Magnetic mattress pad use in patients with fibromyalgia: a randomized double-blind pilot study.” Colbert AP; Markov M, Banerji M, Pilla A. *Journal of Back and Musculoskeletal Rehabilitation*, July 1, 1999, Volume 13, Number 1, 19–31.

**1998**

“Percutaneous electrical nerve stimulation: an alternative to antiviral drugs for acute herpes zoster.” Ahmed HE, Craig WF, White PF, Ghoname ES, Hamza MA, Gajraj NM, Taylor SM, *Anesthesia and Analgesia* 87(4): 911–914.

“Treatment with AC pulsed electromagnetic fields normalizes the latency of the visual evoked response in a multiple sclerosis patient with optic atrophy.” Sandyk R, *International Journal of Neuroscience* 93(3–4): 239–250.

“Initial exploration of pulsing electromagnetic fields for treatment of migraine.” Sherman RA, Robson L, Marden LA, *Headache* 38(3): 208–213.

**1997**

“Electrochemical treatment of mouse and rat fibrosarcomas with direct current.” Chou CK, McDougall JA, Ahn C, Vora N, *Bioelectromagnetics* 18(1): 14–24.

“Multicentre experience with combined hyperthermia and radiation therapy in the treatment of superficially located non-Hodgkin’s lymphomas.” Donato V, Zurlo A, Nappa M, Capua A, Banelli E, Martelli M, Gabriele P, Amichetti M, Biagini C, *Journal of Experimental and Clinical Cancer Research* 16(1): 87–90.

“The results of a double-blind trial of pulsed electromagnetic frequency in the treatment of Perthes disease.” Harrison MH, Bassett CA, *Journal of Pediatric Orthopaedics* 17(2): 264–265.

“DC electrical stimulation for chronic wound healing enhancement.” Karba R, Semrov D, Vodovnik L, Benko H, Savrin R, *Bioelectrochemistry and Bioenergetics* 43(2): 265–270.

**1996**

“Application of weak electromagnetic fields facilitates sensory-motor integration in patients with multiple sclerosis.” Sandyk R, *International Journal of Neuroscience* 85(1–2): 101–110.

“Treatment with electromagnetic field alters the clinical course of chronic progressive multiple sclerosis—a case report.” Sandyk R, *International Journal of Neuroscience* 88(1–2): 75–82.

“Microwave diathermy treatment for primary dysmenorrhea.” Vance AR, Hayes SH, Spielholz NI, *Physical Therapy* 76(9): 1003–1008.

**1995**

“A novel electric design for electromagnetic stimulation—the Slinky coil.” Ren C, Tarjan PP, Popovic DB, *IEEE Transactions on Biomedical Engineering* 42(9): 918–925.

“Improvement of right hemispheric functions in a child with Gilles de la Tourette’s syndrome by weak electromagnetic fields.” Sandyk R, *International Journal of Neuroscience* 81(3–4): 199–213.

“Chronic relapsing multiple sclerosis: a case of rapid recovery by application of weak electromagnetic fields.” Sandyk R, *International Journal of Neuroscience* 82(3–4): 223–242.

“Effectiveness of electrochemical treatment of primary pulmonary malignant tumors.” Song Y, Zhang X, Du X, Wang Z, Chen Y, *Chinese Medical Journal* 108(1): 66–67.

**1994**

“Treatment of osteonecrosis of the femoral head with electrical stimulation.” Aaron RK, *Instructional Course Lectures* 43: 495–98.

“Electromagnetic stimulation of the auditory system of deaf patients.” Counter SA, Borg E, Bredberg G, Linde G, Vainio M, *Acta Otolaryngologica* 114(5): 501–509.

“Electrochemical therapy of pelvic pain: effects of pulsed electromagnetic fields (PEMF) on tissue trauma.” Jorgensen WA, Frome BM, Wallach C, *European Journal of Surgical Supplies* 574: 83–86.

“Alzheimer’s disease: improvement of visual memory and visuoconstructive performance by treatment with picotesla range magnetic fields.” Sandyk R, *International Journal of Neuroscience* 76(3–4): 185–225.

“Improvement in word-fluency performance in Parkinson’s disease by administration of electromagnetic fields.” Sandyk R, *International Journal of Neuroscience* 77(1–2): 23–46.

