

CURRICULUM VITAE

ROY KENNETH AARON, M.D.

PLACE OF BIRTH: New York, New York

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Present Position: Professor, Orthopaedic Surgery
Professor, Molecular Pharmacology, Physiology and
Biotechnology
Director, Orthopaedic Cell Biology Laboratory
Director, Center for Restorative and Regenerative Medicine
The Warren Alpert Medical School of Brown University
Providence, Rhode Island

Attending Orthopaedic Surgeon
Lifespan Academic Medical Center
Providence, Rhode Island

1991: Clinical Associate Professor, Orthopaedic Surgery
The Warren Alpert Medical School of Brown University
Providence, Rhode Island

1981: Assistant Professor, Orthopaedic Surgery
The Warren Alpert Medical School of Brown University
Providence, Rhode Island

EDUCATION

- 1961-65 Lafayette College, A.B. Political Science
Honors Research Program in Biological Sciences
- 1965-69 State University of New York, Downstate Medical Center, M.D.
Surgical Research Fellow (1967-68)
Surgical Fellowship, Guy's Hospital, London (1968)

POSTGRADUATE TRAINING

- 1969-70 Intern in Medicine
Montefiore Hospital and Medical Center
New York, New York
- 1970-71 Surgical Resident
U.S. Public Health Service Hospital
New York, New York
- 1971-73 Clinical Associate, Surgery Branch
National Cancer Institute
National Institutes of Health
Bethesda, Maryland
- 1974-77 Resident, Harvard Orthopaedic Program
Massachusetts General Hospital
Boston, Massachusetts
- 1977-78 Fellow in Arthritis Surgery
Robert Breck Brigham Hospital
Boston, Massachusetts
- 1978-81 Guest Investigator, Proteoglycan Section
Laboratory of Biochemistry
National Institute of Dental Research
National Institutes of Health
Bethesda, Maryland

NATIONAL APPOINTMENTS AND COMMITTEES

- 2003-Present Scientific Team, Brown - NIH Osteoarthritis Initiative
- 2010 Presenter, “Electrical Stimulation of Bone Repair, Clinical Experiences”, Electric and Electromagnetic Stimulation of Bone and Cartilage Repair; Medical Applications of Electromagnetic Fields: Research and Therapy, Erice, Italy.
- 2010 Chair, Surgical Interventions and Rehabilitation Study Section, Peer Reviewed Orthopaedic Research Program, Congressionally Directed Medical Research Program, Department of Defense
- 2010 Discussor, “Prosthetics and Orthotics”, VA/DoD State of the Art Conference, Rehabilitation Research and Development Service, Department of Veterans Affairs
- 2010 Faculty, Orthopaedic Research Society/ Orthopaedic Research and Education Foundation/ American Academy of Orthopaedic Surgeons, Grant Writing Course
- 2010 Presenter, “VA/DoD Collaborations”, Center Director’s Conference; Rehabilitation Research and Development Service, Department of Veterans Affairs
- 2010 NIH CSR Special Emphasis Panel, Musculoskeletal, Oral and Skin Sciences IRG
- 2010 Moderator, “Imaging”, Musculoskeletal Biology and Bioengineering Gordon Research Conference
- 2009 NIH CSR Special Emphasis Panel, Musculoskeletal, Oral and Skin Sciences IRG
- 2009 Moderator, “Visualizing Skeletal Pathology”, 3rd New York Symposium on Skeletal Biology and Medicine
- 2009 Speaker, “Development Perspective on Regeneration”, State of the Science Workshop: Regenerative Rehabilitation, Walter Reed Army Medical Center
- 2009 NE Representative, Arthritis Foundation Osteoarthritis Alliance Leadership Group
- 2007-2009 Board of Directors, Orthopaedic Research Society

- 2005-2008 Special Projects and Education Committee, Orthopaedic Research Society (Chair 2007)
- 2008 Speaker, "Perfusion Abnormalities in Subchondral Bone Associated with Marrow Edema, OA and AVN", Musculoskeletal Biology and Bioengineering Gordon Research Conference
- 2008 Faculty, Orthopaedic Research Society/ Orthopaedic Research and Education Foundation/ American Academy of Orthopaedic Surgeons, Grant Writing Course
- 2007 Moderator, "Subchondral Bone and Osteoarthritis", Orthopaedic Research Society
- 2007 Moderator, "Orthopaedic War Injuries - From Combat Casualty Care to Definitive Treatment" Orthopaedic Research Society/ American Academy of Orthopaedic Surgeons Combined Symposium
- 2007 Moderator, "Infection, Inflammation, and Bone", 2nd Conference on Skeletal Biology and Medicine, New York Academy of Sciences
- 2006 Brown Corporation Spring Meeting: "Program for Recovery from Trauma"
- 2006 Lifetime Achievement Award, NE Arthritis Foundation: "New Paradigms in the Management of Joint Diseases"
- 2006 Speaker, "War Extremity Injuries" American Academy of Orthopaedic Surgeons Symposium
- 2005 Speaker, "Clinical biophysics: The promotion of skeletal repair by physical forces", Skeletal Development and Remodeling in Health, Disease and Aging, New York Academy of Sciences Symposium
- 2005 Speaker, "Developmental Sequences in Clinical Orthopedics and Their Modulation by Sequential Drug Delivery" Controlled Release Society
- 2002-2005 Instructional Course Lecturer, "Osteonecrosis", American Academy of Orthopaedic Surgeons
- 2004 NIH, CSR, Special Study Section
- 2004 Reviewer, Orthopaedic Basic Science, 3rd edition, American Academy of Orthopaedic Surgeons
- 1998-2003 NIH Study Section, Orthopaedics and Musculoskeletal Disease

1997-2003 Committee on Research, American Academy of Orthopaedic Surgeons

2003 Chair, American Academy of Orthopaedic Surgeons Annual Scientific Workshop, "Physical Regulation of Skeletal Repair"

2003 Organizer, "Physical Regulation of Skeletal Repair" Symposium, Orthopaedic Research Society

2003 Delphi Panel on Osteonecrosis, Johns Hopkins University School of Medicine

2003 Master of Arts (ad eun.), Brown University

2002 NIH, NIAMS, Special Study Section

2001 NIH, NIAMS, Special Study Section

2001 NIH, CSR, Special Study Section

2001 Moderator, "Bone Biology", Orthopaedic Research Society

2000 Faculty, Harvard Hip Course

2000 Program Committee, Orthopaedic Research Society

2000 Moderator, "Osteoarthritis", Orthopaedic Research Society

1999-2000 Surdna Foundation Fellow, Brown University Center for Gerontology and Health Care Research

1998 NIH, NIEHS Science Review Symposium: Clinical and In Vivo Laboratory Findings. Rapporteur: "Tissue Healing"

1997 Moderator, "Stimulation of Bone and Cartilage" Second World Congress for Electricity and Magnetism in Biology and Medicine

1997 Speaker, Skeletal Morphogenesis Workshop, American Academy of Orthopaedic Surgeons

1997 NIH, NIEHS Science Review Symposium: *In Vitro* Studies

1997 Faculty, Harvard Hip Course

1996-97 Discussor, "Osteonecrosis of the Femoral Head," American Academy of Orthopaedic Surgeons

- 1996 Speaker, Duke University Symposium on Etiology, Diagnosis and Management of Osteonecrosis
- 1994-95 Council, Second World Congress for Electricity and Magnetism in Biology and Medicine
- 1993-95 Instructional Course Lecturer, "Osteonecrosis," American Academy of Orthopaedic Surgeons
- 1994 Faculty, Harvard Hip Course
- 1994 Moderator, "Chondrocyte Responses to Mechanical and Electrical Stimuli", Society for Physical Regulation in Biology and Medicine
- 1994 Moderator, "Models of Physical Signal Detection," Society for Physical Regulation in Biology and Medicine
- 1994 Moderator, "Clinical Symposium on Bioelectromagnetics in Medicine," Bioelectromagnetics Society
- 1994 Moderator, "Medical Applications of Electric and Magnetic Fields," Bioelectromagnetics Society
- 1993 Moderator, "*In Vivo* Modeling Techniques," Bioelectrical Repair and Growth Society
- 1992 Special Interest Symposium Lecturer, American Society for Cell Biology
- 1991-92 Chairman, Medical/Scientific Committee, Rhode Island Arthritis Foundation
- 1991-92 President, Bioelectrical Repair and Growth Society
- 1990-92 Council and Chairman, Clinical Program Committee, First World Congress for Electricity and Magnetism in Biology and Medicine
- 1986-92 Committee on Basic Science, American Academy of Orthopaedic Surgeons
- 1992 Moderator, "Clinical Applications," First World Congress for Electricity and Magnetism in Biology and Medicine
- 1991 Moderator, "Field Effects on Bone and Cartilage," Bioelectrical Repair and Growth Society
- 1990 Moderator, "Bone and Cartilage Stimulation," Bioelectrical Repair and Growth Society

