CURRICULUM VITAE

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EDUCATION

Illinois Institute of Technology, Chicago, Illinois 60616, **1959 to 1963**.

B.S., Chemistry, 1963; spent 1½ years working for Dr. A. E. Martell, Chairman, Chemistry Department, on the chelative structure of reduced glutathione.

The Johns Hopkins University Medical School, Baltimore, Maryland 21205, **1963 to 1967**.

1963-1966, Ph.D., Physiological Chemistry; during the first year of graduate school, participated in a research project, "The Effects of Sr^{++} on Swelling and ATP-Linked Contraction of Mitochondria," under the supervision of Dr. Albert L. Lehninger. Thesis work, under the supervision of Dr. J. W. Greenawalt, was concerned with the separation, identification and characterization of the inner and outer mitochondrial membranes. This entailed a combined electron microscopic and biochemical approach.

1966-1967, Postdoctoral Fellow with Dr. C. R. Hackenbrock, Department of Anatomy; research was concerned with an investigation of the ultrastructure of isolated, intact mitochondria during various metabolic states. The observations obtained were used to elaborate the general thesis of the ultrastructural basis for energy transfer.

Brandeis University, Waltham, Massachusetts 02154, **1967 to 1969**.

1967-1968, Postdoctoral Fellow with Dr. N. O. Kaplan, Graduate Department of Biochemistry; in collaboration with Dr. E. Zwilling of the Biology Department, investigation of the effects of nicotinamide-antagonized teratogens on cartilage and muscle development in both in vitro and in vivo systems.

1968-1969, Postdoctoral Fellow with Dr. E. Zwilling, Department of Biology; continuation of work initiated during the previous year.

WORK HISTORY

Case Western Reserve University, Cleveland, Ohio 44106, 1969 to Present.

1981-Present	**Professor, Department of Biology.** Director, Cellular and Molecular Basis of Aging Training Program (ended 2007).
1986-Present	**Director**, **Skeletal Research Center**. Professor of General Medical Sciences (Oncology).
2005- Present	Professor of Biomedical Engineering.
2004-2011	Professor of Pathology.
1989-2000	Professor of Physiology and Biophysics.
1984-1985	Erna and Jakob Michael Visiting Professor, Department of Biophysics, **Weizmann Institute of Science, Rehovot, Israel**.
1981-1988	Professor, Developmental Genetics and Anatomy.
1976-1977	(Josiah Macy, Jr. Faculty Scholar Award), Sabbatical Leave, **Faculte de Medecine de Strasbourg, Institute de Chimie Biologique, 67085 Strasbourg CEDEX, France**. In the laboratory of Prof. Pierre Chambon, research involved investigation of chromatin structure and function, especially as related to molecular details of the relationship between poly (ADP-ribose) and other chromatin constituents.

Case Western Reserve University - Continued

1975-1981 Associate Professor, Departments of Biology and Anatomy; Co-Director, Developmental Biology Center; Research involved elucidation of the factors controlling muscle, bone and cartilage development in chick limb mesodermal cells. A working hypothesis was suggested that the local metabolic environment had a profound effect on the choice mechanism(s) governing mesodermal cell differentiation into particular phenotypic pathways.

1975-1991 Co-Director, Cellular and Molecular Biology Training Program.

1973 (Research Career Development Award) Leave of Absence as Visiting Professor, Department of Biochemistry and Biophysics, **University of California Medical School, San Francisco, California 94122**. In collaboration with Dr. Brian J. McCarthy, investigation into the basis of gene selectivity.

1969-1975 Assistant Professor, Departments of Biology and Anatomy (Medical School).

HONORS/AWARDS

1. 2022 Stem Cell and Regenerative Medicine Action Lifetime Achievement Award, Regenerative Medicine Foundation, June 2022.
2. Lifetime Achievement Award, International Joint Preservation Congress, Warsaw, September 2017
3. Lifetime Achievement Award, National Center for Regenerative Medicine, August 2015
4. Inaugural Member of the "Pioneers of Innovation" chosen by the Advocacy Committee of the Orthopaedic Research Society, March 2014
5. Honorary Alumni of the Year Award, School of Med., Case Western Reserve University, September 2013
6. TERMIS-NA 2010 Inaugural Lifetime Achievement Award, December 2010
7. Elected Fellow: College of Fellows of the American Institute for Medical and Biological Engineering, Instillation, February 2010.
8. Honorary Member: Stem Cell Research Italy, 2010
9. The Genzyme Life-Time Achievement Award given by the International Cartilage Repair Society, October, 2007
10. The Marshall Urist Award for Excellence in Tissue Regeneration Research presented by the Orthopaedic Research Society, February 1999.
11. The Elizabeth Winston Lanier Award given by the American Academy of Orthopaedic Surgeons as part of their 1990 Kappa Delta Awards conferred on February 8, 1990.
12. The Erna and Jakob Michael Visiting Professorship; The Weizmann Institute of Science, Israel, 1984-85.
13. Josiah Macy Faculty Scholar Award, 1976-1977.
14. National Institutes of Health Career Development Award, 1971-1976.
15. American Cancer Society Postdoctoral Fellowship, 1967-1969.

COMMERCIAL INTERESTS

1. President and Founder, Skeletech, Inc.; 1989-1992.
2. Founder, Chief Scientific Officer, Member of Board of Directors, Osiris Therapeutics, Inc. 1992-1997.
3. Founder, Arnold Caplan and associates, **aCa**, consulting group; 1996-Present
4. Founder, Cell Targeting, Inc., 2004-2011
5. Consultant, Chief Scientific Officer, Orthocyte a subsidiary of BioTime, Inc.
6. Founder, CellBank Technologies, LLP, 2011-Present

PUBLICATIONS

https://www.ncbi.nlm.nih.gov/myncbi/arnold.caplan.1/bibliography/public/

1965

1. AI Caplan and E Carafoli. The Effects of Sr^{++} on Swelling and ATP-Linked Contraction of Mitochondria. Biochem Biophys Acta 104:317-329 (1965).

1966

2. AI Caplan and JW Greenawalt. Biochemical and Ultrastructural Properties of Osmotically Lysed Rat Liver Mitochondria. J Cell Biol 31:455-472 (1966).

1968

3. AI Caplan and JW Greenawalt. The Effects of Osmotic Lysis on the Oxidative Phosphorylation and Compartmentation of Rat Liver Mitochondria. J Cell Biol 36:15-31 (1968).
4. AI Caplan, E Zwilling and NO Kaplan. 3-Acetylpyridine: Effects In Vitro Related to Teratogenic Activity in Chick Embryos. Science 160:1009-1010 (1968).

1969

5. CR Hackenbrock and AI Caplan. Ion-Induced Ultrastructural Transformations in Isolated Mitochondria. J Cell Biol 42:221-234 (1969).

1970

6. AI Caplan. Effects of the Nicotinamide-Sensitive Teratogen 3-Acetylpyridine on Chick Limb Cells in Culture. Exp Cell Res 62:341-355 (1970).

1971

7. AI Caplan. The Teratogenic Action of the Nicotinamide Analogs 3-Acetylpyridine and 6-Aminonicotinamide on Developing Chick Embryos. J Exp Biol 178:351-358 (1971).

1972

8. AI Caplan. Effects of a Nicotinamide-Sensitive Teratogen 6-Aminonicotinamide on Chick Limb Cells in Culture. Exp Cell Res 70:185-195 (1972).
9. AI Caplan. The Effects of the Nicotinamide-Sensitive Teratogen 3-Acetylpyridine on Chick Limb Mesodermal Cells in Culture: Biochemical Parameters. J Exp Zool 180:351-362 (1972).
10. AI Caplan. Comparison of the Capacity of Nicotinamide and Nicotinic Acid to Relieve the Effects of Muscle and Cartilage Teratogens in Developing Chick Embryos. Dev Biol 28:344-351 (1972).
11. AI Caplan. The Site and Sequence of Action of 6-Aminonicotinamide in Causing Bone Malformations of Embryonic Chick Limb and Its Relationship to Normal Development. Dev Biol 28:71-83 (1972).

1973

12. AI Caplan and S Koutroupas. The Control of Muscle and Cartilage Development in the Chick Limb: The Role of Differential Vascularization. J Embryol Exp Morph. 29:571-583 (1973).
13. AI Caplan and AC Stoolmiller. Control of Chondrogenic Expression in Mesodermal Cells of Embryonic Chick Limb. Proc Natl Acad Sci 70:1712-1717 (1973).

1974

14. MJ Rosenberg and AI Caplan. Nicotinamide Adenine Dinucleotide Levels in Cells of Developing Chick Limbs: Possible Control of Muscle and Cartilage Development. Dev Biol 38:157-164 (1974).

1975

15. MJ Rosenberg and AI Caplan. Nicotinamide Adenine Dinucleotide Levels in Chick Limb Mesodermal Cells In Vitro: Effects of 3-Acetylpyridine and Nicotinamide. J Embryol Exp Morph 33:947-956 (1975).
16. AI Caplan and MJ Rosenberg. Interrelationship Between Poly(Adenosine Diphosphoribose) Synthesis, Intracellular NAD Levels, and Muscle or Cartilage Differentiation from Embryonic Chick Limb Mesodermal Cells. Proc Natl Acad Sci 72:1852-1857 (1975).
17. AI Caplan and MJ Rosenberg. The Control of Chondrogenic and Myogenic Expression in Chick Limb Mesodermal Cells. In: *Extracellular Matrix Influences on Gene Expression,* Ed. H.C. Slavkin and R. Greulich, Academic Press, New York, pp. 47-55 (1975).
18. AI Caplan. Biochemical Influences on Organ and Tissue Differentiation. In: *7th Mead Johnson Symposium in Perinatal and Developmental Medicine: Clinical and Biological Aspects of Malformation*, Ed. R.S. Bloom, J.C. Sinclair and J.B. Warshaw, pp. 38-53 (1975).

1976

19. VC Hascall, TR Oegema, M Brown and AI Caplan. Isolation and Characterization of Proteoglycans from Avian Embryonic Limb Bud Chondrocytes Grown In Vitro. J Biol Chem 251:3511-3519 (1976).
20. P Osdoby and AI Caplan. The Possible Differentiation of Osteogenic Elements In Vitro from Chick Limb Mesodermal Cells: I. Morphological Evidence. Dev Biol 52:283-299 (1976).
21. CP Ordahl and AI Caplan. Transcriptional Diversity in Myogenesis. Dev Biol 54:61-72 (1976).
22. CP Ordahl, TR Johnson and AI Caplan. Sheared DNA Fragment Sizing: Comparison of Techniques. Nucl Acids Res 3:2985-2999 (1976).
23. AI Caplan. Simplified Procedure for Preparing Myogenic Cells for Culture. J Embryol Exp Morph 36:175-181 (1976).

1977

24. S DeLuca, D Heinegard, VC Hascall, JH Kimura and AI Caplan. Chemical and Physical Changes in Proteoglycans During Development of Chick Limb Bud Chondrocytes Grown In Vitro. J Biol Chem 252:6600-6608 (1977).
25. AI Caplan. Muscle, Cartilage and Bone Development and Differentiation from Chick Limb Mesenchymal Cells. In: *Vertebrate Limb and Somite Morphogenesis*. Ed. DA Ede, JR Hinchliffe and M Balls, Cambridge University Press, Cambridge, England, pp. 199-213 (1977).

1978

26. AI Caplan. Molecular Basis for Limb Morphogenesis. In: *5th International Conference on Birth Defects*, Ed. J Littlefield and J DeGrouchy, Excerp. Medica. pp. 208-220 (1978).
27. JH Kimura, P Osdoby, AI Caplan and VC Hascall. Electron Microscopic and Biochemical Studies of Proteoglycan Polydispersity in Chick Limb Bud Chondrocyte Cultures. J Biol Chem 253:4721-4729 (1978).
28. JE Zull, S Krug, D Abel and AI Caplan. Development of Parathyroid Hormone and Calcitonin-Activated Adenylate Cyclases in the Embryonic Limb and in Cultured Cells from Embryonic Chick Limb. Proc Natl Acad Sci 75:3871-3875 (1978).
29. S DeLuca, AI Caplan and VC Hascall. Biosynthesis of Proteoglycans by Chick Limb Bud Chondrocytes. J Biol Chem 253:4713-4720 (1978).
30. AI Caplan and CP Ordahl. Irreversible Gene Repression Model for Control of Development. Science 201:120-130 (1978).
31. JE Saffitz and AI Caplan. Separation of Transcriptively Active and Inactive Chromatin: Agarose Gel Chromatography. Biochem Biophys Acta 520:368-375 (1978).
32. AI Caplan, MG Ord and LA Stocken. Chromatin Structure Through the Cell Cycle: Studies With Regenerating Rat Liver. Biochem J 174:475-483 (1978).

PUBLICATIONS- Continued

33. JE Saffitz and AI Caplan. Hydroxylapatite Thermal Fractionation of Chromatin and DNA. Biochem 17:3480-3486 (1978).
34. JE Saffitz and AI Caplan. Attempted Separation of Transcriptively Active and Inactive Chromatin by Hydroxylapatite Thermal Chromatography. Biochem 17:3487-3495 (1978).
35. CP Ordahl and AI Caplan. High Diversity in the Polyadenylated RNA Populations of Embryonic Myoblasts. J Biol Chem 253:7683-7691 (1978).
36. JH Kimura and AI Caplan. Identification of Glycogen as the Major Xylose Acceptor in Polysomal Preparations from Chick Embryo Cartilage Cultures. Arch Biochem Biophys 191:687-697 (1978).

1979

37. AI Caplan, C Neidergang, H Okazaki and P Mandel. Poly(ADP-ribose) Levels as a Function of Chick Limb Mesenchymal Cell Development as Studied In Vitro and In Vivo. Dev Biol 72:102-109 (1979).
38. P Osdoby and AI Caplan. Osteogenesis in Cultures of Limb Mesenchymal Cells. Dev Biol 73:84-102 (1979).
39. LS Lohmander, VC Hascall and AI Caplan. Effects of 4-Methyl Umbelliferyl-ß-D-Xylopyranoside on Chondrogenesis and Proteoglycan Synthesis in Chick Limb Bud Mesenchymal Cell Cultures. J Biol Chem 254:10551-10561 (1979).
40. JH Kimura, P Osdoby, AI Caplan and VC Hascall. Electron Microscopic Examination of Isolated Proteoglycan Aggregates. In: *Glycoconjugate Research*, Vol. I, Ed. JO Gregory, RW Jeanloz, Academic Press, New York, pp. 189-192 (1979).
41. AI Caplan, C Neidergang, H Okazaki and P Mandel. Poly(ADP-ribose) Polymerase: Self-ADP-ribosylation, the Stimulation by DNA and the Effects on Nucleosome Formation and Stability. Arch Biochem Biophys 198:60-69 (1979).
42. LS Lohmander, VC Hascall and AI Caplan. Effects of ß-D-Xyloside on Chondrogenesis and Proteoglycan Synthesis in Chick Limb Bud Cell Cultures. In: *Proc. of 2nd Munich Symposium on Biology of Connective Tissue: Biology of the Articular Cartilage in Heath and Disease*, (1979).

1980

43. AI Caplan and VC Hascall. Structure and Development Changes in Proteoglycans. In: *Dilatation of the Uterine Cervix*, Ed. F Naftolin and PG Stubblefield, Raven Press, New York, pp. 79-98 (1980).
44. P Osdoby and AI Caplan. Scanning Electron Microscopy of In Vitro Osteogenesis. Calcif Tiss Intl 30:43-50 (1980).
45. S DeLuca, LS Lohmander, B Nilsson, VC Hascall and AI Caplan. Proteoglycans from Chick Limb Bud Chondrocyte Cultures: Keratan Sulfate and Oligosaccharides which Contain Mannose and Sialic Acid. J Biol Chem 255:6077-6083 (1980).

1981

46. AI Caplan. Embryological Development: Evolutionary History, Genetic Bias and Cellular Environment Control the Flow of Developmental Events. J Col Sci Teach 10:226-230; 289-293 (1981).
47. AI Caplan. Studies on the Role of NAD and Poly(ADP-ribose) in the Control of the Differentiation and Development of Embryonic Chick Limb Cells. In: *Novel ADP-Ribosylation of Regulatory Enzymes and Proteins*, Ed. T Sigamura and M Smulson, Elsevier, North Holland, pp. 315-324 (1981).
48. RL Stevens, SP Nissley, JH Kimura, M Rechler, AI Caplan and VC Hascall. Effects of Insulin and Multiplication-Stimulating Activity on Proteoglycan Biosynthesis in Chondrocytes from the Swarm Rat Chondrosarcoma. J Biol Chem 256:2045-2052 (1981).
49. AI Caplan. The Molecular Control of Muscle and Cartilage Development. In: *39th Annual Symposium of the Society for Developmental Biology*, Ed. S Subtelney and U Abbott, Alan R. Liss, Inc., New York, pp. 37-68 (1981).
50. P Osdoby and AI Caplan. First Bone Formation in Embryonic Chick Limbs. Dev Biol 86:147-156 (1981).

PUBLICATIONS - Continued

51. P Osdoby and AI Caplan. Characterization of a Bone-Specific Alkaline Phosphatase in Cultures of Chick Limb Mesenchymal Cells. Dev Biol 86:136-146 (1981).
52. JE Zull, K Youngman and AI Caplan. The Development of Hormonal Responses of Cultured Embryonic Chick Limb Mesenchymal Cells. Dev Biol 86:61-68 (1981).

1982

53. K von der Mark, P Osdoby and AI Caplan. Effect of 4-Methyl Umbelliferyl-ß-D-Xyloside on Collagen Synthesis in Chick Limb Bud Mesenchymal Cell Cultures. Dev Biol 90:24-30 (1982).
54. MJ Katz, RJ Lasek, P Osdoby, JR Whittaker and AI Caplan. Bolton-Hunter Reagent as a Vital Stain for Developing Systems. Dev Biol 90:419-429 (1982).
55. DA Carrino and AI Caplan. Isolation and Preliminary Characterization of Proteoglycans Synthesized by Skeletal Muscle. J Biol Chem 257:14145-14154 (1982).
56. BW Cherney, RJ Midura and AI Caplan. Poly(ADP-ribose) and the Differentiation of Embryonic Tissue. In: *ADP-Ribosylation Reactions: Biology and Medicine*, Ed. O Hayaishi and K Ueda, Academic Press, New York, pp. 389-406 (1982).
57. CP Ordahl, T Cooper, C Ovitt, J Fornwald, AI Caplan and A Calman. Structure and Developmental Regulation of Muscle-Regulated Gene Sets. In: *Cold Spring Harbor Symposium, Muscle Development: Molecular and Cellular Control*. Ed. ML Pearson and HF Epstein (1982).
58. R Shogren, AM Jamieson, J Blackwell, DA Carrino and AI Caplan. Light Scattering Studies of Chick Limb Bud Proteoglycans. J Biol Chem 257:8627-8629 (1982).
59. P Osdoby, MC Martini and AI Caplan. Isolated Osteoclasts and Their Presumed Progenitor Cells, the Monocyte, in Culture. J Exp Biol 224:331-344 (1982).
60. MC Martini, P Osdoby and AI Caplan. Adhesion of Osteoclasts and Monocytes to Developing Bone. J Exp Biol 224:345-354 (1982).

1983

61. SJ Hunter and AI Caplan. The Control of Cartilage Differentiation. In: *Cartilage, Vol. II, Development and Differentiation*, Ed. BK Hall, Academic Press, New York, pp. 87-120 (1983).
62. P Osdoby, MC Martini and AI Caplan. The Development of Long Bones of the Limb: Cell and Matrix Interactions of Osteoclasts and Monocytes. In: *Limb Development and Regeneration, Part B*, Ed. RO Kelly, PF Goetinck and JA MacCabe, Alan R. Liss, Inc., New York, pp. 229-238 (1983).
63. DM Jargiello and AI Caplan. The Fluid Flow Dynamics in the Developing Chick Wing. In: *Limb Development and Regeneration, Part A*, Ed. JF Fallon and AI Caplan, Alan R. Liss, Inc., New York, pp. 143-154 (1983).
64. DA Carrino and AI Caplan. Proteoglycans Produced by Skeletal Muscle In Vitro and In Vivo. In: *Limb Development and Regeneration, Part B*, Ed. RO Kelly, PF Goetinck and JA MacCabe, Alan R. Liss, Inc., New York, pp. 379-390 (1983).
65. AI Caplan, GT Syftestad and P Osdoby. The Development of Bone and Cartilage in Tissue Culture. J Clin Ortho Rel Res. 174:243-263 (1983).
66. DM Jargiello and AI Caplan. The Establishment of Vascular-Derived Micro-Environments in the Developing Chick Wing. Dev Biol 97:364-374 (1983).
67. DP Lennon, P Osdoby, DA Carrino, BM Vertel and AI Caplan. Isolation and Characterization of Chondrocytes and Non-Chondrocytes from High-Density Chick Limb Bud Cell Cultures. J Craniofac Genet Develop Biol 3:235-251 (1983).
68. DA Carrino, DP Lennon and AI Caplan. Extracellular Matrix and the Maintenance of the Differentiated State: Proteoglycans Synthesized by Replated Chondrocytes and Non-Chondrocytes. Dev Biol 99:132-144 (1983).
69. AI Caplan, MY Fiszman and HM Eppenberger. Molecular and Cell Isoforms During Development. Science 221:921-927 (1983).

PUBLICATIONS - Continued

70. RL Shogren, J Blackwell, AM Jamieson, DA Carrino, DG Pechak and AI Caplan. Light-Scattering Studies of Chick Limb Bud Proteoglycan Aggregate. J Biol Chem 258:8627-8629 (1983).

1984

71. AI Caplan. Cartilage. Scientific American 251:84-94 (1984).
72. DA Carrino, DG Pechak and AI Caplan. Characterization of Proteoglycans which are Synthesized During Skeletal Muscle Development. In: *Developmental Processes in Normal and Diseased Muscle*, Ed. H Eppenberger and J-C Perriard: Vol. 9 of Experimental Biology and Medicine, Ed. A Wolsky, S Karger, Publishers, Basel, Switzerland, pp. 80-86 (1984).
73. GT Syftestad and AI Caplan. A Fraction from Extracts from Demineralized Bone Stimulates the Conversion of Mesenchymal Cells into Chondrocytes. Dev Biol 104:348-356 (1984).
74. GT Syftestad and AI Caplan. Effects of Osteoinductive Bone Matrix Extracts on the Transition of Mesenchymal Cells into Chondrocytes. Calc Tiss Intl 36:625-627 (1984).
75. DA Carrino and AI Caplan. Isolation and Partial Characterization of High-Buoyant-Density Proteoglycans Synthesized In Ovo by Embryonic Chick Skeletal Muscle and Heart. J Biol Chem 259:12419-12430 (1984).

1985

76. DA Carrino and AI Caplan. Isolation and Characterization of Proteoglycans Synthesized In Ovo by Embryonic Chick Cartilage and New Bone. J Biol Chem 260:122-127 (1985).
77. AI Caplan. The Vasculature and Limb Development. Cell Diff 16:1-11 (1985).
78. DG Pechak, DA Carrino and AI Caplan. Electron Microscopic Characterization of Chick Embryonic Skeletal Muscle Proteoglycans. J Cell Biol 100:1767-1776 (1985).
79. RF Drushel, DG Pechak and AI Caplan. The Anatomy, Ultrastructure and Fluid Dynamics of the Developing Vasculature of the Embryonic Chick Wing Bud. Cell Diff 16:13-28 (1985).
80. AI Caplan. Poly(ADP-ribose)Synthetase and Cell Differentiation. In: *ADP-Ribosylation of Proteins*, Ed. F Althaus, H Hilz and S Shall, Springer-Verlag, Berlin, pp. 388-396 (1985).
81. GT Syftestad, M Weitzhandler and AI Caplan. Isolation and Characterization of Osteogenic Cells Derived from First Bone of the Embryonic Tibia. Dev Biol 110:275-283 (1985).
82. DA Carrino, M Weitzhandler and AI Caplan. Proteoglycans Synthesized During the Cartilage to Bone Transition. In: *The Chemistry and Biology of Mineralized Tissues*, Ed. WT Butler, Ebsco Media, Inc., Birmingham, Alabama, pp. 197-208 (1985).
83. RJ Midura, BW Cherney and AI Caplan. The Relationship of Nicotinamide Adenine Dinucleotide to the Chondrogenic Differentiation of Limb Mesenchymal Cells. Dev Biol 111:232-242 (1985).
84. BW Cherney, RJ Midura and AI Caplan. Poly(ADP-ribose) Synthetase and Chick Limb Mesenchymal Cell Differentiation. Dev Biol 112:115-125 (1985).
85. GT Syftestad, PA Lucas and AI Caplan. The In Vitro Chondrogenic Response of Limb Bud Mesenchyme to a Water-Soluble Fraction Prepared from Demineralized Bone Matrix. Differentiation 29:230-237 (1985).

1986

86. DA Carrino and AI Caplan. Proteoglycan Synthesis During Skeletal Muscle Development. In: *Molecular Biology of Muscle Development, UCLA Symposia on Molecular and Cellular Development*, Vol. 29, Ed. C Emerson, DA Fischman, B Nadal-Ginard and MAQ Siddiqui, Alan R. Liss, Inc., New York, pp. 117-132 (1986).
87. MJ Kujawa, DG Pechak, MY Fiszman and AI Caplan. Hyaluronic Acid Bonded to Cell Culture Surfaces Inhibits the Program of Myogenesis. Dev Biol 113:10-16 (1986).
88. H Ohno, J Blackwell, AM Jamieson, DG Pechak, DA Carrino and AI Caplan. Structure of Native Proteoglycan Aggregates from Chick Limb Bud Chondrocytes. Biopolymers 25:931-946 (1986).

PUBLICATIONS - Continued

89. MJ Kujawa and AI Caplan. Hyaluronic Acid Bonded to Cell Culture Surfaces Stimulates Chondrogenesis in Stage 24 Limb Mesenchyme Cell Cultures. Dev Biol 114:504-518 (1986).
90. AI Caplan. Molecular and Cellular Differentiation of Muscle, Cartilage and Bone in the Developing Limb. In: *Progress in Developmental Biology Part B, Progress in Clinical and Biological Research*. Vol. 217B, Ed. HC Slavkin, Alan R. Liss, Inc., New York, pp. 307-318 (1986).
91. MJ Kujawa, DA Carrino and AI Caplan. Substrate-Bonded Hyaluronic Acid Exhibits a Size-Dependent Stimulation of Chondrogenic Differentiation of Stage 24 Limb Mesenchymal Cells in Culture. Dev Biol 114:519-528 (1986).
92. AI Caplan. The Extracellular Matrix is Instructive. BioEssays 5:129-132 (1986).
93. PA Lucas, GT Syftestad and AI Caplan. Partial Isolation and Characterization of a Chemotactic Factor from Adult Bone for Mesenchymal Cells. Bone 7:365-371 (1986).
94. H Ohno, J Blackwell, AM Jamieson, DA Carrino and AI Caplan. Calibration of the Relative Molecular Mass of Proteoglycan Subunit by Column Chromatography on Sepharose CL-2B. Biochem J 235:553-557 (1986).
95. DG Pechak, MJ Kujawa and AI Caplan. Morphological and Histological Events During First Bone Formation in Embryonic Chick Limbs. Bone 7:441-458 (1986).
96. DG Pechak, MJ Kujawa and AI Caplan. Morphology of Bone Development and Bone Remodeling in Embryonic Chick Limbs. Bone 7:459-472 (1986).

1987

97. AI Caplan. Bone Development and Repair. BioEssays 6:171-175 (1987).
98. AI Caplan and DG Pechak. The Cellular and Molecular Embryology of Bone Formation. In: *Bone and Mineral Research*, Vol. 5, Ed. WA Peck, Elsevier, New York, pp. 117-184 (1987).
99. AM Jamieson, J Blackwell, H Reihanian, H Ohno, R Gupta, DA Carrino, AI Caplan, LH Tang and LC Rosenberg. Thermal and Solvent Stability of Proteoglycan Aggregates by Quasielastic Laser Light-Scattering. Carbohydr Res 160:329-342 (1987).
100. SE Haynesworth, DA Carrino and AI Caplan. Characterization of the Core Protein of the Large Chondroitin Sulfate Proteoglycan Synthesized by Chondrocytes in Chick Limb Bud Cell Cultures. J Biol Chem 262:10574-10581 (1987).
101. AR Poole and AI Caplan. An Appreciation: Dame Honor B. Fell, R.F.S. (1900-1986). Dev Biol 122:297-299 (1987).
102. GT Syftestad, PA Lucas, H Ohgushi and AI Caplan. Chondrogenesis as an In Vitro Response to Bioactive Factors Extracted from Adult Bone and Non-Skeletal Tissues. In: *UCLA Symposium Volume, Development and Diseases of Cartilage and Bone Matrix*, Ed. T Thornhill and A Senn, Alan R. Liss, Inc., New York, pp. 187-199 (1987).

1988

103. HE Young, DA Carrino and AI Caplan. Initial Characterization of Small Proteoglycans Synthesized by Embryonic Chick Leg Muscle-Associated Connective Tissues. Conn Tiss Res 17:99-118 (1988).
104. H Ohgushi, GT Syftestad and AI Caplan. In Vitro Chondrogenesis Stimulated by Extracts of Gall Bladder Epithelium. Bone 8:375-379 (1988).
105. RF Drushel and AI Caplan. The Extravascular Fluid Dynamics of the Chick Wing Bud. Dev Biol 126:7-18 (1988).
106. PA Lucas, GT Syftestad and AI Caplan. A Water-Soluble Fraction from Adult Bone Stimulates the Differentiation of Cartilage in Explants of Embryonic Muscle. Differentiation 37:47:-52 (1988).
107. PA Lucas and AI Caplan. Chemotactic Response of Embryonic Limb Bud Mesenchymal Cells and Muscle-Derived Fibroblasts to Transforming Growth Factor Beta. Conn Tiss Res 18:1-7 (1988).
108. AI Caplan. Biomaterials and Bone Repair. BIOMAT 87:15-24 (1988).

