

# CURRICULUM VITAE

JEFFREY R. MORGAN

## 1. Name, Position, Academic Department

Jeffrey R. Morgan  
Professor of Medical Science and Engineering  
Department of Pathology and Laboratory Medicine  
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## 2. Home address

## 3. Education

1977 B.S. Syracuse University, Syracuse, NY (Biology)  
1983 Ph.D. Harvard University, Cambridge, MA (Biological Chemistry)  
Dissertation title: *Messenger RNA Biogenesis by Vaccinia Virus*

## 4. Professional appointments

1983 - 1988 Post Doctoral Fellow, Massachusetts Institute of Technology and Whitehead  
Institute for Biomedical Research  
1988 - 1991 Co-Founder, Somatix Corporation, Cambridge, MA  
1988 - 1990 Senior Scientist, Somatix Corporation, Cambridge, MA  
1990 - 1991 Scientific Officer, Somatix Corporation, Cambridge, MA  
1991 - 1994 Instructor in Surgery, Harvard Medical School, Boston, MA  
1991 - 2002 Senior Research Scientist, Shriners Hospital for Children, Boston, MA  
1994 - 2000 Assistant Professor in Surgery, Harvard Medical School, Boston, MA  
1991 - 1996 Assistant Biologist, Department of Surgery, Massachusetts General Hospital,  
Boston, MA  
2001 - 2002 Associate Professor in Surgery, Harvard Medical School, Boston, MA  
1997 - 2002 Associate Biologist, Department of Surgery, Massachusetts General Hospital,  
Boston, MA  
2002 - 2004 Associate Professor of Medical Science, Brown University, Providence, RI  
2005 - 2013 Associate Professor of Medical Science and Engineering,  
Brown University, Providence, RI  
2004 -  
2002 - 2007 Investigator, Providence Veterans Affairs Medical Center, Providence, RI  
Program Director, Graduate Program in Biomedical Engineering,  
Brown University, Providence, RI

- 2007 – 2007 Vice Chair, Department of Molecular Pharmacology, Physiology and Biotechnology, Brown University, Providence, RI
- 2007 – 2007 Interim Chair, Department of Molecular Pharmacology, Physiology and Biotechnology, Brown University, Providence, RI
- 2014 – 2014 Acting Chair, Department of Molecular Pharmacology, Physiology and Biotechnology, Brown University, Providence, RI
- 2007 - 2016 Co-Director, Center for Biomedical Engineering, Brown University, Providence, RI
- 2017 Founding Director, Center to Advance Predictive Biology, Brown University, Providence, RI
- 2013 - Professor of Medical Science and Engineering, Brown University, Providence, RI
- 2021- Donna Weiss '89 and Jason Weiss, Director of the Center for Alternatives to Animals in Testing, Brown University, Providence, RI

## 5. Completed Research, Scholarship and/or Creative Work

### a. Books/monographs (authored and/or edited volumes)

1. Morgan, J.R., Messenger RNA Biogenesis by Vaccinia Virus [dissertation]. Harvard University, Cambridge, MA, 1983.
2. Morgan, J.R. and Yarmush, M.L. Eds. "Tissue Engineering Methods and Protocols", In: Methods in Molecular Medicine. Humana Press, Totowa, NJ, 1999.
3. Morgan, J.R., Ed., "Gene Therapy Protocols", 2<sup>nd</sup> Edition, In: Methods in Molecular Medicine. Humana Press, Totowa, NJ, 2002.
4. Berthiamue, F. and Morgan, J.R. Eds., "3D Tissue Engineering", Artech House, Boston, MA. 2010.

### b. Chapters in books

1. Morgan, J.R., Tompkins, R.G., Yarmush, M.L. Advances in Recombinant Retroviruses for Gene Delivery, In: "Gene Therapeutics issue of *Advanced Drug Delivery Reviews*," Elsevier Publishers Amsterdam, The Netherlands, 12:143-158, 1993.
2. Morgan, J.R., Yarmush, M.L., Tompkins, R.G. Consultations in Molecular Biology, In: "Surgical Consultations," Beahrs OH, Beart, JR., RW, Pemberton JH, (Eds.) St. Louis, MO, Mosby-Year Book, Inc., Chapter 15:1-22, 1993.
3. Morgan J.R., Tompkins R.G., Yarmush, M.L. Genetic Engineering and Therapeutics, In: "Implantation Biology: The Host Response and Biomedical Devices," CRC Press, Inc., Boca Raton, FL, pp387-400, 1994.