**1993**

“Therapeutic effects of electromagnetic fields in the stimulation of connective tissue repair.” Aaron RK, Ciombor DM, *Journal of Cellular Biochemistry* 52(1): 42–46.

“Pain control using high-intensity pulsed magnetic stimulation.” Ellis WV, *Bioelectromagnetics* 14(6): 553–556.



**1992**

“Magnetic facial nerve stimulation in Bell’s palsy.” Rimpilainen I, Karma P, Laranne J, Eskola H, Hakkinen V, *Acta Otolaryngologica* 112(2): 311–316.

“Therapeutic effects of pulsed magnetic fields on joint diseases.” Riva Sanseverino E, Vannini A, Castellacci P, *Panminerva Medica* 34(4): 187–196.

“The influence of the pineal gland on migraine and cluster headaches and effects of treatment with picoTesla magnetic fields.” Sandyk R, *International Journal of Neuroscience* 67(1–4): 145–171 [2 Hz to 7 Hz].

**1991**

“Magnetic stimulation in the treatment of partial seizures.” Anninos PA, Tsagas N, Sandyk R, Derpapas K. *International Journal of Neuroscience*, October 1991;60(3–4):141–171.

“Long-term follow-up of fracture nonunions treated with PEMFs.” Garland DE, Moses B, Salyer W. *Contemporary Orthopaedics*, March 1991; 22(3):295–302.

**1990**

“Pulsed high frequency (27 MHz) electromagnetic therapy for persistent neck pain. A double blind, placebo-controlled study of 20 patients.” Foley-Nolan D, Barry C, Coughlan RJ, O’Connor P, Roden D, *Orthopaedics* 13(4): 445–451.

“Bone density changes in osteoporosis-prone women exposed to pulsed electromagnetic fields (PEMFs).” Tabrah F, Hoffmeier M, Gilbert Jr F, Batkin S, Bassett CA, *Journal of Bone and Mineral Research* 5(5): 437–442.

**1989**

“Radio frequency (13.56 MHz) energy enhances recovery from mild hypothermia.” Hesslink RL, Pepper S, Olsen RG, Lewis SB, Homer LD, *Journal of Applied Physiology* 67(3): 1208–1212.

“Prevention of osteoporosis by pulsed electromagnetic fields.” Rubin CT, McLeod KJ, Lanyon LE, *Journal of Bone and Joint Surgery—American Volume* 71(3): 411–417.

**1988**

“Treatment of the damaged rat hippocampus with a locally applied electric field.” Politis MJ, Zanakis MF. *Experimental Brain Research* 1988; 71(1):223–226.

“The use of DC electric fields to promote regeneration in the mammalian nervous system.” Zanakis MF. *ASAIO Transactions*, October-December 1988;34(4):947–951.

**1986**

“Effect of external pulsing electromagnetic fields on the healing of soft tissue.” Glassman LS, McGrath MH, Bassett CA, *Annals of Plastic Surgery* 16(4): 287–295.

**1985**

“Microwave hyperthermia for brain tumors.” Winter A, Laing J, Paglione R, Sterzer F, *Neurosurgery* 17(3): 387–399.

**1984**

“Use of pulsed electromagnetic fields in Perthes disease: report of a pilot study.” Harrison MH, Bassett CA, *Journal of Pediatric Orthopaedics* 4(5): 579–584.

“Design and thermometry of an intracavitary microwave applicator suitable for treatment of some vaginal and rectal cancers.” Li DJ, Luk KH, Jiang HB, Chou CK, Hwang GZ, *International Journal of Radiation Oncology Biology Physics* 10(11): 2155–2162.

“Results of pulsed electromagnetic fields (PEMFs) in ununited fractures after external skeletal fixation.” Marcer M, Musatti G, Bassett CA, *Clinical Orthopaedics and Related Research* (190): 260–265.

“Whole-body hyperthermia induction techniques.” Milligan AJ, *Cancer Research* 44 (10 Supplement): 4869S–4872S.

**1983**

“Review of pulsing electromagnetic field therapy and its possible application to horses.” Auer JA, Burch GE, Hall P, *Equine Veterinary Journal* 15(4): 354–360.

“Effects of pulsing electromagnetic fields on bone growth and articular cartilage.” Smith RL, Nagel DA, *Clinical Orthopaedics and Related Research* (181): 277–282.