PUBLICATIONS - Continued

109. DA Carrino and AI Caplan. Extracellular Matrix and Sequential Replacement Events During Tissue Formation, Remodeling and Repair. In: *The Biology of Tooth Movement*, Ed. LA Norton and CJ Burstone, CRC Press, Inc., Boca Raton, Florida, Chapter 11, pp. 183-194 (1988).
110. AI Caplan. Bone Development. In: *Cell and Molecular Biology of Vertebrate Hard Tissues*. CIBA Foundation Symposium 136, Wiley, Chichester, pp. 3-21 (1988).
111. M Weitzhandler, DA Carrino and AI Caplan. Proteoglycans Synthesized During the Cartilage-to-Bone Transition in Developing Chick Embryos. Bone 9:225-233 (1988).
112. AI Caplan. Cell and Molecular Strategies for Massive Bone Repair/Regeneration, Japanese Orthopaedic Research Society, Special Lectures at a Glance, Tokyo, Japan, pp. 97-104 (1988).
113. DA Carrino, U Oron, DG Pechak and AI Caplan. Reinitiation of Embryonic Chondroitin Sulfate Proteoglycan Synthesis in Regenerating Skeletal Muscle. Development 103:641-656 (1988).
114. AI Caplan, BM Carlson, JA Faulkner, DA Fischman and WE Garrett, Jr. Skeletal Muscle. In: *Injury and Repair of the Musculoskeletal Soft Tissue*. Ed. SL-Y Woo and JA Buckwalter, American Academy of Orthopaedic Surgeons, pp. 209-291 (1988).
115. PA Lucas, PA Price and AI Caplan. Chemotactic Response of Mesenchymal Cells, Fibroblasts and Osteoblast-like Cells to Bone GLA Protein. Bone 9:319-323 (1988).

1989

116. MJ Kujawa, M Weitzhandler, AR Poole, L Rosenberg and AI Caplan. Association of the C-Propeptide of Type II Collagen with Mineralization of Embryonic Chick Long Bone and Sternal Development. Conn Tiss Res 23:179-199 (1989).
117. H Ohgushi, VM Goldberg and AI Caplan. Heterotopic Osteogenesis in Porous Ceramics Induced by Marrow Cells. J Ortho Res 7:568-578 (1989).
118. SP Bruder and AI Caplan. Discrete Stages Within the Osteogenic Lineage are Revealed by Alterations in the Cell Surface Architecture of Embryonic Bone Cells. In: *The Chemistry and Biology of Mineralized Tissue*, Ed. MJ Glimcher and JB Lian, Gordon and Breach, New York, pp. 73-79 (1989).
119. DA Carrino, C Lidor, S Edelstein and AI Caplan. Proteoglycan Synthesis in Vitamin D-Deficient Cartilage: Recovery from Vitamin-D Deficiency. Conn Tiss Res 19:135-147 (1989).
120. SP Bruder and AI Caplan. First Bone Formation and the Dissection of an Osteogenic Lineage in the Embryonic Chick Tibia is Revealed by Monoclonal Antibodies Against Osteoblasts. Bone 10:359-375 (1989).
121. PA Lucas, GT Syftestad, VM Goldberg and AI Caplan. Ectopic Induction of Cartilage and Bone by Water-Soluble Proteins from Bovine Bone Using a Collagenous Delivery Vehicle. J Biomed Matl Res 23:23-39 (1989).
122. SP Bruder and AI Caplan. Cellular and Molecular Events During Embryonic Bone Development. In: *The Chemistry and Biology of Mineralized Tissue*, Ed. MJ Glimcher and JB Lian, Gordon and Breach, New York, pp. 65-71 (1989).
123. H Ohgushi, VM Goldberg and AI Caplan. Repair of Bone Defects with Marrow Cells and Porous Ceramic. Acta Scandia Ortho 60:334-339 (1989).
124. SP Bruder and AI Caplan. Cellular and Molecular Events During Embryonic Bone Development. Conn Tiss Res 20:65-71 (1989).
125. DA Carrino and AI Caplan. Structural Characterization of Skeletal Muscle Chondroitin Sulfate Proteoglycan. Conn Tiss Res 19:35-50 (1989).
126. SP Bruder and AI Caplan. Discrete Stages Within the Osteogenic Lineage are Revealed by Alterations in the Cell Surface Architecture of Embryonic Bone Cells. Conn Tiss Res 20:73-79 (1989).
127. HE Young, DA Carrino and AI Caplan. Analysis of Newly Synthesized and Accumulated Sulfated Glycosaminoglycans During Musculogenesis in the Embryonic Chick Leg. J Morph 201:85-103 (1989).
128. MJ Kujawa, DP Lennon and AI Caplan. Growth and Differentiation of Stage 24 Limb Mesenchymal Cells in a Serum-Free, Chemically Defined Medium. Exp Cell Res 183:45-61 (1989).

PUBLICATIONS - Continued

129. AI Caplan. Bioactive Factors in Bone: Marshall R. Urist, M.D. May 1988, Kerrville, Texas. Conn Tiss Res 23:103-106 (1989).
130. HE Young, VE Young and AI Caplan. Comparison of Fixatives for Maximal Retention of Radiolabeled Glycoconjugates for Autoradiography, Including Use of Sodium Sulfate to Release Unincorporated [^{35}S]Sulfate. J Histochem Cytochem 37:223-228 (1989).
131. H Ohgushi, M Okumura, K Masuhara, VM Goldberg, DT Davy and AI Caplan. Calcium Phosphate Block Ceramic with Bone Marrow Cells Improves Repair of Rat Long Bone Defect" and "Osteogenic Potential of Bone Marrow Sustained by Porous Calcium Phosphate Ceramics. In: *Handbook of Bioactive Ceramics, Volume II: Calcium Phosphate and Hydroxylapatite Ceramics*, Ed. T Yamamuro, LL Hench and J Wilson-Herch, CRC Press, Inc., Boca Raton, Florida, (1989).
132. DA Carrino, MJ Kujawa, DP Lennon and AI Caplan. Altered Proteoglycans Synthesized by Chick Limb Bud Chondrocytes Cultured in Serum-Free Defined Medium. Exp Cell Res 183:62-77 (1989).
133. AI Caplan. Cell Delivery and Tissue Regeneration. J Contr Release 11:157-165 (1989).

1990

134. DM Snow, V Lemmon, DA Carrino, AI Caplan and J Silver. Sulfated Proteoglycans in Astroglial Barriers Inhibit Neurite Outgrowth In Vitro. Exp Neurol 109:111-130 (1990).
135. SP Bruder and AI Caplan. A Monoclonal Antibody Against the Surface of Osteoblasts Recognizes Alkaline Phosphatase Isoenzymes in Bone, Liver, Kidney and Intestine. Bone 11:133-139 (1990).
136. H Nakahara, SP Bruder, VM Goldberg and AI Caplan. In Vivo Osteochondrogenic Potential of Cultured Cells Derived from the Periosteum. Clin Ortho Rel Res 259:223-232 (1990).
137. HE Young, DA Carrino and AI Caplan. Change in Synthesis of Sulfated Glycoconjugates During Muscle Development, Maturation and Aging in CBF-1 Mouse. Mech Aging Develop 53:179-193 (1990).
138. T Rabinowitz, GT Syftestad and AI Caplan. Chondrogenic Stimulation of Embryonic Chick Limb Mesenchymal Cells by Bioactive Factors in Bovine and Human Dentine Extracts. Arch Oral Biol 35:49-54 (1990).
139. AI Caplan. Cartilage Begets Bone Versus Endochondral Myelopoiesis. Clin Ortho Rel Res 261:257-267 (1990).
140. JE Dennis, DA Carrino, NB Schwartz and AI Caplan. Ultrastructural Characterization of Embryonic Chick Cartilage Proteoglycan Core Protein and the Mapping of a Monoclonal Antibody Epitope. J Biol Chem 265:12098-12103 (1990).
141. SP Bruder and AI Caplan. Osteogenic Cell Lineage Analysis is Facilitated by Organ Culture of Embryonic Chick Periosteum. Dev Biol 141:319-329 (1990).
142. JM Sorrell, B Caterson, AI Caplan, BR Davis and IA Schafer. Human Keratinocytes Contain Carbohydrates that Are Recognized by Keratan Sulfate-Specific Monoclonal Antibodies. J Invest Derm 95:347-352 (1990).
143. AI Caplan. Stem Cell Delivery Vehicle. Biomaterials 11:44-46 (1990).
144. SP Bruder and AI Caplan. Terminal Differentiation of Osteogenic Cells in the Embryonic Chick Tibia is Revealed by a Monoclonal Antibody Against Osteocytes. Bone 11:189-198 (1990).
145. AI Caplan. Bone Formation: The Rules for Fabricating a Composite Ceramic. In: *Materials Synthesis Utilizing Biological Processes*, Ed. PC Rieke, PD Calvert and M Alper, Materials Research Society Symposium Proceedings, Vol. 174, pp. 9-13 (1990).
146. SP Bruder, D Gazit, L Passi-Even, I Bab and AI Caplan. Osteochondral Differentiation of Avian Bone Marrow Cells in Diffusion Chambers In Vivo. Bone and Mineral 11:141-151 (1990).
147. PA Lucas, C Laurencin, GT Syftestad, A Domb, VM Goldberg, AI Caplan and R Langer. Ectopic Induction of Cartilage and Bone by Water-Soluble Proteins from Bovine Bone Using a Polyanhydride Delivery Vehicle. J Biomed Matl Res 24:901-911 (1990).
148. H Nakahara, K Watanabe, SP Sugrue, BR Olsen and AI Caplan. Temporal and Spatial Distribution of Type XII Collagen in High Cell Density Culture of Periosteal-Derived Cells. Dev Biol 142:481-485 (1990).

PUBLICATIONS - Continued

149. H Nakahara, SP Bruder, SE Haynesworth, JJ Holecek, MA Baber, VM Goldberg and AI Caplan. Bone and Cartilage Formation in Diffusion Chambers by Subcultured Cells Derived from the Periosteum. Bone 11:181-188 (1990).
150. H Ohgushi, M Okumura, S Tamai, EC Shors and AI Caplan. Marrow Cell Induced Osteogenesis in Porous Hydroxyapatite and Tricalcium Phosphate. J Biomed Matl Res 24:1563-1570 (1990).

1991

151. JL Arias, MS Fernandez, JE Dennis and AI Caplan. Collagens of the Chicken Eggshell Membranes. Conn Tiss Res 26:37-45 (1991).
152. J Goshima, VM Goldberg and AI Caplan. The Origin of Bone Formed in Composite Grafts of Porous Calcium Phosphate Ceramic Loaded with Marrow Cells. Clin Ortho Rel. Res 269:274-283 (1991).
153. SP Bruder, AI Caplan, Y Gotoh, LC Gerstenfeld and MJ Glimcher. Immunohistochemical Localization of a ~66kD Glycosylated Phosphoprotein During Development of the Embryonic Chick Tibia. Calcif Tiss Intl 48:429-437 (1991).
154. H Nakahara, VM Goldberg and AI Caplan. Culture-Expanded Human Periosteal-Derived Cells Exhibit Osteochondral Potential In Vivo. J Ortho Res 9:465-476 (1991).
155. AI Caplan. Extracellular Matrix and Muscle Formation. In: *Developmental Pattern of the Vertebrate Limb*, Ed. JR Hinchliffe, J Hurle and D Summerbell, Plenum Pub., New York, pp. 285-292 (1991).
156. JL Arias, MS Fernandez, VJ Laraia, Jr., J Janicki, AH Heuer and AI Caplan. The Avian Eggshell as a Model of Biomineralization. In: *Materials Synthesis Utilizing Biological Processes*, Ed. PC Rieke, Materials Research Society Symposium Proceedings, Pittsburgh, Pennsylvania, 218:193-199 (1991).
157. AI Caplan. Mesenchymal Stem Cells. J Ortho Res 9:641-650 (1991).
158. RW Moskowitz, JH Reese, RG Young, D Fein-Krantz, CJ Malemud and AI Caplan. The Effect of Rumalon, a Glycosaminoglycan Peptide-Complex (GP-C), on Experimentally Induced Osteoarthritis in Rabbits. J Rheumatol 18:205-209 (1991).
159. MD Willen, JM Sorrell, CC Lekan, BR Davis and AI Caplan. Patterns of Glycosamino-glycan/Proteoglycan Immunostaining in Human Skin During Aging. J Invest Derm 96:968-974 (1991).
160. RF Drushel and AI Caplan. Three-Dimensional Reconstruction and Cross-Sectional Anatomy of the Thigh Musculature of the Developing Chick Embryo (Gallus gallus). J Morph 208:293-309 (1991).
161. AI Caplan. Cell-Mediated Bone Regeneration. In: *Bone-Biomaterials Interface*, Ed. JE Davies, University of Toronto Press, Toronto, Canada, Part III, Chapter 18, pp. 199-204 (1991).
162. AI Caplan. Regenerating Tissues in Adults. In: *Controversies of Total Knee Arthroplasty*, Ed. VM Goldberg, Raven Press, New York, pp. 249-252 (1991).
163. O Nakamura, DJ Fink and AI Caplan. Oriented Collagen Matrices: The Control of Biomineralization in Bone. In: *Materials Synthesis Utilizing Biological Process*, Ed. PC Rieke, Materials Synthesis Society Symposium Proceedings, Pittsburgh, Pennsylvania, 218:275-280 (1991).
164. SE Haynesworth, DA Carrino and AI Caplan. Comparison of the Cartilage Core Protein Synthesized by Chondrocytes of Different Ages. Conn Tiss Res 25:311-320 (1991).
165. DA Carrino, JL Arias and AI Caplan. A Spectrophotometric Modification of a Sensitive Densitometric Safranin O Assay for Glycosaminoglycans. Biochem Intl 24:485-495 (1991).
166. DP Lennon, DA Carrino, MA Baber and AI Caplan. Generation of a Monoclonal Antibody Against Avian Small Dermatan Sulfate Proteoglycan: Immunolocalization and Tissue Distribution of PG-II (Decorin) in Embryonic Tissues. Matrix 11:412-427 (1991).
167. MS Fernandez, JE Dennis, RF Drushel, DA Carrino, K Kimata, M Yamagata and AI Caplan. The Dynamics of Compartmentalization of Embryonic Muscle by Extracellular Matrix Molecules. Dev Biol 147:46-61 (1991).
168. H Nakahara, JE Dennis, SP Bruder, SE Haynesworth, DP Lennon and AI Caplan. In Vitro Differentiation of Bone and Hypertrophic Cartilage from Periosteal-Derived Cells. Exp Cell Res 195:492-503 (1991).

PUBLICATIONS - Continued

169. JL Arias, MS Fernandez, JE Dennis and AI Caplan. The Fabrication and Collagenous Substructure of the Eggshell Membrane in the Isthmus of the Hen Oviduct. Matrix 11:313-320 (1991).
170. JL Arias, MS Fernandez and AI Caplan. Absence from Avian Eggshell Membranes of Epitopes Recognized by Anti-Keratin Sulfate Antibodies. Poultry Sci 70:1647-1650 (1991).
171. J Goshima, VM Goldberg and AI Caplan. Osteogenic Potential of Culture-Expanded Rat Marrow Cells as Assayed In Vivo with Porous Calcium Phosphate Ceramic. Biomaterials 12:253-258 (1991).
172. AI Caplan, T Goto, S Wakitani, SJ Pineda, SE Haynesworth and VM Goldberg. Cell-Based Technologies for Cartilage Repair. In: *Biology and Biomechanics of the Traumatized Synovial Joint: The Knee as a Model*, Edited by GAM Finerman and FR Noyes Publisher: American Academy of Orthopaedic Surgeons, Rosemont, IL, pp. 111-122 (1992).
173. J Goshima, VM Goldberg and AI Caplan. The Osteogenic Potential of Culture-Expanded Rat Marrow Mesenchymal Cells Assayed In Vivo in Calcium Phosphate Ceramic Blocks. Clin Ortho Rel Res 262:298-311 (1991).

1992

174. H Nakahara, VM Goldberg and AI Caplan. Culture-Expanded Periosteal-Derived Cells Exhibit Osteochondrogenic Potential in Porous Calcium Phosphate Ceramics In Vivo. Clin Ortho Rel Res 276:291-298 (1992).
175. AH Heuer, DJ Fink, VJ Laraia, JL Arias, PD Calvert, K Kendall, GL Messing, J Blackwell, PC Rieke, DH Thompson, AP Wheeler, A Veis and AI Caplan. Innovative Materials Processing Strategies: A Biomimetic Approach. Science 255:1098-1105 (1992).
176. SE Haynesworth, MA Baber and AI Caplan. Cell Surface Antigens on Human Marrow-Derived Mesenchymal Cells are Detected by Monoclonal Antibodies. Bone 13:69-80 (1992).
177. SE Haynesworth, J Goshima, VM Goldberg and AI Caplan. Characterization of Cells with Osteogenic Potential from Human Marrow. Bone 13:81-88 (1992).
178. S Pineda, A Pollack, S Stevenson, VM Goldberg and AI Caplan. A Semi-quantitative Scale for Histologic Grading of Articular Cartilage Repair. Acta Anatomica 143:335-340 (1992).
179. JE Dennis, SE Haynesworth, RG Young and AI. Caplan. Osteogenesis in Marrow-Derived Mesenchymal Cell Porous Ceramic Composites Transplanted Subcutaneously: Effect of Fibronectin and Laminin on Cell Retention and Rate of Osteogenic Expression. Cell Transpl 1:23-32 (1992).
180. AI Caplan. Mesenchymal Stem Cell-Mediated Cartilage and Bone Repair. In: *The Biological Mechanisms of Tooth Movement and Craniofacial Adaptation*, Ed. Z Davidovitch, EBSCO Pub., pp. 433-438 (1992).
181. K Nakata, H Nakahara, T Kimura, A Kojima, M Iwasaki, AI Caplan and K Ono. Collagen Gene Expression During Chondrogenesis from Chick Periosteum-Derived Cells. FEBS Letters 229(3):278 (1992).
182. JL Arias, DA Carrino, MS Fernandez, JP Rodriguez, JE Dennis and AI Caplan. Partial Biochemical and Immunochemical Characterization of Avian Eggshell Extracellular Matrices. Arch Biochem Biophys 298(1):293-302 (1992).
183. DJ Fink, AI Caplan and AH Heuer. Eggshell Mineralization: A Case Study of a Bioprocessing Strategy. Matls Res Soc Bull 17(10):27-31 (1992).
184. T-M Wu, DJ Fink, JL Arias, JP Rodriguez, AH Heuer and AI Caplan. The Molecular Control of Avian Eggshell Mineralization. In: *4th International Symposium on Chemistry and Biology of Mineralized Tissues*, San Diego, California, Eds. HC Slavkin and P Price, Excepta Medica, Amsterdam, pp. 133-142 (1992).
185. LC Gerstenfeld, M Broess, SP Bruder, AI Caplan, and WJ Landis. Regulation of Osteoblast Extracellular Matrix Formation: Post-translational Regulation of Extracellular Matrix Deposition and Relationship Between Embryonic Development and Hormonal Response. In: *The Chemistry and Biology of Mineralized Tissues*, Eds. H Slavkin and P Price. New York: Elsevier Science, pp. 287-295 (1992).

PUBLICATIONS - Continued

1993

186. JL Arias, DJ Fink, S-Q Xiao, AH Heuer and AI Caplan. Biomineralization and Eggshells: Cell-Mediated Acellular Compartments of Mineralized Extracellular Matrix. Intl Review Cytol 145:217-250 (1993).
187. AI Caplan, DJ Fink, T Goto, AE Linton, RG Young, S Wakitani, VM Goldberg and SE Haynesworth. Mesenchymal Stem Cells and Tissue Repair. In: *The Anterior Cruciate Ligament: Current and Future Concepts*, Eds. D Jackson, S Arnoczky, S Woo and C Frank, Raven Press, New York, pp. 405-417 (1993).
188. M Iwasaki, K Nakata, H Nakahara, T Nakase, T Kimura, K Kimata, AI Caplan and K Ono. Transforming Growth Factor-β1 Stimulates Chondrogenesis and Inhibits Osteogenesis in High-Density Culture of Periosteum-Derived Cells. Endocrinol 132(4):1603-1608 (1993).
189. JM Sorrell, DA Carrino and AI Caplan. Structural Domains in Chondroitin Sulfate Identified by Anti-Chondroitin Sulfate Monoclonal Antibodies. Immunosequencing of Chondroitin Sulfates. Matrix 13:351-361 (1993).
190. JE Dennis and AI Caplan. Porous Ceramic Vehicles for Rat-marrow-derived *(Rattus norvegicus)* Osteogenic Cell Delivery: Effects of Pre-treatment with Fibronectin or Laminin. J Oral Implant 19:106-115 (1993).
191. T Nakase, H Nakahara, M Iwasaki, T Kimura, AI Caplan, K Kimata and K Ono. Clonal Analysis for Developmental Potential of Chick Periosteum-Derived Cells: Agar Gel Culture System. Biochem Biophys Res Commun 195:1422-1428 (1993).
192. J Vilamitjana-Amedee, R Bareille, F Rouais, AI Caplan, and M-F Harmand. Human Bone Marrow Stromal Cells Express an Osteoblastic Phenotype in Culture. In Vitro Cell Dev Biol 29:699-707 (1993).

1994

193. SE Haynesworth, VM Goldberg and AI Caplan. Diminution of the Number of Mesenchymal Stem Cells as a Cause for Skeletal Aging. In: *Musculoskeletal Soft-Tissue Aging: Impact on Mobility, Section 1*, Chapter 7, Eds. JA Buckwalter, VM Goldberg, and SL-Y Woo, American Academy of Orthopaedic Surgeons, Publishers (1994) pp. 79-87.
194. DA Carrino, JE Dennis, RF Drushel, SE Haynesworth and AI Caplan. Identity of the Core Proteins of the Large Chondroitin Sulfate Proteoglycans Synthesized by Skeletal Muscle and Prechondrogenic Mesenchyme. Biochem J 298: 51-60 (1994).
195. S Wakitani, T Goto, SJ Pineda, RG Young, JM Mansour, VM Goldberg and AI Caplan. Mesenchymal Cell-Based Repair of Large Full-Thickness Defects of Articular Cartilage and Underlying Bone. J Bone Joint Surg 76:579-592 (1994).
196. DA Carrino and AI Caplan. The Effect of ß-D-Xyloside on the Synthesis of Proteoglycans by Skeletal Muscle: Lack of Effect on Decorin and Differential Polymerization of Core Protein-Bound and Xyloside-Linked Chondroitin Sulfate. Matrix 14:121-133, 1994.
197. AI Caplan. The Mesengenic Process. Clinics in Plastic Surgery 21: 429-435 (1994).
198. M Iwasaki, H Nakahara, T Nakase, T Kimura, K Takaoka, AI Caplan, and K Ono. Bone Morphogenetic Protein 2 Stimulates Osteogenesis but Does Not Affect Chondrogenesis in Osteochondrogenic Differentiation. J Bone Miner Res 9(8):1195-1204 (1994).
199. K Watanabe, SP Bruder and AI Caplan. Transient Expression of Type II Collagen and Tissue Mobilization During Development of the Scleral Ossicle, A Membranous Bone, of the Chick Embryo. Dev Dynamics 200: 212-226 (1994).
200. AI Caplan and BD Boyan. Endochondral Bone Formation: The Lineage Cascade, In: *Bone*, Volume 8, Ed. B. Hall, CRC Press, Inc., Boca Raton, Chapter 1, pp. 1-46 (1994).
201. O Nakamura and AI Caplan. Noncollagenous Matrix Protein-Enhanced Mineral Deposition in Osteoblast-Like Cell Culture. J Bone Miner Met 12:17-25 (1994).
202. SP Bruder, DJ Fink and AI Caplan. Mesenchymal Stem Cells in Bone Development, Bone Repair, and Skeletal Regeneration. J Cell Biochem 56:283-294 (1994).

PUBLICATIONS - Continued

203. VM Goldberg and AI Caplan. Evolving Technologies: Old Problems and New Answers. Biological Resurfacing: An Alternative to Total Joint Arthroplasty Orthopaed 17(9): 819-821 (1994).
204. M Liebergall, RG Young, N Ozawa, JH Reese, DT Davy, VM Goldberg and AI Caplan. The Effects of Cellular Manipulation and TGF-ß in a Composite Graft. In: *Bone Formation and Repair*, Ed. CT Brighton, GE Friedlaender, and JM Lane, American Academy of Orthopaedic Surgeons Symposium, November 13-16, 1993, Tampa, Florida, Section 4, Chapter 26, pp. 367-378 (1994).
205. T-M Wu, JP Rodriguez, DJ Fink, DA Carrino, J Blackwell, AI Caplan, and AH Heuer. Crystallization Studies on Avian Eggshell Membranes: Implications for the Molecular Factors Controlling Eggshell Formation. Matrix Biol 14: 507-513 (1994).

1995

206. DP Lennon, SE Haynesworth, RG Young, JE Dennis and AI Caplan. A Chemically Defined Medium Supports Proliferation and Maintains Osteochondrogenic Potential of Rat Marrow-Derived Mesenchymal Stem Cells. Exp Cell Res 219: 211-222 (1995).
207. VM Goldberg and AI Caplan. Cellular Repair of Articular Cartilage. In: *Osteoarthritic Disorders*, Ed., KE Keuttner and VM Goldberg, American Academy of Orthopaedic Surgeons Symposium, New Horizons in Osteoarthritis, April 1995. Rosemont, Illinois, Chapter 25, pp. 357-363 (1995).
208. HM Lazarus, SE Haynesworth, SL Gerson, N Rosenthal, and AI Caplan. *Ex-Vivo* Expansion and Subsequent Infusion of Human Bone Marrow-Derived Stromal Progenitor Cells (Mesenchymal Progenitor Cells) [MPCs]: Implications for Therapeutic Use. Bone Marrow Transpl 16:557-564 (1995).
209. S Wakitani, T Saito and AI Caplan. Myogenic Cells Derived from Rat Bone Marrow Mesenchymal Stem Cells Exposed to 5-Azacytidine. Muscle & Nerve 18:1417-1426 (1995).
210. AI Caplan. *Osteogenesis Imperfecta*, Rehabilitation Medicine and Fundamental Research. Conn Tissue Res 31:S9-S14 (1995).

1996

211. T Saito, JE Dennis, DP Lennon, RG Young and AI Caplan. Myogenic Expression of Mesenchymal Stem Cells within Myotubes of *mdx* Mice In Vitro and In Vivo. Tissue Eng1:327-344 (1996).
212. AI Caplan and SP Bruder. Cell and Molecular Engineering of Bone Regeneration. In: *Principles of Tissue Engineering*, Ed., RP Lanza, WL Chick, and R Langer. RG Landes Co. (Springer, NY) pp. 599-618 (1996).
213. JM Sorrell, MA Baber and AI Caplan. Construction of a Bi-Layered Dermal Equivalent Containing Human Papillary and Reticular Dermal Fibroblasts: Use of Fluorescent Vital dyes. Tissue Eng 2:39-50 (1996).
214. P Cassiede, JE Dennis, F Ma, and AI Caplan. Osteochondrogenic Potential of Marrow Mesenchymal Progenitor Cells Exposed to TGF-β1 or PDGF-BB As Assayed In Vivo and In Vitro. J Bone Min Res 11:1264-1273 (1996).
215. JE Dennis, S-Q Xiao, M Agarwal, DJ Fink, AH Heuer, and AI Caplan. Microstructure of the Matrix and Mineral Components of Avian Eggshells. J Morphol 228:287-306 (1996).
216. SE Haynesworth, MA Baber and AI Caplan. Cytokine Expression by Human Marrow-Derived Mesenchymal Progenitor Cells In Vitro*:* Effects of Dexamethasone and IL-1α. J Cell Physiol 166:585-592 (1996).
217. DP Lennon, SE Haynesworth, SP Bruder, N Jaiswall and AI Caplan. Human and Animal Mesenchymal Progenitor Cells from Bone Marrow: Identification of Serum for Optimal Selection and Proliferation. Vitro Cell Develop Bio 32:602-611, (1996).
218. JM Sorrell, DA Carrino and AI Caplan. Regulated Expression of Chondroitin Sulfates at Sites of Epithelial-Mesenchymal Interaction: Spatio-Temporal Patterning Identified with Anti-Chondroitin Sulfate Monoclonal Antibodies. Int J Devel Neurosci 14:233-248, (1996).
219. AI Caplan and JE Dennis. Mesenchymal Stem Cells: Progenitors, Progeny and Pathways. J Bone Min Metab 14:193-201 (1996).

PUBLICATIONS - Continued

220. LM Mann, DP Lennon, and AI Caplan. Cultured Rat Pulp Cells Have the Potential to Form Bone, Cartilage, and Dentin In Vivo. In: *Biological Mechanisms of Tooth Movement & Craniofacial Adaptation*. Z Davidovitch and LA Norton, eds., Harvard Society for the Advancement of Orthodontics, Publishers. Printed by EBSCO Media, Birmingham, AL., pp. 7-16 (1996).
221. JE Dennis and AI Caplan. Differentiation Potential of Conditionally Immortalized Mesenchymal Progenitor Cells from Adult Marrow of a H-2K^b-tsA58 Transgenic Mouse. J Cell Physiol 167:523-538, (1996).
222. LC Gerstenfeld, DJ Zurakowski, JL Schaffer, DP Nichols, CD Toma, M Broess, SP Bruder, and AI Caplan. Variable Hormone Responsiveness of Osteoblast Populations Isolated at Different Stages of Embryogenisis and its Relationship to the Osteogenic Lineage. Endocrinology 137:3957-3968, (1996).

1997

223. DA Carrino, JE Dennis, T-M Wu, JL Arias, MS Fernandez, JP Rodriguez, DJ Fink, AH Heuer, and AI Caplan. The Avian Eggshell Extracellular Matrix as a Model for Biomineralization. Conn Tissue Res 35:325-329, (1997).
224. JE Dennis and AI Caplan. Analysis of the Developmental Potential of Conditionally Immortal Marrow-Derived Mesenchymal Progenitor Cells Isolated from the H-2K^b-tsA58 Transgenic Mouse. Conn Tissue Res 35:93-99, (1997).
225. N Jaiswal, SE Haynesworth, AI Caplan, and SP Bruder. Osteogenic Differentiation of Purified, Culture-Expanded Human Mesenchymal Stem Cells In Vitro. J Cell Biochem 64:295-312 (1997).
226. JL Arias, O Nakamura, MS Fernandez, T-M Wu, P Knigge, DR Eyre and AI Caplan. Role of Type X Collogen on Experimental Mineralization of Eggshell Membranes. Conn Tiss Res 36:21-33 (1997).
227. K Hanada, JE Dennis, and AI Caplan. Stimulatory Effects of Basic Fibroblast Growth Factor (bFGF) and Bone Morphogenetic Protein-2 (BMP-2) on Osteogenic Differentiation of Rat Bone Marrow-Derived, Mesenchymal Stem Cells (MSCs). J Bone and Min Res12:1606-1614(1997).
228. AI Caplan, M Elyaderani, Y Mochizuki, S Wakitani, and VM Goldberg. The Principles of Cartilage Repair/Regeneration. Clin Orth Rel Res 342:254-269 (1997).
229. JA Allay, JE Dennis, SE Haynesworth, M Majumdar, DW Clapp, AI Caplan and SL Gerson. LacZ and IL-3 Expression In Vivo After Retroviral Transduction of Marrow-Derived Human Osteogenic Mesenchymal Progenitors. Human Gene Therapy 8:1417-1427 (1997).