4. LeDoux, J.M., Morgan, J.R., and Yarmush, M.L. Antisense Technology, In: "The Biomedical Engineering Handbook," CRC Press, Inc., Boca Raton, FL, pp1472-1488, 1994.
5. LeDoux J.M., Morgan J.R., and Yarmush, M.L. Gene Therapy, In: "The Biomedical Engineering Handbook," CRC Press, Inc. Boca Raton, FL, pp1518-1535, 1995.
6. Eming, S.A., and Morgan, J.R. Methods for the Use of Genetically Modified Keratinocytes in Gene Therapy, In: "Methods in Molecular Medicine: Gene Therapy Protocols," Robbins, P. (Ed.), Humana Press, Totowa, N.J., Chapter 19; 264-279, 1997.
7. Morgan, J.R. and Yarmush, M.L. Gene Therapy in Tissue Engineering. In: "Frontiers in Tissue Engineering", Patrick, Jr., CW, Mikos, AG, McIntire, LV, (eds.) Pergamon; Elsevier Science Publishers, Amsterdam, The Netherlands, Chapter II.15, 278-310, 1998.
8. Medalie, D.A. and Morgan, J.R. Methods for the Preparation and Transplantation of a Composite Graft of Epidermal Keratinocytes on Acellular Dermis, In: "Methods in Tissue Engineering," Morgan, J.R. and Yarmush, M.L. (Eds.), Humana Press, Totowa, NJ, Chapter 30; 407-421, 1999.
9. Machens, H-G., Morgan, J.R., Berthiaume, F., Stefanovich, P. and Berger, A. Genetically Modified Fibroblasts Induce Angiogenesis in the Rat Epigastric Island Flap. In: "Biological Matrices and Tissue Reconstruction", Stark, Horch, Tanczos (Eds.) Springer Verlag/Berlin/Heidelberg/New York, 53-59, 1998.
10. Morgan, J.R. "Genetic Engineering of Skin Substitutes" In: Bioengineering of Skin Substitutes, International Business Communications, Inc., Southborough, MA, Chapter 1.4., 61-73, 1998.
11. LeDoux, J.M., Morgan J.R., and Yarmush, M.L. Gene Therapy In: "The Biomedical Engineering Handbook, 2<sup>nd</sup> Edition" CRC Press, Inc. Boca Raton, FL, Chapter 106; 1-19, 2000.
12. Sheridan, R.L., Morgan, J.R. and Mohammed, R. Biomaterials in Burn and Wound Dressings. In: "Polymeric Biomaterials, Second Edition, Revised and Expanded", Dumitriu (Ed.) Marcel Dekker, Inc., New York, Chapter 17; 451-458, 2001.
13. Andreadis, S.T and Morgan, J.R. Methods for the Quantitative Measurement of the Concentration of Active Recombinant Retrovirus, In: "Gene Therapy Protocols" 2<sup>nd</sup> Edition, Morgan, J.R. (Ed.), Humana Press, Totowa, NJ, Chapter 13; 161-172, 2002.
14. Hamoen, K.E., Erdag, G., Cusick, J.L., Rakhorst, H.A. and Morgan, J.R. Methods for the Preparation and Use of Genetically Modified Skin Substitutes, In "Gene Therapy Protocols", 2<sup>nd</sup> Edition, Morgan, J.R. (Ed.), Humana Press, Totowa, N.J., Chapter 16: 203-217, 2002.

15. Morgan, J.R., Sheridan, R.L., Tompkins, R.G., Yarmush, M.L. and Burke, J.F. Burn Dressings, In: "Biomaterials Science: An Introduction to Materials in Medicine, 2<sup>nd</sup> Edition". Ratner, B.D., Hoffman, A.S., Schoen, F.J. and Lemons, J.E. (Eds.) Academic Press, San Diego, CA, Chapter 7.12; 602-614, 2004.
16. Youssef, J., and Morgan, J.R. Self-assembled Scaffold-free 3D Micro-tissues for Tissue Repair. Wound Healing Society Year Book- Advances in Wound Care. In Press.
17. Youssef, J., Bao, B., Ferruccio, T-M. and Morgan, J.R. Micro-molded Nonadhesive Hydrogels for the Self-Assembly of Scaffold-Free 3D Cellular Microtissues. In: "3D Tissue Engineering", Berthiaume, F. and Morgan, J.R. Eds. Artech House, Boston, MA. Chapter 9: 151-166, 2010.
18. Blakely, A.M., Schell, J.Y., Rago, A.P., Chai, P.R., Napolitano, A.P, Morgan, J.R. Formation of Multi-cellular Microtissues and Applications in Biofabrication, In "Biofabrication", Forgacs, G., Sun, W. (Eds) Elsevier, Amsterdam, The Netherlands Chapter 8: 149-164, 2013.
19. Leary, E., Curran, S., Susienka, M., Manning, K.L., Blakely, A.M. and Morgan, J.R. Micro-moulded Nonadhesive Hydrogels to Form Multi-cellular Microtissues – The 3D Petri Dish®. In "3D Cell Culture: Technology and Application", Przyborski, S. (Ed.) Wiley-Blackwell, West Sussex, United Kingdom. Chapter 5: 97-123, 2017.

### c. Refereed journal articles.

1. Roberts, B.E., Miller, J.S., Ricciardi, R., Mahr, A., Jones, R., Rice, A., Morgan, J.R. Determination of the Identity and Organization of Messenger RNAs within DNA. *Am. J. Trop. Hyg.* 29:1117-1122, 1980.
2. Morgan, J.R., Roberts, B.E. Organization of RNA Transcripts from a Vaccinia Virus Early Gene Cluster. *J. Virol.* 51: 283-297, 1984.  
PMCID: PMC254437
3. Morgan, J.R., Cohen, L.K., Roberts, B.E. Identification of the DNA Sequences Encoding the Large Subunit of the mRNA-Capping Enzyme of Vaccinia Virus. *J. Virol.* 52: 206-214, 1984.  
PMCID: PMC254507
4. Morgan, J.R., Barrandon, Y., Green, H., Mulligan, R.C. Transfer and Expression of Foreign Genes in Transplantable Human Epidermal Cells. *Science* 237:1476-1479, 1987.  
PMID: 3629250
5. Barrandon, Y., Morgan, J.R., Mulligan, R.C., Green, H. Restoration of Growth Potential in Paraclones of Human Keratinocytes by a Viral Oncogene. *Proc. Nat'l. Acad. Sci. USA* 86: 4102-4106, 1989.  
PMCID: PMC287397