- 1990 Moderator, "Mechanisms of Response to Electromagnetic Fields in Bone Healing," Bioelectromagnetics Society
- 1989-92 Council, Bioelectrical Repair and Growth Society
- 1989-91 Program Committee, Bioelectrical Repair and Growth Society
- 1989 Moderator, "Clinical Experience with Pulsing Electromagnetic Fields," Bioelectrical Repair and Growth Society
- 1989 Moderator, "Application of Time-Varying Fields for Tissue Healing," Bioelectromagnetics Society
- 1989 Moderator, "Growth Factors and Bone," Orthopaedic Research Society
- 1989 Program Committee, Orthopaedic Research Society
- 1988-89 Program Committee, Bioelectromagnetics Society
- 1987 Iwao Yasuda Award (B.R.A.G.S.) for Excellence in Bioelectrical Research

UNIVERSITY AND HOSPITAL COMMITTEES

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|-----------|---|
| 2010 | Internal Advisory Committee, Center for Biomedical Engineering, Brown University |
| 2009 | Clinical and Translational Neurosciences Advisory Council, Lifespan Academic Medical Center |
| 2003-2006 | Strategic Planning Subcommittee, Curriculum Committee, Brown Medical School |
| 2005 | (Chair) Brown University Search Committee for the Vice President of Research |
| 2003-2004 | Brown University Search Committee for the Dean of Biology and Medicine |
| 2000-2003 | Curriculum Committee, Brown Medical School |
| 2003 | Brown Medical School LCME Task Force for Reaccreditation |
| 2003 | Brown Medical School Search Committee for Director, Division of Rheumatology |
| 2001 | Brown Medical School Search Committee for Ehrlich Chair of Orthopedic Research |

EDITORIAL POSITIONS

- 2009- Editorial Board, *Orthopaedic Research and Reviews*
- 2007- Reviewer, *Osteoarthritis and Cartilage*
- 2000- Reviewer, *Journal of Orthopaedic Research*
- 1987-2008 Editorial Board, *Journal of Arthroplasty*
- 1998, 2006 Guest Editor, *Medicine and Health/Rhode Island*
- 1993-2000 Reviewer, *Clinical Orthopaedics and Related Research*
- 2000 Guest Editor, *Techniques in Orthopaedics*
- 1993-1996 Associate Editor, *Bioelectromagnetics*

RESEARCH SUPPORT

1. Center for Restorative and Regenerative Medicine
Director and Principal Investigator VA A3772C
2004-2014
\$22,111,000
2. Engineering Replacement Tissues with Amniotic Stem Cells
Principal Investigator Department of Defense
2010-2012
\$1,401,000
3. Physicochemical Signaling in Osteoarthritis
Principal Investigator NIH K24 AR 02128-06A2
2008-2012
\$631,956
4. COBRE for Skeletal Health and Repair, Cartilage Tissue Engineering for Joint Repair
Mentor NIH P20 RR024484-01
2007-2012
5. Virtual Reality and Motion Analysis to Characterize Disabilities in Lower Limb Injury
Principal Investigator Department of Defense
W81XWH-07-1-0689
2009-2011
\$849,000
6. Nanotechnology in Tissue Engineering
Principal Investigator Hermann Foundation
2007-2010
\$275,000
7. PTSD in limb Trauma and Recovery
Principal Investigator Department of Defense
W81XWH-07-1-0689
2007-2009
\$937,000
8. The Role of Bone Perfusion in the Progression of Osteoarthritis: Identification of New Mechanisms and Pathways
Principal Investigator AstraZeneca
2007-2009
\$277,000
9. Identification and Treatment of Osteonecrosis of the Hip
Principal Investigator NIH K24 AR 02128
1999-2007
\$543,375
10. Virtual Immersive Environments and Motion Analysis for Advanced Rehabilitation
RI STAC RIRA2007-22
2007
\$200, 000

<u>Principal Investigator</u>		
9.	Determination of Dosimetry and Mechanism of PEMF <u>Principal Investigator</u>	EBI, LP 1998-2007 \$2,200,000
10.	Microsphere Based Drug Delivery Systems and Hydrogels for the Creation of Cartilage Biocomposites: A Tissue Engineered Solution to Joint Damage <u>Co-Investigator</u>	Brown University Vice Presidential Research Seed Grant 2003 \$93,920
11.	Workshop Support Grant <u>Chair</u>	NIH R13-AR 050033 2003 \$18,000
		NASA 2003 \$15,000
		Whitaker Foundation 2003 \$5,000
		AAOS Corporate Relations Advisory Group 2003 \$55,000
16.	Effects of Chrysalin on Chondrogenic Differentiation of Synovial Cells <u>Co-Investigator</u>	Orthologic 2003 \$55,939
17.	Stimulation of Chondrogenic Differentiation by Polymer-Encapsulated Growth Factors <u>Co-Investigator</u>	Aircast Foundation-S700 2000-2003 \$100,000
18.	EMF and Early Bone Development <u>Principal Investigator</u>	NIH R01 ES 074042 1995-1999 \$1,126,077

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| 19. | Modulation of Cell Cycle Growth,
Control and Differentiation in a
Connective Tissue System by Magnetic
and Electric Fields
<u>Co-Investigator</u> | Whitaker Foundation
1995-1998
\$180,000 |
| 20. | The Stimulation of Chondrogenesis
by Electromagnetic Fields
<u>Principal Investigator</u> | Fetzer Institute 852
1994-1996
\$140,000 |
| 21. | Hyperbaric O ₂ on Experimental
Endochondral Ossification
<u>Co-Investigator</u> | NIH R15 AR 40382
1990-1993
\$107,036 |

PUBLICATIONS

1. Srinivasan, S., R.K. Aaron, P. Chopra, T. Lucas and P.N. Sawyer. Effects of thrombotic and anti-thrombotic drugs on surface charge characteristics of canine blood vessels *in vivo* and *in vitro*. Surgery. 64:827, 1968.
2. Aaron, R.K., T. Lucas, S. Srinivasan and P.N. Sawyer. Alterations in vascular surface charge and propensity to thrombosis produced by blood vessel injury. Bull. N.Y. Acad. Med. 45:969, 1969.
3. Aaron, R.K., S. Srinivasan, D. Burrowes, and P.N. Sawyer. Effects of chemical compounds upon current-induced thrombosis in rat mesenteric vessels. Thromb. et Diath. Haemorr. 23:621, 1970.
4. Bennett, S., G. Geelhoed, R.K. Aaron, T. Solis and R. Hoye. Pulmonary injury resulting from perfusion with stored bank blood in the baboon and the dog. J. Surg. Res. 13:295, 1972.
5. Roberts, A.J., R.K. Aaron, D. Conkle, J. Brown, E. Stinson and C. McIntosh. Lasix and albumin therapy in the post-operative cardiac patient. Circulation 48 (Suppl):207, 1973.
6. Aaron, R.K., S. Srinivasan and P.N. Sawyer. Synthetics and Implants. In: Medical Engineering. Ed: C. D. Ray. Year Book Medical Publishers, Chicago, Illinois. 1973.
7. Aaron, R.K., R. Beazley and G. Riggle. Hematologic integrity after intraoperative autotransfusion - a comparison with bank blood. Arch. Surg. 108:831, 1974.
8. Aaron, R.K. Reduction of Hageman factor, prekallikrein, and kininogen in surgical stress. In: The Chemistry and Biology of the Kallikrein-Kinin System in Health and Disease. Eds.: J.J. Pisano and K.F. Austen. P. 545. National Institutes of Health, DHEW 76-791, 1976.
9. Aaron, R.K., L. Ellman, A. Carvalho and W.H. Harris. Relationship of intravascular coagulation and fibrinolysis to venous thrombosis following total hip replacement. Clin Orthop Relat Res. 135:148, 1978.
10. Brook, I. and R.K. Aaron. Hospital-based aspergillus flavus infection in a surgical wound: A case report. Orthopaedics 3:1215, 1980.
11. Aaron, R.K. Total joint arthroplasty. Surg. Clin. N Am. 63:697, 1983.
12. Aaron, R.K. and D. McK. Ciombor. Venous thromboembolism in orthopaedic surgery. Surg.Clin. N Am. 63:529, 1983.