1998

230. HM Lazarus, MA Thiede, SE Haynesworth, SL Gerson and AI Caplan. Human Bone Marrow-Derived Mesenchymal Progenitor Cells (MPCs) Cannot Be Recovered From Peripheral Blood Progenitor Cell Collections. J Hematotherapy 6:447-455 (1998).
231. LA Solchaga, P Cassiede, and AI Caplan. Different Response to Osteo-Inductive Agents in Bone Marrow- and Periosteum-Derived Cell Preparations. Acta Scandia Ortho 69: 426-432 (1998).
232. AI Caplan, DJ Fink, SP Bruder, RG Young and DL Butler. The Regeneration of Skeletal Tissues Using Mesenchymal Stem Cells. In: *Frontiers in Tissue Engineering* Eds. CW Patrick Jr., AG Mikos and LV McIntire, Elsevier Science, New York, Chapter III.7, Pages 471-480 (1998).
233. B Johnstone, TM Hering, VM Goldberg, JU Yoo, and AI Caplan. In Vitro Chondrogenesis of Bone Marrow-Derived Mesenchymal Progenitor Cells. Exp Cell Res 238:265-272 (1998).
234. JE Fleming, Jr., P Cassiede, M Baber, SE Haynesworth and AI Caplan. A Monoclonal Antibody Against Adult Marrow-Derived Mesenchymal Cells Recognizes Developing Vasculature in Embryonic Human Skin. Dev Dyn 212:119-132 (1998).
235. Young RG, Butler DL, Weber W, Caplan AI, Gordon SL, Fink DJ. Use of Mesenchymal Stem Cells in Achilles Tendon Repair. J Orthop Res 16:406-413 (1998).
236. S Kawamura, S Wakitani, A Maeda, AI Caplan, T Kimura, K Shino, and T Ochi. Articular Cartilage Repair. Rabbit Experiments with a Collagen Gel-Biomatrix and Chondrocytes Cultured Within It. Acta Orthop Scand 69:56-62 (1998).

PUBLICATIONS - Continued

237. JE Dennis, EK Konstantakos, D Arm, and AI Caplan. In Vivo Osteogenesis Assay: A Rapid Method for Quantitative Analysis. Biomaterials 19:1323-1328 (1998).
238. DA Carrino, JP Rodriguez, and AI Caplan. Dermatan Sulfate Proteoglycans from the Mineralized Matrix of the Avian Eggshell. Conn Tiss Res 36:175-193 (1998).
239. S Wakitani, T Goto, RG Young, JM Mansour, VM Goldberg and AI Caplan. The Repair of Large Full-Thickness Weight-Bearing Articular Cartilage Defects with Allograft Articular Chondrocytes Embedded in a Collagen Gel. Tissue Eng 4:429-442 (1998).
240. JU Yoo, TS Barthel, K Nishimura, LA Solchaga, AI Caplan, VM Goldberg, and B Johnstone. The Chondrogenic Potential of Human Bone-Marrow-Derived Mesenchymal Progenitor Cells. J Bone and Joint Surg 80:1745-1757 (1998).

1999

241. SE Haynesworth, D Reuben and AI Caplan. Cell-based Tissue Engineering Therapies: The Influence of Whole Body Physiology. Adv Drug Delivery Rev 33:3-14 (1999).
242. BD Boyan, AI Caplan, JD Heckman, DP Lennon, W Ehler, and Z Schwart Osteochondral Progenitor Cells in Acute and Chronic Canine Nonunions. J Orthop Res 17:246-255 (1999).
243. VM Goldberg, LA Solchaga, J Yoo, B Johnstone and AI Caplan. Chondroprogenitor Cell Repair of Full Thickness Defects of Articular Cartilage. J Sports Traumatol 20: 81-89 (1999).
244. H Ohgushi and AI Caplan. Stem Cell Technology and Bioceramics: From Cell to Gene Eng. J Biomed Mat Res 48:1-15, 1999.
245. LA Solchaga, JE Dennis, VM Goldberg and AI Caplan. Hyaluronic Acid-Based Polymers as Cell Carriers for Tissue Engineered Repair of Bone and Cartilage. J Orthop Res 17:205-213 (1999).
246. H Awad, DL Butler, P Malaviag, GP Boivin, FNL Smith, B Huibregste, and AI Caplan. Autologous Mesenchymal Stem Cell-Mediated Repair of Tendon. Tissue Eng 5 (3): 267-277 (1999).
247. JM Sorrell, DA Carrino, MA Baber, D Asselineau and AI Caplan. A Monoclonal Antibody PG-4 Recognizes a Glycosaminoglycan Epitope Found on both Dermatan Sulfate and Chondroitin Sulfate Proteoglycans in Human Skin. Histochem J 31:549-558 (1999).
248. DA Carrino, JM Sorrell and AI Caplan. Dynamic Expression of Proteoglycans During Chicken Skeletal Muscle Development and Maturation. J Poult Sci 78:769-777 (1999).
249. JM Sorrell, DA Carrino, MA Baber and AI Caplan. Versican in Human Fetal Skin Development. Anat Embryol 199:45-56 (1999).
250. LA Solchaga, B Johnstone, JU Yoo, VM Goldberg and AI Caplan. High Variability in Rabbit Bone Marrow-Derived Mesenchymal Progenitor Cell Preparations. Cell Transplant 8:511-519 (1999).
251. CJ Walsh, D Goodman , AI Caplan and VM Goldberg. Meniscus Regeneration in a Rabbit Partial Meniscectomy Model. Tissue Eng 5:327-337. (1999).
252. VM Goldberg and AI Caplan. Biological Restoration of Articular Surfaces. Instr Course Lect 48:623-628 (1999) [AAOS, Rosement, IL].
253. K Nishimura, LA Solchaga, AI Caplan, JU Yoo, VM Goldberg and B Johnstone. Chondroprogenitor Cells of Synovial Tissue. Arthritis Rheum 42:2631-7 (1999).
254. VM Goldberg, LA Solchaga, M Lundberg, J Yoo, B Johnstone, B Huibregtse, AI Caplan. Regenerative Cell-based Repair of Osteochondral Defects of Articular Cartilage. Semin Arthrop 10:30-36, (1999).
255. JE Dennis, A Meriam, A Awadallah, J Yoo, B Johnstone and AI Caplan. A Quadripotential Mesenchymal Progenitor Cell Isolated from the Marrow of an Adult Mouse. J Bone & Min Res 14:1-10, (1999).
256. AI Caplan and VM Goldberg. The Principles of Tissue Engineered Regeneration of Skeletal Tissues. Clin Orthop Rel Res 367S:S12-S16 (1999).
257. O Nakamura, DJ Fink, DP Lennon, VL Laraia, AH Heuer, and AI Caplan. Matrix-Directed *In Vitro* Osteogenesis. Bioceramics 12:249-252 (1999).
258. ON Koc, C Peters, P Aubourg, S Raghavan, S Dyhouse, R DeGasperi, EH Kolodny, YB Yoseph, SL Gerson, HM Lazarus, AI Caplan, P Watkins, and W Krivit. Bone Marrow Derived Mesenchymal Stem

PUBLICATIONS - Continued

Cells Remain Host-Derived Despite Successful Hematopoietic Engraftment after Allogeneic Transplantation in Patients with Lysosomal and Peroxisomal Storage Diseases. Exp Hemtaol 27:1675-1681 (1999).

259. AI Caplan. Tissue Engineering Strategies for Mesenchymal or Skeletal Tissues. In: *Tissue Eng for Therapeutic* Use 4: Proceedings of the 4th Intl Symp on Tiss *Eng*, Eds. Y Ikada and Y Shimizu Elsevier Science, BV: Kyoto, Japan, September, 1999, pp 67-72.
260. AI Caplan and JE Dennis. Commentary: Genetically Linked Scientists: The One-Two Punch for NFATp Knockout. J Exp Med 191:1-3 (1999).

2000

261. LA Solchaga, JU Yoo, M Lundberg, JE Dennis, BA Huibregtse, VM Goldberg and AI Caplan. Hyaluronic Acid-Based Polymers in the Treatment of Osteochondral Defects. J Orthop Res 18:773-780, (2000).
262. BA Huibregste, B Johnstone, and AI Caplan. The Effect of Age and Sampling Site on the Chondro-Osteogenic Potential of Rabbit Marrow-derived Mesenchymal Progenitor Cells J Orthop Res 18:18-24 (2000).
263. ON Koc, SL Gerson, BW Cooper, SM Dyhouse, SE Haynesworth, AI Caplan, N Tainer, and HM Lazarus. Rapid Hematopoietic Recovery After Co-Infusion of Autologous Blood Stem Cells and Culture Expanded Marrow Mesenchymal Stem Cells in Advanced Breast Cancer Patients Receiving High Dose Chemotherapy. J Clin Oncology 18:307-316 (2000).
264. M Richards, BA Huibregtse, AI Caplan, JA Goulet and SA Goldstein. Marrow-Derived Progenitor Cell Injections Enhance Bone Regeneration During Distraction. J Orthop Res 17:900-908 (2000).
265. SP Bruder and AI Caplan. Bone Regeneration through Cellular Engineering. In: *Principles in Tissue Engineering, 2nd Edition*, Chapter 48, Eds. R Lanza, R Langer and J Vancanti, Springer, New York (2000) pp. 683-696.
266. LA Solchaga, VM Goldberg, and AI Caplan. Hyaluronic Acid Based Biomaterials in Tissue Engineered Cartilage Repair. In: *New Frontiers in Medical Sciences: Redefining Hyaluronan*, Eds. G Abantangelo and PH Weigel, Elsevier Science, (2000) pp. 233-246.
267. DP Lennon, SE Haynesworth, DM Arm, MA Baber and AI Caplan. Dilution of Human Mesenchymal Stem Cells with Dermal Fibroblasts and the Effects on *In Vitro* and *In Vivo* Osteogenesis. Devel Dynamics 219:50-62 (2000).
268. AI Caplan. Tissue Engineering Designs for the Future: New Logics, Old Molecules. Tiss Eng 6:1-8 (2000).
269. DA Carrino, JM Sorrell and AI Caplan. Age-related Changes in the Proteoglycans of Human Skin. Archives of Biochemistry and Biophysics, 373:91-101 (2000).
270. AI Caplan. Mesenchymal Stem Cells and Gene Therapy. Clin Ortho & Rel Res 379S:67-70 (2000).
271. JM Sorrell, DA Carrino, and AI Caplan. In: *Core Proteins*. Eds. Developmental and Aging Changes of Chondroitin/Dermatan Sulfate Proteoglycans. Chapter 44, Pp. 729-742, (2000).

2001

272. AI Caplan and SP Bruder. Mesenchymal Stem Cells: Building Blocks for Molecular Medicine in the 21st Century. Trends in Molecular Medicine 6:259-264 (2001).
273. J Gao, JE Dennis, RF Muzic, M Lundberg and AI Caplan. The Dynamic *In Vivo* Distribution of Bone Marrow-Derived Mesenchymal Stem Cells after Infusion. Cells Tissues Organs 169:12-20 (2001).
274. JE Dennis, DA Carrino, K Yamashita, and AI Caplan. Monoclonal Antibodies to Mineralized Matrix Molecules of the Avian Eggshell. Matrix Biol 19:683-692 (2001).
275. DP Lennon, J Edmison, and AI Caplan. Cultivation of Rat Marrow-Derived Mesenchymal Stem Cells in Reduced Oxygen Tension: Effects on *In Vitro* and *In Vivo* Osteochondrogenesis. J Cell Physiol. 187:345-355 (2001).

PUBLICATIONS - Continued

276. J Gao, JE Dennis, LA Solchaga, A Awadallah, VM Goldberg and AI Caplan. Tissue Engineered Fabrication of an Osteochondral Composite Graft Using Rat Bone Marrow-Derived Mesenchymal Stem Cells. Tiss Eng 7:363-371 (2001).
277. LA Solchaga, VM Goldberg, and AI Caplan. Cartilage Regeneration Using Principles of Tissue Engineering. Clin Orthop Suppl 391:S161-S170 (2001).
278. K Hanada, LA Solchaga, AI Caplan, TM Hering, VM Goldberg, JU Yoo, B Johnstone. BMP-2 induction and TGF-beta 1 modulation of rat periosteal cell chondrogenesis J.Cell Biochem 81, 284-294 (2001).

2002

279. JE Dennis, J-P Carbillet, AI Caplan and P Charbord. The STRO-1+ Marrow Cell Population is Multi-Potential. Cells Tissues Organs 170:73-82 (2002).
280. AI Caplan. Physiological Changes: Mesenchymal Stem Cells. In: *Macmillan Encyclopedia of Aging*. DJ Ekerdt Ed. 1st Edition, August (2002).
281. LA Solchaga, J Gao, JE Dennis, A Awadallah, M Lundberg, AI Caplan, VM Goldberg. Treatment of Osteochondral Defects with Autologous Bone Marrow in a Hyaluronan-Based Delivery Vehicle. Tiss Eng 8:333-347 (2002).
282. J Gao, JE Dennis, LA Solchaga, VM Goldberg, and AI Caplan. Repair of Osteochondral Defect with Tissue Engineered Two-phase Composite Material of Injectable Calcium Phosphate and Hyaluronan Sponge. Tissue Eng 8:827-837 (2002).
283. A Naumann, JE Dennis, A Awadallah, DA Carrino, JM Mansour, E Kastenbauer, AI Caplan, Immunochemical and Mechanical Characterization of Cartilage Subtypes in Rabbit Journal of Histochemistry & Cytochemistry 50(8):1049-1058 (2002).
284. AI Caplan. *In Vivo* Remodeling" In: *Reparative Medicine: Growing Tissues and Organs*, Ann. NY Acad Sci, 961:307-309 (2002).
285. MS Wolfe, D Dean, JE Chen, JP Fisher, C Rimnac, AI Caplan, M N Cooke, LA Solchaga, S Han, and AG Mikos. In Vitro Degradation and Fracture Toughness of Multilayered Porous Poly(Propylene Fumerate)/ß-Tricalcium Phosphate Scaffolds Ann. N.Y. Acad Sci 961: 1-8 (2002).
286. M0 Pei, LA Solchaga, J Seidel, L Zeng. G Vunjak-Novakovic, AI Caplan, LE Freed, Bioreactors mediate the effectiveness of tissue engineering scaffolds, FASEB, 16:1691-4, (2002).

2003

287. A Naumann, JE Dennis, R Staudenmaier, N Rotter, J Aigner, B Ziegelaar, T Happ, G Rasp, AI Caplan, Mesenchymal Stem Cells – A New Pathway for Tissue Engineering in Reconstructive Surgery. Laryngo Rhino Otol 81:521-527 (2003).
288. LA Solchaga, JF Welter, AI Caplan, VM Goldberg. Cartilage tissue engineering. In: *The Adult Knee*, JJ Callaghan, AG Rosenberg, HE Rubash, PT Simonian and TA Wickiewicz, Eds. Lippincott Williams & Wilkins, Philadelphia, PA, Chapter 18, 251-258, 2003.
289. AI Caplan. Design Parameters For Functional Tissue Engineering In: *Functional Tissue Engineering*, F Guilak, DL Butler, SA Goldstein, DJ Mooney, Eds. Springer-Verlag, New York, Chapter 10, pp. 129-138, 2003.
290. AI Caplan Embryonic Development and the Principles of Tissue Engineering In: *Novartis Foundation: Tissue Engineering of Cartilage and Bone*, John Wiley & Sons Ltd., London, England. 249, 17-33, 2003.
291. JM Sorrell, MB Seavolt, M Baber, DA Carrino, D Asselineau, AI Caplan, Production of a Monoclonal Antibody, DF-5, that Identifies Cells at the Epithelial/Mesenchymal Interface in Normal Human Skin. APN/CD13 is an Epithelial/Mesenchymal Marker in Skin. Exp Derm 12:315-323 (2003).
292. LA Solchaga, VM Goldberg and AI Caplan. Hyaluronan and Tissue Engineering. In: *Hyaluronan* eds. JF Kennedy, GO Phillips, PA Williams and VC Hascall. Woodhead Pub. Limited, Cambridge, England, Vol. 2, pp. 45-54 (2003).

PUBLICATIONS - Continued

293. DA Carrino, P Önnerfjord, J Sandy, G Cs-Szabo, P Scott, JM Sorrell, D Heinegård, AI Caplan, Age-related changes in the proteoglycans of human skin: Specific cleavage of decorin to yield a major catabolic fragment in adult skin, Journal of Biological Chemistry 278: 19:17566-17572 (2003).
294. LA Solchaga, VM Goldberg and AI Caplan. Cartilage Repair with Bone Marrow in a Hyaluronan-Based Scaffold. In: *Hyaluronan* eds. JF Kennedy, GO Phillips, PA Williams and VC Hascall. Woodhead Pub. Limited, Cambridge, England, Vol. 2, pp. 63-66 (2003).
295. JE Dennis, LA Solchaga, AI Caplan, Book Chapter: Chapter 10. Human Mesenchymal Stem Cells for Cartilage Repair. In*: Mesenchymal stem cells: biology and potential clinical uses*, pp 157-168. Ed by S Grisolía, MD Miñana and EB Bendala-Tufanisco. Madrid, Spain, Ministerio De Sanidad Y Consumo, 2003.
296. LA Solchaga and AI Caplan. Potential Use of a Novel Hyaluronan-Based Delivery Vehicle in Bone Regeneration. In: *Hyaluronan* eds. JF Kennedy, GO Phillips, PA Williams and VC Hascall. Woodhead Pub. Limited, Cambridge, England, Vol. 2, pp. 67-70 (2003).
297. JM Sorrell, L Brinon, MA Baber, AI Caplan, Cytokines and glucocorticoids differentially regulate APN/CD13 and DPPIV/CD26 enzyme activities in cultured human dermal fibroblasts. Arch Dermatol Res 295:160-168 (2003).
298. T Tallheden , JE Dennis, DP Lennon, E Sjogren-Jansson, AI Caplan, A Lindahl. Phenotypic plasticity of human articular chondrocytes. J Bone Joint Surg 85-A Suppl 2:93-100. (2003).
299. J Gao, AI Caplan. Mesenchymal Stem Cells and Tissue Engineering for orthopaedic surgery. Chir Organi Mov 88:305-316, (2003).
300. K Yamashita, JE Dennis, DP Lennon, H Morimoto, S Kitamura, AI Caplan. Dental Pulp Cells with Multi-Potential for Differentiation to Odontoblast and Chondroblast. J Hard Tiss Biol 12:49-55, 2003.

2004

301. A Alhadlaq, J Elisseeff, L Hong, C Williams, AI Caplan, B Sharma, R Kopher, S Tomkoria, DP Lennon, A Lopez, J Mao. Adult stem cell driven genesis of human-shaped articular condyle. Annals of Biomedical Engineering 32:911-923, 2004.
302. JM Sorrell and AI Caplan. Fibroblast heterogeneity: more than skin deep. J Cell Sci 117, 667-675, 2004.
303. JE Dennis, N Cohen, VM Goldberg, AI Caplan. Targeted Delivery of Progenitor Cells for Cartilage Repair. J Orthop Res 22:735-741, 2004.
304. VM Goldberg and AI Caplan. Principles of Tissue Engineering and Regeneration of Skeletal Tissues, In: *Orthopedic Tissue Engineering Basic Science and Practice*. Eds. VM Goldberg, AI Caplan, Marcel Dekker, Inc. New York, NY, Chapter 1, pp. 1-9, 2004.
305. JM Sorrell, MA Baber, D Asselineau, AI Caplan. Site-matched papillary and reticular human dermal fibroblasts differ in their production of specific growth factors/cytokines and in their interaction with keratinocytes. J Cell Phys 200:134-145 (2004).
306. K Derwin, C Androjna, E Spencer, O Safran, TW Bauer, T Hunt, J Iannotti, AI Caplan. Porcine small intestine submucosa (SIS) as a flexor tendon graft. Clin Ortho and Rel Res 423:245-252, 2004.
307. JE Dennis, and AI Caplan. Bone Marrow Mesenchymal Stem Cells, In: Stem Cells Handbook, S Sell ed., Humana Press, Totowa, NJ, pp. 108-118 (2004).
308. G Kogler, S Sensken, JA Airey, T Trapp, M Muschen, N Feldhahn, S Liedtke, RV Sorg, J Fischer, C Rosenbaum, S Greschat, A Knipper, J Bender, O Degistirici, J Gao, AI Caplan, EJ Colletti, G Almeida-Porada, HW Muller, E Zanjani, P Wernet. A new human somatic stem cell from placental cord blood with intrinsic pluripotent differentiation potential. J Exp Med 200:123-35, 2004.
309. J Gao, D Knaack, VM Goldberg, AI Caplan. Osteochondral Defect Repair by Demineralized Cortical Bone Matrix. Clin Ortho 427:62-66, 2004.
310. JE Dennis, AI Caplan. Advances in mesenchymal stem biology. Curr Opin Orthop 15:341-346, 2004.
311. EL Hedberg, CK Shih, LA Solchaga, AI Caplan, AG Mikos. Controlled release of hyaluronan oligomers from biodegradable polymeric microparticle carriers. J Con Rel 100:257-266, 2004.

PUBLICATIONS - Continued

312. A Naumann, JE Dennis, J Aigner, J Coticchia, J Arnold, A Berghaus, ER Kastenbauer, AI Caplan. Tissue Engineering of Autologous Cartilage Grafts in Three-Dimensional in Vitro Macroaggregate Culture System. Tiss Eng 10:1695-1706, 2004.
313. LA Solchaga, JF Welter, DP Lennon, AI Caplan. Generation of Pluripotent Stem Cells and Their Differentiation to the Chondrocytic Phenotype, In: Cartilage and Osteoarthritis Volume 1 Cellular and Molecular Tools, M Sabatini, P Pastoureau, FD Ceuninck eds., The Humana Press, Totowa, NJ, pp. 53-67, 2004.
314. AI Caplan. Mesenchymal Stem Cells, In: Handbook of Stem Cells, Vol 2, Academic Press, pp. 299-308, 2004.

2005

315. K Nishioka, JE Dennis, J Gao, VM Goldberg, AI Caplan. Sustained Wnt Protein Expression in Chondral Constructs From Mesenchymal Stem Cells. J Cell Phys 203:6-14, 2005.
316. LA Solchaga, K Penick, JD Porter, VM Goldberg, AI Caplan, JF Welter. FGF-2 Enhances the Mitotic and Chondrogenic Potentials of Human Adult Bone Marrow-Derived Mesenchymal Stem Cells. J Cell Physiol, J Cell. Physiol 203:398-409, 2005.
317. LA Solchaga, JS Temenoff, J Gao, AG Mikos, AI Caplan, VM Goldberg. Repair of osteochondral defects with hyaluronan- and polyester-based scaffolds. OsteoArthritis and Cartilage 13:297-209, 2005.
318. D Dean, MS Wolfe, Y Ahmad, A Totonchi, JE-K Chen, JP Fisher, MN Cooke, CM Rimnac, DP Lennon, AI Caplan, NS Topham, AG Mikos. The Effect of TGF-β2 on Marrow-infused-foam Poly(Propylene Fumarate) Tissue Engineered Constructs for the Repair of a Critical Size Cranial Defect in the Rabbit. Tiss Eng 11:923-939, 2005.
319. AI Caplan. Mesenchymal Stem Cell: Cell-Based Reconstructive Therapy in Orthopaedics. Tiss Eng 11:1198-1211, 2005.
320. AI Caplan. Mesenchymal Stem Cells, In: Essentials of Stem Cell Biology, R Lanza, J Gearhart, B Hogan, D Melton, R Pedersen, ED Thomas, J Thomason, M West eds., Elsevier Academic Press, Ch. 27, pp. 205-210, 2005.

2006

321. DP Lennon and AI Caplan. Mesenchymal Stem Cells for Tissue Engineering, *In: Culture of Cells for Tissue Engineering*, G Vunjak-Novakovic, RI Freshney eds., John Wiley & Sons, Inc., Ch. 1, pp. 23-59, 2006.
322. AI Caplan and JE Dennis. Mesenchymal Stem Cells as Trophic Mediators. J Cell Biochem, 98:1076-1084, 2006.
323. AI Caplan. Fundamentals of Stem Cell Tissue Engineering, *In: Tissue Engineering and Artificial Organs*, JD Bronzino ed, Taylor and Francis Group CRC Press, Ch. 30, pp. 1-10, 2006.
324. G Lisignoli, S Cristino, A Piacentini, C Cavallo, AI Caplan, A Facchini. Hyaluronan-based polymer scaffold modulates the expression of inflammatory and degradative factors in mesenchymal stem cells: Involvement of CD44 and CD54. J Cell Physiol 207:364-373, 2006.
325. Y Chang, VM Goldberg, AI Caplan. Toxic Effects of Gentamicin on Marrow-derived human mesenchymal stem cells. Clin Ortho Rel Res 452:242-249, 2006.
326. DP Lennon, AI Caplan. Isolation of human marrow-derived mesenchymal stem cells. Exp Hema 34:1604-1605, 2006.
327. DP Lennon, AI Caplan. Isolation of rat-marrow-derived mesenchymal stem cells. Exp Hema 34:1606-1607, 2006.
328. I Kerkis, A Kerkis, D Dozortsev, GC Stukart-Parsons, SMG Massironi, LV Pereira, AI Caplan, HF Cerruti. Isolation and characterization of a population of immature dental pulp stem cells expressing OCT-4 and other embryonic stem cell markers. Cells Tissues Organs 184:105-116, 2006.

PUBLICATIONS - Continued

2007

329. JM Sorrell, MA Baber, AI Caplan. Clonal characterization of fibroblasts in the superficial layer of the adult dermis. Cell and Tissue Research, 327:499-510, 2007.
330. L Bai, AI Caplan, DL Lennon, RH Miller. Human mesenchymal stem cells signals regulate neural stem cell fate. Neurochem Res, 32:353-362, 2007.
331. H Park, JS Temenoff, Y Tabata, AI Caplan, AG Mikos. Injectable biodegradable hydrogel composites for rabbit marrow mesenchymal stem cell and growth factor delivery for cartilage tissue engineering. Biomaterials, 28:3217-3227, 2007.
332. JH Henderson, JF Welter, JM Mansour, C Niyibizi, AI Caplan, JE Dennis. Cartilage tissue engineering for pediatric laryngotracheal reconstruction: comparison of chondrocyte from three anatomic locations in the rabbit. Tiss Eng, 13:843-853, 2007.
333. J Gao, JQ Yao, AI Caplan. Stem cells for tissue engineering of articular cartilage. Proc. IMechE, 221:441-450, 2007.
334. AI Caplan. Adult mesenchymal stem cells for tissue engineering versus regenerative medicine. J. Cell Physiol, 213:341-347, 2007.
335. JM Sorrell, MA Baber, AI Caplan. A self-assembled fibroblast-endothelial cell co-culture system that supports in vitro vasculogenesis by both human umbilical vein endothelial cells and human dermal microvascular endothelial cells. Cells Tissues Organs, 186:157-168, 2007.

2008

336. JM Sorrell, MA Baber, AI Caplan. Human dermal fibroblast subpopulations; differential interactions with vascular endothelial cells in coculture: Nonsoluble factors in the extracellular matrix influence interactions. Wound Rep Reg, 16:300-309, 2008.
337. DL Butler, JL Lewis, CB Frank, AJ Banes, AI Caplan, PG De Deyne, et al. Evaluation criteria for musculoskeletal and craniofacial tissue engineering constructs: A conference report. Tiss Eng, Part A 14:2089-2104, 2008.
338. WL Grayson, S Bhumiratana, C Canizzarro, PG Chao, DP Lennon, AI Caplan, G Vunjak-Novakovic. Effects of initial seeding density and fluid perfusion rate on formation of tissue-engineered bone. Tiss Eng, Part A: 14:1809-1820, 2008. PMID: 18620487; PMCID: PMC2773295.
339. L da Silva Meirelles, AI Caplan, NB Nardi. In search of the in vivo identity of mesenchymal stem cells. Stem Cells 26:2287-2299, 2008.
340. AI Caplan. All MSCs are pericytes? Cell Stem Cell, 3:229-30, 2008.

2009

341. AI Caplan. New era of cell-based orthopaedic therapies. Tissue Eng Part B, 15(2):195-200, 2009. PMID:19228082; PMCID: PMC2817662
342. L Bai, DP Lennon, V Eaton, K Maier, AI Caplan, SD Miller and RH Miller. Human bone marrow-derived mesenchymal stem cells induce Th2-polarized immune response and promote endogenous repair in animal models of multiple sclerosis. Glia, 57:1192-203, 2009.
343. AI Caplan. Why are MSCs therapeutic? New data: new insight. J Pathol, 217:318-324, 2009. PMID:19023885.
344. JM Sorrell, MA Baber and AI Caplan. Influence of Adult Mesenchymal Stem Cells on In Vitro Vascular Formation. Tiss Eng: Part A 15(7):1751-1761, 2009.
345. NL Malinin, L Zhang, J Choi, A Ciocea, O Razorenova, YQ Ma, EA Podrez, M Tosi, DP Lennon, AI Caplan, SB Shurin, EF Plow and TV Byzova. A point mutation in kindlin-3 ablates activation of three integrin subfamilies in humans. Nat Med, 15, 313-318, 2009.