6. Morgan, J.R. and Eden, C.A. Retroviral-Mediated Gene Transfer into Transplantable Human Epidermal Cells. *Prog. Clin. & Biol. Res.* 356: 417-428, 1991.  
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7. Lee, J., Morgan, J.R., Tompkins, R.G., Yarmush, M.L. The Importance of Proline on Long-Term Hepatocyte Function in a Collagen Gel Sandwich Configuration: Regulation of Protein Secretion. *Biotech. & Bioeng.* 40: 298-305, 1992.  
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8. Lee, J, Morgan, J.R., Tompkins, R.G., Yarmush, M.L. Proline Mediated Enhancement of Hepatocyte Function in a Collagen Gel Sandwich Configuration, *FASEB J.* 7: 586-591, 1993.  
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9. Foy, B.D., Lee, J., Morgan, J.R., Toner, M., Tompkins, R.G., Yarmush, M.L. Optimization of Hepatocyte Attachment to Microcarriers: Importance of Oxygen. *Biotech. & Bioeng.* 42: 579-588, 1993.
10. Morgan, J.R., Lee, J., Tompkins, R.G., Yarmush, M.L. Rapid Quantitation of Recombinant Retroviruses. *Biotechnol. Prog.* 10: 441-446, 1994.
11. Krueger, G.G., Morgan, J.R., Jorgensen, C.M., Schmidt, L., Li, H.L., Li, L.T., Boyce, S.T., Wiley, H.S., Kaplan J., Petersen, M.J. Genetically Modified Skin to Treat Disease: Potential and Limitations. *J. Invest. Derm.* 103: 76S-84S, 1994.
12. Petersen, M., Kaplan, J., Jorgensen, C., Schmidt, L., Li, L., Morgan, J.R, Krueger, G.G. Sustained Production of Human Transferrin by Transduced Fibroblasts Implanted Into Athymic Mice: A Model for Somatic Gene Therapy. *J. Invest. Derm.* 104: 171-176, 1995.
13. Eming, S.E., Lee, J., Snow, R.G., Tompkins, R.G. Yarmush, M.L., Morgan, J.R. Genetically Modified Epidermis Overexpressing PDGF-A Directs the Development of a Cellular and Vascular Connective Tissue Stroma When Transplanted to Athymic Mice. *J. Invest. Derm.* 105: 756-763, 1995. Featured article
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16. Matthew, H.W.T., Sternberg, J., Stefanovich, P., Morgan, J.R., Toner, M., Tompkins, R.G., Yarmush, M.L. Effects of Plasma Exposure on Cultured Hepatocytes: Implications for Bioartificial Liver Support. *Biotech. & Bioeng.* 51: 100-111, 1996.

17. Eming, S.A., Yarmush, M.L., Morgan, J.R. Enhanced Function of Cultured Epithelium by Genetic Modification: Cell-Based Synthesis and Delivery of Growth Factors. *Biotech. & Bioeng.* 52: 15-23, 1996.
18. Eming, S.A., Snow, R.G., Yarmush, M.L., Morgan, J.R. Targeted Expression of IGF-I to Human Keratinocytes: Modification of the Autocrine Control of Keratinocyte Proliferation. *J. Invest. Derm.* 107: 113-120, 1996.
19. Medalie, D.A., Eming, S.A., Tompkins, R.G., Yarmush, M.L., Krueger, G.G., Morgan, J.R. Evaluation of Human Skin Reconstituted from Composite Grafts of Cultured Keratinocytes and Human Acellular Dermis Transplanted to Athymic Mice. *J. Invest. Derm.* 107: 121-127, 1996.
20. Choate, K.A., Medalie, D.A., Morgan, J.R., Khavari, P.A. Corrective Gene Transfer in the Human Skin Disorder Lamellar Ichthyosis. *Nature Medicine* 2: 1263-1267, 1996.
21. Benn, S.I., Whistitt, J.S., Broadley, K.N., Nanney, L.B., Perkins, D., He, L., Patel, M., Morgan, J.R., Swain, W.F., Davidson, J.R. Particle Mediated Gene Transfer with TGF- $\beta$ 1 cDNAs Enhances Wound Repair in Rat Skin. *J. Clin. Invest.* 98: 2894-2902, 1996. PMID: PMC5077572008
22. Medalie, D.A., Tompkins, R.G., Morgan, J.R. Evaluation of Acellular Human Dermis as a Dermal Analog in a Composite Skin Graft. *ASAIO-J.* 42(5): 455-462, 1996.
23. Roth, C.M., Reiken, S.R., LeDoux, J.M, Rajur, S.B., Lu, X.-M., Morgan, J.R., Yarmush, M.L. Targeted Antisense Modulation of Inflammatory Cytokine Receptors. *Biotech. & Bioeng.* 55: 72-81, 1997.
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25. Rajur, S.B., Roth, C.M., Morgan, J.R., Yarmush, M.L. Covalent Protein-Oligonucleotide Conjugates for Efficient Delivery of Antisense Molecules. *Bioconjugate Chemistry* 8: 935-940, 1997.
26. Medalie, D.A., Eming, S.A., Collins, M.E., Tompkins, R.G., Yarmush, M.L., Morgan, J.R. Differences in Dermal Analogs Influence Subsequent Pigmentation, Epidermal Differentiation, Basement Membrane and Rete Ridge Formation of Transplanted Composite Skin Grafts. *Transplantation* 64: 454-465, 1997.
27. LeDoux, J.M., Morgan, J.R., Yarmush, M.L. Removal of Proteoglycans Increases the Efficiency of Retroviral Mediated Gene Transfer. *Biotech. & Bioeng.* 58: 23-34, 1998.
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29. Wiley, H.S., Woolf, M.F., Opresko, L.K., Burke, P.M., Will, B., Morgan, J.R., Lauffenburger, D.A. Removal of the Membrane-anchoring Domain of Epidermal Growth Factor Leads to Intracrine Signaling and Disruption of Mammary Epithelial Cell Organization. *J. Cell Biol.* 143: 1317-1328, 1998.  
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30. Medalie, D.A., Tompkins, R.G., Morgan, J.R. Characterization of a Composite Tissue Model Which Supports Clonal Growth of Human Melanocytes In Vitro and In Vivo. *J. Invest. Derm.* 111: 810-816, 1998.
31. Machens, H-G., Morgan, J.R., Berthiaume, F., Stefanovich, P., Reimer, R., and Berger, A. Genetically Modified Fibroblasts Induce Angiogenesis in the Rat Epigastric Island Flap. *Langenbeck's Arch Surg.* 383: 345-350, 1998.
32. Bieganski, R. M., Fowler, A., Morgan, J.R., Toner, M. Stabilization of Active Recombinant Retroviruses in an Amorphous Dry State with Trehalose. *Biotech. Prog.* 14: 615-620, 1998.
33. Machens, H-G., Morgan, J.R., Weich, H.E., Berthiaume, F., Stefanovich, P., Berger, A. Genetically Modified Fibroblasts Induce Angiogenesis in the 3 x 6cm Rat Epigastric Island Flap. *Eur. J. Plast. Surg.* 22: 203-209, 1999.
34. Eming, S.A., Yarmush, M.L., Krueger, G.G., Morgan, J.R. Regulation of the Spatial Organization of Mesenchymal Connective Tissue: Effects of Cell-Associated Versus Released Isoforms of Platelet-Derived Growth Factor. *Am. J. Path.* 154: 281-289, 1999.  
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35. Krueger G.G., Jorgensen, C.M., Matsunami, N., Morgan, J.R., Liimatta, A., Meloni-Ehrig, A., Shepard, R., Petersen, M.J. Persistent Transgene Expression and Normal Differentiation of Immortalized Human Keratinocytes In Vivo. *J. Invest. Derm.* 112: 233-239, 1999.
36. Eming, S.A., Whitsitt, J.S., He, L., Krieg, T., Morgan, J.R., Davidson, J.M. Particle-Mediated Gene Transfer of PDGF Isoforms Promotes Wound Repair. *J. Invest. Derm.* 112: 297-302, 1999.  
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37. LeDoux, J.M, Davis, H.E., Morgan, J.R., Yarmush, M.L. Kinetics of Retrovirus Production and Decay. *Biotech. & Bioeng.* 63: 654-662, 1999.
38. LeDoux, J.M, Morgan, J.R., Yarmush, M.L. Differential Inhibition of Retrovirus Transduction by Proteoglycans and Free Glycosaminoglycans. *Biotech. Prog.* 15: 397-406, 1999.
39. Andreadis, S.T., Lavery, T., Davis, H.E., Le Doux, J.M., Yarmush, M.L., Morgan, J.R. Towards a More Accurate Quantitation of the Activity of Recombinant Retroviruses: Alternatives to Titer and Multiplicity of Infection. *J. Virol.* 74:1258-1266, 2000.  
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41. Supp, D.M., Bell, S.M., Morgan, J.R., Boyce, S.T. Genetic Modification of Cultured Skin Substitutes by Transduction of Human Keratinocytes and Fibroblasts with Platelet-Derived Growth Factor-A. *Wound Repair and Regeneration* 8: 26-35, 2000.
42. Pins, G.D., Collins-Pavao, M.E., Van De Water, L., Yarmush, M.L., Morgan, J.R. Plasmin Triggers Rapid Contraction and Degradation of Fibroblast Populated Collagen Lattices. *J. Invest. Derm.* 114: 647-653, 2000.
43. Davis, H. E., Morgan, J.R., Yarmush, M.L. Analysis of Electrostatic Effects on the Success of Retroviral-Mediated Gene Delivery. *Mat. Res. Symp. Proc.*662: 3.9.1-3.9.10, 2001.
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51. Erdag, G. and Morgan, J.R. IL-1 $\alpha$  and IL-6 Enhance the Anti-Bacterial Properties of Cultured Composite Keratinocyte Grafts. *Annals of Surgery* 235: 113-124, 2002.  
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  109. Manning, K.L, Thomson, A.H and Morgan, J.R. Funnel-Guided Positioning of Multi-cellular Microtissues to Build Macrotissues. *Tissue Engineering Part C*, 24: 557-565, 2018.  
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  110. Wilks, B.T., Evans, E.B., Nakhla, M.N., and Morgan, J.R. Directing Fibroblast Self-Assembly to Fabricate Highly-Aligned, Collagen-Rich Matrices. *Acta Biomaterialia*, 81: 70-79, 2018.  
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#### **d. Non-refereed journal articles**