“Electromagnetic applicators for regional and whole-body hyperthermia.” Wahid PF, Hagmann MJ, Gandhi OP, *Physics in Medicine and Biology* 28(3): 301–307.

**1982**

“Pulsing electromagnetic field treatment in ununited fractures and failed arthrodeses.” Bassett CA, Mitchell SN, Gaston SR, *Journal of the American Medical Association* 247(5): 623–628.

“Clinical experiences with combined hyperthermia and radiotherapy in the treatment of cancer.” Friedenthal E, Mendecki J, Botstein C, Sterzer F, Paglione R, Nowogrodzki M, *Progress in Clinical and Biological Research* 107: 751–760.

**1981**

“A new approach to microwave hyperthermia therapy for cancer.” Heinmets F, *Physiological Chemistry and Physics and Medical NMR* 13(6): 561–564.

“Hyperthermia, still experimental, may win place in cancer therapy.” Johnson RS, *Journal of the American Medical Association* 245(11): 1109–1116.

**1980**

“Microwave applicators for localized hyperthermia treatment of cancer of the prostate.” Mendecki J, Friedenthal E, Botstein C, Paglione R, Sterzer F, *International Journal of Radiation Oncology Biology Physics* 6(11): 1583–1588.

“Microwave adjuvant to radiotherapy and chemotherapy for advanced lymphoma.” Nelson AJ, Holt JA, *Medical Journal of Australia* 1(7): 311–313.

**1979**

“Microwave diathermy: the invisible healer.” Greene J, *FDA Consumer* 13(1): 7–11.

“The cause of cancer: biochemical defects in the cancer cell demonstrated by the effects of electromagnetic radiation, glucose and oxygen.” Holt JA, *Medical Hypotheses* 5(1): 109–143.

“Fracture healing in rats exposed to extremely low-frequency electric fields.” Marino AA, Cullen JM, Reichmanis M, Becker RO, *Clinical Orthopaedics and Related Research* (145): 239–244.

**1978**

“Repair of non-unions by pulsing electromagnetic fields.” Bassett CA, Mitchell SN, Norton L, Pilla A, *Acta Orthopaedica Belgica* 44(5): 706–724.

**1977**

“Increase in X-ray sensitivity of cancer after exposure to 434 MHz electromagnetic radiation.” Holt JA, *Journal of Bioengineering* 1(5–6): 479–485.

“Electrical bone-growth stimulation in an experimental model of delayed union.” Paterson DC, Carter RF, Maxwell GM, Hillier TM, Ludbrook J, Savage JP, *Lancet* 1(8025): 1278–1281.

**1976**

“Percutaneous electrical stimulation for clinical tibial fracture repair.” Romano RL, Burgess EM, Rubenstein CP. *Clinical Orthopaedics and Related Research*, January–February 1976;(114):290–295.

**1975**

“Radiation sensitization of tumor cells by microwaves—end of the oxygen problem.” Dietzel F, *Naturwissenschaften* 62(1): 44–45.

“Effects of magnetic field on inflammation.” Mizushima Y, Akaoka I, Nishida Y, *Experientia* 31(12): 1411–1412.

“Electromagnetic fields and skin wound repair.” Romero-Sierra C, Halter S, Tanner JA, Roomi MW, Crabtree D, *Journal of Microwave Power and Electromagnetic Energy* 10(1): 59–70.

**1974**

“Augmentation of bone repair by inductively coupled electromagnetic fields.” Bassett CA, Pawluk RJ, Pilla AA, *Science* 184(136): 575–577.

“The effects of pulsed electromagnetic energy on peripheral nerve regeneration.” Wilson DH, Jagadeesh P, Newman PP, Harriman DG, *Annals of the New York Academy of Sciences* 238: 575–585.

**1968**

“Effects of coherent electromagnetic fields on the neoplastic malignant process.” [Czech] Pokorny J, Jelinek V, *Casopis Lekaru Ceskych*, April 12, 1968; 107(16): 474–482.





Note: For this next section, all of which are books, detailed descriptions are included to give readers an idea of the scope of electromedical therapies offered (in both clinics and hospitals), and the medical community's openness to electromedicine. In most cases, the title pages contained a great deal of text, a some of which is reproduced here. Due to the amount of text, it was sometimes difficult to discern between the actual titles and the explanatory subtitling.