13. Aaron, R.K., D. McK. Ciombor, R. Glasser and S. Bruder. Quantitative histomorphometric analysis of decalcified bone matrix-induced enchondral ossification. Ann. N.Y. Acad. Sci. 435:237, 1985.
14. Aaron, R.K. and D. McK. Ciombor. Treatment of osteonecrosis of the femoral head with pulsed external magnetic fields. Ann. N.Y. Acad. Sci. 435:367, 1985.
15. Aaron, R.K. and R. Scott. Supracondylar fractures after total knee replacement. Clin Orthop Relat Res. 219:30, 1987.
16. Aaron, R.K., C.B. Sledge, and S. Shortkroff. Experimental arthritis induced by polysaccharide macromolecules. Arthritis Rheum. 30:679, 1987.
17. Aaron, R.K. Patients at risk for femoral osteonecrosis. Diagnosis 9:51, 1987.
18. Limbird, R.S. and R.K. Aaron. Laterally comminuted fracture dislocations of the ankle. J. Bone Joint Surg. Am. 69A:881, 1987.
19. Aaron, R.K., G. Jolly, D. McK. Ciombor, and H-J. Barrach. A histochemical method for the demonstration of calcifying cartilage. Calcified Tissue Int. 43:244, 1988.
20. Aaron, R.K., D. McK. Ciombor and G. Jolly. Stimulation of experimental endochondral ossification by low-energy pulsing electromagnetic fields. J. Bone Miner. Res. 4:227-233, 1989.
21. Froehlich, J., G.S. Dorfman, J. Cronan, P.J. Urbanek, J.H. Herndon, and R.K. Aaron. Compression ultrasound for detection of deep venous thrombosis in patients with hip fractures: A prospective study. J. Bone Joint Surg. Am. 71A:249, 1989.
22. Aaron, R.K., D. Lennox, G.E. Bunce and T. Ebert. The conservative treatment of osteonecrosis of the femoral head - A comparison of pulsed electromagnetic fields and core decompression. Seventeenth Open Meeting of the Hip Society. Clin. Orthop. Relat. Res. 249:209, 1989.
23. Aaron, R.K. Basic science of fractures and fracture healing. Curr. Opin. Ortho. 1:294, 1990.
24. Savin, H. B., Zimmermann, R.K. Aaron, P. Libbey, J. Alper, and E.V. Lally. Seronegative symmetric polyarthritis in Sezary syndrome. J. Rheumatol. 18:464, 1991.

25. Aaron, R. K., D. Lennox, G. Bunce, D. McK. Ciombor, and T. Ebert. Durability of outcome in osteonecrosis of the femoral head treated with pulsing electromagnetic fields or core decompression. In: Electromagnetics in Medicine and Biology. Ed: C.T. Brighton and S.R. Pollack. p.309, San Francisco Press, San Francisco, CA.1991.
26. Aaron, R.K. and M.E. Steinberg. Electrical stimulation of osteonecrosis of the femoral head. Semin. Arthroplasty. 2:214, 1991.
27. Aaron, R.K. and D. McK. Ciombor. Electrical stimulation of bone induction and bone grafting. In: Bone Grafts and Bone Substitutes. Ed.: M. Habal and A.H. Reddi. p. 192, W.B. Saunders Inc, Philadelphia, PA. 1992.
28. Gershuni, D., R.K. Aaron, C.T. Brighton, F. Magee, and C.F. Smith. Symposium-Recent Advances in Electrical Stimulation. Contemp. Ortho. 26:609, 1993.
29. Ciombor, D. McK. and R.K. Aaron. Influence of electromagnetic fields on endochondral bone formation. J. Cell. Biochem. 52:37-41, 1993.
30. Aaron, R.K. and D. McK. Ciombor. Therapeutic effects of electromagnetic fields in the stimulation of connective tissue repair. J. Cell. Biochem. 52:42-46, 1993.
31. Aaron, R.K. Advances in the surgical treatment of arthritis. R.I. Med. J. 77:16,1994.
32. Aaron, R.K. Treatment of osteonecrosis of the femoral head with electrical stimulation. AAOS Instructional Course Lectures 43:495, 1994.
33. Aaron, R.K. Treatment of osteonecrosis of the femoral head with electrical stimulation In: Impiego Dei Campi Elettromagnetici Pulsati (CEMP) in Orthopedia E Traumatologia. Eds. G.C. Traina, L. Romanini, L. Massari, C. Villani, and R. Cadossi. P.69, Walberti Ediore, Ravenna, Italy. 1995.
34. Aaron, R.K. and D. McK. Ciombor. Acceleration of experimental endochondral ossification by biophysical stimulation of the progenitor cell pool. J. Ortho. Res. 14: 582-589, 1996.
35. Aaron, R.K., and D. McK. Ciombor. The role of electrical stimulation in the treatment of avascular necrosis of the femoral head. Curr. Orthopaed. London, UK. 11:187, 1997.
36. Aaron, R.K. Osteonecrosis: Etiology, pathophysiology and diagnosis. In: The Adult Hip. Eds: J. Callaghan, A. Rosenberg, and H. Rubash. p. 451, Raven Press, New York, NY. 1997.

37. Aaron, R.K., D. Lennox and B. Stulberg. The natural history of osteonecrosis of the femoral head and risk factors for progression. In: The Etiology, Diagnosis and Management of Osteonecrosis of the Human Skeleton. Ed. J. Urbaniak. p. 261, AAOS, Chicago, IL. 1997.
38. Aaron, R.K., D. McK. Ciombor, and C.F. Lord. Core decompression augmented with human decalcified bone matrix graft for osteonecrosis of the femoral head. In: The Etiology, Diagnosis and Management of Osteonecrosis of the Human Skeleton. Ed. J. Urbaniak. p. 301, AAOS, Chicago, IL. 1997.
39. Polk, C., R.K. Aaron, and D. McK. Ciombor. Therapeutic applications of low frequency electric and magnetic fields in the US. In: Treatment with Electromagnetic Fields. Ed: J.P. Stossel. Schattauer, Stuttgart, Germany. 1997.
40. Aaron, R.K. Importance of the early diagnosis of hip pain: New approaches to hip preservation in osteonecrosis. Medicine and Health/Rhode Island 81:157, 1998.
41. Aaron, R.K. Musculoskeletal disease (Editorial). Medicine and Health/Rhode Island. 81:154, 1998.
42. Aaron, R.K., D. McK. Ciombor and C. Polk. Therapeutic potential of electric fields in skeletal morphogenesis. In: Skeletal Growth and Development: Clinical Issues and Basic Science Advances. Eds. J.A. Buckwalter, M.G. Ehrlich, L.J. Sandell, and S.B. Trippel. p. 589-610, AAOS, Chicago, IL. 1998.
43. Scully, S., R.K. Aaron and J. Urbaniak. Survival analysis of hips treated with core decompression or vascularized fibular grafting because of avascular necrosis. J. Bone Joint Surg. Am. 80:1270, 1998.
44. Carson, J.L., M.L. Terrin, F.B. Barton, R.K. Aaron, A.G. Greenberg, et al. A pilot randomized trial comparing symptomatic vs. hemoglobin-level-driven red blood cell transfusions following hip fracture. Transfusion. 38:522-29, 1998.
45. Aaron, R.K. and D. McK. Ciombor. Electrical stimulation, demineralized bone matrix, and bone morphogenic protein. Semin. Arthroplasty. 9:221-30, 1998.
46. Aaron, R.K., D. McK. Ciombor, H. Keeping, et al. Power frequency fields promote cell differentiation coincident with an increase in TGF- β expression. Bioelectromagnetics. 20: 453-458, 1999.
47. Ciombor, D. McK. and R.K. Aaron. EMF stimulates cartilage differentiation in endochondral ossification coincident with an increase in TGF- β expression. In: Electricity and Magnetism in Biology and Medicine. Ed: F. Bersani p. 139-144. Kluwer Academic/Plenum Publishers, New York, NY, 1999.

48. Aaron, R.K. and D. McK. Ciombor. Preservation of the hip in osteonecrosis of the femoral head. In: Modulazione Biofisica Della Osteogenesi Mediante Campi Elettromagnetici Pulsati. Vol. II; Eds. G.C. Traina, F. Pipino, L. Massari, L. Molfetta, and R. Cadossi. p. 69-74. Walberti Editore, Ravenna, Italy 1999.
49. Collaborative Osteonecrosis Group. Multifocal osteonecrosis - A multicenter study. Clin. Orthop. Relat. Res. 369: 312-326; 1999.
50. Aaron, R.K., B. Stulberg and D. Lennox. Clinical and radiographic outcomes in untreated symptomatic osteonecrosis of the femoral head. Techniques in Orthopaedics 16: 1-5; 2001.
51. Ciombor, D. McK. and R.K. Aaron. Biologically augmented core decompression for the treatment of osteonecrosis of the femoral head. Techniques in Orthopaedics 16: 32-38; 2001.
52. Aaron, R.K. Technique of core decompression. Techniques in Orthopaedics 16: 98-100; 2001.
53. Aaron, R.K. Concepts of the pathogenesis of osteonecrosis. Techniques in Orthopaedics 16: 101-104; 2001.
54. Aaron, R.K. and D. McK. Ciombor. Coagulopathies in osteonecrosis. Curr. Opin. Ortho. 12: 378-383; 2001.
55. Ciombor, D. McK., G. Lester, R.K. Aaron, P. Neame, and B. Caterson. Low frequency EMF regulates chondrocyte differentiation and expression of matrix proteins J. Orthop. Res. 20: 40-49; 2002.
56. Aaron, R.K., S. Wang, and D. McK. Ciombor. Upregulation of basal TGF- β levels coincident with chondrogenesis. Implications for skeletal repair and tissue engineering. J. Orthop. Res. 20: 233-240; 2002.
57. Lieberman, J., D. Berry, M. Mont, R.K. Aaron, et al. Osteonecrosis of the hip: Management in the 21st century. J. Bone Joint Surg. 84: 834-853; 2002.
58. Lieberman, J., D. Berry, M. Mont, R.K. Aaron, et al. Osteonecrosis of the hip: Management in the 21st century. AAOS Instructional Course Lectures. 52:337; 2003.
59. Ciombor, D. McK., R.K. Aaron, S. Wang, and B. Simon. Modification of osteoarthritis in the guinea pig – A morphological study. Osteoarthritis and Cartilage. 11: 455-462; 2003.