1. Leonard, E., Morgan, J.R. and Nerem, R.M. "A Tribute to Michael J. Lysaght, 1942-2009". *Tissue Eng.* 16: 767-787, 2010.

#### **e. Review articles**

1. Morgan, J.R. and Yarmush, M.L. Bioengineered Skin Substitutes. *Science & Medicine* 4: 6-15, 1997.
2. Eming, S.A., Morgan, J.R., and Berger, A. Gene Therapy for Tissue Repair: Approaches and Prospects, *Brit. J. Plastic Surgery* 50: 491-500, 1997.
3. Machens, H-G., Morgan, J.R., Berthiaume, F., Stefanovich, P. und Berger, A. Funktionelle Angiogeneseinduktion im epigastrischen Lappen der Ratte nach genetischer Modifikation von Fibroblasten. *Langenbeck's Arch Chir Suppl I*: 681-687, 1998.
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5. Andreadis, S.T., Roth, C.M., Le Doux, J.M., Morgan, J.R., Yarmush, M.L. Large-Scale Processing of Recombinant Retroviruses for Gene Therapy. *Biotech Progress* 15: 1-11, 1999.
6. Krueger, G.G., Morgan, J.R., Petersen, M.J. Biologic Aspects of Expression of Stably Integrated Transgenes in Cells of the Skin In Vitro and In Vivo. *Proc. Assoc. Amer. Physicians* 3: 198-205, 1999.
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8. Morgan, J.R., Enhancing Tissue-Engineered Skin by Genetic Modification. *Science & Medicine* 9: 305-307, 2003.
9. Gagnani, A., Morgan, J.R., and Ferreira, L.M. Experimental Model of Cultured Skin Graft. *Acta Cir. Bras.* 19: 4-10, 2004.
10. Aaron, R.K., Herr, H., Ciombor, D.M., Hochberg, L., Donoghue, J., Briant, C., Morgan, J., and Ehrlich, M.G. Horizons in Prosthetic Development for the Restoration of Limb Function. *J. Am. Acad. of Orthopaedic Surg.* 14: S198-.S204, 2006.

