

## CURRICULUM VITAE

---

Andrew A. Marino, Ph.D., J.D.

Professor

Louisiana State University Medical Center

P.O. Box 33932

Shreveport, Louisiana 71130

Telephone: (318) 675-6177

Fax: (318) 675-6186

E-mail: [amarino@lsuhsc.edu](mailto:amarino@lsuhsc.edu)

<http://andrewamarino.com>

## EDUCATION

B.S., Physics, St. Joseph's University, Philadelphia, PA, 1962

M.S., Biophysics, Syracuse University, Syracuse, NY, 1965

Ph.D., Biophysics, Syracuse University, Syracuse, NY, 1968

J.D., Law, Syracuse University College of Law, 1974

## POSITIONS HELD

Research Biophysicist, Veterans Administration Medical Center, Syracuse, New York, 1964-1981

Assistant Professor, Department of Orthopaedic Surgery, SUNY Upstate Medical Center, Syracuse, New York, 1972-1981

Assistant Professor, Department of Orthopaedic Surgery, Louisiana State University Medical Center, Shreveport, Louisiana, 1981-1985

Associate Professor, Department of Orthopaedic Surgery, Louisiana State University Medical Center, Shreveport, Louisiana, 1985-1989

Associate Professor, Department of Bioengineering, Louisiana Tech University, Ruston, Louisiana, 1988-1994

Professor: Department of Neurology, Louisiana State University Health Sciences Center, Shreveport, Louisiana, 2010 to present

Department of Orthopaedic Surgery, Louisiana State University Health Sciences Center, Shreveport, Louisiana, 1989-2010

Department of Cellular Biology and Anatomy, Louisiana State University Medical Center, Shreveport, Louisiana, 1989 to present

Department of Bioengineering, Louisiana Tech University, Ruston, Louisiana, 1995 to present

Chairman, LSU Medical School Institutional Review Board for Human Research, June, 1986-1990

Chairman, Committee on Promotions Guidelines, 1990-1992

Chairman, Medical Communications Committee, 1990-1992

President of the Faculty of the Medical School, 1991-1992, 1999-2000

Member, Elected Faculty Council, LSUMC, 1986-1992

Member, Institutional Animal Care and Use Committee, 1990-1996

Vice-President, International Society for Bioelectricity, 1981-1983

President, International Society for Bioelectricity, 1983-1991

Editorial Consultant in Biophysics and Medical Physics, Encyclopedia of Applied Physics, 1990-present

Editor, Journal of Bioelectricity, 1980-1991

Associate Editor, Journal of Electro- and Magnetobiology, 1991-2002

Associate Editor, Electromagnetic Medicine and Biology, 2002-present

Member, Advisory Board, Center for Frontier Sciences, Temple University, 1998-present

Member, Editorial Board, Center for Frontier Sciences, Temple University, 1998-present

#### BAR MEMBERSHIP:

New York, 1975-present

Louisiana, 1995-present

#### BOOKS

1. Electromagnetism & Life. with R.O. Becker. State University of New York Press, Albany, 1982.
2. Electric Wilderness. A.A. Marino and J. Ray. San Francisco Press, San Francisco, 1986.
3. Foundations of Modern Bioelectricity. A.A. Marino, ed. Marcel Dekker, New York, 1988.

#### LAW REVIEW

1. The Scientific Basis of Causality in Toxic Tort Cases. A.A. Marino & L.E. Marino. Dayton Law Review, vol. 21, pp.1-62, 1995.

#### PATENTS

1. United States Patent No. US 6,547,746 B1: Method and Apparatus for Determining Response Thresholds. Andrew A. Marino. April 15, 2003.

## PAPERS

161. Transient and steady-state magnetic fields induce increased fluorodeoxyglucose uptake in the rat hindbrain. C. Frilot II, S. Carrubba & A.A. MARINO. *Synapse* 65:617-623, 2011. Published online ahead of print December 28, 2010.
160. Numerical analysis of recurrence plots to detect effect of environmental-strength magnetic fields on human brain electrical activity. S. Carrubba, C. Frilot II, A.L. Chesson Jr. & A.A. MARINO. *Med. Eng. Phys.* 32:898-907, 2010.
159. Simulated MR magnetic field induces steady-state changes in brain dynamics: implications for interpretation of functional MR studies. A.A. MARINO, S. Carrubba, C. Frilot II, A.L. Chesson Jr. & E. Gonzalez-Toledo. *Magn. Reson. Med.* 64:349-357, 2010.
158. Multiple sclerosis impairs ability to detect abrupt appearance of a subliminal stimulus. S. Carrubba, A. Minazar, E. Gonzalez Toledo, A.L. Chesson, C. Frilot II & A.A. MARINO. *Neurolog. Res.* 32:297-302, 2010.
157. Mobile-phone pulse triggers evoked potentials. S. Carrubba, C. Frilot II, A.L. Chesson Jr. & A.A. MARINO. *Neurosci Lett.* 469:164–168, 2010.
156. Pathophysiology of osteoarthritis: evidence against the viscoelastic theory. S. Dunn, O.V. Kolomytkin & A.A. MARINO. *Pathobiology* 76:322–328, 2009.
155. The electric field is a sufficient physical determinant of the human magnetic sense. S. Carrubba, C. Frilot, II, F.X. Hart, A.L. Chesson, Jr. & A.A. MARINO. *Int. J. Radiat. Biol.* 85:622–632, 2009.
154. The effects of mobile-phone electromagnetic fields on brain electrical activity: a critical analysis of the literature. A.A. MARINO & S. Carrubba. *Electromagnetic Medicine and Biology* 28:250-274, 2009.
153. Evidence that transduction of electromagnetic field is mediated by a force receptor. A.A. MARINO, S. Carrubba, C. Frilot & A.L. Chesson Jr. *Neurosci. Lett.* 452:119–123, 2009.
152. Magnetosensory function in rats: localization using positron emission tomography. C. Frilot II, S. Carrubba & A.A. MARINO. *Synapse* 63:421–428, 2009.
151. Neurobiophysics. O.V. Kolomytkin & A.A. MARINO. In *Handbook of Molecular Biophysics. Methods and Applications*. H.G. Bohr, Ed. Wiley VCH, 2009, pp. 523–556.
150. Hyaluronan-binding receptors: possible involvement in osteoarthritis. S. Dunn, O.V. Kolomytkin, D.D. Waddell & A.A. MARINO. *Mod. Rheumatol.* 19:151–155, 2009.
149. Method for detection of changes in the EEG induced by the presence of sensory stimuli. S. Carrubba, C. Frilot, A.L. Chesson Jr. & A.A. MARINO. *J. Neurosci Methods.* 173:41–46, 2008.
148. Design and implementation of a system-based course in musculoskeletal medicine for medical students. K. Bilderback, J. Eggerstedt, K.K. Sadasivan, L. Seelig, R. Wolf, S. Barton, R. McCall, A.L. Chesson, Jr. & A.A. MARINO. *J. Bone Joint Surg.* 90:2292–2300, 2008.
147. The effects of low-frequency environmental-strength electromagnetic fields on brain electrical activity: a critical review of the literature. S. Carrubba & A.A. MARINO. *Electromag. Biol. Med.* 27:83–101, 2008.
146. Magnetosensory evoked potentials: consistent nonlinear phenomena. S. Carrubba, C. Frilot, A.L. Chesson, Jr., C.L. Webber, Jr., J.P. Zbilut & A.A. MARINO. *Neurosci. Res.* 60:95–105, 2008.