PUBLICATIONS - Continued

346. H Park, X. Guo, JS Temenoff, Y Tabata, AI Caplan, FK Kasper, and AG Mikos. Effect of swelling ratio of injectable hydrogel composites on chondrogenic differentiation of encapsulated rabbit marrow mesenchymal stem cells in vitro. Biomacromolecules, 10:541-546, 2009.
347. H Park, JS Temenoff, Y Tabata, AI Caplan, RM Raphael, JA Jansen, AG Mikos. Effect of dual growth factor delivery on chondrogenic differentiation of rabbit marrow mesenchymal stem cells encapsulated in injectable hydrogel composites. J Biomed Matl Res Part A, 88:889-897, 2009.
348. IH Song, AI Caplan, JE Dennis. Dexamethasone inhibition of confluence-induced apoptosis in human mesenchymal stem cells. J Orthop Res, 27:216-221, 2009.
349. L Da Silva Meirelles, TT Sand, RJ Harman, DP Lennon, AI Caplan. MSC frequency correlates with blood vessel density in equine adipose tissue. Tiss Eng, Part A 15: 221-229, 2009.
350. JM Sorrell, AI Caplan. Fibroblasts – A diverse population at the center of it all. In International Review of Cell and Molecular Biology, Vol. 276, Chapter 4, Pp.159-212, 2009.
351. L Da Silva Meirelles, AM Fontes, DT Covas, AI Caplan. Mechanisms involved in the therapeutic properties of Mesenchymal Stem Cells. Cytokine Growth Factor Rev, 20:419-427, 2009.
352. J Wagner, T Kean, R Young, JE Dennis and AI Caplan. Optimizing mesenchymal stem cell-based therapeutics. Curr Opin Biotechnol, 20:531-536, 2009.
353. IH Song, AI Caplan, JE Dennis. In vitro dexamethasone pretreatment enhances bone formation of human mesenchymal stem cells in vivo. J Orthop Res, 27:916-921, 2009

2010

354. TL Bonfield, M Koloze, D Lennon, B Zuchowski, SE Yang, AI Caplan. Human mesenchymal stem cells suppress chronic airway inflammation in the murine ovalbumin asthma model. Am J Physiol Lung Cell Mol Physiol, 299(6):L760-70, 2010. PMID:20817776
355. LA Solchaga, K Penick, VM Goldberg, AI Caplan and J Welter. Fibroblast growth factor-2 enhances proliferation and delays loss of chondrogenic potential in human adult bone-marrow-derived mesenchymal stem cells. Tiss Eng Part A. 1009-1019, 2010. PMCID: PMC2862658
356. BO Diekman, CR Rowland, DP Lennon, AI Caplan and F Guilak. Chondrogenesis of adult stem cells from adipose tissue and bone marrow: Induction by growth factors and cartilage derived matrix. Tiss Eng, Part A, 523-533, 2010. PMCID: PMC2813149
357. PK Valonen, FT Moutos, A Kusanagi, M Moretti, BO Diekman, JF Welter, AI Caplan, F Guilak, LE Freed. In vitro generation of mechanically functional cartilage grafts based on adult human stem cells and 3D-woven poly (ε-caprolactone) scaffolds. Biomaterials, 31(8):2193-2200, 2010. PMCID: PMC2824534
358. JM Sorrell, MA Baber and AI Caplan. Influence of adult mesenchymal stem cells on in vitro vascular formation. *In: Advances in Tissue Engineering*, Volume 1: Angiogenesis. Chapter 24, Pp. 241-248, 2010.
359. AI Caplan. Mesenchymal stem cells: The past, the present, the future. Cartilage 1(1)6-9, 2010.
360. TL Bonfield, MT Nolan (Koloze), D Lennon, B Zuchowski, SE Yang, AI Caplan. Defining mesenchymal stem cell efficacy in vivo. J Inflamm (Lond). 7:51, 2010. PMCID: PMC2987779
361. TL Bonfield and AI Caplan. Adult mesenchymal stem cells: An innovative therapeutic for lung diseases. Discovery Medicine, 9(47):337-345, 2010. PMID:20423678
362. C Abrahamsson, F Yang, H Park, J Brunger, P Valonen R Langer, J Welter, A Caplan, F Guilak, L Freed. Chondrogenesis and mineralization with in vitro culture of human mesenchymal stem cells on 3D-woven scaffolds. Tiss Eng Part A. 16(12): 3709-3718, 2010. PMCID: PMC2991213
363. RH Miller, L Bai, DP Lennon, AI Caplan. The potential of mesenchymal stem cells for neural repair. Discovery Medicine, 9(46):236-242, 2010. PMID:20350491
364. AI Caplan. What's in a name? Tiss Eng, Part A, 16(8):2415-2417, 2010. PMID: 20412005
365. JM Sorrell and AI Caplan. Topical delivery of mesenchymal stem cells and their function in wounds. Stem Cell Research & Therapy, 1:30, 2010. PMCID: PMC2983443

PUBLICATIONS - Continued

366. JH Henderson, Ginley NM, AI Caplan, C Niyibizi, JE Dennis. Low oxygen tension during incubation periods of chondrocyte expansion is sufficient to enhance postexpansion chondrogenesis. Tissue Eng Part A, 16(5): 1585093, 2010. PMCID: PMC2952116

2011

367. AI Caplan. 2010 lifetime achievement award of Tissue Engineering and Regenerative Medicine International Society--North America: Arnold I. Caplan, Ph.D. Caplan AI. Tissue Eng Part A. 17(3-4):267, 2011. PMID: 21128820
368. NG Singer and AI Caplan. Mesenchymal stem cells: Mechanisms of inflammation. (Epub ahead of print 2010) Annu Rev Pathol Mech Dis, 6:457–78, 2011. PMID:21073342
369. AI Caplan. MSCs in Regenerative Medicine. In: *Principles of Regenerative Medicine Second Edition*, Ed., A Atala, R Lanza, JA Thomson, and R Nerem. RG Landes Co. (Elsevier) pp. 253-262, 2011.
370. DA Carrino, A. Calabro, AB Darr, MT Dours-Zimmermann, JD Sandy, DR Zimmermann, JM Sorrell, VC Hascall, and AI Caplan. Age-related differences in human skin proteoglycans. Glycobiol, 21: 257-268, 2011. PMID: 20947661, PMCID: PMC3010768.
371. AI Caplan, D Correa. The MSC: An injury drugstore. Cell Stem Cell, 9(1):11-15, 2011. PMCID: PMC3144500
372. AI Caplan and D Correa. PDGF in bone formation and regeneration: New insights into a novel mechanism involving MSCs. [Epub ahead of print 25 May, 2011], J Orthop Res, 29(12):1795-803, 2011. PMID: 21618276.
373. N Pineau, DA Carrino, AI Caplan, L Breton. Biological evaluation of a new C-xylopyranoside derivative (C-Xyloside) and its role in glycosaminoglycan biosynthesis. Eur J Dermatol. 2011 May 20. [Epub ahead of print] PMID: 21609902.
374. JM Walker, AM McKee, MD Schluchter, VM Goldberg, AI Caplan, JA Berilla, JM Mansour, JF Welter. Nondestructive evaluation of hydrogel mechanical properties using ultrasound. Ann Biomed Eng, 2011 Jul 20. [Epub ahead of print].
375. P Lin, D Correa, Y Lin, AI Caplan. Polybrene inhibits human mesenchymal stem cell proliferation during lentiviral transduction. PLoS ONE 6(8):1-9, 2011. PMCID: PMC3162604
376. JM Sorrell, MA Baber, DO Traktuev, KL March, AI Caplan. The creation of an in vitro adipose tissue that contains a vascular-adipocyte complex. Biomaterials, 32:9667-9676, 2011. PMID: 21959010.
377. I Kerkis, AI Caplan. Stem cells in dental pulp of deciduous teeth. Tissue Eng Part B Rev, 18(2):129-38 2012. [Epub ahead of print Dec 2011] PMCID: PMC3311402
378. TJ Kean, L Duesler, RG Young, A Dadabayev, A Olenyik, M Penn, J Wagner, DJ Fink, AI Caplan and JE Dennis. Development of a peptide-targeted, myocardial ischemia-homing, mesenchymal stem cell. J Drug Target, 1-10, 2011. [Epub ahead of print]
379. J Soltzberg, S Frischmann, CV Heeckeren, N Brown, AI Caplan, and TL Bonfield. Quantitative microscopy in murine models of lung inflammation. Anal Quant Cytol Histol 33:245-252, 2011.

2012

380. DA Carrino, S Mesiano, NM Barker, WW Hurd and AI Caplan, 2011. Proteoglycans of uterine fibroids and keloid scars: similarity in their proteoglycan composition. Biochem J, 2012 443(2):361-8 [Epub ahead of print]. PMID: 22257180
381. AI Caplan. Adult mesenchymal stem cells: Cell sources for tissue engineering: mesenchymal stem cells. In: Biomaterials Science; B.D. Ratner, A.S. Hoffman & F.J. Schoen (Eds.). Elsevier Inc., Academic Press. Chapter II.6.4, pp. 1159-1164, 2012.
382. DP Lennon, MD Schluchter, AI Caplan. The effect of extended first passage culture on the proliferation and differentiation of human marrow-derived mesenchymal stem cells. Stem Cell J Transl Med 1:279–288, 2012. PMID: 23197807

PUBLICATIONS - Continued

383. NF Lizier A Kerkis, CM Gomes, J Hebling, CF Oliveira, AI Caplan, I Kerkis. Scaling-up of dental pulp stem cells isolated from multiple niches. PLoS ONE, 7(6): e39885, 2012. PMCID: PMC3387222
384. Z Lee, J Dennis, J Welter and A Caplan. Imaging stem cell differentiation for cell-based tissue repair, (invited chapter) in M Conn (Eds), Methods in Enzymology: Imaging and Spectroscopic analysis of living cells, Volume 506, p247-263, Elsevier, Inc., 2012. PMID: 22341228
385. L Bai, DP Lennon, AI Caplan, A DeChant, J Hecker, J Kranso, A Zaremba and RH Miller. Hepatocyte growth factor mediates mesenchymal stem cell–induced recovery in multiple sclerosis models. Nat Neurosci, 15:862–870, 2012. PMCID: PMC3427471
386. PH Ousema, FT Moutos, BT Estes, AI Caplan, DP Lennon, F Guilak and JB Weinberg. Interleukin 1 inhibits chondrogenic differentiation of mesenchymal stem cells and development of biomechanical properties in biomimetic three-dimensionally woven scaffolds. [Epub 2012 Sep 19]. Biomaterials, 33(35):8967-74, 2012. PMCID: PMC3466362
387. L da Silva Meirelles, AI Caplan, NB Nardi. Pericytes as the source of mesenchymal stem cells. In: Resident Stem Cells and Regenerative Therapy, RC Goldenberg and ACC de Carvalho, eds. Elsevier Inc. Chapter 12, Pp. 233-250, 2012.
388. AI Caplan. Mesenchymal Stem Cells in Regenerative Medicine. *In: Handbook of Stem Cells,* Vol 2, eds A Atala and R Lanza, eds. Academic Press, Chapter 43, Pp. 493-502 , 2012.
389. F Dong and AI Caplan. Cell transplantation as an initiator of endogenous stem cell based tissue repair. Curr Opin Organ Transplant. [Epub 29 Oct, 2012]. PMID: 23111645
390. P Lin, Y Lin, DP Lennon, D Correa, M Schluchter, AI CapIan. Efficient lentiviral transduction of human mesenchymal stem cells that preserves proliferation and differentiation capabilities. Stem Cells Transl Med, 1(12):886-897, 2012. PMCID: PMC3659678
391. AI Caplan. MSCs as Therapeutics. In: *Stem Cell Biology and Regenerative Medicine. Mesenchymal Stromal Cells: Biology and Clinical Applications, Stem Cell Biology and Regenerative Medicine*. P. Hematti and A. Keating (Eds.), Springer Science+Business Media New York, Chapter 5. Pp.79-90, 2012.

2013

392. AI Caplan. MSCs: The new medicine (invited chapter) In: *Stem Cells in Regenerative Medicine: Science, Regulation, and Business Strategies*. A Vertes (Eds), John Wiley & Sons, Ltd, Chapter 22, Pp 415-421 2013.
393. AI Caplan. Adult mesenchymal stem cells and the NO pathways PNAS, 110(8):2695-2696, 2013. PMID: 23396846
394. CR Rowland, DP Lennon, AI Caplan, F Guilak. The Effects of crosslinking of scaffolds engineered from cartilage ECM on the chondrogenic differentiation of MSCs. Biomaterials, 34(12):5802–581, 2013. PMCID: PMC3660461
395. TJ Kean, P Lin, AI Caplan and JE Dennis. MSCs: Delivery routes and engraftment, cell-targeting strategies, and immune modulation, Stem Cells International, Vol. 2013, Article ID 732742, 13 pages. doi:10.1155/2013/732742, 2013. PMCID: PMC3755386.
396. K Crapnell, R Blaesius, A Hastings, M Eng, DP Lennon, AI Caplan and SP Bruder. Growth, differentiation capacity, and function of mesenchymal stem cells expanded in serum-free medium developed via combinatorial screening. Exp Cell Res 319(10):1409-1418, 2013. PMID: 23597555
397. CL Chou, AL Rivera, T Sakai, AI Caplan, VM Goldberg, JF Welter, and H Baskaran. Micrometer scale guidance of mesenchymal stem cells to form structurally oriented cartilage extracellular matrix. Tissue Eng Part A, 19(9):1081-90, 2013. PMCID: PMC3609643.
398. MB Murphy, K Moncivais, AI Caplan. Mesenchymal Stem Cells: Environmentally responsive therapeutics for regenerative medicine. Exp Mol Med 45, e54; doi:10.1038/emm.2013.94; [Epub ahead of print Nov. 2013], 2013. PMID: 24232253

PUBLICATIONS - Continued

399. P Lin, D Correa, TJ Kean, A Awadallah, JE Dennis, AI Caplan. Serial transplantation and long-term engraftment of intraarterially delivered clonally-derived mesenchymal stem cells to injured bone marrow. Mol Ther 22(1):160-68, 2014. [Epub Sep 2013] PMID: 24067545
400. AI Caplan and C Ricordi. The rule of science. CellR4, 1(2):137-139, 2013. [Epub Sept. 2013]
401. TL Bonfield, D Lennon, SK Ghosh, AM DiMarino, A Weinberg, AI Caplan. Cell based therapy aides in infection and inflammation resolution in the murine model of cystic fibrosis lung disease. Stem Cell Discovery 3(2):139-153, 2013. doi: 10.4236/scd.2013.32019
402. AM DiMarino, AI Caplan, TL Bonfield. Mesenchymal stem cells in tissue repair. Front Immunol 4:201, 2013. PMID: 24027567.

2014

403. AI Caplan, MD West. Progressive approval: A proposal for a new regulatory pathway for regenerative medicine. Stem Cells Trans Med 3(5):560-563, 2014. PMCID: PMC4006487.
404. J Wallace, MO Wang, P Thompson, M Busso, V Belle, N Mammoser, K Kim, JP Fisher, A Siblani, Y Xu, JF Welter, DP Lennon, J Sun, AI Caplan, D Dean. Validating continuous digital light processing (cDLP) additive manufacturing accuracy and tissue engineering utility for a dye-initiator package. Biofabrication. [Epub Jan. 2014]. 6(1):015003, 2014. PMID: 24429508
405. JW Cheng, Z Sadeghi, MS Penn, HA von Recum, AI Caplan. The Role of CXCL12 and CCL7 homing factors in tissue regeneration, immune regulation, and embryonic development. Cytokine 69:277-283, 2014. doi:10.1016/j.cyto.2014.06.007
406. RA Somoza, JF Welter, D Correa, AI Caplan. Chondrogenic differentiation of mesenchymal stem cells: challenges and unfulfilled expectations. Tissue Eng Part B. 20(6):596-608, 2014. PMCID: PMC4241862
407. V Holt, AI Caplan, SE Haynesworth. Identification of a subpopulation of marrow MSC-derived medullary adipocytes that express osteoclast-regulating molecules. PLoS ONE, 9(10):e108920, 2014.
408. AI Caplan. Adult Mesenchymal Stem Cells and Women's Health. [Epub Jan. 2015] MENOPAUSE. 22:2:131–135, 2015. PMCID: PMC4308553
409. AI Caplan. The future of cell-based therapies orthopaedic sports medicine. In: *Sports Injuries: Prevention, Diagnosis, Treatment and Rehabilitation*. M.N. Doral and J. Karlsson (eds.), Springer Science+Business Media New York. pp 1-6, 2014.
410. M Siemionow, G. Kwiecien, M. Madajka, H Uygur, J Cwykiel, A Bobkiewicz and A Caplan. Human Epineural Sheath Conduit Augmented with Human Mesenchymal Stem Cells as a New Biologic Construct Supporting Peripheral Nerve Regeneration: A Preliminary Report. Plast Reconstr Surg 134:67-68, 2014. PMID: 25254771 [PubMed - in process]

2015

411. V Adorno-Cruz, G Kibria, X Liu, M Doherty, D Junk, D Guan, C Hubert, M Venere, E Mulkearns-Hubert,, M Sinyuk A Alvardo, AI Caplan, J Rich, SL Gerson, J Lathia, H Liu. Cancer Stem Cells: Targeting the Roots of Cancer, Seeds of Metastasis, and Sources of Therapy Resistance. Cancer Res 75(6): 924–929, 2015. ePub January 20, 2015; doi: 10.1158/0008-5472.CAN-14-3225. PMCID: PMC4359955
412. WD Murrell, AW Anz, H Badsha, WF Bennett, RE Boykin, AI Caplan. Regenerative treatments to enhance orthopedic surgical outcome. PMR 7(20):S41-S52, 2015.
413. AI Caplan and R Hariri. Body management. Stem Cells Transl Med 4(7):695-701. PMCID: PMC4479626.
414. A Giori, C Tremolada, R Vailati, SE Navone, G Marfia, AI Caplan. Recovery of function in anal incontinence after micro-fragmented fat graft (Lipogems) injection: Two years follow up of the first 5 cases. CellR4 3(2):e1544, 2015.
415. P Lin, AI Caplan and E Ruoslahti. Delivery and targeting of therapeutic cells. In: *Stem Cells in Regenerative Medicine: Science, Regulation and Business Strategies*. A Vertes, N Qureshi, A Caplan and L Babiss (Eds), John Wiley & Sons, Ltd, Chapter 21, Pp 389-398, 2015

PUBLICATIONS - Continued

416. AI Caplan. MSCs: The new medicine (invited chapter) In: *Stem Cells in Regenerative Medicine: Science, Regulation, and Business Strategies*. A Vertes, N Qureshi, A Caplan and L Babiss (Eds), John Wiley & Sons, Ltd, Chapter 23, Pp 415-421, 2015
417. AI Caplan and JM Sorrell. The MSC curtain that stops the immune system. [Epub Jan. 2015] .Immunol Lett, 168(2):136-139, 2015.
418. BP Hung, DL Hutton, KL Kozielski, CJ Bishop, B Naved, JJ Green, AI Caplan, JM Gimble, AH Dorafshar and WL Grayson. Platelet-derived growth factor BB enhances osteogenesis of adipose-derived but not bone marrow-derived mesenchymal stromal/stem cells. Stem Cells [Epub ahead of print June 2015]. PMCID: PMC4549224
419. C Tremolada, G Beltrami, F Bianchi, C Ventura, C DiVito, R Capanella, SE Navone, G Marfia, AI Caplan. Adipose mesenchymal stem cells and "regenerative adipose tissue graft" (Lipogems™) for musculoskeletal regeneration. J Musculoskelet Dis 57-67, 2015.
420. D Correa, RA Somoza, SA Greenberg, P Lin, E Rom, J Welter, L Duesler, A Yayon, AI Caplan. Sequential stimulation with fibroblast growth factors (FGFs) 2, 9 and 18 regulate the ultimate phenotype of MSC-derived chondrocytes. Osteoarthr Cartilage. 23:443-453, 2015. http://dx.doi.org/10.1016/j.joca.2014.11.013
421. D Correa, RA Somoza, P Lin, WP Schiemann, AI Caplan. Mesenchymal Stem Cells regulate Melanoma Cancer Cells extravasation to bone and liver at their perivascular niche. [Epub August, 2015] PMID: 26235173. Int. J. Cancer 138:417–427, 2016. PMCID: PMC4882929
422. AI Caplan. Are all adult stem cells the same? [Epub September 2015] Regen Eng Transl Med, 1(1):4-10, 2015.
423. AI Caplan. Adult mesenchymal stem cells (MSCs): When, where, how? Stem Cells Intl. [Epub Jul 2015]. Volume 2015 (2015), Article ID 628767. PMCID: PMC4529977.
424. Z Sadeghi, J Isariyawongse, M Kavran, K Izgi, G Marini, F Bicer, X Hao, A Rabie F Daneshgari, A Caplan, A Hijaz. Mesenchymal Stem Cell Therapy in a Rat Model of Birth Trauma Injury: Functional Improvements and Biodistribution. Int Urogynecol J. [Epub Sept 2015]. PMCID: PMC4890611
425. NM Barker, DA Carrino, AI Caplan WW Hurd, JH Liu, H Tan, S Mesiano. Proteoglycans in leiomyoma and normal myometrium: Abundance, steroid hormone control and implications for pathophysiology. Reprod Sci, 1-8, 2015. [Epub Sept 2015]. PMID: 26423601 doi: 10.1177/1933719115607994
426. R. Somoza, D Correa, AI Caplan. Roles for mesenchymal stem cells as medicinal signaling cells. [Epub Dec 2015]. (http://www.nature.com/nprot/posters/msc/index.html) Nat Protoc, Vol 11 No 1, 2016.
427. AI Caplan. MSCs: The sentinel and safe-guards of injury. J Cell Physiol, 213:1413-1416, 2015. PMID: 26565391

2016

428. MT Sutton, D Fletcher, SK Ghosh, A Weinberg, R van Heeckeren, S. Kaur, Z Sadeghi, A Hijaz, J. Reese, HM Lazarus, DP Lennon, AI Caplan, TL Bonfield. Antimicrobial properties of mesenchymal stem cells: Therapeutic potential for cystic fibrosis infection, and treatment. Stem Cells International, Vol. 2016, Article ID 5303048, 12 pages. [Epub ahead of print 2016 Jan 26]. PMCID: PMC4746399.
429. G Shalev-Malul, DC Soler, A Ting, N Lehman, E Barnboym, TS McCormick, D Anthony, H Lazarus, AI Caplan, M Brietman and NG Singer. Development of a functional biomarker for use in cell-based therapy studies in seropositive rheumatoid arthritis. Stem Cells Transl Med 5:628–63, 2016. PMCID: PMC4835254.
430. AI Caplan, C Mason, B Reeve. The 3Rs of Cell Therapy. [Epub ahead of print 8 Aug 2016], Stem Cells Transl Med, 5:1-5, 2016.
431. C Tremolada, C Ricordi, AI Caplan, C Ventura. Mesenchymal Stem Cells in Lipogems, A Reverse Story: from Clinical Practice to Basic Science. *In: Mesenchymal Stem Cells*. Massimiliano Gnecchi (ed.), Springer Science+Business Media New York; Chapter 6, pp.109-122, 2016.
432. R Mishra, RS Sefcik, TJ Bishop, SM Montelone, N Crouser, JF Welter, AI Caplan, D Dean. Growth factor dose tuning for bone progenitor cell proliferation and differentiation on resorbable poly (propylene fumarate) scaffolds. Tissue Eng Part C Methods, 22(9):904-13, 2016. PMCID: PMC5035914

PUBLICATIONS - Continued

433. A Santamaria, G Asatrian, WCW Chen, AW James, W Hardy, K Ting, AI Caplan, C Soo, B Peault. Nature or Nurture: Innate versus Cultured Mesenchymal Stem Cells for Tissue Regeneration. In: *Translating Regenerative Medicine to the Clinic*. Jeffrey Laurence (ed), Boston: Academic Press; Chapter 15, pp. 227-240, 2016.
434. AI Caplan. Legislation for Today's Cell and Tissue Based Therapies. CellR4, 4(2):e1804, 2016.
435. AI Caplan and C Ricordi. Editorial: Improving the regulatory framework for cell therapy does not equate to deregulation. CellR4 4(4):e2109, 2016.

2017

436. AI Caplan. New MSC: MSCs as pericytes are sentinels and gatekeepers. [Epub aead of print 11 Apr 2017] J Ortho Res, pp. 1151-1155, 2017.
437. AI Caplan. MSCs in Regenerative Medicine. In: *Principles of Regenerative Medicine Third Edition*, Ed., A Atala, R Lanza, JA Thomson, and R Nerem. RG Landes Co. (Elsevier). Accepted 2017.
438. BD Goldstein, AI Caplan and TL Bonfield. MSCs in Asthma. In: *Mesenchymal Stem Cells and Immunomodulation*. CJ Malemud and E Alsberg (Eds). Springer: pp.7-24, 2017.
439. AI Caplan. MSCs as Therapeutics. In: *Stem Cell Biology and Regenerative Medicine*. P Hematti and A Keating (Eds), Springer, Chapter 5, pp. 79-99, 2017.
440. AI Caplan. Mesenchymal Stem Cells: Time to change the name! Stem Cells Trans Med, 6:1445–1451, 2017.
441. TM Best, A Caplan, M Coleman, L Goodrich, J Hurd, LD Kaplan, B Noonan, P Schoettle, C Scott, H Stiene, J Huard. Not missing the future: A call to action for investigating the role of regenerative medicine therapies in pediatric/adolescent sports injuries. Current Sports Medicine Reports; 16(3):202-210, 2017.
442. D Correa, RA Somoza and AI Caplan. Non-destructive/non-invasive imaging evaluation of cellular differentiation progression during in vitro MSC-derived chondrogenesis. [Epub ahead of print 2017 Aug 21] https://doi.org/10.1089/ten.TEA.2017.0125, 2017. Tissue Eng Part A. 24(7-8): 662-671. PMCID: PMC5905945.
443. M Dave, P Menghini, K Sugi, RA Somoza, Z Lee, M. Jain, A Caplan, F Cominelli. Ultrasound-guided Intracardiac Injection of Human Mesenchymal Stem Cells to Increase Homing to the Intestine for Use in Murine Models of Experimental Inflammatory Bowel Diseases. J Vis Exp (127), e55367, doi:10.3791/55367, 2017. PMCID: PMC5614401
444. BD Goldstein, ME Lauer, AI Caplan and TL Bonfield. Chronic asthma and Mesenchymal stem cells: Hyaluronan and airway remodeling. doi:10.1186/s12950-017-0165-4. J Inflamm 14(18), 2017.
445. EA Verbus, J Kenyon, O Sergeeva, A Awadallah, L Yuan, JF Welter, AI Caplan, M Schluchter, AM Khalil, Z Lee. Expression of miR-145-5p During Chondrogenesis of Mesenchymal Stem Cells. J Stem Cell Res (Overl Park), 1(3): 1–10, 2017. PMCID: PMC5926818.
446. MT Sutton, D Fletcher, N Episalla, L Auster, S Kaur, MC Gwin, M Folz, D Velasquez, V Roy, R van Heeckeren, DP Lennon, AI Caplan and TL Bonfield. Mesenchymal Stem Cell Soluble Mediators and Cystic Fibrosis. oi:10.4172/2157-7633.1000400. J Stem Cell Res Ther, August, 7(9), 2017.

2018

447. JM Sorrell, RA Somoza, AI Cell-based therapies: the nonresponder. Human mesenchymal stem cells induced to differentiate as chondrocytes follow a biphasic pattern of extracellular matrix production. J Orthop.Res, 36:1757-1766, 2018. PMCID: PMC5976510.
448. RA Somoza, D Correa, I Labat, H Sternberg, ME Forrest, AM Khalil, MD West, P Tesar and AI Caplan. Transcriptome-wide analyses of human neonatal articular cartilage and human mesenchymal stem cell-derived cartilage provide a new molecular target for evaluating engineered cartilage. DOI: 10.1089/ten.tea.2016.0559, Tiss Eng: Part A, 24(3-4):335-350, 2018. PMCID: PMC5963669.
449. JD Kenyon, O Sergeeva, RA Somoza, M Li, AI Caplan, AM Khalil, and Z Lee. Analysis of -5p and -3p strands of miR-145 and miR-140 during mesenchymal stem cell chondrogenic differentiation. [Epub aead of print 20 Apr 2018]. Tiss Eng Part A, 25(1-2): 80-90. PMCID: PMC6352508

PUBLICATIONS - Continued

450. E Rivera-Delgao, A. Djuhadi, C. Danda, J Kenyon, J Maia, AI Caplan, HA von Recum. Injectable liquid polymers extend the delivery of corticosteroids for the treatment of osteoarthritis. J Controlled Release 284:112-121, 2018. PMCID: PMC6190600.
451. Y Zhong, M Motavalli, K-C Wang, AI Caplan, JF Welter, H Baskaran. Dynamics of intrinsic glucose uptake kinetics in human mesenchymal stem cells during chondrogenesis. Ann Biomed Eng, 46:1896-1910, 2018. PMID: 29948374 PMCID: PMC6204100.
452. KC Wang, TT Egelhoff, AI Caplan, JF Welter, H Baskaran. ROCK inhibition promotes the development of chondrogenic tissue by improved mass transport. [Epub aead of print 19 Apr 2018]. Tissue Eng Part A. 24(15-16):1218-1227, 2018. PMCID: PMC6080111.
453. AI Caplan. Cell-based therapies: The non-responder. Stem Cells Trans Med, 7(11):762-766, 2018. PMID: 30251411 PMCID: PMC6216418
454. JM Mansour, M Motavalli, JE Dennis, TJ Kean, AI Caplan, JA Berilla, JF Welter. Rapid detection of shear-induced damage in tissue-engineered cartilage using ultrasound. Tissue Eng Part C 24(8):443-456, 2018. PMCID: PMC6088252.
455. DP Lennon, LA Solchaga, R Somoza, MD Schluchter, S. Margevicius, AI Caplan. Human and Rat Bone Marrow-Derived Mesenchymal Stem Cells Differ in Their Response to Fibroblast Growth Factor and Platelet-Derived Growth Factor. Tissue Eng Part A. 2018 Aug 22. doi: 10.1089/ten.TEA.2018.0126. [Epub ahead of print] PMCID: PMC6302675.
456. SF Badylak, AI Caplan, LC Davies, S Stromblad, DJ Weiss and K LeBlanc. Author Accountability in Biomedical Research. (Letter to the Editor). Doi: 10.1089/scd.2018.0214. Stem Cells and Development, 27(24), 2018.