11. Aaron, R.K., and Morgan, J.R. Biohybrid Limbs: New Materials and New Properties. *Medicine & Health/Rhode Island*. 90: 4-6, 2007.
12. Dean, D. M., and Morgan, J.R. Directed Self-Assembly of Complex-Shaped Microtissues. *Science & Medicine* 10: 215-217, 2008.
13. Achilli. T.-M., Meyer, J., and Morgan J.R. Advances in the Formation, Use and Understanding of Multi-cellular Spheroids. *Expert Opinion on Biological Therapy*. 12, 1347-1360, 2013. PMID: 22784238

#### **f. Abstracts**

Do not keep track

#### **g. Invited lectures**

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|---------------------------------------|--|
| 07-07-81<br>Spring                    | "Mapping of Specific mRNAs by Hybridization-Selection and Cell-Free Translation." Molecular Cloning Course, Cold Spring Harbor Labs, Cold Harbor, NY.  |
| 08-02-83                              | "Messenger RNA Biogenesis by Vaccinia Virus." Integrated Genetics, Inc., Framingham, MA.   |
| 07-25-84<br>University of             | "Identification of the DNA Sequences Encoding the Large Subunit of mRNA-Capping Enzyme of Vaccinia Virus." Workshop on Vaccinia Virus, Wisconsin, Madison, WS.   |
| 10-01-85<br>School of<br>Stony Brook, | "Transfer and Expression of Foreign Genetic Material in Transplantable Human Epidermal Cells." Department of Oral Biology and Dental Medicine, Dental Medicine, State University of New York at Stony Brook, NY. |
| 02-12-86                              | "Expression of Human Growth Hormone by Transplantable Human Epidermal Cells." UCLA Workshop on Human Gene Therapy, Lake Tahoe, CA.   |
| 02-25-87                              | "Genetic Modification of Transplantable Human Epidermal Cells." Yale Department of Dermatology, New Haven, CT.   |
| 03-18-87                              | "Genetic Modification of Transplantable Human Epidermal Cells." Department of Physiology and Biophysics, Case Western Reserve, University School of Medicine, Cleveland, OH.                                     |
| 05-11-87                              | "Immortalization of Human Epidermal Cells." NIH and Cystic Fibrosis Foundation sponsored workshop, Cell Immortalization, Bethesda, MD.   |
| 05-01-87                              | "Gene Transfer Into Transplantable Human Epidermal Cells." Salk Institute Biotechnology/Industrial Associates, Inc., La Jolla, CA.   |



- 12-09-87 "Transfer and Expression of Foreign Genetic Material in Transplantable Human Epidermal Cells." Department of Biochemistry, University of Massachusetts Medical School, Worcester, MA.
- 01-14-90 "Retroviral-Mediated Gene Transfer Into Transplantable Human Epidermal Cells." Third International Symposium on Tissue Repair: Clinical and Experimental Approaches to Dermal and Epidermal Repair: Normal & Chronic Wounds, Miami, FL.
- 10-12-90 "Biological Bandage for Advanced Wound Healing." Biomedical Business International Meeting, Innovative Wound Care Technologies, San Francisco, CA.
- 12-04-90 "Somatic Cell Gene Therapy." Massachusetts Centers of Excellence Symposium: Genetics, Biotechnology & Public Health, Boston, MA.
- 12-07-90 "Applications of Cell-Based Protein Deliver Systems for Growth Factors." Technology Management Group Conference, Growth Factors for Wound Healing II, Cambridge, MA.
- 03-28-91 "Gene Transfer into Transplantable Human Epidermal Cells." The University of Michigan, Ann Arbor, MI.
- 04-15-91 "The Challenges to Gene Therapy." Symposium on "New Horizons in Biotechnology." Sponsored by American Society for Microbiology, Jamaica Plain, MA.
- 10-2-91 "Modification of Human Keratinocytes by Viral Transfection." Seminar in Research Medicine, Rockefeller University, New York, NY.
- 12-2-91 "Gene Transfer into Transplantable Human Epithelial Cell." Section of Molecular Dermatology, Jefferson Institute of Molecular Medicine, Department of Dermatology, Jefferson Medical College, Philadelphia, PA.
- 04-14-82 "Research: A New State of the Art." International Shrine Hospital Day and Hospital Symposium. Shriners Burns Institute, Boston, MA.
- 02-20-95 "Gene Modified Skin Grafts to Promote Wound Healing." American Association for the Advancement of Science Annual Meeting and Science Innovation Exposition, Atlanta, GA.
- 04-20-95 "Enhanced Function of Cultured Epithelium by Genetic Modification." American Burn Association, 27th Annual Meeting, Albuquerque, NM.
- 05-22-95 "Gene Modified Skin Grafts to Promote Wound Healing." Biochemical Engineering IX, Davos, Switzerland.

- 08-20-95 "Growth Factor Gene Therapy: Production of Wound Healing Growth Factors by  
Cell Genetically Modified Skin Grafts." Second International Conference on  
Engineering, La Jolla, CA.
- 09-13-95 "Differential Connective Tissue Formation: Effects of Cell Associated versus  
Secreted Isoforms of PDGF-BB." Organogenesis, Inc., Canton, MA.
- 04-22-96 "Gene Modified Skin Grafts to Promote Wound Healing." Ninth Annual  
& Advanced Wound Care Meeting, Symposium on Advanced Wound Care  
Medical Research Forum on Wound Repair, Atlanta, GA.
- 05-02-96 "Overexpression of PDGF-A Enhances the Performance of a Composite Skin  
Organs, Graft." 42nd Annual Conference, American Society for Artificial Internal  
Washington, DC.
- 05-03-96 "Targeted Expression of EGF and IGF-1 to Human Keratinocytes: Modification  
of the Autocrine Control of Keratinocyte Proliferation," The Society for  
Investigative Dermatology, 57th Annual Meeting, Washington, DC.
- 05-17-96 "Engineering Genetic Strategies for Tissue Repair." European Association of  
Plastic Surgeons, 7th Annual Meeting, Innsbruck, Austria.
- 06-19-96 "Gene Therapy for Tissue Repair: Production of Wound Healing Growth Factors  
by Genetically Modified Skin Grafts." Genzyme Tissue Repair, Inc.,  
Framingham, MA.
- 07-16-96 "Gene Therapy Technologies: Rate Limiting Steps to Retroviral-Mediated Gene  
Transfer." 5th World Congress of Chemical Engineering, Cell Transplantation  
and Gene Therapy Symposium, San Diego, CA.
- 07-16-96 "Growth Factor Gene Therapy: Genetically Modified Skin Grafts for the  
Synthesis and Delivery of Wound Healing Growth Factors." 5th World Congress  
of Chemical Engineering, Cell Transplantation and Gene Therapy Symposium,  
San Diego, CA.
- 11-21-96 "Genetic Strategies for Tissue Engineering." American Society of Mechanical  
Engineering, Tissue Engineering Symposium, Atlanta, GA.
- 02-07-97 "Growth Factor Gene Therapy for Wound Healing of the Skin." Department of  
University, Molecular Pharmacology, Physiology & Biotechnology, Brown  
Providence, RI.
- 04-03-97 "Technologies and Applications in Gene Therapy." BioDelivery Sciences, Inc.,  
Newark, NJ.
- 06-12-97 "Gene-Modified Skin Grafts for Wound Healing." Cell Genesys, Inc.,  
Foster City, CA.