60. Shalvoy, R., G. Ferguson, R.K. Aaron. Hip and Knee Pain. In: Primary Care for Women. Eds: P. Leppert and J. Peipert. p. 652-658, Lippincott-Raven, Philadelphia, PA. 2003.
61. Aaron, R.K., D. McK. Ciombor, B. Simon. Treatment of nonunions with electric and electromagnetic fields. Clin Orthop. Relat. Res. 419: 21-29; 2004.
62. Aaron, R.K., B. Boyan, D. McK. Ciombor, Z. Schwartz, B. Simon. Stimulation of growth factor synthesis by electric and electromagnetic fields. Clin Orthop Relat. Res. 419: 30-37; 2004.
63. Aaron, R.K., and D. McK. Ciombor. Pain in osteoarthritis. Medicine and Health/RI. 87: 205-209; 2004.
64. Aaron, R.K. and M. Bolander (eds.). Physical Regulation of Skeletal Repair. American Academy of Orthopaedic Surgeons, Chicago, IL. 2005.
65. Paek, H.J., A.B. Campaner, J.L. Kim, R.K. Aaron, D. Ciombor, J. Morgan, M. Lysaght. In-vitro characterization of TGF- β 1 release from genetically modified fibroblasts in calcium alginate microcapsules. ASAIO. 51: 379-384, 2005.
66. Ciombor, D. McK. and R.K. Aaron. The role of electrical stimulation in bone repair. Foot and Ankle Clinics. 10: 579- 593; 2005.
67. Aaron, R.K., E. Bluman, M.G. Ehrlich, P.G. Trafton. The Pelvis, Hip and Thigh. In: Netter Textbook of Orthopaedics. Ed: W. Greene. p. 363-394, Elsevier Saunders, Philadelphia, PA. 2006.
68. Aaron, R.K., A. Skolnick, S. Reinert, D. McK. Ciombor. Arthroscopic debridement for osteoarthritis of the knee. J. Bone Joint Surg. 88A: 936-943; 2006.
69. Aaron, R.K., D. McK. Ciombor, S. Wang. Clinical biophysics: The promotion of skeletal repair by physical forces. Ann. N.Y. Acad. Sci. 1068: 513-531; 2006.
70. Ciombor, D. McK., A. Jaklenec, A. Liu, C. Thanos, N. Rahman, P. Weston, R. Aaron, E. Mathiowitz. Encapsulation of BSA using a W/O/O emulsion solvent removal method. J. Microencap. 23: 183-194; 2006.
71. Paek, H.J., A.B. Campaner, J.L. Kem, L. Golden, R.K. Aaron, D. McK. Ciombor, J. Morgan, M. Lysaght. Microencapsulated cells genetically modified to overexpress human transforming growth factor-beta1: viability and functionality in allogeneic and xenogeneic implant models. Tissue Eng. 12: 1733-9; 2006.
72. Aaron, R.K., H. Herr, D. McK. Ciombor, L. Hochberg, J. Donoghue, C. Briant, J. Morgan, M. Ehrlich. Horizons in prosthetic development for restoration of limb function. J. Am. Acad. Orthop. Surg. 14: S198-204; 2006.

73. Aaron, R.K. and D. McK. Ciombor. Orthopaedic complications of solid organ transplantation. Surg. Clin. N Am. 86: 1237-1255; 2006.
74. Aaron, R.K. and R. Gray. Osteonecrosis: Etiology, Natural History, Pathophysiology and Diagnosis. In: The Adult Hip, 2nd edition. Eds: J. Callaghan, A. Rosenberg, and H. Rubash. Lippincott Williams & Wilkins, Philadelphia, PA. v. 1 pg 463-476; 2007.
75. Aaron, R.K. and J. Morgan. Biohybrid limbs: New materials and new properties Medicine and Health/Rhode Island. 90: 4; 2007.
76. Aaron, R.K., D. McK. Ciombor, M. Lysaght, E. Mathiowitz, M. Ehrlich Regenerative medicine for limb trauma. Medicine and Health/Rhode Island. 90: 6; 2007.
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PRESENTATIONS

1. "Effects of Thrombotic and Anti-thrombotic Drugs on Surface Charge Characteristics of Canine Blood Vessels *In Vivo* and *In Vitro*." Federation of American Societies for Experimental Biology (FASEB), 1968.
2. "Alterations in Vascular Surface Charge and Propensity to Thrombosis Produced by Blood Vessel Injury." New York Heart Association Scientific Session on Research, New York, NY. 1968.
3. "Surface Electrochemistry in Thrombotic Vascular Disease." Clinical Society U.S.P.H.S., Galveston, TX. 1971.
4. "Reduction of Hageman Factor, Prekallikrein, and Kininogen in Surgical Stress." Symposium on Kinins and Related Peptides, John E. Fogarty Center for Advanced Study in the Health Sciences and The National Heart and Lung Institute, National Institutes of Health, Bethesda, MD. 1974.
5. "Total Hip Replacement." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1983.
6. "Total Knee Replacement." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1983.
7. "Osteonecrosis." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1983.
8. "Radiology of Arthritis." Radiology Grand Rounds, Rhode Island Hospital, Providence, RI. 1983.
9. "Treatment of Osteonecrosis with Pulsed External Magnetic Fields." Orthopaedic Grand Rounds, Brown University, Rhode Island Hospital, Providence, RI. 1983.
10. "Osteoporosis." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1983.
11. "Structural Aspects of the Skeleton in Aging and Metabolic Bone Disease." Medical Grand Rounds, Rhode Island Hospital, Providence, RI. 1983.
12. "Patterns of Arthritis in the Upper Extremity." Reconstructive Surgery in the Upper Extremity. Newport, RI. 1983.
13. "Current Advances in Implant Fixation." Reconstructive Surgery in the Upper Extremity. Newport, RI. 1983.

14. "Total Knee Replacement." Orthopaedic Grand Rounds, Brown University, Rhode Island Hospital, Providence, RI. 1983.
15. "Immobility in the Elderly." American College of Physicians (New England Regional Meeting), Providence, RI. 1983.
16. "Pulsed External Magnetic Fields in the Treatment of Osteonecrosis." (Poster), New York Academy of Sciences, New York, NY. 1983.
17. "Quantitative Histomorphometric Analysis of Decalcified Bone Matrix-Induced Enchondral Ossification." (Poster), New York Academy of Sciences, New York, NY. 1983.
18. "Pulsed External Magnetic Fields in the Treatment of Osteonecrosis." American Rheumatism Association (New England Regional Meeting), Providence, RI. 1983.
19. "Quantitative Histomorphometric Analysis of Decalcified Bone Matrix-Induced Enchondral Ossification." Orthopaedic Research Society, Atlanta, GA. 1984.
20. "Decalcified Bone Matrix-Induced Enchondral Ossification - A Histomorphometric Study." (Poster) East Coast Connective Tissue Society, Philadelphia, PA. 1984.
21. "Quantitative Assessment of Chondrogenesis and Calcification in Decalcified Bone Matrix-Induced Enchondral Ossification." (Poster) Federation of American Societies for Experimental Biology (FASEB), St. Louis, MO. 1984.
22. "Treatment of Osteonecrosis of the Femoral Head with Pulsed External Magnetic Fields." New England Orthopaedic Society, Cape Elizabeth, ME. 1984.
23. "Predictability of Implant Position with an Instrumented Guide System." New England Orthopaedic Society, Cape Elizabeth, ME. 1984.
24. "Lateral Impaction Fractures of the Ankle." New England Orthopaedic Society, Cape Elizabeth, ME. 1984.
25. "Skeletal Complications of Chronic Renal Disease." Medical Grand Rounds, Rhode Island Hospital, Providence, RI. 1984.
26. "Quantitative Histomorphometric Analysis of Decalcified Bone Matrix-Induced Enchondral Ossification." 3rd International Society for Research in Orthopaedics and Traumatology (SIROT), London, England. 1984.
27. "Metabolic Bone Disease." Surgical Nutrition Grand Rounds, Rhode Island Hospital, Providence, RI. 1984.