Thousands of titles were available in the 1880s and some were published even earlier in the 1700s. For historical interest, the degrees of the authors are included where applicable. All of these books are available in eBook form online, without charge.

## 1946

Richard Kovač, M.D. *Electrotherapy and Light Therapy, 5th Ed.* (Philadelphia: Lea & Febiger, 1946).

[Subtitled: *with the Essentials of Hydrotherapy and Mechanotherapy.* This is a major work in the field. Topics include electrophysics; generation, measurement and transfer of electrical charges; effects of currents, injury vs. harm, and passage through all parts of the body; electrodiagnosis; galvanic current and ion transfer; low-frequency current and apparatus; high-frequency current and apparatus; medical diathermy; hyperthermy; electrosurgery; electrical injuries; physics of radiant energy; infrared, ultraviolet and luminous radiation; helio or sun therapy; hydrotherapy; massage; exercise; physical therapies. There are also lengthy chapters on treating, with electromedicine, afflictions of the respiratory tract; central and peripheral nervous system; bones, joints, muscles and tendons; genital tract; urinary tract; cardiovascular system; ear, nose and throat; eyes; and gastrointestinal tract (which includes metabolic conditions). Arthritis and fibrosis (fibromyalgia) are also addressed. The author gives detailed instructions on what electromedical equipment to use for what ailment.]

## 1920

F. Miramond de Laroquette, M.D. *Atlas for Electro-Diagnosis and Therapeutics* (London: Bailliere, Tindall and Cox, 1920).

George Knapp Abbott, A.B., M.D. *Essentials of Medical Electricity for Medical Students and Nurses* (Philadelphia and London: W.B. Saunders Company, 1920).

## 1910

J. H. Kellogg, M.D. *Light Therapeutics: A Practical Manual of Phototherapy for the Student and the Practitioner, with Special Reference to the Incandescent Electric-Light Bath* (Battle Creek, Mich.: The Good Health Publishing Co.).

[The author is none other than John Harvey Kellogg, who headed a world-famous sanitarium or "health spa" that hosted a range of clients, some of them famous (the Roosevelts, Charles Lindburgh, Mary Todd Lincoln, Sojourner Truth, and Amelia Earhart). Kellogg was later known for creating a breakfast food, corn flakes, and starting a cereal company. His "incandescent electric-light bath" was the first far infrared sauna, which used special light bulbs created by Kellogg's friend Thomas Edison. The title page lists his credentials as follows: "Author of "Rational Hydrotherapy," "The Art of Massage," etc. Member of the British Gynaecological Society, the International Periodical Congress of Gynaecology and Obstetrics, American and British Associations for the Advancement of Science, the Société d'Hygiène of France, American Society of Microscopists, American Climatological Society, American Medical Association, Michigan State Medical Society, Superintendent of the Battle Creek (Mich.) Sanitarium."]

## 1904

Toby Cohen ("nerve specialist, Berlin") and Francis A. Scratchley, M.D. *Electro-Diagnosis and Electro-Therapeutics: A Guide for Practitioners and Students* (New York and London: Funk & Wagnalls Company, 1904).

Margaret A Cleaves, M.D. *Light Energy: Its Physics, Physiological Action and Therapeutic Applications* (New York and London: Rebman Company and Rebman Limited, 1904).

[The author's credentials and affiliations are given on the title page as follows: "Fellow of the New York Academy of Medicine; Fellow of the American Electro-Therapeutic Association; Member of the New York County Medical Society; Fellow of the Societe Francaise d'Electrotherapie; Fellow of the American Electro-Chemical Society; Member of the Society of American Authors; Member of the New York Electrical Society; Professor of Light Energy in the New York School of Physical Therapeutics; Late Instructor in Electro-Therapeutics in the New York Post-Graduate Medical School."]



**1902**

W.F. Brady, M.D. et al. *A System of Electrotherapeutics, Volume 6: Electrotherapy* (Scranton: International Textbook Company, 1902).