145. Hyaluronan suppresses IL-1 $\beta$ -induced metalloproteinase activity from synovial tissue. D.D. Waddell, O.V. Kolomytkin, S. Dunn & A.A. MARINO. *Clin. Orthop*, 465:241–248, 2007.
144. Chronic knee effusions in patients with advanced osteoarthritis. D.D. Waddell & A.A. MARINO. *J. Knee Surg.* 20:181–184, 2007.
143. Nonlinear EEG activation by low-strength low-frequency magnetic fields. S. Carrubba, C. Frilot, A.L. Chesson & A.A. MARINO. *Neurosci. Lett.* 417:212–216, 2007.
142. Glycoproteins bound to ion channels mediate detection of electric fields: a proposed mechanism and supporting evidence. O.V. Kolomytkin, S. Dunn, F.X. Hart, C. Frilot, D. Kolomytkin & A.A. MARINO. *Bioelectromagnetics* 28:379–385, 2007.
141. Evidence of a nonlinear human magnetic sense. S. Carrubba, C. Frilot II, A.L. Chesson Jr. & A.A. MARINO. *Neuroscience* 144:356–367, 2007.
140. Detection of nonlinear event-related potentials. S. Carrubba, C. Frilot, A. Chesson & A.A. MARINO. *J. Neurosci. Meth.* 157:39–47, 2006.
139. Assessment of immunologic mechanisms for flare reactions to Synvisc®. A.A. MARINO, D.D. Waddell, O.V. Kolomytkin, S. Pruetz, K.K. Sadasivan & J.A. Albright. *Clin. Orthop.* 442:187–194, 2006.
138. External suction drainage in primary total joint arthroplasties. L.M. Gehrig, K.K. Sadasivan, A.A. MARINO & J.A. Albright. *Am. J. Orthop.* 34:164–166, 2005.
137. Effect of low-frequency magnetic fields on brain electrical activity in human subjects. A.A. MARINO, E. Nilsen, A.L. Chesson Jr., & C. Frilot. *Clin. Neurophysiol.* 115:1195–1201, 2004.
136. Increased intercellular communication through gap junctions may contribute to progression of osteoarthritis. A.A. MARINO, D.D. Waddell, O.V. Kolomytkin, W.D. Meek, R. Wolf, K.K. Sadasivan & J.A. Albright. *Clin. Orthop.* 422:224–232, 2004.
135. Localization of electroreceptive function in rabbits. A.A. MARINO, E. Nilsen & C. Frilot. *Phys. Behav.* 79:803–810, 2003.
134. Nonlinear changes in brain electrical activity due to cell-phone radiation. A.A. MARINO, E. Nilsen & C. Frilot. *Bioelectromagnetics* 24:339–346, 2003.
133. Extracellular currents alter gap junction intercellular communication in synovial fibroblasts. A.A. MARINO, O.V. Kolomytkin & C. Frilot. *Bioelectromagnetics* 24:199–205, 2003.
132. Comment on “Proposed test for detection of nonlinear responses in biological preparations exposed to RF energy.” A.A. MARINO & C. Frilot. *Bioelectromagnetics* 24:70–72, 2003.
131. Action potentials from neuroblastoma cells in weak magnetic fields. H. Sonnier, O. Kolomytkin & A. MARINO. *Neuroscience Letters* 337:163–166, 2003.
130. Nonlinearity in biological systems: How can physics help? A.A. MARINO & C. Frilot. In *Energy and Information Transfer in Biological Systems* (F. Musumeci, L.S. Brizhik, and M.-W. Ho, eds.) World Scientific Press, 2002, pp. 245–263.
129. Consistent magnetic-field induced dynamical changes in rabbit brain activity detected by recurrence quantification analysis. A.A. MARINO, E. Nilsen & C. Frilot. *Brain Res.* 951:301–310, 2002.
128. IL-1 $\beta$ -induced production of metalloproteinases by synovial cells depends on gap-junction conductance during the early stage of signal transduction. O.V. Kolomytkin, A.A. MARINO, D.D. Waddell, J.M. Mathis, R.E. Wolf, K.K. Sadasivan & J.A. Albright. *Am. J. Physiol: Cell Physiol.* 282:C1254–C1260, 2002.