28. "Treatment of Osteonecrosis of the Femoral Head with Pulsed External Magnetic Fields." 11th Northeast Bioengineering Conference, Worcester, MA. 1985.
29. "Suppression of Experimental Heterotopic Ossification by Retinoic Acid Analogues." Orthopaedic Research Society, Las Vegas, NV. 1985.
30. "Acceleration of Experimental Enchondral Ossification by Pulsed Electromagnetic Fields." Orthopaedic Research Society, Las Vegas, NV. 1986.
31. "Suppression of Experimental Enchondral Ossification and Restoration by Pulsed External Magnetic Fields." (Poster) East Coast Connective Tissue Society, Falmouth, MA. 1986.
32. "Effects of Pulsed Electromagnetic Fields on Osteonecrosis of the Femoral Head." New England Orthopaedic Society, Newport, RI. 1986.
33. "Influence of Pulsed Electromagnetic Fields on Bone Formation." National Institute of Dental Research Seminar, Bethesda, MD. 1986.
34. "Acceleration of Chondrogenesis and Calcification with Pulsed Electromagnetic Fields." Bioengineering and Orthopaedic Sciences Gordon Conference (Poster), Andover, NH. 1986
35. "Enhancement of Experimental Enchondral Ossification by Pulsed Electromagnetic Fields." Bioelectrochemistry Gordon Conference, Andover, NH. 1986.
36. "Stimulation of Proteoglycan Synthesis in Articular Chondrocyte Cultures by a Pulsed Electromagnetic Field." Orthopaedic Research Society, San Francisco, CA. 1987.
37. "Modulation of Chondrogenesis and Chondrocyte Differentiation by Pulsed Electromagnetic Fields." Orthopaedic Research Society, San Francisco, CA. 1987.
38. "Transcutaneous Nerve Stimulation as an Adjunct to Rehabilitation in Total Knee Arthroplasty." (Poster) American Academy of Orthopaedic Surgeons, San Francisco, CA. 1987.
39. "Lateral Impaction Fractures of the Ankle." American Orthopaedic Foot and Ankle Society, San Francisco, CA. 1987.
40. "Implant Position and Limb Alignment in Total Knee Replacement." American Academy of Orthopaedic Surgeons, San Francisco, CA. 1987.
41. "Stimulation of Connective Tissue Repair with Pulsing Electromagnetic Fields." Bioengineering Graduate Seminar, Brown University, Providence, RI. 1987.

42. "Enhanced Bone and Cartilage Formation by Low Energy Pulsing Electromagnetic Fields." (Poster) 2nd International Symposium on Tissue Repair, Tarpon Springs, FL. 1987.
43. "Effects of Pulsed Electromagnetic Fields of Varying Configurations on Experimental Enchondral Ossification." (Poster) 2nd International Symposium on Tissue Repair, Tarpon Springs, FL. 1987.
44. "Contemporary Advances in Total Joint Replacement." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1987.
45. "The Effects of Low Energy Pulsing Electromagnetic Fields on Experimental Enchondral Ossification." Orthopaedic Research Seminar, Mt. Sinai Hospital, New York, NY. 1987.
46. "Conservative Treatment of Osteonecrosis of the Femoral Head." Orthopaedic Grand Rounds, Mt. Sinai Hospital, New York, NY. 1987.
47. "Aging of the Skeleton and Metabolic Bone Disease." Basic Science Lecture Series, Department of Orthopaedics, SUNY, Stonybrook, NY. 1987.
48. "Augmentation of Matrix-Induced Bone and Cartilage Formation by Low Energy Pulsing Magnetic Fields." Society for Biomaterials, New York, NY. 1987.
49. "Effect of Pulsed Electromagnetic Fields of Varying Configurations on Experimental Enchondral Ossification." (Poster) Society for Biomaterials, New York, NY. 1987.
50. "Conservative Treatment of Avascular Necrosis of the Femoral Head." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1987.
51. "Tissue Response of Experimental Enchondral Ossification to Pulsing Electromagnetic Fields." Calcium and Phosphorous Gordon Research Conference, Plymouth, NH. 1987.
52. "Stimulation of Chondrogenesis and Enchondral Ossification." Bioelectric Repair and Growth Society, Toronto, Canada. 1987.
53. "Enhancement of Bone Maturation in Experimental Endochondral Ossification by Stimulation of Chondrogenesis with Pulsing Electromagnetic Fields." Orthopaedic Research Society, Atlanta, GA. 1988.

54. "The Conservative Treatment of Osteonecrosis of the Femoral Head - A Comparison of Core Decompression and Pulsing Electromagnetic Fields." Clinical Investigators Conference, Scottsdale, AZ. 1988.
55. "Enhancement of Bone Maturation in Experimental Endochondral Ossification by PEMF." Bioelectromagnetics Society, Stamford, CT. 1988.
56. "Treatment of Osteonecrosis of the Femoral Head with Pulsing Electromagnetic Fields." Bioelectromagnetics Society, Stamford, CT. 1988.
57. "Skeletal Maturation and Osteoporosis." Materials Research Society, Boston, MA. 1988.
58. "Core Decompression and Pulsing Electromagnetic Fields in the Treatment of Osteonecrosis of the Femoral Head." Bioelectrical Repair and Growth Society, Washington, DC. 1988.
59. "Enhancement of Bone Maturation in Experimental Endochondral Ossification by Stimulation of Chondrogenesis with Pulsing Electromagnetic Fields." Bioelectrical Repair and Growth Society, Washington, DC. 1988.
60. "Diagnosis and Treatment of Osteonecrosis of the Femoral Head." Basic Science Lecture Series, Department of Orthopaedics, SUNY, Stonybrook, NY. 1988.
61. "Enhancement of Bone Maturation in Experimental Endochondral Ossification by Stimulation of Chondrogenesis with Pulsing Electromagnetic Fields." (Poster) Bioengineering and Orthopaedic Science Gordon Research Conference, Andover, NH. 1988.
62. "Surgical Reconstruction of the Rheumatoid Foot." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1989.
63. "The Conservative Treatment of Osteonecrosis of the Femoral Head- A Comparison of Core Decompression and Pulsing Electromagnetic Fields." Orthopaedic Research Society, Las Vegas, NV. 1989.
64. "Enhanced Extracellular Matrix Synthesis in a Bone Repair Model." Orthopaedic Research Society, Las Vegas, NV. 1989.
65. "Participation of Allogeneic Bone Matrix Particles in Induced Endochondral Ossification." Orthopaedic Research Society, Las Vegas, NV. 1989.
66. "The Conservative Treatment of Osteonecrosis of the Femoral Head - A Comparison of Pulsed Electromagnetic Fields and Core Decompression." Hip Society, Las Vegas, NV. 1989.

67. "A Comparison of Pulsing Electromagnetic Fields and Core Decompression in the Treatment of Osteonecrosis of the Femoral Head." Galvani Symposium, Bologna, Italy. 1989.
68. "Indications for the Use of Pulsing Electromagnetic Fields in Osteonecrosis of the Femoral Head." Bioelectrical Repair and Growth Society, Cleveland, OH. 1989.
69. "Modulation of Gene Expression in Experimental Endochondral Ossification by Pulsing Electromagnetic Fields." Bioelectrical Repair and Growth Society, Cleveland, OH. 1989.
70. "Osteonecrosis of the Femoral Head." Orthopaedic Grand Rounds SUNY, Syracuse, NY. 1989.
71. "The Scientific Basis for the Use of Pulsing Electromagnetic Fields in Musculoskeletal Repair." Research Seminar, Department of Orthopaedics, SUNY, Syracuse, NY. 1989.
72. "Surgical Approaches to the Arthritic Knee." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1989.
73. "Effects of Exogenous Growth Factors on Endochondral Ossification in a Bone Repair Model-A Comparison with Pulsing Electromagnetic Fields." (Poster) Orthopaedic Research Society, New Orleans, LA. 1990.
74. "The Conservative Treatment of Osteonecrosis." Postgraduate Orthopaedic Seminar, Guy's Hospital, London, England. 1990.
75. "Pulsed Field Effects on Bone Induction in the Rat Ossicle." Symposium on the Response of Bone to Electrical Stimulation. Musculoskeletal Research Group, University of Bristol, Bristol, England. 1990.
76. "The Conservative Treatment of Osteonecrosis of the Femoral Head." Orthopaedic Grand Rounds, New England Baptist Hospital, Boston, MA. 1990.
77. "Sensitivity of Developmental Events in Endochondral Ossification to Stimulation with PEMF". Bioelectromagnetics Society, San Antonio, TX. 1990.
78. "Hip Fractures and Osteoporosis." R.I. Diabetes and Endocrine Society, Providence, RI. 1990.
79. "Osteonecrosis of the Femoral Head." Brown University Rheumatology Grand Rounds, Roger Williams General Hospital, Providence, RI. 1990.