Dr. Wilhelm Winternitz (Professor of Clinical Medicine in the University of Vienna; Director of the General Polyclinic in Vienna), assisted by Dr. Alois Strasser (Instructor in Clinical Medicine at the University of Vienna) and Dr. B. Buxbaum (Chief Physician of the Hydrotherapeutic Institute in Vienna) and Dr. E. Heinrich Kisch (Professor in the University of Prague; Physician at Marienbad Spa). *Hydrotherapy, Thermotherapy, Heliotherapy, and Phototherapy, Volume IX. A System of Physiologic Therapeutics: A Practical Exposition of the Methods, Other than Drug-Giving, Useful in the Prevention of Disease and in the treatment of the Sick.*

S.H. Monell, M.D. *X-Ray Methods and Medical Uses of Light, Hot-Air, Vibration and High-Frequency Currents.* (New York: E.R. Pelton, 1902)

William Benham Snow, M.D. (Editor). *The Journal of Advanced Therapeutics, Volume XXI* (A.L. Chatterton & Co., 1902).

[Many medical professionals contributed to Snow's journals, which included information on all types of diseases and their treatment with phototherapy, thermotherapy, hydrotherapy, diet, therapeutic exercise, psychotherapy, and "mechanical vibration therapy." Volume XXI was published in 1902 and Volume XXXI (also available online) was published in 1913, one volume per year. Therefore, we can guess that the first volume of *Journal of Advanced Therapeutics* was probably published in 1882.]

**1886**

Elizabeth J. French. *A New Path in Electrical Therapeutics* (Philadelphia: J.B. Lippincott Company, 1886).

[Also appearing on title page: *Electrical Therapeutics: An Account of the Author's Great Discovery of Electrical Cranial Diagnosis, and the Scientific Application of Different Currents of Electricity to the Cure of Disease. A Brief Treatise on Anatomy and Physiology. An Historical Account of the Discoveries in Magnetism and Electricity, the Progress of Medical Science, and Brief Sketches of the Lives of Eminent Practitioners, from the Earliest Ages to the Present Century; Also a Thorough System of Hygiene; to which are Added Plain Directions for the Treatment of Disease by the Author's System of Electrical Applications.*]

**1883**

Dr. Wilhelm Erb, professor in the University of Leipzig; Translated by L. Putzel, M.D. (Neurologist to Randall's Island Hospital, and Physician to the Clinic for Nervous Diseases, Bellevue Out-Door Department, etc.). *Handbook of Electro-Therapeutics* (New York: William Wood & Company, 1883).

[Contains an extensive chapter outline on many topics: electronics, physiology, physical examination, electro-diagnosis, general electro-therapeutics, diseases, and conditions of the urinary tract, sexual organs, nervous system, muscles, glands, digestive system, and more.]

**1878**

Edwin D. Babbitt. *The Principles of Light and Color* (New York: Babbitt & Co., 1878).

John Butler, M.D., L.R.C.P.E., L.R.C.S.I. *Electro-Therapeutics and Electro-Surgery* (New York and Philadelphia: Boericke & Tafel, 1878).

**1877**

Gen. A.J. Pleasonton and Others. *The Influence of the Blue Ray of the Sunlight and of the Blue Colour of the Sky, in developing animal and vegetable life: in arresting disease, and in restoring health in acute and chronic disorders to human and domestic animals* (Philadelphia: Claxton, Remsen & Haffelfinger, 1877).

Herbert Tibbits, M.D., F.R.C.P.E. *How To Use a Galvanic Battery in Medicine and Surgery, 2nd Ed.*



## ENDNOTES

### Appendix D

#### SELECTED PUBLISHED STUDIES IN ELECTROMEDICINE

- 1 A. Barbault, F.P. Costa, B. Bottger, R.F. Munden, F. Bomholt, N. Kuster, and B. Pasche, "Amplitude-modulated electromagnetic fields for the treatment of cancer: Discovery of tumor-specific frequencies and assessment of a novel therapeutic approach." *Journal of Experimental and Clinical Cancer Research*, April 14, 2009; 28:51. Abstract at [www.ncbi.nlm.nih.gov/pubmed/19366446](http://www.ncbi.nlm.nih.gov/pubmed/19366446) (November 3, 2010).
- 2 Pierre Le Chapellier and Badri Matta, "Is Victory over Pancreatic Cancer Possible, with the Help of Tuned Non-Invasive Physiotherapy? A Case Study Says Yes." *Journal of Cancer Therapy* 2014, Volume 5, Number 5, 460.