127. Nonlinear determinism in the immune system. In vivo influence of electromagnetic fields on different functions of murine lymphocyte subpopulations. A.A. MARINO, R.M. Wolcott, R. Chervenak, F. Jourd'heuil, E. Nilsen & C. Frilot II. *Immunol. Invest.* 30:313–334, 2001.
126. Nonlinear dynamical law governs magnetic field changes in lymphoid phenotype. A.A. MARINO, R.M. Wolcott, R. Chervenak, F. Jourd'heuil, E. Nilsen & C. Frilot II. *Bioelectromagnetics* 22:529–546, 2001.
125. Coincident nonlinear changes in the endocrine and immune systems due to low-frequency magnetic fields. A.A. MARINO, R.M. Wolcott, R. Chervenak, F. Jourd'heuil, E. Nilsen, C. Frilot II & S.B. Pruet. *NeuroImmunoModulation* 9:65–77, 2001.
124. Sensory transduction as a proposed model for biological detection of electromagnetic fields. H. Sonnier & A.A. MARINO. *Electro- and Magnetobiology* 20:153–175, 2001.
123. In the eye of the beholder: The role of style of thought in the determination of health risks from electromagnetic fields. Andrew A. MARINO. *Frontier Perspectives* 9:22–27, 2000.
122. Nonlinear response of the immune system to power-frequency magnetic fields. A.A. MARINO, R.M. Wolcott, R. Chervenak, F. Jourd'heuil, E. Nilsen & C. Frilot II. *Am. J. Physiol Regulatory Integrative Comp. Physiol.* 279:R761–R768, 2000.
121. Effect of soft-tissue trauma on the early periosteal response of bone to injury. P.S. Landry, A.A. MARINO, K.K. Sadasivan & J.A. Albright. *J. Trauma* 48:479–483, 2000.
120. Gap junctions in human synovial cells and tissue. O.V. Kolomytkin, A.A. MARINO, K.K. Sadasivan, W.D. Meek, R.E. Wolf, V. Hall, K.J. McCarthy & J.A. Albright. *J. Cell. Physiol.* 184:110–117, 2000.
119. Resting potential of excitable neuroblastoma cells in weak magnetic fields. H. Sonnier O.V. Kolomytkin & A.A. MARINO. *Cell. Molec. Life Sci.* 57:514–520, 2000.
118. Programmed cell death in post-traumatic bone callus. M.L. Olmedo, P.S. Landry, K.K. Sadasivan, J.A. Albright & A.A. MARINO. *Cell. Molec. Biol.* 46:89–97, 2000.
117. Neurobiophysics. H. Sonnier & A.A. MARINO. in *Encyclopedia of Applied Physics*, Update 1, Wiley-VCH Publishers, Inc., pp. 401–405, 1999.
116. Regulation of osteoblast levels during bone healing. M.L. Olmedo, P.S. Landry, K.K. Sadasivan, J.A. Albright, W.D. Meek, R. Routh & A.A. MARINO. *J. Orthop. Trauma* 13:356–362, 1999.
115. Intracellular signaling mechanisms of interleukin-1 $\beta$  in synovial fibroblasts. O.V. Kolomytkin, A.A. MARINO, K.K. Sadasivan, R.E. Wolf & J.A. Albright. *Am. J. Physiol.* 276 (Cell Physiol. 45):C9–C15, 1999.
114. Repair of fascial defects in dogs using carbon fibers. D.M. Morris, J. Hindman & A.A. MARINO. *J. Surg. Res.* 80:300–303, 1998.
113. Low-frequency electromagnetic fields alter the replication cycle of MS2 bacteriophage. J. Staczek, A.A. MARINO, L.B. Gilleland, A. Pizarro & H.E. Gilleland, Jr. *Current Microbiology* 36:298–301, 1998.
112. Interleukin-1 $\beta$  switches electrophysiological states of synovial fibroblasts. O.V. Kolomytkin, A.A. MARINO, K.K. Sadasivan, R.E. Wolf & J.A. Albright. *Am. J. Physiol.*, 273 (Regulatory Integrative Comp. Physiol. 42):R1822–R1828, 1997.
111. Electromagnetic fields can affect osteogenesis by increasing the rate of differentiation. P.S. Landry, K.K. Sadasivan, A.A. MARINO & J.A. Albright. *Clin. Orthop.*, 338:262–270, 1997.

110. Electromagnetic fields enhance chemically-induced hyperploidy in mammalian oocytes. J.B. Mailhes, D. Young, A.A. MARINO & S.N. London. *Mutagenesis*, 12:347–351, 1997.
109. Apoptosis is coordinately regulated with osteoblast formation during bone healing. P. Landry, K. Sadasivan, A. MARINO & J. Albright. *Tissue & Cell* 29(4):413–419, 1997.
108. Piezoelectricity in the human pineal gland. S.B. Lang, A.A. MARINO, G. Berkovic, M. Fowler & K.D. Abreo. *Bioelectrochem. Bioenerg.* 41:191–195, 1996.
107. Bone injury response: an animal model for testing theories of regulation. P.S. Landry, A.A. MARINO, K.K. Sadasivan & J.A. Albright. *Clin. Orthop.* 332:260–273, 1996.
106. Low-level EMFs are transduced like other stimuli. A.A. MARINO, G.B. Bell & A. Chesson. *J. Neurolog. Sci.* 144:99–106, 1996.
105. Elemental diet and IV-TPN-induced bacterial translocation is associated with loss of intestinal mucosal barrier function against bacteria. E.A. Deitch, D. Xu, M.B. Naruhn, D.C. Deitch, Q. Lu & A.A. MARINO. *Ann. Surg.* 221:299–307, 1995.
104. Electromagnetic fields in the classroom. A.A. MARINO, in *The Healthy School Handbook*. Miller, ed., NEA Professional Library, Washington, DC, 221–241, 1995.
103. Different outcomes in biological experiments involving weak EMFs: Is chaos a possible explanation? A.A. MARINO. *Am. J. Physiol.* 268 (Regulatory Integrative Comp. Physiol. 37: R1013–R1018, 1995.
102. Time-dependent hematological changes in workers exposed to electromagnetic fields. A.A. MARINO. *Am. Ind. Hyg. Assoc. J.* 56:189–192, 1995.
101. Neurobiophysics. A.A. MARINO, in *Encyclopedia of Applied Physics*, Vol. 11, VCH Publishers, Inc., pp. 297–322, 1994.
100. Electrical potential measurements in human breast cancer and benign lesions. A.A. MARINO, D.M. Morris, M.A. Schwalke, I.G. Iliev & S. Rogers. *Tumor Biology* 15:147–152, 1994.
99. Treatment of tendon injuries in Thoroughbred racehorses using carbon-fiber implants. K.P. Reed, S.S. van den Berg, A. Rudolph, J.A. Albright, H.W. Casey & A.A. MARINO. *J. Vet. Sci.* 14:371–377, 1994.
98. A comparative study of osseointegration of titanium implants in corticocancellous block and corticocancellous chip grafts in canine ilium. D. Lew, A.A. MARINO, J.M. Startzell & J.C. Keller. *J. Oral Maxillofac. Surg.* 52:952–958, 1994.
97. Association between cell membrane potential and breast cancer. A.A. MARINO, I.G. Iliev, M.A. Schwalke, E. Gonzalez, K.C. Marler & C.A. Flanagan. *Tumor Biology* 15:82–89, 1994.
96. Frequency-specific responses in the human brain caused by electromagnetic fields. G.B. Bell, A.A. MARINO & A.L. Chesson. *J. Neurol. Sci.* 123:26–32, 1994.
95. Frequency-specific blocking in the human brain caused by electromagnetic fields. G.B. Bell, A.A. MARINO & Andrew L. Chesson. *NeuroReport* 5:510–512, 1994.
94. Potassium channels in epithelial cells. I.G. Iliev & A.A. MARINO. *Cell. and Mol. Biol. Res.* 39:601–611, 1993.
93. Electromagnetic fields, cancer, and the theory of neuroendocrine-related promotion. A.A. MARINO. *Bioelectrochem. Bioenerg.* 29:255–276, 1993.