80. "Enhancement of Bone Repair." Bioelectrochemistry Gordon Research Conference, Andover, NH. 1990.
81. "Comprehensive Treatment of Osteonecrosis of the Femoral Head." Orthopaedic Grand Rounds, Mt. Sinai Hospital, New York, NY. 1990.
82. "Comprehensive Treatment of Osteonecrosis of the Femoral Head." Orthopaedic Grand Rounds, Brown University, Rhode Island Hospital, Providence, RI. 1990.
83. "Durability of Outcome in Osteonecrosis of the Femoral Head Treated with PEMF or Core Decompression." Bioelectrical Repair and Growth Society, Philadelphia, PA. 1990.
84. "Sensitivity of Developmental Events in Endochondral Ossification to Stimulation with PEMF." IEEE Engineering in Medicine and Biology Society, Philadelphia, PA. 1990.
85. "Treatment of Osteonecrosis of the Femoral Head with PEMF or Core Decompression." Association Recherche Circulation Osseuse, Ischia, Italy. 1990.
86. "Sensitivity of Developmental Events in Endochondral Ossification to Stimulation with PEMF." (Poster) American Society for Cell Biology, San Diego, CA. 1990.
87. "Augmentation of Repair with Electromagnetic Fields." Wound Healing Society, Galveston, TX. 1991.
88. "Sensitivity of Developmental Events in Endochondral Ossification." Orthopaedic Research Society, Anaheim, CA. 1991.
89. "Arthroscopy in the Management of Arthritis of the Knee." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 1991.
90. "Tissue Specificity in Response to Electrical Stimulation." Bioelectrical Repair and Growth Society, Scottsdale, AZ. 1991.
91. "Sine Wave Interaction with an In-Vivo Model of Bone Development." Bioelectrical Repair and Growth Society, Scottsdale, AZ. 1991.
92. "The Conservative Treatment of Osteonecrosis of the Femoral Head-A Comparison of Core Decompression and Pulsed Electromagnetic Fields." Symposium: New Horizons - A Review of Existing and New Indications for Electrical Stimulation. Amsterdam, Holland. 1991.

93. "Tissue Responses to Electromagnetic Field Exposure and Their Clinical Use. Symposium on Mechanical and Electrical Control of Cellular Responses in Injury and Repair." American College of Surgeons, Clinical Congress, Chicago, IL. 1991.
94. "Effects of 15 Hz Sinusoidal Magnetic Fields on Cartilage Development In-Vivo Depends Non-Linearly on Duration of Daily Stimulation." (Poster) Department of Energy Research Review, Milwaukee, WI. 1991.
95. "Synergistic Effects of Growth Factors and Pulsed Fields on Proteoglycan Synthesis in Articular Cartilage." (Poster) American Society for Cell Biology, Boston, MA. 1991.
96. "Comparison of the Progression of Osteonecrosis of the Femoral Head Treated by Core-Decompression, Electromagnetic Therapy and Protected Weight Bearing." Association Recherche Circulation Osseuse, Basel, Switzerland. 1991.
97. "Synergistic Effects of Growth Factors and Pulsed Fields on Proteoglycan Synthesis in Articular Cartilage." Orthopaedic Research Society, Washington, DC. 1992.
98. "The Treatment of Osteonecrosis of the Femoral Head by Electric Stimulation." American Academy of Orthopaedic Surgeons, Washington, DC. 1992.
99. "Sine Wave Interaction with an *In-Vivo* Model of Bone Development." 18th IEEE Northeast Bioengineering Conference, Kingston, RI. 1992.
100. "Stimulation with Pulsing Electromagnetic Fields Acts Synergistically with Growth Factors to Increase Cartilage Matrix Synthesis." First World Congress for Electricity and Magnetism in Biology and Medicine, Lake Buena Vista, FL. 1992.
101. "Comparison of the Progression of Osteonecrosis of the Femoral Head Treated by Core-Decompression, Electromagnetic Therapy, and Protected Weight Bearing." First World Congress for Electricity and Magnetism in Biology and Medicine, Lake Buena Vista, FL. 1992.
102. "The Treatment of Osteonecrosis of the Femoral Head by Electric Stimulation." American Orthopaedic Association, Toronto, Canada. 1992.
103. "Surgical Planning and Staging in Polyarticular Rheumatoid Arthritis." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 1992.
104. "Orthopaedic Treatment of Paget's Disease." Paget's Disease Foundation, Providence, RI. 1992.

105. "Synergistic Effects of Growth Factors and Pulsed Fields on Proteoglycan Synthesis in Articular Cartilage." (Poster) Bioengineering and Orthopaedic Science Gordon Research Conference, Andover, NH. 1992.
106. "The Biological Basis for the Stimulation of Connective Tissue Repair by Electromagnetic Fields." Orthopaedic Grand Rounds, Johns Hopkins University, Baltimore, MD. 1992.
107. "Effects of Extremely Low Frequency Fields on the Synthesis of Extracellular Matrix Proteins." American Society for Cell Biology, Denver, CO. 1992.
108. "Modulation of Chondrocyte Differentiation from Mesenchymal Stem Cells." (Poster) American Society for Cell Biology, Denver, CO. 1992.
123. "Proteoglycan Synthesis in Articular Cartilage Explants." (Poster) American Society for Cell Biology, Denver, CO. 1992.
124. "Stimulation of Connective Tissue Repair by Electromagnetic Fields." Orthopaedic Grand Rounds, University of Massachusetts Medical Center, Worcester, MA. 1993.
125. "Update on the Diagnosis and Treatment of Osteonecrosis of the Femoral Head." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 1993.
126. "Treatment of Osteonecrosis of the Femoral Head with Electrical Stimulation." American Academy of Orthopaedic Surgeons Instructional Course Lecture, San Francisco, CA. 1993.
127. "Stimulation of Connective Tissue Repair by Electromagnetic Fields." Orthopaedic Grand Rounds, Stanford University, Palo Alto, CA. 1993.
128. "Enhancement of Extracellular Matrix Synthesis in Cartilage Explant Cultures by Exposure to an Electric Field." (Poster) Orthopaedic Research Society, San Francisco, CA. 1993.
129. "Pulsed Fields Act Synergistically With Growth Factors to Increase Cartilage Matrix Synthesis." (Poster) Bioelectrical Repair and Growth Society, Dana Point, CA. 1993.
130. "Increase in Proteoglycan Synthesis in Cartilage Explant Cultures Exposed to Pulsed Fields." (Poster) Bioelectrical Repair and Growth Society, Dana Point, CA. 1993.

131. "Comparison of the Efficacy of Core Decompression and PEMF for the Treatment of Osteonecrosis of the Femoral Head in Hips Matched for Prognostic Risk Factors." Society for Physical Regulation in Biology and Medicine, Washington, DC. 1994
132. "Stimulation of Proteoglycan Synthesis in Human Osteoarthritic Cartilage by PEMF." Society for Physical Regulation in Biology and Medicine, Washington, DC. 1994.
133. "Osteoporosis." Women's Health Initiative, Miriam Hospital, Providence, RI. 1994.
134. "Treatment of Arthritis of the Knee." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 1994
135. "Stimulation of Chondrogenesis in Articular Cartilage Explant Cultures by Exposure to PEMF - II. Age Dependence of Field and Growth Factor Stimulation." Bioelectromagnetics Society, Copenhagen, Denmark. 1994.
136. "Stimulation of Chondrogenesis in Articular Cartilage Explant Cultures by Exposure to PEMF - I. Proteoglycan Homeostasis." Bioelectromagnetics Society, Copenhagen, Denmark. 1994.
137. "Stimulation of Proteoglycan Synthesis in Human Osteoarthritic Cartilage by PEMF." Bioelectromagnetics Society, Copenhagen, Denmark. 1994.
138. "Stimulation of the Early Stages of Endochondral Ossification by Exposure to a PEMF." Bioelectromagnetics Society, Copenhagen, Denmark. 1994.
139. "The Treatment of Osteonecrosis of the Femoral Head with PEMF." Bioelectromagnetics Society, Copenhagen, Denmark. 1994.
140. "Osteonecrosis - Treatment with Protected Weight Bearing." Harvard Hip Course, Boston, MA. 1994.
141. "Osteonecrosis." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 1994.
142. "Treatment of Osteonecrosis of the Femoral Head with Electrical Stimulation." American Academy of Orthopaedic Surgeons, Instructional Course Lecture, New Orleans, LA. 1994.
143. "Restoration of Cartilage Matrix can be Stimulated by Exogenous Factors in an Age-Dependent Manner." (Poster) Orthopaedic Research Society, New Orleans, LA. 1994.