- 06-13-97 "Rate Limiting Steps to Retroviral-Mediated Gene Transfer." Systemix, Inc. Palo Alto, CA.
- 09-18-97 "Genetic Engineering of Skin Substitutes." International Business  
Substitutes, Communications Group plc Conference: Bioengineering of Skin  
Boston, MA.
- 10-18-97 "Gene Therapy and Tissue Engineering of the Skin." Dr. John Francis Burke  
Symposium, Massachusetts General Hospital, Boston, MA.
- 4-21-98 "Rate Limiting Steps to Retroviral-Mediated Gene Transfer." Symposium:  
Meeting, Engineering Gene Therapeutics, Experimental Biology 98, FASEB  
San Francisco, CA.
- 07-12-98 "Gene Therapy and Engineered Skin Substitutes." The 35th Annual Meeting of  
the Society for Cryobiology Pittsburgh, PA.
- 10-11-98 "Growth Factor Delivery from Genetically Modified Skin Grafts." Annual  
Meeting of the Biomedical Engineering Society, Cleveland, OH.
- 02-19-99 "Use of Genetically Modified Composite Skin Grafts in Tissue Engineering."  
3rd Annual Hilton Head Workshop: Tissue Engineering, Gene Delivery, and  
Regenerative Healing, Hilton Head Island, SC.
- 03-23-99 "Applications of Gene Therapy and Microfabrication Technologies in Tissue  
Interest Engineering of the Skin." Keynote Speaker for the Canadian Special  
Group, American Burn Association Annual Meeting, Orlando, FL.
- 07-20-99 "Local Growth Factor Delivery from Genetically Modified Skin Grafts."  
Conference, Epithelial Differentiation and Keratinization, Gordon Research  
Tilton, NH
- 10-23-99 "Wound Healing." Group Leader for Discussion. Dystrophic Epidermolysis  
Visioning Bullosa Research Association of America and the United Kingdom  
Meeting, Florham Park, NJ.
- 12-02-99 "Novel Membranes for the Capture of Virus Particles." Cambridge Healthtech  
Nanostructures for Institute's Second Biannual Conference: "Bioengineering of  
Biomedical and Biotechnical Applications", Boston, MA.
- 10-05-99 "Growth Factors in Wound Healing." Course in Bioengineering and Gene  
Medicina, Therapy, Universidade Federal de Sao Paulo/ Escola Paulista de  
Sao Paulo, Brasil.

- 10-06-99 "Tissue Engineering and Applications to Skin." Course in Bioengineering and Gene Therapy, Universidade Federal de Sao Paulo/ Escola Paulista de Medicina, Sao Paulo, Brasil.
- 10-08-99 "Gene Transfer Technologies." Course in Bioengineering and Gene Therapy, Universidade Federal de Sao Paulo/ Escola Paulista de Medicina, Sao Paulo, Brasil.
- 10-08-99 "Gene Therapy and Applications in Tissue Engineering." Course in Bioengineering and Gene Therapy, Universidade Federal de Sao Paulo/ Escola Paulista de Medicina, Sao Paulo, Brasil.
- 06-01-00 "Gene Therapy and Tissue Engineering of the Skin." Department of Molecular Pharmacology, Physiology & Biotechnology, Brown University, Providence, RI.
- 06-28-00 "Microfabrication of a Basal Lamina Analog." Gordon Research Conference, Tilton, NH.
- 07-18-00 "Transient Hyperproliferation of a Transgenic Human Epidermis Expressing Hepatocyte Growth Factor." Tissue Engineering 2000, Advances in Tissue Engineering, Biomaterials and Cell Signaling, York, England.
- 07-18-00 "Innate Immunity of Cultured Skin Substitutes: Cytokines Stimulate Anti-Microbial Activity." Tissue Engineering 2000, Advances in Tissue Engineering, Biomaterials and Cell Signaling, York, England
- 08-04-00 "Tissue Engineering: From Discovery to Patient Care." Medicine Meets Millennium during EXPO 2000, Hannover, Germany.
- 02-21-01 "Enhancing Tissue Function Through Gene Transfer." ET-2001 Workshop: The New Biology Tool Box for Tissue Engineering, Hilton Head Island, SC.
- 02-25-01 "IL-1 and IL-6 Enhance the Anti-Bacterial Properties of Cultured Skin Substitutes." 5th Annual Hilton Head Workshop: Engineering Tissues, Hilton Head Island, SC.
- 04-01-01 "Enhancing Tissue Function Through Gene Transfer." Tissue Engineering: Opportunities and Challenges, Experimental Biology 2001, FASEB Meeting, Orlando, FL.
- 09-11-01 "Growth Factor Gene Delivery in Wound Healing." Cutaneous Gene Therapy: Applications in Genodermatoses and Wound Healing, Berzellius Symposium 57, Uppsala, Sweden.
- 09-11-01 "Functionalized Membranes for the Capture and Purification of Recombinant Retroviruses." Amersham Pharmacia Biotech, Uppsala, Sweden.