92. Alterations in brain electrical activity caused by magnetic fields: detecting the detection process. G.B. Bell, A.A. MARINO & A.L. Chesson. *Electroencephalog. Clin. Neurophysiol.* 83: 389–397, 1992.
91. Electrochemical modification of tumor growth in mice. D.M. Morris, A.A. MARINO & E. Gonzalez. *J. Surg. Res.* 53:306–309, 1992.
90. Electrical states in the rabbit brain can be altered by light and electromagnetic fields. G. Bell, A.A. MARINO, A. Chesson & F. Struve. *Brain Res.* 570:307–315, 1992.
89. Human sensitivity to weak magnetic fields. G. Bell, A.A. MARINO, A. Chesson & F. Struve. *Lancet* 338:1521–1522, 1991.
88. The effect of electrical stimulation on bone formation around hydroxyapatite implants placed on the rabbit mandible. D. Lew & A. MARINO. *J. Oral Maxillofac. Surg.* 49:735–739, 1991.
87. Use of carbon fibers in the reconstruction of knee ligaments. P. Demmer, M. Fowler & A.A. MARINO. *Clin. Orthop.* 271:225–232, 1991.
86. Meta-analysis of multi-generational studies in mice exposed to power-frequency electric fields. A.A. MARINO. *J. Bioelectricity* 9:213–231, 1990.
85. Bioelectricity. A.A. MARINO. *Collier's Encyclopedia*, 1990.
84. Use of carbon fibers for repair of abdominal-wall defects in rats. D.M. Morris, A.A. MARINO, R. Haskins, R. Misra, S. Rogers, S. Fronczak & J.A. Albright. *Surgery* 107:627–631, 1990.
83. Exposure system for the production of uniform magnetic fields. G.B. Bell & A.A. MARINO. *J. Bioelectricity* 8:147–158, 1989.
82. Piezoelectricity in cementum, dentin, and bone. A.A. MARINO & B.D. Gross. *Arch. Oral Biol.* 34:507–509, 1989.
81. Use of carbon fibers for the repair of bowed tendons: a preliminary report. S.S. van den Berg, K.P. Reed & A. MARINO. *J. Equine Surg.* 8:339–340, 1988.
80. Quasi-static charge interactions in bone. A.A. MARINO, J. Rosson, E. Gonzalez, L. Jones, S. Rogers & E. Fukada. *J. Electrostatics* 21:347–360, 1988.
79. Environmental electromagnetic fields and public health. A.A. MARINO, in *Foundations of Modern Bioelectricity*, A.A. MARINO, ed., Marcel Dekker, New York, 965–1044, 1988.
78. Direct current and bone growth. A.A. MARINO, in *Foundations of Modern Bioelectricity*, A.A. MARINO, ed., Marcel Dekker, New York, 657–709, 1988.
77. Are powerline fields hazardous to health? A.A. MARINO. *Public Power* 45:1820, 1987.
76. Electric man and the work of Björn Nordenström. A.A. MARINO. *J. Appl. Nutr.* 39:106–108, 1987.
75. Silver-nylon cloth: In vitro and in vivo evaluation of antimicrobial activity. E.A. Deitch, A.A. MARINO, V. Malakanok & J.A. Albright. *J. Trauma* 27:301–304, 1987.
74. Slow healing fractures: can they be prevented? G. Fontanesi, G.C. Traina, F. Giancetti, I. Tartaglia, R. Rotini, B. Virgili, R. Cadossi, G. Ceccherelli & A.A. MARINO. *Ital J Orthop Traumatol* 12(3):371–385, 1986.
73. Health risks from electric power facilities. A.A. MARINO, in *Proceedings of International Utility Symposium, Health Effects of Electric and Magnetic Fields*, Ontario Hydro, Toronto, 1986.

72. Orthopaedic applications of carbon fibers. A.A. MARINO, Stephen Fronczak, Clarence Boudreaux, Douglas N. Lyles, E. Michael Keating & James A. Albright. *IEEE Eng. Med. & Biol.* 5:31–34, 1986.
71. Electrical stimulation of mandibular osteotomies in rabbits. A.A. MARINO, B. Gross & R.D. Specian. *Oral Surg. Oral Med. Oral Path.* 62:20–24, 1986.
70. Electrical treatment of Lewis lung carcinoma in mice. A.A. MARINO & D.M. Morris. *J. Surg. Res.* 41:198–201, 1986.
69. Functional repair of rabbit gastrocnemius tendons using carbon fibers. E.M. Keating, A.A. MARINO, J.A. Albright & R.D. Specian. *Clin. Orthop.* 209:292–297, 1986.
68. Penetration of electric fields into a concentric-sphere model of biological tissue. F.X. Hart & A.A. MARINO. *Med. & Biol. Eng. & Comput.* 24:105–108, 1985.
67. Chronic electromagnetic stressors in the environment: A risk factor in human cancer. A.A. MARINO & D.M. Morris. *J. Environ. Sci.* C3(2):189–219, 1985.
66. Electromagnetic energy in the environment and human disease. A.A. MARINO. *Clin. Ecol.* 3(3):154–157, 1985.
65. Electromagnetic fields and public health. A.A. MARINO, in *Assessments and Viewpoints on the Biological and Human Health Effects of Extremely Low Frequency Electromagnetic Fields*, American Institute of Biological Sciences, Arlington, Va., 205–232, 1985.
64. Electric silver antiseptics. A.A. MARINO, E.A. Deitch & J.A. Albright. *IEEE Trans. Biomed. Eng.* BME-32:336–337, 1985.
63. Electrochemical properties of silver-nylon fabrics. A.A. MARINO, V. Malakanok, E.A. Deitch, J.A. Albright & R.D. Specian. *J. Electrochem. Soc.* 132:68–72, 1985.
62. Public health aspects of the energy flux of high-voltage powerlines. F.X. Hart & A.A. MARINO. *Innov. Tech. Bio. Med. (French)* 5:636–640, 1984.
61. Electrical augmentation of the antimicrobial activity of silver-nylon fabrics. A.A. MARINO, E.A. Deitch & J.A. Albright. *J. Biol. Phys.* 12:93–98, 1984.
60. The use of carbon fibers in ligament repair: mechanical and biological properties. J.A. Albright, E.M. Keating & A.A. MARINO. *Schumpert Med. Q.* 3:16–24, 1984.
59. Electrical stimulation in orthopaedics: past, present and future. A.A. MARINO. *J. Bioelectricity*, 3: 235–244, 1984.
58. Weak electrical fields affect plant development. A.A. MARINO, F.X. Hart & M. Reichmanis. *IEEE Trans. Biomed. Eng.* BME 30: 833–834, 1983.
57. Silver nylon: a new antimicrobial agent. E.A. Deitch, A.A. MARINO, T.E. Gillespie & J.A. Albright. *Antimicrob. Agents Chemother.* 23: 356–359, 1983.
56. Bioelectric considerations in the design of high-voltage power lines. M. Reichmanis & A.A. MARINO. *J. Bioelectricity* 1: 329–338, 1982.
55. ELF dosage in ellipsoidal models of man due to high-voltage transmission lines. F.X. Hart & A.A. MARINO. *J. Bioelectricity* 1: 129–154, 1982.
54. Electret-induced bone formation in rats. A.A. MARINO, J. Cullen, R.O. Becker & E. Fukada, in *Frontiers of Engineering in Health Care*, B.A. Cohen, ed., 220–222, 1981.
53. Environmental power-frequency magnetic fields and suicide. F.S. Perry, M. Reichmanis, A. MARINO, & R. Becker. *Health Phys.* 41: 267–277, 1981.