144. "Evaluation of Hip-Preserving Treatment Strategies in Osteonecrosis of the Femoral Head." Orthopaedic Research Society, New Orleans, LA. 1994.
145. "Treatment of Osteonecrosis of the Femoral Head with Electrical Stimulation." American Academy of Orthopaedic Surgeons, Instructional Course Lecture, Orlando, FL. 1995.
146. "Treatment of Osteonecrosis of the Femoral Head with Electrical Stimulation." Campi Elettromagnetici in Ortopedia: Stato Dell'Arte, Universita Degli Studi Di Ferrara Clinica Ortopedica, Ferrara, Italy. 1995.
147. "Immuno-Localization of Proteoglycans Expressed During Endochondral Ossification." (Poster) Second Combined Meeting of the Orthopaedic Research Societies of USA, Japan, Canada, and Europe, San Diego, CA. 1995.
148. "Radiographic Progression in Osteonecrosis of the Femoral Head." American Academy of Orthopaedic Surgeons, Atlanta, GA. 1996.
149. "Treatment of Osteonecrosis of the Femoral Head with Electrical Stimulation." SICOT, Amsterdam, Holland. 1996.
150. "EMF in Early Bone Development." Bioelectromagnetics Society, Victoria, BC, Canada. 1996.
151. "Chondrogenic Differentiation in Endochondral Bone Formation and its Enhancement by ELF Electromagnetic Stimulation." (Poster) Bioengineering and Orthopaedic Science Gordon Research Conference, Andover, NH. 1996.
152. "PEMF Alters Gene Expression of mRNA for Growth Factors in Early Endochondral Bone Formation." Society for Physical Regulation in Biology and Medicine, Chicago, IL. 1996.
153. "Conservative Treatment Options for Early Osteoarthritis of the Knee." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 1996.
154. "The Natural History of Osteonecrosis of the Femoral Head and Risk Factors for Progression." AOA International Symposium, The Etiology and Management of osteonecrosis of the Human Skeleton, Duke University Medical Center, Durham, NC. 1996.
155. "Localization of IGFs, IGF – Binding Proteins, and Microvessels in Endochondral Ossification and the Effect of Electrical Stimulation." (Poster) Orthopaedic Research Society, San Francisco, CA. 1997.

156. "Bone Induction by Decalcified Bone Matrix and mRNA of TGF β and IGF-1 are Increased by ELF Field Stimulation." (Poster) Orthopaedic Research Society, San Francisco, CA. 1997.
157. "Chondrogenic Differentiation is Enhanced by ELF Electromagnetic Stimulation." (Poster) Orthopaedic Research Society, San Francisco, CA. 1997.
158. "Core Decompression Augmented with Human Decalcified Bone Matrix Graft for Osteonecrosis of the Femoral Head." (Poster) American Academy of Orthopaedic Surgeons, San Francisco, CA. 1997.
159. "Modified Grice Arthrodesis in Rheumatoid Arthritis." American Academy of Orthopaedic Surgeons. (Poster) American Academy of Orthopaedic Surgeons, San Francisco, CA. 1997.
160. "The Role of Therapeutic Arthroscopy in the Management of Osteoarthritis of the Knee." (Poster) American Academy of Orthopaedic Surgeons. San Francisco, CA. 1997.
161. "Core Decompression Augmented with Human Decalcified Bone Matrix Graft for Osteonecrosis of the Femoral Head." American Academy of Orthopaedic Surgeons, San Francisco, CA. 1997.
162. "Stimulation of Chondrogenic Differentiation in Endochondral Bone Formation - Implications in Skeletal Morphogenesis." American Academy of Orthopaedic Surgeons. Skeletal Morphogenesis and Growth Workshop, Orlando, FL. 1997.
163. "Stimulation of Chondrogenic Differentiation in Experimental Endochondral Ossification by Low Frequency Electromagnetic Fields." Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy. 1997.
164. "Preservation of the Hip in Osteonecrosis of the Femoral Head." International Symposium on Electromagnetics and Bone Healing. Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy. 1997.
165. "Core Decompression Augmented with Human Decalcified Bone Matrix Graft for Osteonecrosis of the Femoral Head." American Association of Tissue Banks, San Diego, CA. 1997.
166. "Surgical Blood Transfusion Trial: Pilot Study." American Association of Blood Banks. Denver, CO. 1997.
167. "Hip Preserving Treatments for Osteonecrosis of the Femoral Head." Harvard Hip Course, Cambridge, MA. 1997.

168. "Clinical and Radiographic Outcomes in Osteonecrosis of the Femoral Head." Harvard Hip Course, Cambridge, MA. 1997.
169. "Biologically Augmented Core Decompression for the Treatment of Osteonecrosis of the Femoral Head." Harvard Hip Course, Cambridge, MA. 1997.
170. "Survival Analysis of Hips Afflicted with Avascular Necrosis Treated by Either Core Decompression or Vascularized Fibular Grafting." American Academy of Orthopaedic Surgeons. New Orleans, LA. 1998.
171. "Biologically Augmented Core Decompression for the Treatment of Osteonecrosis of the Femoral Head." Orthopaedic Research Society, New Orleans, LA. 1998.
172. "Tissue Repair." NIH, NIEHS Science Review Symposium, Phoenix, AZ. 1998.
173. "Total Knee Arthroplasty and Cartilage Replacement - Options for the Treatment of Osteoarthritis of the Knee." Brown University Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI 1998.
174. "Power Frequency Fields Affect Cell Differentiation Coincident with an Increase in TGF β ." Bioelectromagnetics Society, St. Pete Beach, FL. 1998.
175. "Repair of Musculoskeletal Tissues with Electromagnetic Fields -Results and Mechanisms." Bioelectromagnetics Society, St. Pete Beach, FL. 1998.
176. "Responses of Bone and Cartilage to EMF." Bioelectrochemistry Gordon Research Conference, Henniker, NH. 1998.
177. "Regulation of Articular Cartilage Extracellular Matrix Homeostasis by EMF." Second Symposium of the International Cartilage Repair Society, Boston, MA. 1998.
178. "Low Frequency EMF Stimulates Chondrocyte Differentiation and Cartilage Matrix Maturation - Implications for Cartilage Repair." Second Symposium of the International Cartilage Repair Society, Boston, MA. 1998.
179. "Modification of Osteoarthritis in the Guinea Pig - A Morphological Study." Orthopaedic Research Society; Anaheim, CA. 1999.
166. "Modification of Osteoarthritis and Upregulation of TGF β by EMF." Orthopaedic Research Society, Orlando, FL. 2000.
109. "Constitutive Upregulation of TGF β in Endochondral Ossification by EMF." Orthopaedic Research Society Orlando, FL. 2000.

167. "Total Joint Replacement at the Millennium." Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 2000.
168. "Pathophysiology and Conservative Treatment of Osteonecrosis of the Hip." Harvard Hip Course, Boston, MA. 2000.
170. "Stimulation of Cartilage Repair and Treatment of Osteoarthritis by EMF." Clinical Biophysics in Orthopaedics and Traumatology. Italian Society of Orthopaedics and Traumatology, Turin, Italy. 2000.
171. "Osteonecrosis – Pathophysiology and Natural History." Rheumatology Grand Rounds, Roger Williams Medical Center, Providence, RI. 2000.
172. "Thrombotic Episodes and Hypercoagulation in Osteonecrosis of the Femoral Head." Orthopaedic Research Society, San Francisco, CA. 2001.
173. "Hypercoagulability and Osteonecrosis of the Femoral Head in Patients with Inflammatory Bowel Disease." American College of Gastroenterology; Las Vegas, NV. 2001.
174. "The Biological Basis of Electric and Magnetic Field Effects." European Space Agency; Camogli, Genova, Italy, May 2001.
175. "TGF β Gene Activation by AP1 During Chondrogenesis Induced by EMF." Orthopaedic Research Society, Dallas, TX. 2002.
176. "Sustained Growth Factor Delivery by Polymer-Encapsulation for Tissue Repair." Orthopaedic Research Society, Dallas, TX. 2002.
177. "Mechanomimetic Effects of EMF on Articular Cartilage." Gordon Research Conference on Musculoskeletal Biology and Bioengineering, 2002.
178. "Upregulation of cFos and cJun Increases AP1 Binding to the Transforming Growth Factor Beta Promoter." Orthopaedic Research Society, New Orleans, LA. 2003.
179. "Microvascular Thrombosis and Subchondral Bone-Plate Thickening are Associated with Histologic Changes in the Dunkin-Hartley Guinea Pig Model of Osteoarthritis." Orthopaedic Research Society, New Orleans, LA. 2003.
180. "Suppression of LPS-Induced IL-1 Beta Production in Cultured Synoviocytes." Orthopaedic Research Society, New Orleans, LA. 2003.
180. "The Role of Arthroscopic Debridement in Palliation of Symptoms of Osteoarthritis of the Knee." Orthopaedic Research Society, New Orleans, LA. 2003.