2019

457. AI Caplan. Medicinal signalling cells: they work, so use them. Nature. 2019 Feb; 566(7742):39. doi: 10.1038/d41586-019-00490-6. PMID: 30723355.
458. IR Murray, J Chahla, MR Safran, AJ Krych, DBF Saris, AI Caplan, RF LaPrade on behalf of the Cell Therapies Communication Expert Group. International Expert Consensus on a Cell Therapy Communication Tool: DOSES. J Bone Joint Surg Am, 2019. 101(10): 904-911. PMCID: PMC7292498.
459. AI Caplan. Tissue Engineering: Then, Now and the Future. Tissue Eng Part A. 25(7-8):515-517, 2019. PMCID: PMC7001383.
460. AI Caplan. There is no "Stem Cell Mess". Tissue Eng Part B Rev. 25(4):291-293 https://doi.org/10.1089/ten.TEB.2019.0049. PMID: 30887883; PMCID: PMC6686685.
461. D Vail, R Somoza, A Caplan, A Khalil. Transcriptome dynamics of long non-coding RNAs and transcription factors demarcate human neonatal, adult, and MSC-derived engineered cartilage. Doi: 10.1002/term.2961. [Epub ahead of print 2019]. J Tissue Eng Regen Med. 2020; 14(1): 29-44. PMCID: PMC6992527.
462. Y Dai, RA Somoza, L Wang, JF Welter Y Li, AI Caplan, CC Liu. Exploring the trans-cleavage activity of CRISPR Cas12a (cpf1) for the development of a universal electrochemical biosensor. Doi: 10.1002/anie.201910772. Epub Oct 17, 2019. Angew Chem Int Ed Engl, 58(48):17399-17405, 2019. PMCID: PMC6938695.
463. MF Pittenger, DE Discher, BM Peault, DG Phinney, JM Hare and AI Caplan. Mesenchymal stem cell perspective: cell biology to clinical progress. Doi:10.1038/s41536-019-0083-6. NPJ Regen Med 4:22, 2019. PMCID: PMC6889290.
464. DE Rodríguez-Fuentes, LE Fernández-Garza, JA Samia-Meza, SA Barrera-Barrera, AI Caplan, HA Barrera-Saldaña. Mesenchymal Stem Cells Current Clinical Applications: A Systematic Review. Arch Med Res. 2021 Jan;52(1):93-101. doi: 10.1016/j.arcmed.2020.08.006. Epub 2020 Sep 22. PubMed PMID: 32977984.

PUBLICATIONS - Continued

2020

465. W Qu, Z Wang, JM Hare, G Bu, JM Mallea, JM Pascual, AI Caplan, J Kurtzberg, AC Zubair, E Kubrova, E Engelberg-Cook, T Nayfeh, VP Shah, JC Hill, ME Wolf, LJ Prokop, MH Murad, FP Sanfilippo. Cell-based Therapy to Reduce Mortality From COVID-19: Systematic Review and Meta-Analysis of Human Studies on Acute Respiratory Distress Syndrome. [published online ahead of print, 2020 May 29]. Stem Cells Transl Med. 2020; 9:1007– 1022. https://doi.org/10.1002/sctm.20-0146.
466. C Voskamp, WJLM Koevoet, RA Somoza, AI Caplan, V Lefebvre, GJVM van Osch, R Narcisi. Enhanced Chondrogenic Capacity of Mesenchymal Stem Cells After TNFα Pre-Treatment. Front Bioeng Biotechnol. 2020, 8:658. https://doi.org/10.3389/fbioe.2020.00658. PMCID: PMC7344141
467. Y Nossin, E Farrell, WJLM Koevoet, RA Somoza, AI Caplan, B Brachvogel, GJVM van Osch. Angiogenic potential of tissue-engineered cartilage from human mesenchymal stem cells is modulated by Indian Hedgehog and Serpin E1. Front Bioeng Biotechnol, 8:327, Online: April 17, 2020 https://doi.org/10.3389/fbioe.2020.00327. PMCID: PMC7180203.
468. H Bukulmez, I Horkayne-Szakaly, A Bilgin, T Baker, AI Caplan, O Jones. Intrarenal injection of mesenchymal stem cell for treatment of lupus nephritis in mice – a pilot study. Lupus. On line November 1, 2020. https://doi.org/10.1177/0961203320968897.
469. Y Dai, W Xu, RA Somoza, JF Welter, AI Caplan, CC Liu. An Integrated Multi-Function Heterogeneous Biochemical Circuit for High-Resolution Electrochemistry based Genetic Analysis. Angewandte Chemie. Angew Chem Int Ed Engl; 59(46): 20545-20551. PMID: 32835412
470. D Lennon, RA Somoza, MA Schluchter, AI Caplan. The habitat assay, a platform to study in vivo properties of human mesenchymal stem cells. Tissue Eng Part A. 26(23-24):1378-1387. Epub 2020 Nov 26. PMID: 33107389; PMCID: PMC7759284. https://doi.org/10.1089/ten.tea.2020.0178
471. Sadeghi Z, Kenyon JD, Richardson B, Khalifa AO, Cartwright M, Conroy B, Caplan A, Cameron MJ, Hijaz A. Transcriptomic Analysis of Human Mesenchymal Stem Cell Therapy in Incontinent Rat Injured Urethra. Tissue Eng Part A. 2020 Jul;26(13-14):792-810. doi: 10.1089/ten.tea.2020.0033. Epub 2020 Jul 2. PMID: 32614683; PMCID: PMC7398447.

2021

472. G Lanzoni, E Linetsky, D Correa, SM Cayetano, RA Alvarez, D Kouroupis, AA Gil, R Poggioli, P Ruiz, AC Marttos, K Hirani, CA Bell, H Kusack, LRafkin, D Baidal, A Pastewski, K Gawri, C Leñero, AMA Mantero, SW Metalonis, X Wang, L Roque, B Masters, NS Keny on, E Ginzburg, X Xu, J Tan, AI Caplan, MK Glassberg, R Alejandro, and C Ricordi. Umbilical Cord Mesenchymal Stem Cells for COVID-19 ARDS: A Double Blind, Phase 1/2a, Randomized Controlled Trial. Stem Cells Trans Med. 2021;1–14.
473. BA Kerr, L Shi, AH Jinnah, KS Harris, JS Willey, DP Lennon, AI Caplan, TV Byzova. Kindlin-3 mutation in mesenchymal stem cells results in enhanced chondrogenesis. Exp Cell Res 399(2): 15 February 2021, 112456. https://doi.org/10.1016/j.yexcr.2020.112456
474. AM van Heeckeren, MT Sutton, DR Fletcher, CA Hodges, AI Caplan, TL Bonfield. Enhancing cystic fibrosis immune regulation. Front Pharmacol. (12)269, May, 2021. DOI=10.3389/fphar.2021.573065 https://www.frontiersin.org/article/10.3389/fphar.2021.573065.
475. AI Caplan. Placebo Controls: Now??? Arch Immunol Ther Exp (Warsz). Published online 29 March 2021. https://doi.org/10.1007/s000005-021-00612-x. PMCID: PMC8006883, PMID: 33782781.
476. TL Bonfield, MT Sutton, DR Fletcher, MA Folz, V Ragavapuram, RA Somoza, AI Caplan. Donor-defined mesenchymal stem cell antimicrobial potency against nontuberculous mycobacterium. Stem Cells Transl Med. 2021;10:1202–1216. DOI: 10.1002/sctm.20-0521
477. Y Zhong, AI Caplan, JF Welter and H Baskaran. Glucose Availability Affects Extracellular Matrix Synthesis During Chondrogenesis In Vitro. Tissue Eng Part A. 2021 Jan 26. doi: 10.1089/ten.TEA.2020.0144. Epub ahead of print. PMID: 33499734.

PUBLICATIONS - Continued

478. DJ Vail, RA Somoza, AI Caplan. MicroRNA Regulation of Bone Marrow Mesenchymal Stem Cell Chondrogenesis: Toward Articular Cartilage. Tissue Eng Part A. 2021 Jul 30. https://doi.org/10.1089/ten.TEA.2021.0112. Epub ahead of print. PMID: 34328786.
479. JM Sorrell, R Somoza, MA Baber, J Kenyon and AI Caplan. Migration of Human Bone Marrow-Derived Mesenchymal Stem Cells during Wound Healing. Cells. Preprints 2021, 2021060374. https://www.preprints.org/manuscript/202106.0374/v1 (doi: 10.20944/preprints202106.0374.v1).
480. K. Pelttari, L. Acevedo Rua, M. Mumme, C. Manferdini, S. Darwiche, A. Khalil, D. Buchner, G. Lisignoli, P. Occhetta, B. von Rechenberg, M. Haug, D. Schäfer, M. Jakob, A. Caplan, I. Martin, A. Barbero. Engineered nasal cartilage for the repair of osteoarthritic knee cartilage defects. Sci Transl Med. 13(609) pp. eaaz4499.
481. Y Nossin, E Farrell, WJLM Koevoet, F Datema, RA Somoza, AI Caplan, GJVM van Osch. The releasate of avascular cartilage demonstrates inherent pro-angiogenic properties in vitro and in vivo. Cartilage. 2021 https://doi.org/10.1177/19476035211047628.
482. M Breitman, T Bonfield, A Caplan, H Lazarus, M Haghiac, S LaSalvia, J Reese Koç, N Singer. Optimization of Human Mesenchymal Stem Cells for RA: Implications for Improved Therapeutic Outcomes. ACR Open Rheumatol. Vol. 0, No. 0, Month 2021, pp 1-9. https://doi.org/10.1002/acr2.11356.
483. AI Caplan. Mesenchymal Stem Cells and Covid-19: The Process of Discovery and of Translation. Biomater Transl. 2021, 2(online first), 00-00. http://doi.org/10.12336/biomatertransl.2021.01.000.
484. W Qu, Z Wang, E Engelberg-Cook, AB Siddik, G Bu, JG Allickson, E Kubrova, AI Caplan, JM Hare, C Ricordi, CJ Pepine, J Kurtzberg, JM Pascual, RL Rodriguez, T Nayfeh, S Saadi, EM Richards, K March, FP Sanfilippo. Effectiveness and Safety of MSC Cell Therapies for Hospitalized Patients with COVID-19: A Systematic Review and Meta-analysis. medRxiv. https://doi.org/10.1101/2021.10.05.21264559. Preprint doi: 2021.10.05.21264559.
485. AI Caplan. Stem Cells 101: Letter to the Editor. Am J Sports Med. 2021; 49(14):NP69-NP70. doi:10.1177/03635465211042631.
486. AM van Heeckeren, MT Sutton, DR Fletcher, CA Hodges, AI Caplan, TL Bonfield. Enhancing cystic fibrosis immune regulation. In: *Novel Anti-Inflammatory Approaches for Cystic Fibrosis Lung Disease: Identification of Molecular Targets and Design of Innovative Therapies*, Ed. CM Pedrosa Ribeiro, NG McElvaney and G Cabrini. (eBook) Published in Frontiers in Pharmacology (Dec 2021). DOI 10.3389/978-2-88971-941-9.

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487. LC León-Moreno, AI Caplan, et al. Allogeneic MSC-based treatments legislation in Latin America: The need for standardization in a medical tourism context. Stem Cells and Development. Submitted.
488. Y Nossin, E Farrell, WJLM Koevoet, F Datema, RA Somoza, AI Caplan, GJVM van Osch. Is Cartilage Anti-Angiogenic? Osteoarthritis and Cartilage. Submitted.
489. TL Bonfield, D Lennon, AI Caplan. Human mesenchymal stem cells resolve infection and inflammation in pseudomonas aeruginosa infected cystic fibrosis transmembrane receptor knockout mice. Stem Cell Discovery. Submitted.
490. JM Sorrell, RA Somoza, AI Caplan. CD146/MCAM Is an Adipogenic Marker for Mesenchymal Stem Cells, Adipose-Derived Stem Cells, and Dermal Fibroblasts. Frontiers in Bioengineering and Biotechnology. Submitted.
491. Zhong Y, Somoza RA, Caplan AI, Welter JF, Baskaran H. Amino acid metabolism and requirements during human mesenchymal stem cell chondrogenesis. Stem Cells Translational Medicine. Submitted (under review).
492. DP Lennon, G Wera, M Kraay, AI Caplan. Bone normally discarded after joint-replacement surgery is a source of stem cells. In preparation.

ABSTRACTS

PUBLICATIONS - Continued

Over 150 abstracts have been published from 1965 through 1995. The exact number and citations are no longer recorded.

PATENTS

1. Arnold I. Caplan and Glenn T. Syftestad (August 26, 1986). Bone Protein Purification Process. Patent No. 4,608,199.
2. Arnold I. Caplan and Glenn T. Syftestad (November 4, 1986). Process of Adapting Soluble Bone Protein for Use in Stimulating Osteoinduction. Patent No. 4,620,327.
3. Arnold I. Caplan and Stephen E. Haynesworth (March 30, 1993). Method for Enhancing the Implantation and Differentiation of Marrow-Derived Mesenchymal Cells. Patent No. 5,197,985.
4. Arnold I. Caplan and Stephen E. Haynesworth (July 13, 1993). Method for Treating Connective Tissue Disorders. Patent No. 5,226,914.
5. Arnold I. Caplan and Stephen E. Haynesworth (January 23, 1996). Human Mesenchymal Stem Cells. Patent No. 5,486,359.
6. Arnold I. Caplan, Stanton Gerson and Stephen E. Haynesworth (January 7, 1997). Transduced Mesenchymal Stem Cells. Patent No. 5,591,625.
7. Arnold I. Caplan and Stephen E. Haynesworth (July 1, 1997). Monoclonal Antibodies for Human Osteogenic Cell Surface Antigens. Patent No. 5,643,736
8. Arnold I. Caplan, Stanton Gerson and Stephen E. Haynesworth (March 31, 1998). Enhancing Bone Marrow Engraftment Using MSCs. Patent No. 5,733,542.
9. Arnold I. Caplan, Scott P. Bruder and Stephen E. Haynesworth (April 7, 1998). Lineage-Directed Induction of Human Mesenchymal Stem Cell Differentiation. Patent No. 5,736,396.
10. Arnold I. Caplan, David Fink, and Randell Young (January 5, 1999). Biomatrix for Soft Tissue Regeneration. Patent No. 5,855,619.
11. Arnold I. Caplan, Scott P. Bruder and Stephen E. Haynesworth (August 24, 1999). Lineage-Directed Induction of Human Mesenchymal Stem Cell Differentiation. Patent No. 5,942,225.
12. Arnold I. Caplan, Stephen E. Haynesworth, and Stanton L. Gerson. (January 4, 2000). Enhancing Hematopoietic Progenitor Cell Engraftment Using Mesenchymal Stem Cells. Patent No. 6,010,696.
13. Arnold I. Caplan and Stephen E. Haynesworth (July 11, 2000). Monoclonal Antibodies for Human Mesenchymal Stem Cells. Patent No. 6,087,113.
14. Arnold I. Caplan, Scott P. Bruder, James S. Burns, Daniel Markshak. (2000). Bone Regeneration in Osteoporosis Using Human Bone Marrow Mesenchymal Cells. Patent No. EP 1 007 063 A1.
15. Giovanni, A., Callegaro, L., Young, R.G., Murphy, J.M., Fink, D.J, Bruder, S.P., Barry, F.P., Kadiyala, S., Caplan, A.I., Moskowitz, R., Yoo, J.U., and Solchaga, L.S. (November 19, 2002). Biological material for the repair of connective tissue defects comprising mesenchymal stem cells and hyaluronic acid derivative. Patent No. 6,482,231.
16. Arnold I. Caplan and J. Michael Sorrell (December 24, 2002). Multilayer skin or dermal equivalent having a layer containing mesenchymal stem cells. Patent No. 6,497,875.
17. Arnold I. Caplan and Stephen E. Haynesworth (November 12, 2003). Mesenchymal stem cells and their use. Patent No. EP 1 361 267 A2.
18. Victor M. Goldberg, Arnold I. Caplan, Francis P. Barry, David J. Fink, Daniel R. Marshak, James S. Burns (December 28, 2004). Osteoarthritis cartilage regeneration. Patent No. 6,835,377.
19. D Asselineau and AI Caplan (March 20, 2007). Antibodies specific for papillary fibroblasts as markers for skin quality. Patent No. 7,192,719.
20. Arnold I. Caplan, Randell G. Young, James E. Dennis (March 9, 2008). Myogenic differentiation of human mesenchymal stem cells. Patent No. EP0852463.
21. Arnold I. Caplan, Tracey L. Bonfield (August 16, 2012). Mesenchymal Stem Cell Therapies. Provisional Patent Appln. No. 61/683,987.
22. James E. Dennis, Arnold I. Caplan, Nir Cohen (April 26, 2016). Cell Targeting Methods and Compositions. Patent No. US 9,321,992 B2.
23. Correa D, Caplan AI (August 24, 2017). Pericyte assay for transendothelial migration. United States Patent Application 20170241990. (http://www.freepatentsonline.com/y2017/0241990.html

SELECTED ADDRESSES

24. Bukulmez H, Caplan AI, Bonfield T. Priming of MSCs for Anti-Inflammatory Therapeutic Properties in SLE. Pending (December, 2021).

SELECTED ADDRESSES

1968

Invited Lecture: Gordon Conference on Vitamins and Cofactors; July 1968.

1971

Invited Lecturer: Workshop Meeting on "Limb Development," Boulder, Colorado; June 1971. (See Dev. Biol. 27:285-288 (1972) for a summary of this meeting.)

Invited Speaker: Gordon Conference on "Mucopolysaccharides," July 1971.

1972

Invited Lecturer: Conference of "Limb Development" sponsored by the International Society of Developmental Biologists, Grenoble, France; August 1972.

1974

Invited Lecturer: Second International Santa Catalina Island Colloquium on "Extracellular Matrix Influences on Gene Expression," September 1974.

1975

Invited Participant: Mead-Johnson Symposium on "Clinical and Biological Aspects of Malformations," Vail, Colorado; June 1975.

Invited Speaker: Gordon Conference on "Bones and Teeth," July 1975.

1976

Invited Lecturer: Third Symposium of the British Society for Developmental Biology (Cosponsored by The International Society of Developmental Biologists) on "Vertebrate Limb and Somite Development," Glasgow, United Kingdom; September 1976.

1977

Symposium Lecturer: Fifth International Conference on "Birth Defects," Montreal, Canada; August 1977.

1978

Invited Participant: Dahlem Konference on "Fetal Growth," Berlin, Germany; February 1978.

Invited Participant: W. Alton Jones Cell Science Center, "Structure and Metabolism of Proteoglycans in Cultured Cells"; February 1978.

Invited Lecturer: Conference on the "Biology of Cervical Dilatation"; August 1978.

1979

Invited Lecturer and Rapporteur: Fogarty International Conference on "Novel ADP-Ribosylations of Regulatory Enzymes and Proteins," Washington, D.C.; October 1979.

1980

Symposium Lecturer: AAAS Annual Meeting, San Francisco, California; January 1980.

Symposium Lecturer: Annual Meeting of the National Science Teachers Association, Anaheim, California; March 1980.

Invited Participant: EMBO Workshop on "Muscle Cell Culture in the Study of Gene Expression During Differentiation," Shoresh, Israel; March 1980.

Symposium Lecturer: Midwest Connective Tissue Workshop, Cleveland, Ohio; May 1980.

Symposium Lecturer: 39th Symposium of the Society for Developmental Biology, Storrs, Connecticut; June 1980.

1981

Invited Participant: VIth International Symposium on Glycoconjugates, Tokyo, Japan; September 1981. Satellite meeting on "Proteoglycans," Hakone, Japan.

1982

Invited Participant: XVth EMBO International Embryology Conference, Strasbourg, France; June 1982.

Organizer and Participant: "Third International Conference on Limb Development and Regeneration," Storrs, Connecticut; June 1982.

Workshop on Limb Development organized by NIHCD, Washington, D.C.; September 1982.

1983

Invited Lecturer: 3rd EMBO Workshop on "Molecular and Cellular Aspects of Myogenesis and Myofibrillogenesis in Cell Cultures of Normal and Diseased Muscle," Boldern, Switzerland; March 1983.

Invited Lecturer: "Workshop on Local Mechanisms Regulating Bone Formation," NIDR/NIH, Bethesda, Maryland; May 1983.

SELECTED ADDRESSES

Invited Lecturer: Gordon Research Conference, "The Biochemistry and Physiology of Bones and Teeth"; July 1983.
Invited Lecturer: Midwest Connective Tissue Workshop, Northwestern University, Chicago, Illinois; October 1983.
Distinguished Lecturer Series: University of Texas Health Science Center, Dallas, Texas; November 1983.
Mini Symposium Lecturer: 23rd Annual Meeting, The American Society for Cell Biology, San Antonio, Texas; November/December 1983.

1984

Invited Lecturer: Third Annual Mid-Atlantic States Regional Meeting of the Society for Developmental Biology, Millersville University, Millersville, Pennsylvania; April 1984.
Invited Participant and Session Chairman: Gordon Conference on Proteoglycans, Plymouth State College, New Hampshire; June 1984.Invited Participant: "The Second International Conference on the Chemistry and Biology of Mineralized Tissues," Gulf Shores, Alabama; September 1984.
Invited Lecturer: Seventh International Symposium on ADP-Ribosylation Reactions, Vitznau, Switzerland; September 1984.
Invited Lecturer: 1984 Annual Meeting of the Society of Complex Carbohydrates," Chicago, Illinois; October 1984.

1985

Plenary Lecturer: UCLA Meetings on "Molecular Biology of Muscle Development," Park City, Utah; March 1985.
Session Chairman: 25th Annual Midwest Regional Developmental Biology Meetings, Cleveland, Ohio; May 1985.
Workshop on Arthritis organized by NIH, Warrenton, Virginia; July 1985.
Plenary Lecturer: Tenth International Congress of the International Society of Developmental Biologists, Los Angeles, California; August 1985.
Mini Symposium Lecturer: 25th Annual Meeting, The American Society for Cell Biology, Atlanta, Georgia; November 1985.

1986

Invited Participant: CIBA Foundation Symposium on "Functions of the Proteoglycans," London, England; January 1986.
Invited Participant: 7th International Workshop on Calcified Tissues, Ein Gedi, Israel; March 1986. Symposium Lecturer: 1986 American Association for Dental Research, Washington, D.C.; March 1986.
Platform Lecturer: UCLA Meeting on "Development and Diseases of Cartilage and Bone Matrix," Lake Tahoe, California; March 1986.
Symposium Lecturer: Annual Teratology Society Meeting, Boston, Massachusetts; July 1986.
Invited Participant and Lecturer: Gordon Research Conference on "Bioengineering and Orthopedic Sciences," Proctor Academy, Andover, New Hampshire; August 1986.
Invited Participant and Lecturer: EMBO Meeting on "Molecular Biology of Muscle Development," Bendor, France; August/September 1986.
Symposium Lecturer: "The Biology of Tooth Movement," University of Connecticut, Farmington, Connecticut; November 1986.
Distinguished Lecturer: Columbia University, College of Physicians and Surgeons, Department of Orthopaedics, New York, New York; December 1986.

1987

Organized and conducted: "Workshop on Hard Tissue and Ceramics," Santa Barbara, California; January 1987.
Invited Participant: "8th International Symposium on ADP-Ribosylation," Fort Worth, Texas; May/June 1987.
Invited Participant and Group Leader: "NIH/AAOS Workshop on Injury and Repair of the Musculoskeletal Soft Tissues," Savannah, Georgia; June 1987.
Invited Participant: MDA "Colloquium on Growth Regulation in Normal and Dystrophic Muscle," MIT Endicott House, Dedham, Massachusetts; July/August 1987.
Symposium Lecturer at the Annual Meeting of the Chilean Society of Biology (Cell Biology Section), Santiago, Chile; September 1987.
Invited Participant: Battelle Pacific Northwest Laboratories/U.S. Department of Energy workshop on "Chemistry at Interfaces," Richland, Washington; October 1987.
Invited Lecturer and Proposer: CIBA Foundation Symposium No. 137, "Cell and Molecular Biology of Hard Tissue," London, England; October 1987.
Invited Lecturer, "Midwest Connective Tissue Workshop," Chicago, Illinois; November 1987. Keynote Speaker: "Conference on Mineralized Tissues and Biomaterials," Bordeaux, France; December 1987.

SELECTED ADDRESSES

1988

Invited Discussant: "Second International Workshop on Cells and Cytokines in Bone and Cartilage," Davos, Switzerland; April 1988.

Organizer and Participant: "Bioactive Factors from Bone: A Celebration for Marshall Urist," San Antonio, Texas; May 1988.

Invited Participant: Third Annual Bone Workshop, "The Role of Growth Factors in Bone Formation," sponsored by Merck Sharp & Dohme Research Laboratories, Branchburg Farms, New Jersey; July 1988.

Invited Participant: "Workshop on Myocardial Regeneration," Rockefeller University, New York, New York; June 1988.Invited Participant: "Workshop on Bone Healing," Genentech, Inc., San Francisco, California; August 1988.

Invited Speaker: "Third Annual Meeting of the Orthopaedic Research Society of Japan," Tokyo, Japan; September 1988.

Invited Lecturer and Chairperson: "The Third International Conference on the Chemistry and Biology of Mineralized Tissues," Chatham, Massachusetts; October 1988.

Invited Lecturer: "Midwest Connective Tissue Workshop," Chicago, Illinois; November 1988.

1989

Invited Lecturer: "International Symposium on Recent Advances in Drug Delivery Systems," Salt Lake City, Utah; February 1989.

Invited Lecturer: "The XXI European Symposium on Calcified Tissues," Jerusalem, Israel; March 1989.

Organizer and Symposium Lecturer: "Cellular and Molecular Biology of Skeletal Repair," Cleveland, Ohio; April 1989.

Invited Participant: "Bone Biology Workshop," organized by Merck Sharp & Dohme Research Laboratories, Branchburg Farms, New Jersey; June 1989.

Invited Lecturer: Gordon Research Conference, "Biology of Aging," Plymouth, New Hampshire; July 1989.

Invited Lecturer: "National Conference on Biotechnology Ventures," Redwood Shores, California; November 1989.

Invited Lecturer: "Controversies of Total Knee Arthroplasty: Issues for the Nineties," sponsored by The Knee Society, Phoenix, Arizona; November 1989.

Invited Lecturer: "Materials Research Society, Fall Meeting," Boston, Massachusetts; November/December 1989.

Invited Lecturer: "Conference on Mineralized Tissue and Biomaterials," Bordeaux, France; December 1989.

1990

Distinguished Professor Lecture: Hospital for Special Surgery, Cornell Medical School, New York, New York; February 1990.

Kappa Delta Award Lecture at the Annual Meeting of the American Academy of Orthopaedic Surgeons, New Orleans, Louisiana; February 1990.

Invited Lecturer: UCLA Symposium on "Tissue Engineering," Keystone, Colorado; April 1990.

Invited Lecturer: NATO Advanced Research Workshop, "Developmental Patterning of The Vertebrate Limb," Santander, Spain; September 1990.

Invited Lecturer: Ohio Symposium on "Advances in Biomaterials Science and Engineering," Cleveland, Ohio; October 1990.

Invited Lecturer: Midwest Connective Tissue Workshop, Chicago, Illinois; November 1990.

Invited Participant: Workshop on "The Bone Biomaterials Interface," Toronto, Canada; December 1990.

1991

Organizer/Participant: Workshop on "Materials Processing Strategies for Producing Useful Ceramic Materials Biomimetically," San Diego, California; January 1991.

Invited Lecturer: "International Update on Bone Allografts Symposium," Washington, D.C.; April 1991.

Organizer/Participant: Workshop on "Orthopaedic Applications of Growth Factors," Indianapolis, Indiana; April 1991.

Invited Lecturer: "Annual Meeting of the Scanning Microscopy Society," Bethesda, Maryland; May 1991.

Invited Lecturer: "International Conference on the Biological Mechanisms of Tooth Movement and Craniofacial Adaptation," Columbus, Ohio; May 1991.

Invited Lecturer: "European Developmental Biology Congress," Jerusalem, Israel; August 1991.

Invited Lecturer: Midwest Connective Tissue Workshop, Chicago, Illinois; November 1991.

Invited Lecturer: Workshop on "Biology of Biomechanics of Synovium: The Knee as a Model," Scottsdale, Arizona; November 1991.

1992

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Invited Lecturer: Controlled Release Society Workshop: "Biomaterials, Fundamentals, Applications and Recent Developments," Jupiter Beach, Florida; January 1992.
Invited Lecturer: "4th International Conference on Calcified Tissues," Del Coronado (San Diego), California; February 1992.
Invited Lecturer: Keystone Symposia on Molecular and Cellular Biology: "Tissue Engineering," Keystone, Colorado; April 1992.
Invited Lecturer: "Biotech Ohio," Columbus, Ohio; May 1992.
Invited Participant: "4th International Conference on Limb Development and Regeneration," Asilomar (Pacific Grove), California; June 1992.Invited Participant: "Frontiers in Rehabilitation Medicine: Osteogenesis Imperfecta," NIH, Bethesda, Maryland; September 1992.
Invited Participant: Midwest Connective Tissue Workshop, Chicago, Illinois; October 1992.
Invited Lecturer: European Research Conference, "Biology of Cartilage and Bone: Molecular and Cellular Aspects," sponsored by European Science Foundation, Obernai, France; November 1992.

1993

Invited Lecturer: "The Biological Approach to Hard and Soft Tissue Reconstruction and Repair Processes" Centennial Celebration, Dental School/Northwestern University, Chicago, Illinois; January 1993.
Invited Lecturer: Ralph V. McKinney, Jr. Memorial Symposium, "Experimental Evaluations of the Bone-Dental Interface," IADR/AADR Annual Meeting, Chicago, Illinois; March 1993.
Invited Lecturer: "Bone Repair and Osteoporosis", IBC Conference, San Francisco, CA; June 1993.
Invited Lecturer: "Portland Bone Symposium," Portland, Oregon; July 1993.
Invited Lecturer: "Frontiers of Implant Science" Symposium, American Academy of Implant Dentistry Regional Foundation Annual Meeting, Dallas Texas; October 1993.
Invited Lecturer: "International Conference on the Biological Mechanisms of Tooth Eruption, Resorption and Replacement by Implants," Danvers, Massachusetts; October 1993.
Invited Participant: "Bone Repair" Symposium, National Institutes of Health/American Academy of Orthopaedic Surgeons Conference, Tampa, Florida; November 1993.

1994

Invited Lecturer: "Symposium on BMP and Bone Repair," Johns Hopkins University, Baltimore, Maryland; June 1994.
Invited Lecturer: "FASEB Summer Research Conference on Repair and Regeneration: At the Interface," Saxtons River, Vermont; July 1994.
Invited Lecturer: "Gordon Research Conf on Bioengineering and Orthopaedics Sciences,"; August 1994.
Invited Lecturer: "European Tissue Culture Soc Symp on Applied Cell Culture," Verona, Italy; Oct 1994.
Invited Lecturer: "Annual Meeting of the National Capital Area Tissue Culture Society," College Park, Maryland; October 1994.