52. Separating disputes over facts from disputes over values. A. Mazur, A.A. MARINO & R.O. Becker, in *The Dynamics of Technical Controversy*, A. Mazur, Communications Press, Inc., Washington D.C., 1981.
51. Sensitivity to change in electrical environment: a new bioelectric effect. A.A. MARINO, J.M. Cullen, M. Reichmanis, R.O. Becker & F.X. Hart. *Am. J. Physiol.* 239 (Regulatory Integrative Comp. Physiol. 8): R424–427, 1980.
50. Piezoelectricity in collagen films. A.A. MARINO, J.A. Spadaro, E. Fukada, L.D. Kahn & R.O. Becker. *Calcif. Tissue Int.* 31: 257–259, 1980.
49. Power frequency electric field induces biological changes in successive generations of mice. A.A. MARINO, M. Reichmanis, R.O. Becker, B. Ullrich & J.M. Cullen. *Experientia* 36: 309–311, 1980.
48. Relation between suicide and the electromagnetic field of overhead power lines. M. Reichmanis, F.S. Perry, A.A. MARINO & R.O. Becker. *Physiol. Chem. Phys.* 11: 395–403, 1979.
47. Kirlian photography: potential for use in diagnosis. A.A. MARINO, R.O. Becker & B. Ullrich. *Psychoenerg. Syst.* 3: 47–54, 1979.
46. Fracture healing in rats exposed to extremely low frequency electric fields. A.A. MARINO, J.M. Cullen, M. Reichmanis & R.O. Becker. *Clin. Orthop.* 145: 239–244, 1979.
45. Separating factual disputes from value disputes in controversies over technology. A. Mazur, A.A. MARINO & R.O. Becker. *Technology in Society* 1: 229–237, 1979.
44. Space osteoporosis: an electromagnetic hypothesis. A.A. MARINO, R.O. Becker, F.X. Hart & F. Anders, Jr. *Aviat. Space Environ. Med.* 50: 409–410, 1979.
43. Laplace plane analysis of impedance on the H meridian. M. Reichmanis, A.A. MARINO & R.O. Becker. *Am J Chin Med* 7(2): 188–193, 1979.
42. Laplace plane analysis of skin impedance: a preliminary investigation. M. Reichmanis, A.A. MARINO & R.O. Becker. *J. Electrochem. Soc.* 125: 1765–1768, 1978.
41. Effect of electrostatic fields on the chromosomes of Ehrlich ascites tumor cells exposed in vivo. J.T. Mitchell, A.A. MARINO, T.J. Berger & R.O. Becker. *Physiol. Chem. Phys.* 10: 79–85, 1978.
40. High voltage lines: hazard at a distance. A.A. MARINO & R.O. Becker. *Environment* 20 (9): 6–15, 1978.
39. Power frequency electric fields and biological stress: a cause-and-effect relationship. A.A. MARINO, J.M. Cullen, M. Reichmanis & R.O. Becker, in *Biological effects of extremely low frequency electromagnetic fields*. Proc. 18<sup>th</sup> Hanford Life Sciences Symposium, Richland Wash., U.S. Dept. of Energy. DOE symposium series; 50: 258–276, 1978.
38. Evaluation of electrical techniques for stimulation of hard tissue growth. R.O. Becker, J.A. Spadaro & A.A. MARINO. *Bull. Prosthetics Res.* BPR 10–29: 133–136, 1978.
37. Hazard at a distance: effects of exposure to the electric and magnetic fields of high voltage transmission lines. A.A. MARINO & R.O. Becker. *Med. Res. Eng.* 12: 6–9, 1978.
36. Electromagnetic pollution. R.O. Becker & A.A. MARINO. *The Sciences*, January, 1978, pp. 14, 15, 23.
35. In vivo bioelectrochemical changes associated with exposure to ELF electric fields. A.A. MARINO, T.J. Berger, B.P. Austin, R.O. Becker & F.X. Hart. *Physiol. Chem. Phys.* 9: 433–441, 1977.