181. "Mechanomimetic Effects of EMF on Articular Cartilage." Orthopaedic Research Society, New Orleans, LA 2003.
182. "EMF Fields Activate the JNK Pathway Resulting in Enhanced TGF β Gene Expression." Orthopaedic Research Society, San Francisco, CA. 2004.
183. "Impaired Fibrinolysis and Hypercoagulability in Osteoarthritis." Orthopaedic Research Society, San Francisco, CA. 2004.
184. "Engineered Cartilage from Synovium—A Developmental Approach." Orthopaedic Research Society, San Francisco, CA. 2004.
185. "In-Vitro Characterization of Biological Controlled-Release Device for In Situ Delivery of TGF β 1". Biomedical Engineering Society, Philadelphia, PA. 2004.
186. "Microencapsulated Constitutively Active, Genetically Modified Cells as a Source of TGF β 1 for a Bioartificial Cartilage." Regenerate, Seattle, WA. 2004.
187. "TGF- β 1-Dependent Chondrogenic Effect of IGF-1 and FGF-2 on Synovial Fibroblasts." (Poster) Orthopaedic Research Society, Washington, D.C. 2005.
188. "Modulation of Chondrogenesis in Synovial Fibroblast Engineered Cartilage by Sequential Growth Factors." Orthopaedic Research Society, Washington, D.C. 2005.
189. "Subchondral Fluid Dynamics in the Dunkin-Hartley Guinea Pig Model of Spontaneous Osteoarthritis: Use of a Novel Dynamic MRI Technique." Orthopaedic Research Society, Washington, D.C. 2005.
190. "Restoring Function: Blending Man and Machine." Brown University President's Forum, Providence, RI. 2005.
191. "Clinical Biophysics: The Promotion of Skeletal Repair by Physical Forces." New York Academy of Sciences Symposium, New York, NY. 2005.
192. "Developmental Sequences in Clinical Orthopaedics and their Modulation by Sequential Drug Delivery." Controlled Release Society, Miami, FL. 2005.
193. "Reconstitution of Proteoglycans in Human Osteoarthritic Knee Cartilage and its Biomechanical Consequences." Osteoarthritis Research Society International, Boston, MA. 2005.
194. "Assessment of Bone Perfusion with Gadolinium-Enhanced Magnetic Resonance Imaging in Experimental Osteoarthritis." Osteoarthritis Research Society International, Boston, MA. 2005.

195. "Arthroscopic Debridement for Osteoarthritis of the Knee." Osteoarthritis Research Society International, Boston, MA. 2005.
196. "Representation of the Severity of Arthritis of the Knee by Standard Radiographs." Osteoarthritis Research Society International, Boston, MA. 2005.
197. "Screening At-Risk Patients Enables Early Detection of Osteonecrosis and Hip Preservation." Orthopaedic Research Society, Chicago, IL. 2006.
198. "Reconstitution of Proteoglycans in Human Osteoarthritic Knee Cartilage and its Biomechanical Consequences." Orthopaedic Research Society, Chicago, IL. 2006.
199. "Assessment of Bone Perfusion with Gadolinium-Enhanced Magnetic Resonance Imaging in Experimental Osteoarthritis." Orthopaedic Research Society, Chicago, IL. 2006.
200. "Does Any Mitogenic Growth Factor Always Benefit the Chondrogenesis of Mesenchymal Stem Cells?" Orthopaedic Research Society, Chicago, IL. 2006.
201. "Pathophysiology of Bone Marrow Edema: Insights from Dynamic, Contrast-Enhanced MR Imaging." International Society of Magnetic Resonance in Medicine, Seattle, WA. 2006.
202. "Assessment of Bone Marrow Edema Perfusion with Dynamic Contrast-Enhanced MR Imaging." Radiological Society of North America, Chicago, IL. 2006.
203. "Effects of Dynamic Stimuli and Media Ingredients on the Chondrogenic Potential of Synoviocytes." Tissue Engineering and Biomaterials, Chicago, IL. 2006.
204. "Maintenance of Cartilage Extracellular Matrix by Electric Field Exposure." Pavia, Italy. 2006.
205. "Modulating IGF-1 Release from PLGA Scaffolds for Cartilage Tissue Engineering." Orthopaedic Research Society, San Diego, CA. 2007.
206. "Quantification Of Bone Marrow Lesions With Dynamic Contrast Enhanced MR Imaging." Orthopaedic Research Society, San Diego, CA. 2007.
207. "Fetal Bovine Serum Suppresses TGF- β 1 Induced Chondrogenesis In Synviocyte Pellet Cultures." Orthopaedic Research Society, San Diego, CA. 2007.
208. "Assessment of Bone Perfusion with Contrast-Enhanced Magnetic Resonance Imaging." ARCO, Baltimore, MD. 2007.

209. "Contrast-Enhanced Magnetic Resonance Imaging of Bone Marrow Edema Associated with Osteoarthritis and Avascular Necrosis." Osteoarthritis Research Society International, Ft. Lauderdale, FL. 2007.
210. "TGF- β 1 Released by PLGA Microspheres Enhance Chondrogenesis in Synoviocytes." Orthopaedic Research Society, San Francisco, CA. 2008.
211. "Sequential Release of IGF-1 and TGF- β 1 from Novel PLGA Scaffolds." Orthopaedic Research Society, San Francisco, CA. 2008.
212. "Regenerative and Restorative Techniques to Treat Severe Limb Trauma Orthopaedic War Injuries: New Developments in Treatments and Research." Orthopaedic Research Society, San Francisco, CA. 2008.
213. "Perfusion Abnormalities in Subchondral Bone Associated with Marrow Edema, Osteoarthritis, and Avascular Necrosis." Gordon Conference, Andover, NH. 2008.
214. "VR and Motion Analysis to Characterize Disabilities in Lower Limb Injury." Telemedicine and Advanced Technology Research Center. Department of Defense, Frederick, MD. 2008.
215. "Nanotextured Titanium Surfaces for Enhancing External Fixation Devices." Orthopaedic Research Society, Las Vegas, NV. 2009.
216. "Electrospinning Self-Assembled Rosette Nanotubes with Synovial Stem Cells for Cartilage Tissue Engineering." Orthopaedic Research Society, Las Vegas, NV. 2009.
217. "Rapid Development of Biointerfaces for Antimicrobial Transcutaneous Osseointegrated Implant Devices (TCOIDs)." Orthopaedic Research Society, Las Vegas, NV. 2009.
218. "Using Virtual Environment Navigation and Motion Tracking for the Assessment of Functional Gait Impairment." Orthopaedic Research Society, Las Vegas, NV. 2009.
219. "Rapid Development of Photoactive Solid State Dispersions as Biointerfaces for Orthopaedic Implants." First International Conference on Multifunctional, Hybrid and Nanomaterials, Tours, France. 2009.
220. "MRI and PET Perfusion Kinetics in Advanced Osteoarthritis of the Dunkin-Hartley Guinea Pig: A Pilot Study." International Society for Magnetic Resonance in Medicine, San Francisco, CA. 2009.

221. "Using the Affordance of Gap-Crossing to Characterize Functional Mobility after Lower Limb Injury." 15th International Conference on Perception and Action, Minneapolis and Saint Paul, Minnesota. 2009.
222. MRI and PET Perfusion Kinetics in Advanced Osteoarthritis of the Dunkin-Hartley Guinea Pig. Osteoarthritis Research Society International, Montreal, Canada 2009.
223. "Generation of Plasmin by Hypoxia in Human OA Osteocytes." Osteoarthritis Research Society International, Montreal, Canada. 2009.
224. "Effects of Hypoxia on Tissue Engineered Cartilage Constructs." Osteoarthritis Research Society International, Montreal, Canada. 2009.
225. "Characterization and Differentiation of Porcine Synovium-Derived MSCS." Osteoarthritis Research Society International, Montreal, Canada. 2009.
226. "Hypoxia and Co-culture of Chondrocytes and Synovial Fibroblasts Improve Chondrogenic Differentiation." Orthopaedic Research Society, New Orleans, LA. 2010.
227. "TGF- β 1 Delivery by PLGA Microspheres in Hypoxia for Chondrogenesis." Orthopaedic Research Society, New Orleans, LA. 2010.
228. "Effects of Hypoxia on Tissue Engineered Cartilage Constructs." Orthopaedic Research Society, New Orleans, LA. 2010.
229. "Self-assembled Rosette Nanotubes Functionalized with Multiple Peptides for Orthopaedic Applications." Orthopaedic Research Society, New Orleans, LA. 2010.
230. "Physicochemical Signaling in Human OA Osteoblasts" Orthopaedic Research Society, New Orleans, LA. 2010.
231. "Recurrence Quantification Analysis of Walking Path Trajectories in a Functional Mobility Task with Imposed Constraints" North American Society for Psychology in Sport and Physical Activity; National Conference, podium. Tucson, AZ. 2010.
232. "Approximate Entropy of Stride-To Stride Intervals Following ACL Injury" American Society for Biomechanics, Providence, RI, August 2010, national conference, podium.
233. "Electrical Stimulation of Bone Repair, Clinical Experiences", Electric and Electromagnetic Stimulation of Bone and Cartilage Repair; Medical Applications of Electromagnetic Fields: Research and Therapy. Erice, Italy. 2010.
234. "Oxygen Gradients Affect BMP 2/7 Modulation of Chondrogenesis" Orthopaedic Research Society, Long Beach, CA. 2011.

235. "Design of a Biaxial Loading Device for Cartilage Tissue Engineering"
Orthopaedic Research Society, Long Beach, CA. 2011.