1995

Invited Lecturer: "Developmental Biology" Graduate Course, University of Puerto Rico, San Juan, Puerto Rico; February 1995.
Invited Lecturer: "International Symposium on Bone and Soft Tissue Allografts," Musculoskeletal Transplantation Foundation, Washington, D.C.; April 1995.
Invited Lecturer: "Portland Bone Meeting," Portland, Oregon; August 1995.
Invited Lecturer: "Tissue Engineering and Bone/Cartilage Stimulation," IBC Conference, Washington, D.C.; August 1995.
Session Chair and Presenter: "5th International Conference on the Chemistry and Biology of Mineralized Tissue," Kohler, Wisconsin; October 1995.
Invited Lecturer: "Second International Symposium on Fibrodysplasia Ossificans Progressiva," Philadelphia, Pennsylvania; October 1995.
Invited Lecturer: "Second Combined Meeting of the USA, Japanese, Canadian and European Orthopaedic Research Societies," Del Coronado, California; November 1995.

1996

Invited Lecturer: "Tissue Engineering/Wound Repair," Keystone Symposia on Molecular and Cellular Biology, Taos, New Mexico; January 1996.
Invited Lecturer: "Stem Cells," Branbury Conference, Cold Spring Harbor, NY; February 1996
Invited Lecturer: "Fifth Internl Workshop on Calcified Tissues," Jerusalem, Israel; March 1996.
Invited Lecturer: National Disease Research Interchange."Frontiers in Human Tissue Research". Philadelphia, PA; April 1996.
Invited Lecturer: "Scientific Frontiers in Clinical Density," NIH, Bethesda, Maryland; June 1996.

SELECTED ADDRESSES

Invited Lecturer:"6th International Conference on the Molecular Biology and Pathology of Matrix," Philadelphia, Pennsylvania; June 1996.
Invited Lecture:Washington, DC section of AADR, Dental & Medical Materials Group of N.I.S.T., NIH, Bethesda, MD, June, 1996
Symposium Lecture:"The Intl Cong on Human Cell and Cell Culture", Tokyo, Japan, August, 1996.
Invited Plenary Lecture: "Third International Congress of the Cell Transplant Society," Miami Beach, Flordia, September 1996.

1997

Invited Lecture: Keystone Symposia on Molecular and Cellular Biology, "Biology of Sarcomas II: Molecular, Pathologic, and Oncologic Aspects of Mesenchymal Growth and Differentation," Copper Mountain, Colorado. February 1997.
Invited Lecture: Gordon Conf on "Wound Repair". Colby-Sawyer College, New Hampshire. June, 1997.
Invited Lecture: Workshop on "Osteobiology", Salsomaggiore, Italy. June, 1997.
Invited Lecture: "International Symposium on Gene Therapy for Single Gene Disorders," Helsinki, Finland, June, 1997.
Invited Lecture: Fifth Annual Course on "Advances in Tissue Engineering" Rice University, Houston, Texas, August, 1997.
Invited Lecture: 7th Ann. Mtg. of the "European Tissue Repair Society", Cologne, Germany, August, 1997.
Invited Lecture and Session Chair: IBC Conference on "Skin Substitutes", Boston, MA, September,1997.
Invited Lecture: European Tissue Culture Society Annual Meeting. Mainz, Germany. October, 1997.
Invited Lecture/Participant: Workshop on "Fracture Repair Agumentation" Organized by the Association of Bone and Joint Surgeons and the Intl Society for Fracture Repair. Tampa, Florida, October, 1997.

1998

Invited Lecture: Harvard University "Biology, Biochemistry and Physiology of the Skeletal Systems of Vertebrate," Boston, MA, February, 1998.
Invited Lecture: Tissue Engineering Course: Food and Drug Administration, Rockville, MD, March,
Invited Lecture: 1998 MSGSA Symposium the University of Calgary, Alberta, Canada, April, 1998.
Invited Lecture: The Cleveland Clinic Foundation, Division of Rheumatology and Immunologic Diseases, Cleveland, Ohio, May, 1998.
Invited Lecture: The 50th Anniversary of the Dental School Research Symposium. University of Alabama, Birmingham, Alabama, May, 1998.
Invited Lecture: Tissue Engineering Course, Rice University, Houston, Texas, August, 1998.
Plenary Lecture: "North Sea Biomaterials Conference" and "The 14th European Society for Biomaterials Conference." The Hague, The Netherlands, September, 1998.
Invited Lecture: Annual Meeting of the Biomedical Engineering Society, Cleveland, Ohio, October, 1998.
Organizer and Lecturer: Orthopaedic Tissue Engineering Workshop, Tampa, Florida, November, 1998.
Plenary Lecture: "Second Tissue Engineering Society Meeting" Orlando, Florida, December, 1998.
Invited lecture: "2nd SIS Symposium," Orlando, Florida, December, 1998.

1999

Invited Lecture: IBC 2nd Annual Conference on "Orthopaedic Biomaterials," Cambridge, MA, March,.
Presidential Guest Lecture: 72nd Annual Mtg of the Japanese Orthop. Assn, Yokohama, Japan, April, 1999.
Invited Lecture and Session Chair: Workshop on "Cartilage Repair," Lake Tahoe, California, June, 1999.
Invited Participant: New Frontiers in Medical Science "Redefining Hyaluronan," Padua, Italy, June, 1999.
Symposium Lecture: The 5th Annual Orthop. Symposium, School of Medicine, Stony Brook, NY, June, 1999.
Session Chair: "Portland Bone Symposium," Portland, Oregon, August, 1999.
Invited Lecture: "Advances in Tissue Engineering," Rice University, August, 1999.
Symposium Lecture: "4th Intl. Symposium of Tissue Eng. for Therapeutic Use." Kyoto, Japan, September, 1999.
Symposium Lecture: 14th Annual Orthopaedic Research Meeting, Nara, Japan, October, 1999.
Symposium Lecture: Fondation Rene Touraine Pour La Recherche Dermatologie, "Extracellular Matrix." Paris, France, October, 1999.
Participant/Group Leader: Technology Forum Workshop: NIH/FDA, Bethesda, MD, November, 1999.
Invited Lecture: ABJS Workshop "Orthopaedics and Gene Therapy" Tampa, FL, November, 1999.
Invited Participant: Bone Engineering International Workshop, Institute for Biomaterials and Biomedical Engineering, University of Toronto, November, 1999.

2000

Invited Lecture: Tissue Engineering Symposium, Pittsburg, PA, April, 2000.
Invited Lecture: Cartilage Repair Society Annual Meeting, Tossburg, Sweden, April, 2000.
Invited Lecture: NYAS "Tissue Repair and Remodeling in Arthritis," New York City, NY, May, 2000.

SELECTED ADDRESSES

Invited Lecture: Symposium on "Stem Cells in the Embryo and in the Adult Prospects for Therapy." Collège de France, Paris, May, 2000.
Invited Lecture: Gordon Research Conference, "Signal Transduction by Engineered Extracellular Matrices," June, 2000.
Invited Lecture: "HA 2000" Conference, Wales, Great Britain, September, 2000.
Invited Lecture: "Functional Tissue Engineering Workshop" Sponsored by the U.S. Nat'l Committee on Biomechanics, Tampa, FL, September, 2000.
Invited Lecture: ABJS "Articular Cartilage Repair 2000" Tampa, FL, November, 2000.
Invited Lecture/Organizer: L'Oreal Symposium on "The Science and Technology of Skin" Lyon, France, October, 2000.
Invited Lecture: Italian Orthopaedics Society Annual Meeting. Torino, Italy, October, 2000.
Invited Lecture: Annual ASTM Meeting. "Cell-Based Therapies," Orlando, FL, November, 2000.
Invited Lecture and Teaching Seminar: "The Art of Tissue Engineering 2000" Utrecht, The Netherlands, November 2000.
Invited Lecture: Engineering Orthpaedics, University of Michigan, Ann Arbor, MI, December 2000.

2001

Invited Lecture: Annual Research Meeting of Otolaryngology Society. "Tissue Engineering Symposium" St. Petersburg, FL, February 2001.
Organizer/Lecture: Workshop on "STEM CELLS" at the Annual Meeting of the Orthopaedic Research Society, Dallas, Texas, February 2002.
Invited Lecture: Ernst Klenk Symposium. "Stem Cells" Cologne, Germany, February, 2001.
Invited Lecture: Arthritis Foundation Research Conference. San Diego, CA, March 2001.
Invited Lecture/Organizer: Engineering Tissue Growth, International Conference, Pittsburgh, PA, March.
Invited Lecture: Experimental Biology/Am. Soc. Of Investigative Pathology, Orlando, FL, April 2001.
Organizer: Midwest Tissue Engineering Consortium Annual Meeting, Cleveland, Ohio, April 2001.
Invited Lecture: European Congress of Rheumatology. Symposium on Stem Cells, Prague, Czech Republic, June 2001.
Invited Lecture: World Congress of Biomedical Engineering. "Tissue Engineering Symposium" and "Toxicology of Skin Symposium." St. Louis, MO., June 2001.
Invited Participant: BECON 2001. "Reparative Medicine: Growing Tissues and Organs" NIH, Bethesda, MD, June 2001.
Invited Participant: Stem Cell Workshop, NIH, Bethesda, MD, August 2001.
Invited Lecturer: Annual Midwest Seminars of Dental Medicine, Green Bay, WI, September, 2001.
Invited Lecturer: Topics in Geriatric Medicine. Veterans Administration Hospital, Cleveland, OH, September, 2001.
Invited Participant: Ostoegenesis Imperfecta. NIH Workshop, Chicago, IL, December, 2001.
Invited Lecturer: Symposium on Stem Cells, Eli Lilly Corporation, Indianapolis, IN, October, 2001.
Invited Lecture: World Congress of the OsteoArthritis Research Society International. Washington, DC, October 2001.
Invited Lecturer: "Tecvest 2001" New York, NY, October 2001.
Invited Keynote Lecturer: Binnial Meeting of the European Tissue Engineering Society, Freiburg, Germany, November, 2001.

2002

Invited Lecture: New Frontiers in Science and Technology Lecture Series. University of Buffalo Medical School, Buffalo, NY, January 2002.
Invited Lecture: "AO Conference on Cell Therapies in Orthopaedics", Zurich, Switzerland. March, 2002.
Invited Lecture: "MSCs and their use in Skeletal Tissue Regeneration", London, Ont. Canada, March, 2002.
Invited Lecture: Engineering Tissue Growth, Pittsburgh, PA, March 2002.
Invited Lecture: North American Vascular Biology Organization, Workshop on Tissue Engineering, Salt Lake City, Utah. April, 2002.
Invited Lecture and Meeting Moderator: Novartis Foundation Symposium #249 on Tissue Engineering, London, England, April, 2002.
Organizer/Founder: Midwest Tissue Engineering Consortium, 2nd Meeting, Ann Arbor, MI. April, 2002
Invited Lecture: McGowan Institute Distinguished Lecture Series, Pittsburgh, PA. April, 2002.
Invited Lecture: Society for Biomaterials Annual Meeting, Tampa, FL. April, 2002.
Invited Lecture: Senior Day Symposium, Park Synagogue, Cleveland Heights, OH. May 2002.
Invited Lecture: Symposium on TMJ, NIH, Bethesda, MD 2002.
Invited Lecture/Session Chair: Aegean Conference on Tissue Engineering, Myconos, Greece. May, 2002.

RESEARCH SUPPORT

Organizer/Lecture: Short Course on "Cell-Based Therapies and Tissue Engineering", Case Western Reserve University, Cleveland, OH. May, 2002.
Invited Lecture: Cartilage Repair Society Annual Meeting. Toronto, Canada, June, 2002.
Invited Lecture: Gordon Res. Conferences on Signal Transduction and Tissue Engineering. June, 2002.
Invited Lecture: Baltic Stem Cell Conference, University of Rostock, Rostock, Germany. June, 2002.
Invited Lecture: 10th Annual Tissue Engineering Course, Rice University, Houston, TX. August, 2002.
Organizer/Lecture: International Symposium on Aging of Skin. Cleveland, OH, September, 2002.
Invited Lecture/Course Director: Annual Meeting of the Society for Otolaryngology, San Diego, CA. September, 2002.
Invited Lecture: Italian Orthopaedic Society, Bologna, Italy. October, 2002.
Invited Lecture: ICCC and JSGST Symposium. Kyoto, Japan, October, 2002.
Invited Lecture: Cold Spring Harbor Laboratory Meeting on Stem Cells, Long Island, NY. Nov., 2002.
Invited Lecture: 1st Intl. Mtg. of the Stem Cell Network. North Rhine Westphalia, Düsseldorf Germany, November 2002.
Invited Lecture: University of Texas, San Antonio. Distinguished Professor Lecture. December, 2002.

2003

Invited Chair/Participant: AAOS Workshop, "Tissue Engineering in Musculoskeletal Clinical Practice" Santa Fe, NM. January, 2003.
Invited Lecturer: 2003 Alpha Group Educational Workshop. Antigua. February, 2003.
Invited Lecturer/Organizer: 3rd Engineering Tissue Growth Intl. Conf. and Exposition. Pitts., PA, March 2003.
Invited Lecturer: 29th Mtg. of the Society for Biomaterials. Reno, NV, April 2003.
Invited Lecturer: Keystone Conference "Stem Cells", Steamboat Springs, CO, April 2003.
Invited Lecturer: Research Frontiers Symposium. University of Alabama, Birmingham, AL, April 2003.
Organizer: Midwest Tissue Engineering Meeting. Cincinnati, OH, April 2003.
Invited Lecturer: Gerontology Inst. Workshop on Stem Cells. Univ. of Michigan, Ann Arbor, MI, May 2003.
Organizer: 2nd Annual Cell-Based Therapies and Tissue Engineering Short course (CTTE-2003), Case Western Reserve University, Cleveland, May 2003.
Webcast: Invited by Tissue Engineering Society, June 2003.
Invited Lecturer: 2nd Mtg. of the Institute of Arthritis and Pain. Vienna, July 2003
Invited Lecturer: Alegent Healthcare Institute, Omaha, NB, August 2003.
Invited Lecturer: Distinguished Scientist Lecture Series "Health Sciences and Engineering" Dept. of Biomedical Engineering, University of Michigan, Ann Arbor, MI, October 2003.
Invited Lecturer: Workshop on Osteogenesis Imperfecta, New York, NY, October 2003.
Invited Lecturer: Glaxo/Smith/Kline Stem Cell Symposium, Philadelphia, PA, October 2003.
Invited Lecturer: Workshop on Osteoarthritis (ABJS). Tampa, FL, November 2003.
Invited Lecturer: International Biomaterials Conference, Japan, December 2003.

2004

Invited Lecturer: The Bone Summit (International Meeting), Cleveland, OH, May 2004.
Invited Lecturer: International Cartilage Repair Society, Ghent, Belgium, May 2004.
Organizer: 3rd Annual Cell-Based Therapies and Tissue Engineering Short course (CTTE-2004), Case Western Reserve University, Cleveland, May 2004.
Invited Lecturer: Distinguished Scientist Lecture Series, Mayorca, Spain, June 2004.
Invited Lecturer: Tissue Engineering Symposium LEMI, Bordeaux, France, June 2004.
Instructor: Medical Uses of Hyaluronan, Sanofi Course, New York, NY, June 2004.
Invited Lecturer: Tissue Engineering Course, Rice University, Houston, TX, August 2004.
Invited Lecturer: BioCity Symposium on Regenerative Medicine, Turku, Finland, August 2004.
Invited Lecturer: NCI: CTER Symposium Sacroma and MSCs, Washington, DC, September 2004.
Invited Lecturer: Musculoskeletal Ventures Symposium, Memphis, TN, October 2004.
Invited Lecturer: BioCity Symposium on Stem Cells, Stuttgart, Germany, November 2004.

2005

Invited Lecturer: MSCs and Tissue Engineering and New Insights into Aging, Departments of Cell Biology and Pathology, UCSF, San Francisco, CA, January 2005.
Invited Lecturer: Regenerate 2005, Hilton Head SC, March 2005.
Invited Lecturer: Knowles Lecture, Arthritis Foundation, San Francisco, CA, April 2005.
Invited Lecturer: The Cartilage Summit, Cleveland OH, May 2005.
Invited Lecturer: Tissue Engineering Symposium, Warsaw, Poland, May 2005.
Invited Lecturer: 2nd International Conference on Tissue Engineering, Crete, Greece, May 2005.

RESEARCH SUPPORT

Organizer: 4th Annual Cell-Based Therapies and Tissue Engineering Short course (CTTE-2005), Case Western Reserve University, Cleveland, May 2005.
Invited Lecturer: IX International Conference on Osteogenesis Imperfecta, Annapolis, MD, June 2005.
Distinguished Lecturer: Division of Orthopaedics, University of California at Sacramento, CA, June 2005.
Invited Lecturer: Tissue Engineering Course, Rice University, Houston, TX, August 2005.
Invited Lecturer: LOEX Symposium 2005, Sainte Foy, Quebec Canada, September 2005.
Invited Lecturer: Current Progress in Tissue Engineering and Regenerative Medicine, Harvard University Review Course, Boston, MA, September 2005.
Invited Advisor/Participant: Annual Australian Stem Cell Centre International Scientific Advisory Board Meeting, Melbourne, Australia, November 2005.
Invited Lecturer: Regenerative Medicine Institute, National Centre for Biomedical Engineering and Science, National University of Ireland, Galway Ireland, October 2005.
Invited Lecturer: The 13th Annual Congress of the European Society of Gene Therapy, Prague, Czechoslovakia, October 2005.

2006

Invited Participant: American Orthopaedic Society for Sports Medicine, La Jolla, CA, January 2006.
Invited Keynote Speaker: International Cartilage Repair Society Meeting, San Diego, CA, January 2006.
Invited Keynote Speaker: 24th Scientific Conference Society Physical Regulation in Biology and Medicine, Cancun, Mexico, January 2006.
Invited Lecturer: Buck Institute and CHORI (Oakland), San Francisco, CA, January 2006.
Invited Participant: Workshop on Pain and Osteoarthritis, Phoenix, AZ, January 2006.
Keynote Speaker: Adult Stem Cell Summit, Chicago, IL, March 2006.
Organizer/Participant: InterWest Workshop on Cell-Based Therapy, Napa Valley, CA, April 2006.
Invited Lecturer: 6th Regenerate International Conference and Exposition, Pittsburgh, PA, April 2006.
Organizer: 5th Annual Cell-Based Therapies and Tissue Engineering Short course (CTTE-2006), Case Western Reserve University, Cleveland, May 2006.
Invited Speaker: BioMed 2006, Jerusalem, Israel, June 2006.
Invited Seminar: Cell Biology Department, Tel Aviv University, Israel, June 2006.
Invited Speaker: AO Trustees Meeting (Stem Cells). Berne, Switzerland, June 2006.
Invited Participant: ISSCR Meeting, Toronto, Canada, July 2006.
Invited Speaker: CHI CELLutions Summit, Boston, MA, August 2006.
Invited Speaker: 14th Annual Tissue Engineering Course, Rice University, Houston, TX, August 2006.
Invited Lecturer: International Meeting "Embryonic and Somatic Stem Cells-Regenerative Systems for Cell and Tissue Repair", Dresden, Germany, September 2006.
Organizer: After Meeting Think Tank Shoulder Society, Chicago, IL, September, 2006.
Invited Speaker: AAOS Development in Orthopaedics. Toronto, Canada, October, 2006.
Invited Speaker: Marshall S. Levy, MD, Memorial Lecture, Pittsburgh, PA, November, 2006.

2007

Invited Lecturer: Center for Cranial Facial Biology, USC, Los Angeles, CA, January 2007.
Organizer/Lecturer: NSF/NIH Workshop on Tissue Engineering, Regenerative Medicine and Stem Cells, Arlington, VA, February 2007.
Invited Lecturer: Stem Cell Summit, San Diego, CA, February 2007.
Invited Lecturer: Genzyme Corporation, Boston, MA, February 2007.
Invited Lecturer: Grand Rounds, Department of Rheumatology, UH, CWRU, March 2007.
Invited Lecturer: Annual Meeting Veterinary Orthopaedic Surgeons, Sun Valley, ID, March 2007.
Invited Lecturer: Graduate Student Research Day, University of Toledo, Toledo, OH, March 2007.
Invited Lecturer: Keystone Conference "Development and Tissue Engineering", Snowbird, UT, April 2007.
Invited Lecturer: International Workshop on Hyaluronan, Charleston, SC, April 2007.
Invited Lecturer: Workshop on Functional Tissue Engineering, Hilton Head, SC, April 2007.
Invited Lecturer: Melvin Glimcher Symposium, Harvard University, Boston, MA, May 2007.
Invited Lecturer: Regenerative Medicine Conference, University of Toronto, Toronto, Canada, June 2007.
Invited Lecturer/Session Chair: TERMIS North America, Toronto, Canada, June 2007.
Invited Lecturer: 15th Annual Tissue Engineering Course, Rice University, Houston, TX, August 2007.
Invited Lecturer: Internal Symposium on Regenerative Medicine, Mulhouse, France, September 2007.
Invited Lecturer: International Cartilage Repair Society, Warsaw, Poland, September 2007.
Invited Lecturer: Department of Cell and Molecular Biology Seminar and also the Graduate Stem Cell Course, University of North Carolina at Chapel Hill, October 2007.

RESEARCH SUPPORT

Invited Lecturer: Department of Experimental Medicine and Pathology, Medical School, Universita La Sapienza, Rome, Italy, November 2007.
Invited Lecturer: Italian Society of Orthopaedics and Trauma Annual Meeting, Bologna, Italy, November 2007.
Invited Lecturer: Harvard Stem Cell Institute, Boston, MA, November 2007
Invited Lecturer: The McKnight Brain Institute's Program in Stem Cell and Regenerative Medicine. Amelia Island, FL, December 2007.

2008

Invited Lecturer: Department of Cell Biology and Anatomy Seminar Program, Medical University of South Carolina; Charleston, SC, January 2008.
Invited Lecturer: The Stem Cell Summit; New York, NY, February, 2008.
Invited Lecturer: International Chinese Hard Tissue Society Symposium; San Francisco, CA, March 2008.
Invited Lecturer: ORS/AAOS, Combined Symposium; San Francisco, CA, March 2008.
Invited Lecturer: Biomedical Engineering Department; Distinguished Lecturer, Johns Hopkins University, Baltimore, MD, April 2008.
Keynote Speaker: Midwest Tissue Engineering Consortium, Cincinnati, OH, April, 2008.
Invited Lecturer: Academy of Medical Sciences, Moscow, Russia, April 2008.
Invited Lecture: Moscow Orthopaedic Institute, Moscow, Russia, April 2008.
Invited Lecturer: The Cartilage Summit, Cleveland Clinic Foundation; Cleveland, OH, May 2008.
Invited Lecturer: Distinguished Professor Lecture, Hospital for Special Surgery, New York, NY, May 2008.
Invited Member: Biomaterials National Program: Meeting of International Scientific Advisory Panel, Utrech, The Netherlands, June, 2008.
Invited Lecturer: Stem Cell Symposium, Catholic University, Seoul, S. Korea, June, 2008.
Invited Lecturer: Department of Medical Biology. Daegu University, Daegu, S. Korea, June, 2008.
Invited Lecturer: Cell Signaling and Regenerative Medicine, Gordon Research Conference, Lewiston, Maine, July, 2008.
Organization and Lectured: Second Annual Executive Education Course in "Regenerative Medicine and Entrepreneurism", Cleveland, OH, July 2008.
Organizer and Lecturer: MSC 2008, Regenerative Medicine & Adult Stem Cell Therapy International Meeting, Cleveland, Ohio, August, 2008.
Invited Lecturer: 15th Annual Tissue Engineering Course, Rice University, Houston, TX, August, 2008.
Invited Lecturer: Science of Autism Meeting, Thoughtful House, Austin, TX, September, 2008.
Invited Lecturer: Department of Biology, Graduate Department Seminar Series, Cleveland State University, Cleveland, Ohio, October, 2008.
Invited Lecturer: The McGowan Distinguished Professor Lecture, McGowan Institute, University of Pittsburgh, Pittsburgh, PA, October, 2008.
Invited Lecturer: The International Cartilage Repair Society "Strategic Issues in Cartilage" Meeting, Miami, Florida, October, 2008.
Invited Lecturer: The 9th New Jersey Symposium on Biomaterials Science and Regenerative Medicine. University of New Jersey Medical College, Rutgers, NJ October, 2008.
Invited Lecturer: HEMO2009, 2 plenary lectures, San Paulo, Brazil, November, 2008.
Invited Lecturer: Department of Genetics, Universidade Federal do Rio Grande do Sul, Porto Alegre RS, Brazil, November, 2008.

2009

Invited Lecturer: University of Twente, Faculty Science & Technology, Institute for Biomedical Technology. The Netherlands, January, 2009.
Invited Lecturer: Cardiology Grand Rounds; Jefferson Medical School. Philadelphia, PA, January, 2009.
Invited Lecturer: 4th Annual Stem Cell Summit. New York, New York, February, 2009.
Invited Lecturer: Annual American Academy of Orthopaedic Surgeons, Pediatric Orthopaedic Surgeons of North America (Specialty Day: Basic Science Lecture). Las Vegas, NV, February, 2009.
Invited Lecturer: Stamcelinstituut Leuven (SCIL). Brussels, Belgium, April, 2009.
Invited Lecturer: Second Annual Translational Medicine Alliance Forum. Philadelphia, PA, May, 2009,
Organizer: 8th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE-2009). Case Western Reserve University, Cleveland, May, 2009.
Invited Lecturer: 3rd International Stem Cell Meeting. Tel Aviv, Israel, June, 2009.
Invited Lecturer: Rambam Medical Center, Haifa, Israel, June, 2009.
Organizer and Lecturer: Second Annual Business Course in Regenerative Medicine and Entrepreneurism, Case Western Reserve University. Cleveland, Ohio, July, 2009.

RESEARCH SUPPORT

Organizer and Lecturer: MSC09, Regenerative Medicine & Adult Stem Cell Therapy International Meeting, Cleveland, Ohio, August, 2009.
Invited Lecturer: 17th Annual "Advances in Tissue Engineering". Rice University, Houston, TX, August, 2009.
Invited Lecturer: Children's Hospital Medical Center of Akron. Akron, Ohio, August, 2009
Invited Lecturer: McGill University, Engineering School, Montreal, Canada, September, 2009
Invited Lecturer: University of Pretoria, Forestry and Agricultural Biotechnology Institute (FABI). Pretoria, South Africa, September, 2009.
Invited Lecturer: Symposium: The Science of Cartilage Repair. Chicago, Illinois, October 2009.
Invited Lecturer: IFATS 2009 Conference. Daegu, South Korea, October, 2009.
Invited Lecturer: Carnegie Mellon University, Dept. of Biological Sciences. Pittsburgh, PA, November, 2009.

2010

Invited Lecturer: Stem Cell World Congress. San Francisco, CA, January 2010.
Invited Lecturer: 5th Annual Stem Cell Summit, New York, NY, February 2010.
Invited Lecturer: Department of Rheumatology, Metrohealth, Cleveland, Ohio, March, 2010.
Invited Lecturer: Veterinary and Regenerative Medicine, Santa Ynez, Ca, March 2010.
Invited Lecturer: OrthoIndy Journal Club: Indianapolis, IN, March 2010.
Organizer: 9th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE-2009). Case Western Reserve University, Cleveland, May, 2010.
Organizer and Lecturer: Third Annual Business Education Course: The Business of Regenerative Medicine: From Stem Cells to the Market Place, Case Western Reserve University. Cleveland, Ohio, July, 2010.
Organizer and Lecturer: MSC09, Regenerative Medicine & Adult Stem Cell Therapy International Meeting, Cleveland, Ohio, August, 2010.
Invited Lecturer: 18th Annual Tissue Engineering Course, Rice University, August, 2010.
Invited Lecturer: V Brazilian Congress on Stem Cells and Cell Therapy, Gramado, RS, Brazil, September 2010
Invited Lecturer: National Institute of Science and Technology for Stem Cells and Cell Therapy, Ribeirão Preto, Brazil, September 2010.
Invited Lecturer: Butantan Institute, São Paulo-SP, Brazil, September, 2010.
Invited Lecturer: 2010 World Stem Cell Summit, Detroit, MI, October 2010.
Invited Lecturer: GE Global Research Cell Manufacturing 2010 Symposium, Niskayuna, NY , October 2010.
Invited Lecturer: 10th New Jersey Symposium on Biomaterials Science, New Brunswick, NJ, October 2010.
Invited Lecturer: TERMIS NA 2010, Orlando, FL, December 2010

2011

Invited Lecturer: Center for Law, Technology & the Arts-JOLTI, Case Western Reserve University School of Law, Cleveland, OH, January 2011.
Invited Lecturer: 6th Annual Stem Cell Summit. NY, New York, March 2011.
Invited Lecturer: Rainbow Babies & Childrens Hospital, Pediatric Pulmonary Department, Case Western Reserve University, April 2011.
Invited Lecturer: 2011 Translational Regenerative Medicine Forum. Washington, DC, April 2011.
Invited Lecturer: Science, Engineering & Technology Gateway Ohio (SETGO), Bowling Green State University, Bowling Green, OH. April 2011
Invited Lecturer: 1st International Dental and Craniofacial Stem Cell Conference, Columbia University, New York, NY, April 2011.
Invited Lecturer: Geriatric Medicine, Case Western Reserve University. Cleveland, Ohio, April, 2011
Invited Lecturer: Biotime, Inc. Oakland CA, May 2011.
Organizer: 10th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE-2011). Case Western Reserve University, Cleveland, OH, May, 2011
Invited Lecturer: International Society for Stem Cell Research (ISSCR), Toronto, Canada, ON, June, 2011.
Invited Lecturer: American College of Rheumatology 2011 Pediatric Rheumatology Symposium, Miami, FL, June 2011.
Organizer and Lecturer: 4th Annual Business Education Course: The Business of Regenerative Medicine: From Stem Cells to the Market Place, Case Western Reserve University. Cleveland, OH, July, 2011.
Invited Lecturer: 19th Annual Tissue Engineering Course, Rice University. Houston, TX, August, 2011.
Organizer and Lecturer: MSC11, Regenerative Medicine & Adult Stem Cell Therapy International Meeting. Cleveland, Ohio, August, 2011.
Invited Lecturer: 1st Annual Cell Therapy Commercialization Summit (CTSC). Boston, MA, September, 2011.
Invited Lecturer: World Stem Cell Summit. Pasadena, CA, October, 2011.
Invited Lecturer: 8th Latin American Congress on Clinical Research. Buenos Aires, Argentina, October, 2011.