34. Evaluation of electric techniques for stimulation of hard tissue growth. R.O. Becker, J.A. Spadaro & A.A. MARINO. *Bull. Prosthetics Res. BPR* 10–27: 180–184, 1977.
33. Biological effects of extremely low frequency electric and magnetic fields: a review. A.A. MARINO & R.O. Becker. *Physiol. Chem. Phys.* 9: 131–147, 1977.
32. Energy flux along high voltage transmission lines. F.X. Hart & A.A. MARINO. *IEEE Trans. Biomed. Eng. BME-24*: 493–495, 1977.
31. Laplace plane analysis of transient impedance between acupuncture points Li-4 and Li-12. M. Reichmanis, A.A. MARINO & R.O. Becker. *IEEE Trans. Biomed. Eng. BME-24*: 402–405, 1977.
30. Clinical experiences with low intensity direct current stimulation of bone growth. R. O. Becker, J.A. Spadaro & A.A. MARINO. *Clin. Orthop.* 124: 75–83, 1977.
29. Electrical osteogenesis: an analysis. A.A. MARINO & R.O. Becker. *Clin. Orthop.* 123: 280–282, 1977.
28. Laplace plane analysis of impedance between acupuncture points H-3 and H-4. M. Reichmanis, A.A. MARINO & R.O. Becker. *Comp. Med. East & West* 5: 189–195, 1977.
27. Biophysics of animal response to an electrostatic field. F.X. Hart & A.A. MARINO. *J. Biol. Phys.* 4: 123–143, 1976.
26. Evaluation of electrochemical information transfer system. I. Effect of electric fields on living organisms. A.A. MARINO, T.J. Berger, B.P. Austin & R.O. Becker. *J. Electrochem. Soc.* 123: 1199–1200, 1976.
25. The effect of continuous exposure to low frequency electric fields on three generations of mice: a pilot study. A.A. MARINO, R.O. Becker & B. Ullrich. *Experientia* 32: 565, 1976.
24. Photoconductivity in bone and tendon. R.G. Fuller, A.A. MARINO & R.O. Becker. *Biophys. J.* 16: 845–846, 1976.
23. Electrophysiological correlates of acupuncture points and meridians. R.O. Becker, M. Reichmanis, A.A. MARINO & J.A. Spadaro. *Psychoenerg. Syst.* 1: 105–112, 1976.
22. DC skin conductance variation at acupuncture loci. M. Reichmanis, A.A. MARINO & R.O. Becker. *Am. J. Chin. Med.* 4: 69–72, 1976.
21. Electrical correlates of acupuncture points. M. Reichmanis, A.A. MARINO & R.O. Becker. *IEEE Trans. Biomed. Eng. BME-22*: 533–535, 1975.
20. Piezoelectricity in hydrated frozen bone and tendon. A.A. MARINO & R.O. Becker. *Nature* 253: 627–628, 1975.
19. Electrostatic field induced changes in mouse serum proteins. A.A. MARINO, T.J. Berger, R.O. Becker & F.X. Hart. *Experientia* 30: 1274–1275, 1974.
18. Electrical stimulation of articular cartilage regeneration. B. Baker, J.A. Spadaro, A.A. MARINO & R.O. Becker. *Ann. N. Y. Acad. Sci.* 238: 491–499, 1974.
17. Electric field effects in selected biologic systems. A.A. MARINO, T.J. Berger, J.T. Mitchell, B.A. Duhacek & R.O. Becker. *Ann. N. Y. Acad. Sci.* 238: 436–444, 1974.
16. Effect of selected metals on marrow cells in culture. A.A. MARINO, T.J. Berger, R.O. Becker & J.A. Spadaro. *Chem. Biol. Interactions* 9: 217–223, 1974.
15. Piezoelectricity in bone as a function of age. A.A. MARINO & R.O. Becker. *Calc. Tiss. Res.* 14: 327–331, 1974.

14. Piezoelectricity and autoinduction. A.A. MARINO & R.O. Becker. Clin. Orthop. 100: 247–249, 1974.
13. Lung damage in mice following intraperitoneal injection of butylated hydroxytoluene. A.A. MARINO & J.T. Mitchell. Proc. Soc. Exp. Biol. Med. 140: 122–125, 1972.
12. Dupuytren's contracture: some associated biophysical abnormalities. E. Berg, A.A. MARINO & R.O. Becker. Clin. Orthop. 83: 144–148, 1972.
11. Origin of the piezoelectric effect in bone. A.A. MARINO, S.C. Soderholm & R.O. Becker. Calc. Tiss. Res. 8: 177–180, 1971.
10. Piezoelectric effect and growth control in bone. A.A. MARINO & R.O. Becker. Nature 228: 473, 1970.
9. Evidence for epitaxy in the formation of collagen and apatite. A.A. MARINO & R.O. Becker. Nature 226: 652–653, 1970.
8. The effect of electric current on rat tail collagen in solution. A.A. MARINO & R.O. Becker. Calc. Tiss. Res. 4: 330–338, 1970.
7. Temperature dependence of the electron paramagnetic resonance signal in tendon collagen. A.A. MARINO & R.O. Becker. Nature 222: 164–165, 1969.
6. Correction concerning electron paramagnetic resonance in human bone mineral. A.A. MARINO & R.O. Becker. Nature Feb 15;221(181): 661, 1969.
5. Role of water in some biophysical properties of skeletal tissues. R.O. Becker & A.A. MARINO. In Biology of the Mouth, Publication No. 89, Am. Assoc. Adv. Sci., 135–143, 1968.
4. Mechanically induced free radicals in bone. A.A. MARINO & R.O. Becker. Nature 218: 466–467, 1968.
3. Dielectric determination of bound water of bone. A.A. MARINO, R.O. Becker & C.H. Bachman. Phys. Med. Biol. 12: 367–378, 1967.
2. Evidence for direct physical bonding between the collagen fibers and apatite crystals in bone. A.A. MARINO & R.O. Becker. Nature 213: 697–698, 1967.
1. The electron paramagnetic resonance spectra of bone and its major components. R.O. Becker & A.A. MARINO. Nature 210: 583–588, 1966.

#### ABSTRACTS, EDITORIALS, & REPLIES

60. Constitutive and IL-1 $\beta$ -induced expression of metalloproteinases by synovial lining cells mediated by gap-junction intercellular communication. O.V. Kolomytkin, A.A. MARINO, D.D. Waddell, R.E. Wolf, K.K. Sadasivan & J.A. Albright. 50<sup>th</sup> Annual Meeting, Orthopedic Research Society, March 7-10, 2004.
59. Hyaluronan suppresses IL-1 $\beta$ -induced metalloproteinase activity from synovial lining cells in patients with osteoarthritis. A.A. MARINO, D.D. Waddell, O.V. Kolomytkin, K.K. Sadasivan & J.A. Albright. 50<sup>th</sup> Annual Meeting, Orthopedic Research Society, March 7-10, 2004.
58. Review of "A Survivor's Guide to Reversing Cancer: A Journey from Cancer to Cure," by Dr. Gerald H. Smith. A.A. MARINO. Frontier Perspectives 13:53, 2004.