- 03-20-02 "Growth Factor Delivery from Genetically Modified Skin Grafts." Department of Surgery, University of Utrecht, Utrecht, The Netherlands.
- 04-28-02 "Growth Factor Delivery from Genetically Modified Skin Grafts." 15<sup>th</sup> Annual Wound Symposium on Advanced Wound Care & Medical Research Forum on Repair, Baltimore, MD.
- 11-21-02 "The Next Generation of Living Skin Substitutes." Biomedical Engineering Seminar Series, Brown University, Providence, RI.
- 11-25-02 "Tissue Engineered Skin Substitutes." Biomedical Engineering Seminar Series, Rutgers University, New Brunswick, NJ.
- 03-12-04 "Functionalization of Materials Using Electron Beam Induced Graft Engineering Polymerization." United States Army Research, Development and Command, Natick Soldier Center, Natick, MA.
- 04-20-04 "Entrepreneurial Fellows Program." Rhode Island's Experimental Program to Stimulate Competitive Research (EPSCoR), Providence, RI.
- 06-25-04 "Enhancing the Performance of Tissue Engineered Skin By Genetic Institute at Modification." NIH-NSF Bioengineering and Bioinformatics Summer Clemson University, Clemson, SC.
- 12-20-05 "Enhancing the Performance of Tissue Engineered Skin By Genetic of Modification." Division of Surgical Research Seminar Series, Department Surgery, Brown University, Rhode Island Hospital, Providence, RI.
- 05-24-06 "Production of Complex Micro-Tissues for Evaluation of Nanomaterials." Showcase of NanoMedicine, Brown University, Providence, RI.
- 06-21-06 "Production of Complex Micro-Tissues for Use in Tissue Engineering." Department of Orthopedics Seminar Series, Brown University Medical School, Rhode Island Hospital, Providence, RI.
- 07-17-06 "Use of Micro-Molded Non-Adhesive Hydrogels for the Self-Assembly of Complex Cellular Aggregates." 1<sup>st</sup> Annual Conference Methods in Technology, Bioengineering, Kresge Auditorium, Massachusetts Institute of Cambridge, MA.
- 10-18-06 "Optimizing the Soft Tissue Seal of a Percutaneous Osseo-integration Device." Program in Recovery from Trauma, Brown University, Providence, RI.
- 02-26-07 "Bioengineering of Self-Assembled Complex Branching Micro-Tissue." Department of Biomedical Engineering, Rutgers University, Piscataway, N.J.
- 06-18-07 "Optimizing the Soft Tissue Seal of a Percutaneous Osseointegration Device."

- 4<sup>th</sup> International Meeting, Ten Years of the US-Russian Program in Prosthetics and Rehabilitation, New England Sinai Hospital, Stoughton, MA.
- 06-30-07 “Optimizing the Soft Tissue Seal of a Percutaneous Osseointegration Device.” No Barriers Symposium, Squaw Valley, CA.
- 10-31- 07 “Bioactive Polymer Hybrids to Improve the Soft Tissue Seal Around Percutaneous Devices.” BioInterface 2007, Annual Symposium, Surfaces Biomaterials Foundation, San Mateo, CA.  
in
- 11-29-07 "Transcutaneous Osseointegrated Devices." Scientific Forum: “Biohybrid Concepts in Limb Restoration: Blending Man and Machine" Sponsored by the Center for Restorative and Regenerative Medicine, Providence Veterans Affairs Medical Center and Brown University, Providence, RI.
- 12-11-07 "Micro-molded Nonadhesive Hydrogels for the Self Assembly of 3D Micro-tissues." Millipore Corporation, Danvers, MA.
- 02-28-08 "Self Assembly of 3D Micro-tissues." Organogenesis, Inc., Canton, MA.
- 03-14-08 "Rods, Tori and Honeycombs: The Directed Self-Assembly of Micro-tissues With Prescribed Micro-scale Geometries.” Regenerative Medicine: Advancing to Next Generation Therapies. Institute for Bioengineering and Bioscience and Georgia Tech/Emory Center for Engineering Living Tissues. Hilton, Head, SC.
- 05-21-08 " The Non-adhesive Petri Dish: Self Assembly of 3D Micro-tissues.” Center for Cardiovascular Research, Rhode Island Hospital, Providence, RI.
- 06- 25-08 “Rods, Toroids and Honeycombs: The Directed Self-Assembly of 3D Cellular Micro-tissues with Prescribed Micro-scale Geometries.” Scottish Centre for Regenerative Medicine, University of Edinburgh, Edinburgh, Scotland, UK.  
for
- 06- 27-08 “[Self Assembly of 3D Micro-tissues: Applications in Cancer Biology and Tissue Engineering.](#)” Department of Biochemistry, University of Ghent, Ghent, Belgium.
- 10- 01-08 “[Self Assembly of 3D Micro-tissues: Applications in Tissue Engineering.](#)” The Center for Restorative and Regenerative Medicine, Providence Veterans Affairs Medical Center, Providence, RI.
- 04-02-09 “[Self Assembly](#) and Self-Sorting of Scaffold-free [3D Micro-tissues.](#)” National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs) and the Biotechnology and Biological Research Council (BBRC) Symposium: Tissue Engineering: A New Dimension to Animal Replacement, Royal College of Surgeons, London, UK.