RESEARCH SUPPORT

Invited Lecturer: University of Wisconsin, Stem Cell & Regenerative Medicine Center. Madison, WI, November, 2011
Invited Lecturer: 2011 ACR/ARHP Annual Scientific Meeting, Chicago, IL, November 2011.
Invited Lecturer: Life Sciences Summit 2011. New York, NY, November, 2011.
Invited Lecturer: NY Academy of Sciences Symposium: "Advances in Adult Stem Cell Therapy in Tissue Repair for Cardiovascular Diseases". New York, NY, November, 2011.
Invited Lecturer: Center for Advanced Research and Technology Summit. Bridgewater, NJ, November, 2011.

2012

Invited Lecturer: 7th Annual New York Stem Cell Summit. New York, NY, February 2012.
Invited Lecturer: Cell Society Meeting, San Diego, CA, February 2012.
Invited Lecturer: Department of Orthopaedics, UCLA, Los Angeles, CA February 2012.
Invited Lecturer: Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction Winter Meeting, New Orleans, LA, March 2012
Invited Lecturer: Medical University of South Carolina Spine Care Conference, Kiawah Island, SC, May 2012.
Invited Lecturer: Till & McCulloch Meeting, Montreal, Canada, May 2012.
Invited Lecturer: Stem Cell Institute Catholic University of Leuven, Belgium, May 2012
Organizer: 11th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE-2012). Case Western Reserve University, Cleveland, OH, May, 2012.
Invited Lecturer: Chicago Orthobiologics & Cell Regeneration Summit (CORS), Burr Ridge, IL, June 2012.
Invited Lecturer: Faculty of Medicine University of Monterrey, Monterrey, Mexico, June 2012.
Invited Lecturer: National Academy of Medicine of Mexico, Mexico, June 2012.
Organizer and Lecturer: 5th Annual Business Education Course: The Business of Regenerative Medicine: From Stem Cells to the Market Place, Case Western Reserve University. Cleveland, OH, July, 2012.
Invited Lecturer: International Conference on Mesenchymal Stem Cells, Galway, Ireland, July 2012.
Invited Lecturer: 20th Annual Tissue Engineering Course, Rice University. Houston, TX, August, 2012.
Organizer and Lecturer: MSC12, Regenerative Medicine & Adult Stem Cell Therapy International Meeting. Cleveland, Ohio, August, 2012.
Invited Lecturer: Life Sciences Baltics 2012 Conference, Vilnius, Lithuania, September 2012.
Invited Lecturer: Houston Stem Cell Summit, Houston, Texas, October 2012.
Invited Lecturer: Wake Forest Institute for Regenerative Medicine, Winston-Salem, NC, November 2012
Invited Lecturer: World Stem Cell Summit, West Palm Beach, Florida, December 2012

2013

Invited Lecturer: SpineSmith/Celling BioSciences; Austin, Texas January 2013
Invited Lecturer: Rainbow Babies & Children's Hospital, Pediatric Pulmonary; Cleveland, Ohio, January 2013
Invited Lecturer: 7th Annual Stem Cell Summit; NY, New York, February 2013.
Invited Lecturer: University of Miami; Miami, Florida, February 2013
Invited Lecturer: Israstem 2013; Ramat Gan, Israel, April 2013
Invited Lecturer: Stem Cell Institute; Panama City, Panama, May 2013
Organizer: 12th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE-2012). Case Western Reserve University; Cleveland, OH, May, 2013.
Invited Lecturer: University of Maryland FDA-CERSI Workshop; Bethesda, Maryland, May 2013
Invited Lecturer: OrthoTec Conference 2013; Warsaw, Indiana, June 2013
Invited Lecturer: European Society for Animal Cell Technology (ESACT); Paris, France, June 2013
Organizer and Lecturer: 6th Annual Business Education Course: The Business of Regenerative Medicine: From Stem Cells to the Market Place, Case Western Reserve University. Cleveland, Ohio, July, 2013.
Invited Lecturer: 21th Annual Tissue Engineering Course;, Rice University. Houston, Texas, August, 2013
Organizer and Lecturer: MSC13, Regenerative Medicine & Adult Stem Cell Therapy International Meeting; Cleveland, Ohio, August, 2013.
Invited Lecturer: Cell Society 3rd Annual Clinical Mtg., Coronado Is., San Diego, California, September 2013
Invited Lecturer: University Hospitals of Cleveland; Division of Pain Medicine, Cleveland, Ohio, October 2013
Invited Lecturer: World Summit on Regenerative Medicine; Xi'an, China October 2013
Invited Lecturer: TERMIS-AP; Wuzhen Town, China, October 2013
Invited Lecturer: Young Investigators Lecture, Waterside Resort, Wuzhen Town, China, October 2013
Invited Lecturer: Wulf H. Utian LLC; Advances and Promises of Stem Cell Technology, Woodmere, Ohio, October 2013
Invited Lecturer: Gaetano Pini Orthopaedic Hospital Milan, Italy, December 2013.
Invited Lecturer: San Raffaele Hospital, Milan Italy, December 2013.

RESEARCH SUPPORT

Invited Lecturer: ICRS Focus Meeting; Bologna, Italy, December 2013

2014

Invited Lecturer: 21st Annual Park Synagogue University Day, Cleveland Heights, Ohio, January 2014
Invited Lecturer: JP Morgan Healthcare Conference, San Francisco, CA, January 2014
Invited Lecturer: University of Virginia, Department of Biology, Charlottesville, VA, February 2014
Invited Lecturer: NBA Physician's Association, New Orleans, LA February, 2014
Invited Lecturer: American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, LA March 2014
Invited Lecturer: Wake Forest Institute for Regenerative Medicine, Winston-Salem, NC March 2014
Invited Lecturer: Ankara Cartilage Symposium 2014, Ankara, Turkey, April 2014
Invited Lecturer: Platform for Advanced Cellular Therapies (PACT) Symposium, Vienna, Austria, April 2014
Invited Lecturer: Stem Cells & Regenerative Medicine International Symposium, Seoul, S. Korea, April 2014
Invited Lecturer: 9th World Stem Cells and Regenerative Medicine Conference, London, England, May 2014
Invited Lecturer: University Hospitals Case Medical Center 23rd Annual Cleveland Review of Rheumatic Diseases, Cleveland, Ohio, May 2014
Organizer: 13th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE-2014). Case Western Reserve University; Cleveland, OH, May, 2014
Invited Lecturer: 22nd Annual World Congress on Anti-Aging, Regenerative and Functional Medicine, Orlando, FL, May 2014
Invited Lecturer: Stem Cells and Regenerative Medicine Congress, London, England, May 2014
Invited Lecturer: The Orthobiologic Institute 5th Annual PRP & Regenerative Medicine Symposium, Las Vegas, Nevada, June 2014
Invited Lecturer: USC Ostrow School of Dentistry Symposium 2014, Los Angeles, California, June 2014
Invited Lecturer: IV World Congress of Minimally Invasive Spine Surgery and Techniques 2014, Paris, France, June 2014
Invited Lecturer: 4th Annual International Vision Restoration: Regenerative Medicine in Ophthalmology, Pittsburgh, PA, June 2014
Organizer and Lecturer: 7th Annual Business Education Course: The Business of Regenerative Medicine: New Therapies, New Models, Centre for Commercialization of Regenerative Medicine. Toronto, ON, July 2014
Invited Lecturer: Human Longevity, Inc. San Diego, CA, July 2014.
Invited Lecturer: 22nd Annual Tissue Engineering Course; Rice University. Houston, Texas, August 2014
Organizer and Lecturer: NCRM Cancer Stem Cell Conference, Cleveland, Ohio August 2014
Invited Lecturer: 25th Annual North American Menopause Society, Washington, DC, October 2014
Invited Lecturer: American Society of Nephrology Kidney Week 2014, November 2014

2015

Invited Lecturer: Neurology Department, Case Western Reserve University, Cleveland, OH, January 2015
Invited Lecturer: NCRM Retreat, Case Western Reserve University, Cleveland, OH, March, 2015 (RENEW)
Invited Lecturer: Symposium on Advanced Wound Care (SAWC), San Antonio, TX, May 2015
Organizer: 14th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE). Case Western Reserve University; Cleveland, OH, May, 2015
Invited Lecturer: 2015 Mini Medical School, Case Western Reserve University, Cleveland, OH, May, 2015
Invited Lecturer: 22nd Annual Park Synagogue University Day, Cleveland Heights, Ohio, May, 2015
Invited Lecturer: ICRS International Meeting, Chicago, IL, May, 2015
Invited Lecturer: The Orthobiologic Institute 6th Annual PRP & Regenerative Medicine Symposium, Las Vegas, Nevada, June 2015
Invited Lecturer: XX Colegio Mexicano de Especialistas en Ginecologia y Obstetricia (COMEGO), (3 lectures), Mexico City, Mexico, June 2015
Organizer and Lecturer: 8th Annual Business Education Course: The Business of Regenerative Medicine: Cells at Work, Georgia Institute of Technology. Atlanta, GA, July 2015
Organizer and Lecturer: MSC15, Regenerative Medicine & Adult Stem Cell Therapy International Meeting; Cleveland, Ohio, August, 2015.
Invited Lecturer: 23rd Annual Tissue Engineering Course; Rice University. Houston, Texas, August 2015
Invited Lecturer: II Joint Preservation Congress (2 lectures), Warsaw, Poland September 2015
Invited Lecturer: 2015 4th TERMIS World Congress, Boston, MA, September 2015
Invited Lecturer: Alliance for the Advancement of Cellular Therapies Chicago Conference, Chicago, IL, September 2015
Invited Lecturer: ISCT South and Central America 2015 Regional Meeting (3 lectures), Santiago, Chile, October 2015
Invited Lecturer: Eastside Conversations, CWRU Siegal Lifelong Learning Ctr. Cleveland, OH, November 2015

RESEARCH SUPPORT

Invited Lecturer: Department of Cell Biology, University of Virginia, Charlottesville, VA November 2015
Invited Lecturer: American Society of Regional Anesthesia and Pain Medicine, Miami, FL, November 2015
Invited Lecturer: Global Men's Health Summit, Panama City, Panama, December 2015
Invited Lecturer: World Stem Cell Summit, Atlanta, Georgia, December 2015
Invited Lecturer: Institute of Advanced Biomedical Engineering and Science, Tokyo Women's Medical University, Tokyo, Japan, December 2015

2016

Invited Lecturer: Department of Orthopedics, Virginia Commonwealth University, Richmond, VA, January 2016
Invited Lecturer: Department of Pediatrics, Case Western Reserve University, Cleveland, OH, January 2016
Invited Lecturer: Harvard Stem Cell Institute MSC Colloquium, Boston, MA, March 2016
Invited Lecturer: Orthobiologics Consortium, Cedar Knolls, New Jersey, April 2016
Invited Lecturer: American Association of Orthopaedic Medicine Annual Conference, Clearwater, Florida, April 2016
Invited Lecturer: University of California, Davis Department of Orthopaedic (Grand Rounds), Davis, CA April 2016
Invited Lecturer: 9th Symposium on Biologic Scaffolds for Regenerative Medicine, Napa, California, April 2016
Organizer: 15th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE). Case Western Reserve University; Cleveland, OH, May, 2016
Invited Lecturer: 89th Annual Meeting of the Japanese Orthopaedic Association, Yokohoma, Japan, May 2016.
Invited Lecturer: Stem Cells in Medicine Conference, Panama City, Panama, May 2016.
Invited Lecturer: The Orthobiologic Institute 7th Annual PRP & Regenerative Medicine Symposium, Las Vegas, Nevada, June 2016
Invited Lecturer: 1st International Autologous Micro Fractured and Purified Adipose Tissue Graft Summit, Hangzhou, China, June 2016.
Organizer and Lecturer: 9th Annual Business Education Course: The Business of Regenerative Medicine: How To Build A Company, Harvard Stem Cell Institute, Boston, MA July 2016
Invited Lecturer: IV SOLCEMA Latin American Stem Cell Congress Santiago, Chile, July 2016
Invited Lecturer: National Youth Sports Health and Safety Institute and the American College of Sports Medicine "Innovation Think Tank" Vail, CO August 2016.
Invited Lecturer: 2nd Vail Scientific Summit on Regenerative & Translational Medicine, Vail, CO, August 2016
Invited Lecturer: 24th Annual Tissue Engineering Course; Rice University. Houston, TX, August 2016
Invited Lecturer: Karolinska Institutet, Hematology/Oncology, Stockholm, Sweden, September 2016
Invited Lecturer:3rd Cancer Stem Cell Conference, Cleveland, Ohio, September 2016
Invited Lecturer: 13th ICRS World Congress, Sorrento-Naples, Italy, September 2016
Invited Lecturer: SIGASCOT 2016 International Congress, Florence, Italy, September 2016
Invited Lecturer: First Inter American Regenerative and Cellular Medicine Conf., Havana, Cuba, October 2016
Invited Lecturer: Biochemistry Department, Case Western Reserve University, Cleveland, OH, November 2016
Invited Lecturer: 7th North American Veterinary Regenerative Medicine Association (NAVRMA) Conference, Amelia Island, FL, November 2016
Invited Lecturer: 2016 World Stem Cell Summit, West Palm Beach, FL, December 2016

2017

Invited Lecturer: Interventional Orthopedics Foundation Meeting, Denver Colorado, February 2017
Invited Lecturer: Menorah Park, CWRU Siegal Lifelong Learning Ctr. Cleveland, OH, March 2017
Invited Lecturer: Regenerative Medicine Workshop, Hilton Head, SC, March 2017
Invited Lecturer: Kenyatta National Hospital, College of Health Sciences, Nairobi, Africa, March 2017
Invited Lecturer: University Hospitals Cleveland Medical Center, Urology Institute, Cleveland, OH, April 2017
Invited Lecturer: I International Congress on Regenerative Medicine, San Jose, Costa Rica, April 2017
Invited Lecturer: Whitetulip Cleveland Medical Forum, Cleveland, OH, April 2017
Invited Lecturer: Stanford University School of Medicine (TOPS), Stanford, CA April 2017
Invited Lecturer: Isokinetic Conference Barcelona, Spain, May 1 2017
Organizer and Lecturer: 16th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE). Case Western Reserve University; Cleveland, OH, May, 2017
Invited Lecturer: Departments of Periodontics and Biological Sciences, Case Western Reserve University, Cleveland, OH, June 2017

RESEARCH SUPPORT

Invited Lecturer: The King's Fund, London, England, June 2017
Invited Lecturer: ICRS Heritage Summit, Gothenburg, Sweden, June 2017
Organizer and Lecturer: 10th Annual Business Education Course: The Business of Regenerative Medicine: Leadership, Innovation & Entrepreneurship, Centre for Commercialization of Regenerative Medicine; Toronto, ON, July 2017
Invited Lecturer: Hospital Zambrano Hellion TecSalud; Monterrey, Mexico, August 2017
Invited Lecturer: 22nd Annual Budapest Pain Conference; Budapest, Hungary, August 2017
Invited Lecturer: 25th Annual Tissue Engineering Course; Rice University. Houston, TX, August 2017
Invited Lecturer: 4th Joint Preservation Congress; Warsaw, Poland, September 2017
Invited Lecturer: 2017 Organ Transplantation Academic Conference; Wuhan, China, October 2017

2018

Invited Lecturer: World Stem Cell Summit; Miami Florida, January 2018
Invited Lecturer: Phacilitate Leaders Forum; Miami, Florida, January 2018
Invited Lecturer: 4th Annual Perinatal Stem Cell Society Congress; Salt Lake City, Utah, February 2018
Invited Lecturer: The Medical Association of the Bahamas 46th Annual Scientific Conference; Nassau, Bahamas, March 2018
Invited Lecturer: American Society of Interventional Pain Physicians 20th Annual Meeting; Orlando, FL, March 2018
Invited Lecturer: 2nd Annual INBRE Distinguished Lecture Series, Winthrop University; Rock Hill, SC April 2018
Invited Lecturer: 2nd Regenerative Medicine Symposium, San Jose, Costa Rica, April 2018
Invited Lecturer: International Society for Cellular Therapy (ISCT), Montreal, Canada, May 2018
Invited Lecturer: 9th World Congress of the World Institute of Pain (WIP), Dublin, Ireland, May 2018
Invited Lecturer: Trinity College, Department of Orthopedics, Dublin, Ireland, May 2018
Organizer and Lecturer: 17th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE). Case Western Reserve University; Cleveland, OH, May 2018
Invited Lecturer: The Orthobiologic Institute (TOBI); Wynn, Las Vegas, June 2018
Organizer and Lecturer: 11th Annual Business Education Course: The Business of Regenerative Medicine: Innovation, Clinical Translation & Entrepreneurship, Centre for Commercialization of Regenerative Medicine; Philadelphia, PA, July 2018
Invited Lecturer: Jefferson Medical School, Orthopedics, Philadelphia, PA, July 2018
Invited Lecturer: ESPCR Stem Cell Conference, Cairo University, Alexandria, Egypt, July 2018
Invited Lecturer: 26th Annual Tissue Engineering Course; Rice University. Houston, TX, August 2018
Invited Lecturer: 4th Cancer Stem Cell Conference; Cleveland, Ohio, August 2018
Invited Lecturer: 23nd Annual Gabor Racz Advanced Interventional Budapest, Pain Conference and Workshop; Budapest, Hungary, August 2018
Invited Lecturer: Washington University School of Medicine, St. Louis MO, October 2018
Invited Lecturer: Indiana University School of Medicine, Indianapolis, IN, October 2018
Invited Lecturer: American Orthopaedic Society for Sports Medicine (AOSSM), Rosemont, IL, October 2018
Invited Lecturer: American College of Rheumatology 2018 National Convention, Chicago, IL, October 2018
Invited Lecturer: 21st Annual Pain Symposium, Anesthesia Pain Care Consultants, Fort Lauderdale, FL, October 2018
Invited lecturer: Indiana University Purdue University of Indianapolis, Indianapolis, IN, October 2018
Invited Lecturer: Cedars-Sinai Kerlan-Jobe Institute, Santa Monica, CA, November 2018
Invited Lecturer: Royal Society of Medicine, Orthopedics Today, London, England, December 2018
Invited Lecturer: Humanitas University, Regenerative medicine in Orthopedics, Milan, Italy, December 2018
Invited lecturer: International Cartilage Regeneration & Joint Preservation Society (ICRS), Milan, Italy, December 2018

2019

Invited Lecturer: Int'l Cartilage Regeneration & Joint Preservation Society, San Diego, CA January 2019
Invited Lecturer: 32nd Annual Meeting of Japanese Cartilage Metabolism Society, Osaka, Japan February 2019
Invited Lecturer: American Academy of Pain Medicine 2019 Annual Meeting, Denver, Colorado, March 2019
Invited Lecturer: Terapie Cellulari E Malattie Neurodegenerative, Bologna, Italy, April 2019
Invited Lecturer: American Medical Society for Sports Medicine Inaugural Regenerative Medicine Summit, Houston, TX, April 2019
Organizer and Lecturer: 18th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE). Case Western Reserve University; Cleveland, OH, May 2019
Invited Lecturer: The Orthobiologic Institute (TOBI) 10th Annual PRP & Regenerative Medicine Symposium;

RESEARCH SUPPORT

Chicago, IL, June 2019
Invited Lecturer: 11th Int'l Society for Applied Biological Sciences (ISABS), Split, Croatia, June 2019
Invited Lecturer: Congress of the International Association of Pediatric Dentistry, Cancun, MX July 2019
Organizer and Lecturer: 12th Annual Business Education Course: The Business of Regenerative Medicine: Defining and Creating Value, Boston, MA, July 2019
Invited Lecturer: 26th Annual Tissue Engineering Course; Rice University. Houston, TX, August 2019
Organizer and Lecturer: 50th Year Symposium, Case Western Reserve Univ., Cleveland, OH, September 2019
Invited Lecturer: The Medical Scientist Training Program Distinguished Lecture Services University of California; Irvine CA, September 2019
Invited Lecturer: SoCal Annual Cell & Gene Therapy Conference, Newport Beach, CA, October 2019
Invited Lecturer: ON Foundation/ONstage, Switzerland, October 2019
Invited Lecturer: Texas Pain Society 11th Annual Scientific Conference, San Antonio, TX, October 2019
Invited Lecturer: 2nd Annual Health Span Hawaii Summit, Honolulu, HI, November 2019
Invited lecturer: American Academy of Oral Medicine Fall Meeting, Cleveland Clinic, Cleveland, OH, November 2019
Invited Lecturer: 6th International Joint Preservation Congress, Warsaw, Poland, December 2019
Invited Lecturer: A4M Regenerative Medicine Workshop, Venetian, NV, December 2019

2020

Invited Lecturer: Phacilitate Leaders World and World Stem Cell Summit, Miami FL, January, 2020
Invited Lecturer and Participant: Biologic Association Annual Meeting (Think Tank & Lecture), Carlsbad, CA February 2020
Invited Lecturer: Interventional Orthopedics Foundation (IOF) 5th Annual Scientific Meeting, Bloomfield, CO February 2020
Invited Lecturer: American Academy of Pain Medicine (AAPM) 36th Annual Meeting, National Harbor, MD, February 2020
Invited Lecturer: ON Foundation, Monthly Webinar, Luzern, Switzerland, May 2020
Invited Lecture: Immunology & Immunotherapeutics Committee, Webinar, Case Western Reserve University, July, 2020
Invited Lecturer: International Asian Pacific Association of Surgical Tissue Banks (APASTB), Indonesia, Airlangga Webinar Conference Series. June 2020
Invited Lecturer: International Asian Pacific Association of Surgical Tissue Banks (APASTB), Indonesia, Airlangga Webinar Conference Series. July 2020
Organizer and Lecturer: 19th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE Webinar). Case Western Reserve University; Cleveland, OH, August 2020
Invited Lecturer: Arthritis Foundation OACS Forum Series, Webinar, September 2020
Invited Lecturer: International Cartilage Regeneration & Joint Preservation Society (ICRS) Virtual Conference, October 2020
Invited Lecturer: Stem Wars II: International Symposium Webinar, Bologna, Italy, October, 2020
Invited Lecturer: Cedars-Sinai Symposium on Translation Medicine and Biomanufacturing, Webinar, Los Angeles, CA, November 2020
Invited Lecturer: American Academy of Orthopedic Medicine (AAOM) 2020 Virtual Conference Series, Denver, CO, December 2020

2021

Invited Lecturer: Student Society for Stem Cell Research (SSSCR), Opening Speaker, Virtual Conference, Toronto, CA, March 2021
Invited Lecturer: Joint Preservation Congress, Cartilage Repair Webinar, Keynote Speaker, Virtual Conference, Warsaw, Poland, March 2021
Invited Lecturer: Asian Pacific Association of Surgical Tissue Banks (APASTB), Virtual Conference, Univertias Airlangga, Indonesia, March 2021
Invited Lecturer: 5th Grade Middle School, Virtual Science Lecture. Orange School System, Pepper Pike, OH, April 2021
Invited Lecturer: April 10,2021. Regenerative Medicine Webinar. "The New MSC". Warsaw, Poland, April 2021
Invited lecturer: CryoVida Webinar Use and Management of Mesenchymal Stem Cells, Virtual Conference, Mexico City, MX, April 2021
Invited Lecturer: 1st Mayo Clinic Clinical Regenerative Medicine Fellow Course, Virtual Participant, Jacksonville, FL, May 2021.
Organizer and Lecturer: 20th Annual Cell-Based Therapies and Tissue Engineering Short Course (CTTE). Case

RESEARCH SUPPORT

Western Reserve University; Virtual Conference, Cleveland, OH, May 2021
Invited Lecturer: World Stem Cell Summit and WFIRM/RME Annual Regenerative Medicine Essentials Summer Course, Virtual Conference, June 2021
Invited Lecturer: AOSSM-AANA Combined 2021 Annual Meeting. Biologic Association 2nd Annual Summit, Nashville, Tennessee, July 2021
Invited Lecturer: 28th Annual Advances in Tissue Engineering Short Course, Rice University, Virtual Conference, August 2021
Invited Lecturer: 6th Annual Vail Scientific Summit, Virtual, Vail, CO, August 2021
Invited Lecturer: Advanced Regenerative Medicine Institute (ARMI) EVOLVE 2021 Advanced Courses, Salt Lake City, UT, September 2021
Invited Lecturer: Exploring Public Policy: Regenerative Medicine and Cell Therapies Virtual Conference. Alliance for Cell Therapy Now (ACTN), September 2021
Invited Lecturer Keynote Address: Graduate Student Symposium, Cleveland Clinic Foundation, Jacksonville, FL November 18, 2021.
Invited Lecturer: Keynote Address Graduate Student Symposium, Cleveland Clinic Foundation, Jacksonville, FL November 18, 2021.
Invited Lecturer: 18th Annual International Federation for Adipose Therapeutics and Science (IFATS) Virtual, Fort Lauderdale, FL, November 2021
Invited Lecturer: 6th International Cartilage Regeneration & Joint Preservation Society (ICRS), Joint Preservation Symposium, Miami, Florida, November 2021
Invited Lecturer: Bio Orthopedics Course of the Argentine Association of Sports Traumatology, Buenos Aires, December 30, 2021

2022

Invited lecturer: Interventional Orthobiologics Foundation (IOF), Denver, CO February 17-19, 2022.
Invited Lecturer: Keynote Lecture, International Experimental Biology and Medicine Conference, Memphis, TN, April 29-May 1, 2022.
Invited Lecturer: Inaugural BETTS Lecture in Regenerative Medicine, University Hospitals and CWRU Department of Orthopaedics Regenerative Medicine Grand Rounds; Cleveland, OH June 2022.
Invited Lecturer: The Orthobiologic Institute (TOBI) 10th Annual PRP & Regenerative Medicine Symposium; Hollywood, FL June 2022.

RESEARCH SUPPORT
PAST SUPPORT (as Principal Investigator)

National Institutes of Health

HD-07209; May 1974 through May 1977 ..... $120,000
AM-17110; Program Project; September 1973 through September 1979 ..... $ 13,000/annum
DE-72403; July 1977 through July 1980 ..... $ 51,000
HD-13016; October 1979 through 1982 ..... $ 38,000/annum
GM-25743; EM Equipment Grant 1980-1983 ..... $150,000
AG-02921; Program Project; 1982 through July 1992 ..... $250,000/annum
DE-04008; July 1978 through February 1995 ..... $120,000/annum
AR-40990; February 1992 through January 1998 ..... $139,000/annum
AG-11331; **June** 1992 through May 1998 ..... $210,000/annum
AR37726; December 1989 through November 1999 ..... $336,768
AG08932; October 1989 through November 1999 ..... $250,742
DE07220; March 1993 to February 1998 (June 2001 to May 2003) $244,004
T32-AG00105-20 Cellular and Molecular Aging Training Grant
Originally funded in 1984, now through April 2006. ..... $215,000/annum
T32 GM-085056; Training Grant in Cellular and Molecular Biology; Co-Principal Investigator; July 1975 through 1991.
T32 AG-00105 (AI Caplan, P.I.); "Cellular and Molecular Aging Training Grant;" 5% effort; July 1995 to April 2000 (April 2002 to April 2005) $214,850
(originally funded in 1984)
R01-DE13740 (D Dean, P.I., AI Caplan, Co-P.I.) "Strength and Resorption of Biodegradable Skull Implants" 5% effort, February 2002 to January 2005).

RESEARCH SUPPORT

R01-AR48316-01 (AI Caplan, PI, JE Dennis, Co-PI) "Targeted Progenitor Cell Engraftment;" 20% effort
September 2001 through July 2006.....$237,500/annum

R01-AR049785 (JE Dennis, PI, AI Caplan Co-PI) "Targeted Cellular Repair of Articular Cartilage"
June 2004 through May 2009.....$41,695

R01-DE015322-01A1 (JE Dennis, PI, AI Caplan Co-PI) "Tissue Engineering of Cartilage Subtypes"
August 2004 through July 2009.....$1,816,875

R01-DE015322-01A1 (JE Dennis, PI, AI Caplan Co-PI) "Tissue Engineering of Cartilage Subtypes"
August 2004 through July 2010.....$1,816,875

R01-AG021542-01A2 (AI Caplan, PI, DA Carrino Co-PI) "A Window into the Aging Process: Skin Proteoglycans". July 2005 through June 2010.....$1,912,500

R01-AR050208-01 (JF Welter, PI, AI Caplan Investigator) "Engineering cartilage; an approach to joint repair"
April 2005 through March 2010. .....$15,000/Yr.

R01-DE016887 (J Elisseeff, AI Caplan Investigator) "Tissue Engineering in Congenital Craniofacial Defects"
July 2007 through May 2011. .....$25,000/Yr.

TECH09-006 (AI Caplan, PD) "Treatment
of Acute and Chronic Wounds with Tissue Engineering Strategies" August 2008 through June 2011$107,190

S1072764 (AI Caplan, PD) Armed Forces Institute for Regenerative Medicine (AFIRM)
March 2008 through June 2010.....$302,562

R01-DE13740 (D Dean, PI, AI Caplan Investigator) "Strength and Resorption of Biodegradable Skull Implants" July 2007 through May 31, 2012. .....$28,000/Yr.

MTF0213MS (M Siemionow, PI; AI Caplan, Co-PI) Novel Human Allograft Epineural Conduit for Restoration of Long Nerve Defects. February 01, 2013-February 31, 2014 **.....**$26,226

P01-AR053622 (AI Caplan, PI, D Correa, Co-PI) Program Project Grant Project II Tissue Engineered
Cartilage Repair. August 15, 2008 through July 31, 2014.....$135,246

P01-AR053622 (AI Caplan, PI, V. Goldberg Co-PI) Program Project Grant Core A Tissue Engineered
Cartilage Repair. August 15, 2008 through July 31, 2014.....$83,844

R01-EB020367-01 (AI Caplan, PI) CWRU Center for Multimodal Evaluation of Engineered Cartilage
July 1, 2014 through June 30, 2016 .....$815,117

R01-CA163562 (AI Caplan, PI, D Correa, Co-PI) Bone Marrow MSCs/Pericytes: Gatekeepers Controlling
Skeletal Metastasis. August 23, 2012 through July 31, 2017 .....$315,367

W81XWH-14-2-0004 (A Atala, PI) DoD, Armed Forces Institute for Regenerative Medicine II CF-03:
Craniomaxillofacial Tissue Engineered Bone Grafts 07/30/2013-12/31/2019 (no cost extension) $207,195

CON211741 (T Bonfield, PI) Optimization of MSCs to Treat Microbacterium Avium Complex in Patients
with Chronic Bronchiectasis or Interstitial Pulmonary Fibrosis
July 1, 2016 through June 30, 2019 (no cost extension).....$288,687

Muscular Dystrophy Association
January 1975 through July 1996:
Yearly grants of ..... $16,000-$65,000

Osiris Therapeutics, Inc.;
"Metabolic Bone/Joint Disease" January 1995 to July 1999 (yearly grants of $100,000 to $200,000).