57. Effect of hyaluronans on cytokine-induced metalloproteinase activity secreted by synovial lining cells from patients with osteoarthritis. S. Dunn, D.D. Waddell, O.V. Kolomytkin & A.A. MARINO. *Hyaluronan* 2003, October 11-15, 2003, Cleveland, Ohio, p. 128.
56. Reply to Dr. Adair's comment. A.A. MARINO. *Bioelectromagnetics* 24:442, 2003.
55. Reply to Chen et al. (Letter to the Editor). A.A. MARINO, S. Dunn & D.D. Waddell. *J. Bone Joint Surg.* 85A:2051-2053, 2003.
54. Gap junctions in osteoarthritis. W.D. Meek, A.A. MARINO, D.D. Waddell, O.V. Kolomytkin, R. Wolf, K.K. Sadasivan & J.A. Albright. *Molecular Biology of the Cell* 13S:1212, 2002.
53. Effect of concentration and molecular weight of hyaluronan on interleukin-1-induced matrix metalloprotease activity. S. Dunn, O. Kolomytkin, D. Waddell & A. MARINO. *Osteoarthritis and Cartilage* 10 (Suppl. A):S46, 2002.
52. Unifying the immune and neuroendocrine systems. S.B. Pruetz & A.A. MARINO. *Trends in Endocrinology & Metabolism* 13:273, 2002.
51. Gap junctions in osteoarthritis (Poster No. P490). D.D. Waddell, A.A. MARINO, O.V. Kolomytkin, W.D. Meek, R.E. Wolf, K.K. Sadasivan & J.A. Albright. *Proceedings of the American Academy of Orthopaedic Surgeons 2002 Annual Meeting*, February 13-17, Dallas Texas, p. 574, 2002.
50. Culture of embryos in an environment shielded from exposure to electro-magnetic fields has no effect on IVF outcome. C.J. Turczynski, C. Chang, W. Hovis, A. MARINO & S.L. London. *Fertility & Sterility* 72 (Suppl. 1):S16, 1999.
49. Review of "Applied Bioelectricity: From Electrical Stimulation to Electropathology," by J. Patrick Reilly. A.A. MARINO. *Quarterly Rev. Biol.* 74:371, 1999.
48. The fine structure of apoptosis in bone healing. B. Meek, R. Routh, A. MARINO, P. Landry, K. Sadasivan & O. McClain. *FASEB J.*, 12(5):A1107, 1998.
47. Non-linear effects of 60-Hz magnetic fields on lymphoid phenotype. A.A. MARINO, F. Jourdeuil, M.R. Wolcott & R. Chervenak. *FASEB J.*, 12(5):A1081, 1998.
46. Interleukin-1 $\beta$  is transduced by synovial fibroblasts via a pathway involving Protein kinase C and Ca<sup>2+</sup> influx. K. Sadasivan, O. Kolomytkin, A. MARINO, R. Wolf & J. Albright. *FASEB J.*, 12(4):A437, 1998.
45. Gap Junctions in human synovial tissue. O. Kolomytkin, K. Sadasivan, A. MARINO, R. Wolf & J. Albright. *FASEB J.*, 12(4):A377, 1998.
44. The effect of IL-1 $\beta$  on bone healing. M.L. Olmedo, P.S. Landry, A.A. MARINO, K.K. Sadasivan & J.A. Albright. *Transactions of the 43<sup>rd</sup> Annual Meeting, Orthopaedic Research Society*, San Francisco, CA, Feb. 9-13, 1997, p. 257.
43. Low-level EMFs are transduced like other stimuli. A.A. MARINO. *XXXIII International Congress of Physiological Sciences*, St. Petersburg, Russia, L047.07 (Abstract), 1997.
42. "Brain sand" - Piezoelectric crystals in the pineal gland of the brain. S.B. Lang, A.A. MARINO & G. Berkovic. *Abstracts of the Tenth International Symposium on the Applications of Ferroelectrics*, East Brunswick, NJ, Aug. 18-21, 1996, p. 185.
41. Study of noncentrosymmetric crystals found in the pineal gland of the brain. S.B. Lang, A.A. MARINO & G. Berkovic. *Abstracts of the 3<sup>rd</sup> European Conference on Applications of Polar Dielectrics*, Bled, Slovenia, Aug. 26-29, 1996, p. 182.
40. Reply to Riegler, et al. (Letter to the Editor). A.A. MARINO & E.A. Deitch. *Ann. Surg.* 223:448-449, 1996.