Veterans Administration (University of Cincinnati); "Cell-Assisted Tendon
Repair with Aging;" (August, 1998 to July, 1999)..... $15,500

Electric Power Research Institute Inc.
EPRI/UBP900424 "Biomimetic Approaches to
New Designs for Brittle Laminates;" with Dr. Arthur Heuer (July, 1996 to Dec. 1999 .....$724,019

Department of Energy
Through Battelle Pacific Northwest Laboratories, an RFP to the Skeletal
Research Center; "Development of New Ceramic/Polymer Composites."
Co-Principal Investigator with Dr. Arthur Heuer; July 1, 1988 to
September 30, 1991 (with four CWRU laboratories).....$595,000

National Science Foundation
1970 through June 1973.....$ 38,000

RESEARCH SUPPORT
DCM76-23672; July 1977 through December 1979 .....$ 60,000

American Cancer Society
1971 through June 1973.....$ 62,500
VC-162; July 1974 through July 1976.....$ 80,000

National Foundation (March of Dimes)
1-401; July 1975 through July 1981 .....$210,000

The Kroc Foundation
July 1, 1982 through June 30, 1984 .....$ 80,000
Endowment Gift for Arthritis Research (with Dr. Roland Moskowitz)
Lectureship and travel support; April 1985 .....$ 50,000

Anna Fuller Fund for Cancer Research
1970 through September 1973.....$ 17,000

BARD
U.S.-Israel Binational Agricultural Research and Development Fund
Project No. IS-2679-96; "Extracellular Matrix Molecules of the Eggshell as Related to Eggshell Quality;" (June, 1997 to June 2000) $155,000

STATE OF OHIO
Clinical Tissue Engineering Center (CTEC) (AI Caplan, Co-PI) BRTT State of Ohio.
August 2008 through June 2012. .....$50,000

PAST INDUSTRIAL SUPPORT
Genentech, Inc.; Syntex, Inc.; Robapharm, Inc.; Marion Merrill Dow, Inc.; DePuy, Inc.; Zimmer, Inc.; Kourion Therapeutics, Inc.; L'Oreal; Wright Medical Technology; Fidia Advanced Biopolymers; BioMimetic Therapeutics, Inc.

PRESENT SUPPORT (2020)

NATIONAL INSTITUTES OF HEALTH

1R01CA251612-01 (AI Caplan, PI) Role of Perivascular Mesenchymal Stem Cells (pMSCs) in the Bone Marrow Niche and the Extracellular Matrix in the Control of Skeletal Metastasis
September 1, 2020 – May 31,2025 .....$368,288
1P41EB021911-01 (AI Caplan, PI) CWRU Center for Multimodal Evaluation of Engineered Cartilage
June 1, 2016 through March 31, 2022 .....$1,284,459
1P41EB021911-03S1 (AI Caplan, PI) Administrative Supplement to CWRU Center for Multi-Modal evaluation of Engineered Cartilage September 1, 2018 through March 31, 2022..... $397,661

OTHER RESEARCH SUPPORT
L. David and E. Virginia Baldwin Program for Cell Therapy
October, 2007 to Present.... .....$2,654,300
L. David and E. Virginia Baldwin COVID-19 Project
June, 2020 to Present..... .....$294,509

GRADUATE STUDENTS, POSTDOCTORAL FELLOWS AND OTHER PROFESSIONALS
PAST
1. **James H. Kimura**, Ph.D.; Graduate Student, degree 1976; was Professor of Orthopedics, Joint and Bone Center, Henry Ford Hospital until 2002, now retired, Detroit, Michigan.
2. **Martin J. Rosenberg**, Ph.D.; Postdoctoral Fellow, 1972-1974; now Executive Officer, Department of Biology, Case Western Reserve University, Cleveland, Ohio.

COLLABORATIVE FACULTY- Continued

3. **Jeffrey Saffitz**, M.S., Ph.D., M.D.; Graduate Student, degree 1978; now Professor, Pathology Department, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA.
4. **Anna Palka**, M.S.; Graduate Student, degree 1977; was a Research Technician, National Institutes of Health, Bethesda, Maryland.
5. **Philip Osdoby**, Ph.D.; Graduate Student, degree 1978/Arthritis Foundation Fellow 1979-1981; now Professor, Department of Biological Science, Washington University, St. Louis, Missouri.
6. **Charles P. Ordahl**; Postdoctoral Fellow, 1975-1978; now Professor, Department of Anatomy, University of California School of Medicine, San Francisco, California.
7. **Karen Glasier**; Postdoctoral Fellow, 1977-1979; now Pharmaceutical Company Representative, Cleveland, Ohio.
8. **David A. Carrino**, Ph.D.; Postdoctoral Fellow, 1979-1980; now Senior Research Associate, Department of Biology, Case Western Reserve University, Cleveland, Ohio.
9. **Gail Yander**, Ph.D.; Postdoctoral Fellow, 1979-1980; was Researcher, Eastman Kodak Company, Rochester, New York.
10. **Mary C. Martini**, M.S.; Graduate Student, 1980; now in private medical practice and affiliate of University Medical Center, Pittsburgh, Pennsylvania.
11. **Hue-Lee Kaung**, Ph.D.; sabbatical Visiting Professor, 1980-1981; now in Department of Pediatrics, Case Western Reserve University, Cleveland, Ohio.
12. **Larry W. Fisher**, Ph.D.; Postdoctoral Fellow, 1980-1981; now Staff Scientist at National Institutes of Health, Bethesda, Maryland.
13. **Susan J. Hunter**, Ph.D.; Postdoctoral Fellow, 1980-1981; now Professor, Department of Zoology, University of Maine, Orono, Maine.
14. **Jeffrey A. MacCabe**, Ph.D.; sabbatical Visiting Professor, June-September 1981; now Professor, Department of Zoology, University of Tennessee, Knoxville, Tennessee.
15. **Barry W. Cherney**, Ph.D.; Graduate Student, degree 1984; was Staff Scientist, FDA, Washington, D.C.
16. **Zvi Nevo**, Ph.D.; sabbatical Visiting Professor, July-October 1983; now Professor and Chair, Department of Chemical Pathology, Tel-Aviv University, Israel.
17. **Gerry Beaudoin**, Ph.D.; Research Associate, 1982-1984; was Staff Scientist, Avery Corporation.
18. **Ronald J. Midura**, Ph.D.; Graduate Student, degree 1984; now Staff Scientist, Section of Musculoskeletal Biology, Dept. of Biomedical Eng., The Cleveland Clinic Foundation, Cleveland, Ohio.
19. **Deborah E. Hall**, Ph.D.; Graduate Student, degree 1985; was Research Scientist, Department of Anatomy, University of California at San Francisco, San Francisco, California; now free-lance writer.
20. **Michael Weitzhandler**, Ph.D.; Graduate Student, degree 1985; was Research Scientist, Dionex Corporation, Sunnyvale, California.
21. **Carol Cooper**, Ph.D., M.D.; Graduate Student, degree 1985; was Ophthalmologist, Shokoohi Eye Center, Midland, Michigan .
22. **Ellen J. Matzkin**, M.D.; Postdoctoral Fellow, 1985-1986; now in private medical practice in New York.
23. **Uri Oron**, Ph.D.; sabbatical, 1985-1986; now Professor in Zoology at Tel-Aviv University, Tel-Aviv, Israel.
24. **Stephen E. Haynesworth**, Ph.D.; Graduate Student, degree 1987 (1988-1992 as Senior Research Associate); now Associate Professor and Associate Dean, College of Arts and Sciences, Department of Biology, Case Western Reserve University, Cleveland, Ohio.
25. **Hajime Ohgushi**, M.D.; Postdoctoral Fellow, 1985-1987; now Team Leader & Research Head, Tissue Engineering Research Center, Amagasaki City, Hyogo, Japan
26. **David G. Pechak**, Ph.D.; Postdoctoral Fellow/Senior Research Associate, 1981-1987; now Research Scientist, Kraft Foods, Chicago, Illinois.
27. **Mary J. Kujawa**, Ph.D., M.D.; Postdoctoral Fellow, 1983-1987; now Psychiatry, Atlanta, Georgia.
28. **Terry Rabinowitz**, D.D.S., M.D.; Visiting Assistant Professor, 1983-1986; now Associate Professor of Psychiatry, Fletcher Allen Healthcare, Burlington, VT.
29. **Glenn T. Syftestad**, Ph.D.; Postdoctoral Fellow, Research Associate/Research Scientist, 1981-1987; was Associate Professor, Department of Orthopaedics, University of California, Davis, California.
30. **Paul A. Lucas**, Ph.D.; Postdoctoral Fellow, 1984-1987; now Director of Orthopaedic Research, Department of Orthopaedics, New York Medical College, Val Halla, New York.
31. **Henry E. Young**, Ph.D.; Postdoctoral Fellow, 1983-1987; now Professor, Mercer Medical School, Macon, Georgia.
32. **Danny Gazit**, Ph.D., D.D.S.; CIBA Bursury, 1987; now Professor at Hebrew University/Hadassah Medical Center, Jerusalem, Israel.

COLLABORATIVE FACULTY- Continued

33. **Samuel Itay**, M.D.; Visiting Scientist, 1986-1988; was Department of Orthopaedics, Beilinson Hospital, Petach Tikva, Israel.
34. **Jun Goshima**, M.D.; Visiting Scientist, 1987-1989; was Assistant Professor, Department of Orthopaedics, Nara Medical University, Nara, Japan.
35. **Haruhiko Nakahara**, M.D.; Visiting Scientist, 1987-1989; was Department of Orthopaedics, Osaka University Medical School, Osaka, Japan.
36. **James H. Reese**, Ph.D.; Senior Research Associate, 1986-1989; was Senior Research Associate, Medical College of Ohio, Toledo, Ohio.
37. **Kazuo Watanabe**, Ph.D.; sabbatical Visiting Scientist, 1989-1990; now Professor, Department of Zoology, Hiroshima University, Hiroshima, Japan.
38. **Scott P. Bruder**, Ph.D.; M.D./Ph.D. Graduate Student, 1987-1990; now Sr. Vice President and Chief Technology Officer BD, Franklin Lakes, NJ.
39. **Marlene Willen**, M.D.; Postdoctoral Fellow, 1989-1990; was Dermatology Metrohealth Medical Center, Cleveland, Ohio.
40. **Naoto Ozawa**, M.D.; Visiting Scientist, 1990-1991; was Orthopaedic Surgeon, Yokohama City University, Yokohama, Japan.
41. **Tatsuhiko Goto**, M.D.; Visiting Scientist, 1989-1991; now Orthopaedic Surgeon and Associate Professor, National Defense Medical School, Tokyo, Japan.
42. **Osamu Nakamura**, Ph.D.; Visiting Scientist, 1989-1991; now Div. of Function. Mat. Sc. Kyushu Nat'l Indus. Res. Inst., Tosu Saga, Japan.
43. **Mohamed Rahima**, D.D.S.; collaborative Researcher, 1988-91; now in private practice, Chicago, Illinois.
44. **Stephen J. Pineda**, M.D.; Research Fellow, 1990-91; now Orthopaedic Surgery, University of Maryland Hospital, Baltimore, Maryland.
45. **Jose Luis Arias**, D.V.M.; sabbatical Visiting Scientist, 1989-1991; now Professor, School of Veterinary Science, University of Chile, Santiago, Chile.
46. **Linan Dong**, D.D.S.; Visiting Scientist, 1990-1991; Beijing Medical University, Beijing, People's Republic of China.
47. **Maria Soledad Fernandez**; visiting master's-degree candidate, 1989-1991; now Associate Professor at University of Chile, Santiago, Chile.
48. **Anne E. Linton**, M.D.; Research Fellow/Orthopaedic Surgery Resident, 1991-1992; was Addiction Psychiatry, Oregon Health Sciences University, Portland, Oregon.
49. **Shigeyuki Wakitani**, M.D.; Visiting Scientist, 1990-1992; now Associate Professor/Orthopaedic Surgeon, Osaka University Medical School, Osaka, Japan.
50. **Iri Liebergall**, M.D., Visiting Scientist, 1991-1992; now Professor of Orthopaedic Surgery, Hebrew University, Jerusalem, Israel.
51. **Juan Pablo Rodriguez**, Ph.D.; Postdoctoral Fellow, 1991-1992; now Associate Professor, University of Chile, Santiago, Chile.
52. **Richard F. Drushel**, Ph.D.; Graduate Student, 1987-1992; now Instructor, Department of Biology, Case Western Reserve University, Cleveland, Ohio.
53. **Toshihiro Sugihara**, M.D., Ph.D.; Visiting Scientist, 1991-1993; now Assistant Professor, St. Marianna University, Kawasaki, Japan.
54. **Tomoyuki Saito**, M.D., Visiting Scientist, 1991-1993; now Professor and Director, Department of Orthopaedic Surgery, Yokohama City University, Yokohama City, Japan.
55. **Yu Mochizuki**, M.D., Ph.D.; Visiting Scientist, 1991-1993; Surgeon, Department of Orthopaedics, Hiroshima University Hiroshima, Japan.
56. **Sara Sarig,** Ph.D., Sabbatical/Visiting Professor, 1992-1993; Professor, The Hebrew University of Jerusalem, Jerusalem, Israel (deceased).
57. **Bruce Greene**, M.D., Research Fellow and Resident/Department of Orthopaedics, 1992-1993; now in private practice, Ithaca, New York.
58. **Randell G. Young**, D.V.M.; Postdoctoral Fellow/Research Fellow (surgical models), 1989-1993; now Manager, Preclinical Studies, Osiris Therapeutics, Inc., Baltimore, Maryland.
59. **Felix Ma**, Undergraduate Student, 1991-1994; now Resident, Hennepin County Medical Center, Minneapolis, Minnesota.
60. **Mehrun Elyaderani**, M.D., Research Fellow, 1993-1995; was Department of Orthopaedics, University Hospitals of Cleveland, Cleveland, Ohio.
61. **David J. Fink**, Ph.D., Adjunct Professor and Consultant, 1991-1995; was CEO/President of Biotech startup, Baltimore, Maryland.

COLLABORATIVE FACULTY- Continued

62. **Pierre Cassiede**, Visiting Scholar, 1991-1995; now Laboratoire de recheche sur les matériaux d'intérêt biologique, Faculté de chirurgie dentaire. Nante, France.
63. **Leona M. Mann**, D.D.S., Graduate Student/Research Fellow, 1993-1995; now in private practice, Atlanta, GA.
64. **Christopher Walsh,** M.D., Postdoctoral Fellow, 1994-1995; was in Practice, Department of Orthopaedics, University Hospitals of Cleveland, Cleveland, Ohio.
65. **Kristina Siddall,** Undergraduate, CWRU, Summer 1994.
66. **Lukasz Curylo,** M.D., Postdoctoral Fellow, 1995-96, was Resident, Department of Orthopaedic, University Hospitals of Cleveland, Cleveland, Ohio.
67. **Glen Feltham,** M.D., Postdoctoral Fellow, 1995-96, was Resident, Department of Orthopaedic, University Hospitals of Cleveland, Cleveland, Ohio.
68. **Frederick Jacquot,** M.D., Visiting Scientist, 1995-96, now Chef de Clinique - Assistant, Department of Orthopaedic Surgery, Hospital Raymond Poinrcare, Garches France.
69. **Douglas Arm**, Ph.D., Postdoctoral Fellow 1995-96, now Researcher, Interpore Inc, San Diego, CA.
70. **Keigo Hanada,** Ph.D., Visiting Scientist, 1995-97, now Researcher at Kaken Industry, Tokyo, Japan.
71. **Keita Nishimura,** M.D., Visiting Scientist, 1996-97, now Researcher, University of Japan, Tokyo, Japan.
72. **James E. Fleming, Jr.,** M.D.; Graduate Student/Research Fellow, 1991-97, was Resident, Cleveland Clinic Foundation, Cleveland, Ohio.
73. **Traci G. Barthel**, M.D.; Research Fellow, 1996-97, was Resident, University Hospitals, Cleveland, Ohio.
74. **Barbara A. Huibregtse,** D.V.M., Postdoctoral Fellow/Research Associate, 1994-97, now Preclinical Manager, Boston Scientific Corp., Natick, Massachusetts.
75. **Emmanuel K. Konstantakos,** Undergraduate, 1995-1997, now Medical Student, CWRU.
76. **Randell Bateman**, 1997-1998, now resident, University of Minn., Minn, MN.
77. **Antonios Mikos**, Ph.D., Sabbatical/Visiting Professor, 1998, now Professor of Bioengineering and Chemical Engineering, Rice University.
78. **Magnus Lundberg**, M.D., Ph.D., Visiting Scientist, 1997-1998, now Attending Physician, University Hospital, Linkoping, Sweden.
79. **John Edminson**, Undergraduate Student, CWRU, 1996-1998, now Medical student, CWRU.
80. **Kukuji Yamashita**, D.D.S., Ph.D., Visiting Scientist, 1996-1998, now Associate Professor, First Department of Oral Anatomy, University of Tokushima, School of Dentistry, Tokushima, Japan.
81. **Neil Topham**, M.D., Research Fellow, 1997-1999, now Resident, Plastic Surgery, University Hospitals of Cleveland, Ohio.
82. **Maralyn B. Seavolt**, M.D., Postdoctoral Fellow, 1998-1999, was Resident, Dermatology, Cleveland Clinic Foundation, Cleveland, Ohio.
83. **Andreas Naumann**, M.D.,Visiting Scientist, 1999-2000, now staff Doctor/Researcher, Munich, Germany.
84. **Laure Brinon,** Ph.D., Visiting Researcher, 2000-2001, now Project Manager, Dermal and Transdermal Systems. ETHYMED, Massy, France.
85. **Enrico Tognana,** Ph.D., Visiting Researcher, 2001, now Project Manager, Fidia Advanced Biopolymers Srl, Albano Terme, Italy.
86. **Hervè Pageon,** M.S., Visiting Researcher, 2000-2001, L'Oreal Recherche, France
87. **Tommi Tallaheden**, Visiting Graduate Student, 2001-2002, now Göteborg University Faculty.
88. **Brian Drew,** M.D., Postdoctoral Fellow, 2001-2002, now Physician, Ear, Nose and Throat, Minneapolis, MN.
89. **Nir Cohen,** M.D., Visiting Researcher, 2001-2002, now Faculty, Department Orthopaedics, Tel Aviv University; Tel Aviv, Israel.
90. **Konrad Slynarski**, M.D., Visiting Researcher, 2001-2002, now Assistant Professor, Warsaw Poland.
91. **Wa'el Kafienah,** M.D., Visiting Researcher, 2002, now University of Bristol Academic Rheumatology, Bristol, United Kingdom.
92. **Mauro Fiorini**, Visiting Researcher, 2002-2003, now Researcher at Fidia Adv. Biopol., Srl, Albano Terme, Italy.
93. **Russell Wang,** D.D.S., Associate Professor, School of Dentistry, 2000-2003, now Case Western Reserve University, Cleveland, Ohio.
94. **Katsuhiro Nishioka,** M.D., Visiting Researcher, 2001-2004.
95. **Jizong Gao,** M.D., Ph.D., Research Associate 1998-2004, now with Zimmer Corporation, Austin, Texas.
96. **James Dennis,** Ph.D., Sr. Research Associate; 1988-2005, now Assistant Professor Orthopaedics at University Hospitals, Cleveland, Ohio.

COLLABORATIVE FACULTY- Continued

97. **In-Hwan Song**, M.D., Ph.D., visiting researcher, South Korea, 2004-2005, now Associate Professor and Chairman Department of Anatomy, School of Medicine Yeungnam University, Daegu, South Korea.
98. **Daphne A. Bascom**, M.D., Ph.D., Assistant Professor Otolaryngology Surgery U.H./CWRU, 2002-2005, now Physician Director, Clinical Transformation, Cleveland Clinic Foundation.
99. **Yu-Han Chang,** Ph.D., visiting researcher, Taiwan, 2004-2006, now Attending Physician, Division of Adult Joint Reconstruction, Department of Orthopaedics, Chang Gung Memorial Hospital, Taipei, Taiwan.
100. **Karthik Karibandi**, BA non-designated graduate student, 2005-2006, now Medical Student.
101. **José A. Andrades,** Ph.D., Professor of Cell Biology University of Malaga, Malaga Spain visiting scientist, 2006.
102. **Andreas Winkel,** Ph.D., Postdoctoral fellow 2006-2007, now Postdoctoral fellow, Department of Prosthetic Dentistry, Hannover Medical School, Hannover, Germany.
103. **James (Jay) Henderson,** Ph.D., postdoctoral fellow, 2004-2008, now Assistance Professor Syracuse University.
104. **Sung-Eun Yang,** M.D., Ph.D., visiting researcher, South Korea, 2007-2008, now Assistant Professor Korean University, Seoul, S. Korea.
105. **Fozia Khan,** Ph.D., visiting researcher, 2008-2009, now Assistant Professor, King Saud University, Riyadh, Kingdom of Saudia Arabia.
106. **Durba Mukhopadhyay,** Ph.D.; cartilage repair/rheumatoid arthritis 2008-2009, now at Cuyahoga Community College.
107. **Jonathan Teets**, Medical Student 2009-2010.
108. **Robert M. Lowe,** M.D., Ph.D., rheumatoid arthritis 2009-2011.
109. **Luis A. Solchaga,** Ph.D., tissue engineering, 1994-2010, now Research Scientist at BioMeimetic, Nashville, Tennessee.
110. **Michael Haag,** M.S., 2003-2010. Director Licensing, Technology Transfer Office, Case Western Reserve University.
111. **Kitsie Penick, BA**, Research Assistant III, bioreactors, tissue engineering, 2010-2014. Department of Surgery, University of Arizona.
112. **David A. Carrino,** Ph.D.; 1979-2013. Chemistry Department, Case Western Reserve University.
113. **Paul Lin**, MD-Ph.D., 2005-2013. Medical Student, MD/PhD Program, Case Western Reserve University.
114. **Vance Holt, III**, Ph.D. 2008-2013. Department of Health and Human Science NIH/NIAMS, Bethesda, MD
115. **Steven Greenberg**, M.S., 2012- 2013. Clinical Researcher, Johns Hopkins University, Baltimore, MD.
116. **Lori Duesler**, Research Assistant III, bioreactors, tissue engineering, 2010-2014. Pathology Department, Case Western Reserve University.
117. **Asuman Bilgin,** B.S., 2011-2015. Research Assistant/Research Visitor. California Polytechnic State University-San Luis Obispo.
118. **Diego Correa,** M.D., Ph.D., rheumatoid arthritis 2009-2015.
119. **Obinna Ugwuegbu**, Undergraduate Student Case Western Reserve University, 2015-2016.
120. **Stephen Wang**, Undergraduate Student Case Western Reserve University, 2016-2017.
121. **Abdullah Osme,** M.D., Visiting scientist, gene expression studies 2016-17
122. **Donald P. Lennon**, D.D.S.; tissue culture, 1979-2017.
123. **Hulya Bukulmez,** M.D.; rheumatoid arthritis 2008-18. Metrohealth Medical Center, Cleveland, OH
124. **Maneesh Dave,** M.D.; stem cells and GI tract 2014-2019. Associate Professor, University of California at Davis, Davis, CA
125. **Zhihan Wang,** Undergraduate Student Case Western Reserve University, 2017-2020 now at McGill University, Montreal Quebec, Canada
126. **Yiyan Wang,** Undergraduate Student Case Western Reserve University, 2018-2020
127. **Pravallika Kesarla**, Undergraduate Student Case Western Reserve University 2019-2020
128. **Kevin Echelberry**, Undergraduate Student Case Western Reserve University 2019-2020
129. **Lori Duesler**,B.S., Research Assistant III (tissue engineering) 2016-2020
130. **Jaydah Robertson**, Undergraduate Case Western Reserve University 2019-2021

PRESENT SENIOR RESEARCH ASSOCIATES (as Laboratory Staff), Research Professors and Postdoctoral Fellows and Senior Staff

COLLABORATIVE FACULTY- Continued

1. **J. Michael Sorrell,** Ph.D.; monoclonal antibodies, 1990-
2. **Jean F. Welter,** M.D., Ph.D.; bioreactors, tissue engineering, 2004-
3. **Rodrigo Somoza**, Ph.D.; metastasis, cartilage tissue engineering, 2012-
4. **Jonathan Kenyon,** Ph.D.; stem cell, molecular biology 2015-
5. **Sayyed M. Motavalli,** Ph.D.; cartilage tissue engineering 2016-
6. **Miguel Fuentes Chandia**, PhD; 2021-

GRADUATE STUDENTS

None

SUPPORT STAFF

1. Amad Awadallah, Research Assistant III (histology), 2010-
2. Margie Harris, Research Assistant I (tissue culture), 1984-
3. Tammie Lee, Department Assistant III, 2007-

COLLABORATIVE FACULTY (Shared Resources)

1. Stanton Gerson, M.D., Department of Medicine, Hematology/Oncology (Medical School)
2. Harihara Baskaran, Ph.D., Chemical Engineering (Engineering)
3. Tracey Bonfield, Ph.D., Pulmonary, Pediatrics (RBC)
4. Aaron Weinberg, Ph.D., Department of Biological Sciences (Dental School)
5. Adonis Hijaz, M.D., Urology Institute, (University Hospitals Case Medical Center)
6. Jianguo Cheng, M.D., Department of Pain Management and Neurosciences (CCF)

REVIEWER

Developmental Biology, Science
Journal of Bone and Joint Surgery, Tissue and Cell
Journal of Cell Biology, Bone
Journal of Craniofacial Genetics,Connective Tissue Research Development
Clinical Orthopaedics and Related Research, Journal of Biomaterials Research
Cell Physiology, Experimental Cell Research
Differentiation, Journal of Biological Chemistry
Journal of Orthopaedic Research, Tissue Engineering
Cell Transplantation, Developmental Dynamics
Tissue Engineering and Regenerative Medicine

REVIEWER GRANTING AGENCIES

National Science Foundation (ad hoc)
National Institutes of Health (ad hoc and site visits)

PAST ADVISORY BOARDS

BioMedical Materials International Scientific Advisory Board. Mijdrecht, The Netherlands.
External Advisory Board of The Stem Cell Institute in Leuven. Leuven, Belguim.

UNIVERSITY COMMITTEES*

1. University Restructuring and Strategic Planning Committee, 1986-1987.
2. Faculty Senate Research Committee, 1984-1986.
3. Case Institute Strategic Planning Committee, 1985-1986.
4. President's Committee for the Biological Sciences, 1985-1986.
5. Dean's Committee for Tenure and Promotion, 1984-1985.
6. President's Committee for Tenure and Promotion, 1981-1988.
7. University Hospitals Strategic Planning Task Force, 1988.

TEACHING EXPERIENCE-continued

8. Chairmen's Search Committee, Orthopaedics, University Hospitals, 1989.
9. Provost's Committee on Continuing Education, 1989.
10. Faculty Senate Research Committee, 1990-1993.
11. University Hospitals Biotechnology Committee, 1991-1994.

***Committee assignments are no longer recorded (1995-present).**

TEACHING EXPERIENCE (1968-1992; teaching activities are no longer recorded.)

Case Western Reserve University

1. Biology Core Curriculum (4th semester), Spring. Course is referred to as "Organismal Biology." I taught about one-third of the lectures where I tried to expose students to the events involved in organ formation so that the rest of the course could cover organ and whole animal physiology.
2. "Theories in Aging": An option course for medical students. I am responsible for one week's material.
3. Seminar in Advanced Developmental Biology. A weekly meeting of undergraduate, graduate and medical students interested in selected research topics in Developmental Biology.
4. Correlated Curriculum in Cellular and Molecular Biology. A year-long multidiscipline graduate course, which was taken by all of the student in the Cellular and Molecular Biology Program plus other incoming graduate students. This course was: 7 contact hours/week and had 25 to 45 graduate students from all of the preclinical departments of the Medical School and several departments from the undergraduate school. I have given lectures on Chromatin and Connective Tissue Biochemistry and Molecular Development.
5. Initiated an introductory Biology course designed for engineering and science students called, "Biological Molecules." This course attempts to introduce basic concepts in Biology (evolution, genetics, etc.) by discussing the biological molecules involved. For example, all of the principles of evolution can be brought forth in discussing the primary structure of hemoglobin's or cytochrome c. Previously given every Fall; 3 credit hours with approximately 40 to 50 lectures and 50 to 100 students. No longer offered
6. "Developmental Biology." Basic events from gametogenesis to organogenesis are covered in this 3 credit hour, 40 to 50 lecture course attended by 40 to 100 students. No longer offered.
7. Developmental Biology Laboratory: Twelve separate weekly presentations covering development in sea urchins, chick and frog with emphasis on experimental embryology. The course, as now organized, stresses the molecular biology of development. Two credits, two sections, 24 students each. No longer offered.
8. "Cell Biology": Gave several lectures in the department's required sophomore level Cell Biology Course primarily in the areas of energy metabolism from a structural and biochemical standpoint and chromatin structure and chemistry.
9. "Cell Biology Laboratory": I have given one or two exercises per year (usually in the area of cell fractionation or mitochondrial function). Two credits, 3 sections, 20 students each.
10. "Freshman Special Studies": During the Spring of 1970 and 1971, I offered a course in this unique Freshman Special Studies program which involved a modification of Herman Epstein's "Biology for Non-Science Majors." Three credit hours, 40 to 50 one hour meetings, 20 students. No longer offered.
11. Various graduate and medical school lectures, including areas in Developmental Cell and Molecular Biology.

Brandeis University

Taught section of "Biology for Non-Science Majors." An experimental course attempting to expose non-science majors to scientific exploration by using research publications as teaching tools.

REFERENCES FURNISHED UPON REQUEST