39. The EMF bioeffects debate results from a paradigmatic shift. A.A. MARINO. Abstracts from the 18<sup>th</sup> Annual Meeting of the Bioelectromagnetics Society, Victoria, B.C., Canada, 1996.
38. Effect of 60 Hz magnetic fields on lymphoid phenotype. A.A. MARINO, R.M. Wolcott & R. Chervenak. Abstracts from the 18<sup>th</sup> Annual Meeting of the Bioelectromagnetics Society, Victoria, B.C., Canada, 1996.
37. EMF effects on viral replication: A possible explanation for the conflicting reports regarding protein synthesis. J. Staczek, H.E. Gilleland, Jr., L.B. Gilleland & A.A. MARINO. Abstracts from the 18<sup>th</sup> Annual Meeting of the Bioelectromagnetics Society, Victoria, B.C., Canada, 1996.
36. Comments on "Short exposures to 60 Hz magnetic fields do not alter MYC expression in HL60 or Daudi cells." A.A. MARINO. *Radiation Res.* 145(4): 513-515, 1996.
35. Management of osteolytic metastases and impending or pathologic fracture of the femur. F.L. Ampil, K.K. Sadasivan, A.A. MARINO & H.W. Chin. Abstracts from the XXIX World Congress of the International College of Surgeons, London, 1994.
34. Transient electromagnetic fields alter growth rate of rabbit synoviocytes (HIG-82) in vitro. A.A. MARINO, I. Iliev, J.P. Mains, F.X. Hart & R. Wolf. *FASEB J.* 8(4):A398, 1994.
33. rhIL-1 $\beta$  alters membrane potential in rabbit synoviocytes (HIG-82) in vitro. I. Iliev, A. MARINO, K. Sadasivan & R. Wolf. *FASEB J.* 8(4):A138, 1994.
32. DC magnetic field alters membrane potential in IEC-18 epithelial cells. I. Iliev & A. MARINO. *FASEB J.* 7(3):A353, 1993.
31. Classical and modern bioelectricity. A.A. MARINO. *Medicine in Small Doses, CME, LSUMC-S, Vol. 12, May, 1991.*
30. Development of a diagnostic test for sensitivity to electromagnetic fields based on quantitative analysis of brain waves. A.A. MARINO, G.B. Bell & A. Chesson. *Proc. 9<sup>th</sup> Annual Intl. Symposium on Man and His Environment in Health and Disease*, p. 35, 1991.
29. Potential health risks due to powerline and substation electric and magnetic fields: Miskic Subdivision. A.A. MARINO. *Environmental Impact Report, Santa Cruz, CA, 1990.*
28. Partisanist discrimination in California favors electric power companies. A.A. MARINO. *J. Bioelectricity* 9:v-vii, 1990.
27. Beauty and a beast. A.A. MARINO. *J. Bioelectricity* 9(1):v, 1990.
26. On the relationship between surface electrical potentials and cancer. A.A. MARINO, D.M. Morris & T. Keys. *J. Bioelectricity* 8:279, 1989.
25. Trust me, I'm a doctor. A.A. MARINO. *J. Bioelectricity* 8(2):v, 1989.
24. Negative studies and common sense. A.A. MARINO. *J. Bioelectricity* 8(1):v, 1989.
23. Percutaneous electrical treatment of large malignant tumors in mice. D.M. Morris & A.A. MARINO. *Proc. 13<sup>th</sup> Ann. Surgical Symposium, Assoc. of VA Surgeons, San Antonio, Texas, 39, 1989.*
22. Tissue reaction to high-strength polyethylene fibers used in functional repair of rabbit gastrocnemius tendons. A.A. MARINO, E.L. Anglin, R.B. Misra & S. Fronczak. *Orthop. Trans.* 10: 261, 1986.

21. Role of electricity as an adjunct to management of orthopaedic infection. A.A. MARINO & J.A. Albright, in Current Status of Electricity in the Clinical Sciences, Univ. of Connecticut (Orthopaedic Surgery), pp. 29-30, 1985.
20. Medically significant effects of electromagnetic radiation. A.A. MARINO, in Electromagnetic Fields and Biomembranes, Sofia University, Sofia (Bulgaria), 90-92, 1986.
19. Long-term tissue reaction to carbon fibers. A.A. MARINO & S.J. Fronczak. (Extended Abstract), in Biomedical Engineering V: Recent Developments, Proc. 5<sup>th</sup> Southern Biomedical Engineering Conference, 530-533, 1986.
18. Biological reaction to high-strength polyethylene implants. A.A. MARINO, E.L. Anglin, R.P. Misra & C. Boudreaux. Trans. 32<sup>nd</sup> Annual ORS 11: 105, 1986.
17. Uptake of Tc-99m MDP at fracture sites in rabbits following electrical stimulation. M.J. Wood, A.A. MARINO, C. Ashley & M.M. Hackley. Official Proceedings of the Annual Meeting of the Radiological Society of North America, Washington, DC, 1985.
16. Regrowth of rabbit Achilles tendons around carbon-fiber implants. R.D. Specian, A.A. MARINO & J.A. Albright. Anat. Rev. 211(3): A182-A183, 1985.
15. We need a science court. A.A. MARINO. J. Bioelectricity 4: vii, 1985.
14. Electromagnetic pollution. A.A. MARINO, in Transactions of the 3<sup>rd</sup> Annual International Symposium on Man and his Environment, Human Ecology Research Foundation of the Southwest, Dallas, Texas, 1985.
13. The Battelle studies: an analysis. A.A. MARINO & Maria Reichmanis, in Proceedings of the 6<sup>th</sup> Annual Meeting of the Bioelectromagnetics Society, p. 15, 1984.
12. Health aspects of environmental electromagnetism. A.A. MARINO, in Transactions of the 2<sup>nd</sup> Annual International Symposium, Man and His Environment, Wadley Institutes, Dallas, TX, 1984.
11. Carbon-fiber reconstruction of Achilles tendons in rabbits. A.A. MARINO, V. Malakanok, J. Albright, B. Specian & M. Keating, in Transactions of the 30<sup>th</sup> Annual ORS Meeting 9: 367, 1984.
10. Silver nylon cloth; in vitro evaluation of antimicrobial activity. E.A. Deitch & A.A. MARINO, in Transactions American Burn Association, p. 58, 1984.
9. Where is the EPA's sense of decency? A.A. MARINO. J. Bioelectricity 3: 1-2, 1984.
8. Electrical augmentation of the anti-bacterial activity of silver-nylon. A.A. MARINO, V. Malakanok, E.A. Deitch & J. Albright, in Transactions of the 3<sup>rd</sup> Annual Meeting of the Bioelectrical Repair and Growth Society 3: 36, 1983.
7. Electrical properties of silver-nylon. A.A. MARINO, V. Malakanok, E.A. Deitch & J. Albright, in Transactions of the 3<sup>rd</sup> Annual Meeting of the Bioelectrical Repair and Growth Society 3:36, 1983.
6. Electrical stimulation in orthopaedics: past, present and future. A.A. MARINO, in Transactions of the First Annual Meeting of the International Society of Bioelectricity 1: 3, 1983.
5. Reply to comments of Robert F. Smith. A.A. MARINO, Maria Reichmanis, F.S. Perry & R.O. Becker. Health Phys. 44: 700, 1983.
4. Reply to comments on "environmental power-frequency magnetic fields and suicides". A.A. MARINO, F.S. Perry & R.O. Becker. Health Phys. 44(6): 698-699, 1983.

3. The electrical environment produced at bone fracture sites by inductive coupling. F.X. Hart & A.A. MARINO, in Transactions of the 2<sup>nd</sup> Annual Meeting of the Bioelectrical Repair and Growth Society 2: 70, 1982.
2. Silver-nylon: a new anti-bacterial agent. A.A. MARINO, E.A. Deitch & J.A. Albright, in Transactions 2<sup>nd</sup> Annual Meeting, Bioelectrical Repair and Growth Society 2: 54, 1982.
1. The foundations of bioelectricity. A.A. MARINO. J. Bioelectricity I:iii, 1982.