- 09- 02-09 “The Big Challenge to Prosthesis Development.” Military Health Research Forum, Kansas City, MO.
- 09-28-09 “The Self Assembly Scaffold-Free 3D Microtissues.” Nanoscience-Neuroscience, A Joint Workshop of the Institute for Molecular and Nanoscale Innovation and the Brown Institute for Brain Sciences, Brown University, Providence, RI.
- 10-19-09 “Cell Power: The quantitative Measurement of the Forces Driving the Self Assembly of 3D Microtissues.” Department of Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA.
- 12-04-09 “A New Platform Technology for the Self Assembly of 3D Living Microtissues.” International Biosensing & Bioprocessing Symposium, Cambridge, MA.
- 12-18-09 “3D Microtissues for High Content Screening in Drug Discovery.” Broad Institute, Massachusetts Institute of Technology, Cambridge, MA
- 3-2-10 “Cell Power: The Quantitative Measurement of the Forces Driving the Self Assembly of 3D Microtissues.” Department of Cell Biology and Anatomy, Medical University of South Carolina, Charleston, SC.
- 4-27-10 “A New Platform Technology for the Self-Assembly of 3D Living Microtissues.” Dose-Response 2010: Implications for Toxicology, Medicine, and Risk Assessment, 9<sup>th</sup> Annual Meeting of the International Dose-Response Society
- 8-10-10 “Cell Power: Quantification of the Forces Driving the Self Assembly of 3D Micro-Tissues.” Center for Cell Biology and Cancer Research, Albany Medical College, Albany, NY, Keynote Speak, Annual Retreat at the Glen Sanders Mansion, Glenville, NY
- 10-05-10 “Directed Self-Assembly of Large Scaffold-free Multi-cellular Honeycomb Structures.” 2010 International Conference on Biofabrication, Philadelphia, PA
- 10-13-10 “Cell Power: Quantification of the Forces Driving the Self Assembly of 3D Micro-Tissues.” Department of Orthopedics Seminar Series, Brown University Medical School, Rhode Island Hospital, Providence, RI
- 2-02-11 “3D Cell Culture Models in Cancer Research.” Symposium on Cancer Collaborative Research Opportunities, Brown University Medical School, Rhode Island Hospital and Miriam Hospital, Providence, RI
- 3-25-11 “Cell Power: Quantification of the Forces Driving the Self Assembly of 3D Micro-Tissues.” Program in Biotechnology and Biomedical Engineering University of Massachusetts, Dartmouth, MA

- 6-04-11 “Tissue Engineering of Self Assembled Scaffold-free Multi-cellular Micro-Tissues.” 4<sup>th</sup> International Conference on Tissue Engineering, Chania, Crete, Greece
- 9-22-11 “Scaffold-free Multi-cellular Microtissues Provide High Content” Predictive In Vitro Models; 2<sup>nd</sup> Annual Summit, Boston, MA
- 10-19-11 “Self-assembled 3D Microtissues: Maximizing Cell-to-Cell Communication. Food and Drug Administration National Center for Toxicological Research. Jefferson, AR
- 2-1-12 “3D Multi-cellular Microtissues for Toxicity Testing and Drug Discovery” Department of Electrical, Computer and Biomedical Engineering, University of Rhode Island, Kingston, RI
- 4-19-12 “Drug Transport in 3D Multi-cellular Microtissues: Role of Efflux Pumps and Gap Junctions” Page Morton Hunter Bioengineering Seminar, Department of Bioengineering, Clemson University, Clemson, SC
- 6-13-12 “Drug Transport in 3D Multi-cellular Microtissues: Role of Efflux Pumps and Gap Junctions” Pfizer Global Research and Development, Groton, CT
- 8-31-12 “Drug Transport in 3D Multi-cellular Microtissues: Role of Efflux Pumps and Gap Junctions” Universite’ Angers, Angers, France
- 11-28-12 “Micro-mold Design Controls the Morphological Evolution of Self-assembling Multi-cellular 3D Microtissues” Institute for Molecular and Nanoscale Innovation Brown Bag Seminar, Brown University, Providence, RI
- 12-15-12 “Pannexin1 Expression Resists Spreading of 3D Multi-cellular Glioma Tumor Spheroids” Annual Meeting of the American Society for Cell Biology, San Francisco, CA
- 3-29-13 “Cell-based Synthesis of Extracellular Matrix: ‘Bottoms up’ Approach to Manufacturing Decellularized Structures.” C.R. Bard and the Technology Ventures Office, Brown University, Providence, RI
- 4-2-13 “Mimicking the In Vivo Environment: 3D Multi-cellular Microtissues for Toxicity Testing and Drug Screening” Pfizer, Cambridge Research Facility, Cambridge MA
- 10-10-13 “3D Multi-Cellular Microtissues”. Center for Engineering in Medicine, Massachusetts General Hospital, Boston, MA
- 10-29-13 “Drug Uptake and Diffusion in 3D Multi-Cellular Microtissues”. Functional Analysis & Screening Technologies Congress, Engineering 3D Tissues. Cambridge Healthcare Institute, Cambridge, MA



- 1-31-14 “Role of Transporters and Inhibitors in Drug Uptake and Elimination in 3D Spheroids”. Bristol Myers Squibb Princeton, NJ
- 7-1-14 “Self-assembly and Morphogenesis of 3D Multi-cellular Microtissues *In Vitro*” Microscience Microscopy Congress 2014 sponsored by the Royal Microscopical Society (175<sup>th</sup> Anniversary), Manchester, UK
- 9-5-14 “A Layer-by-Layer and Scaffold-Free Strategy to Build Tissues and Organs” Department of Materials Science and Engineering, University of Michigan, Ann Arbor, MI
- 9-16-14 “Bio-Pick, Place and Perfuse: A New Instrument for Layer-by-Layer 3D Tissue Engineering” IBC’s 4<sup>th</sup> Annual Cell Therapy Bioprocessing Conference, Sheraton Pentagon City, Arlington, VA
- 10-8-14 “A Layer-by-Layer and Scaffold-free Strategy to Build Tissues and Organs” Leiden Institute of Chemistry, University of Leiden, The Netherlands
- 10-28-14 “Micro-molds for the Formation of 3D Multi-cellular Microtissues” Unilever, Inc, Bedford, United Kingdom
- 10-28-14 “3D Microtissues to Quantify Chemical Uptake, Accumulation and Elimination” Unilever, Inc, Bedford, United Kingdom
- 3-7-15 “Can We Build Organs?” Day of Biology, A Celebration of Brown University’s 250<sup>th</sup> Anniversary, Brown University, Providence, RI  
<https://www.youtube.com/watch?v=rXcK-mwCRvE>
- 5-27-15 “Government and Institutional Support for Organ Bioengineering.” Organ Bioengineering and Banking Roadmap Workshop, New Organ, Organ Preservation Alliance and National Science Foundation, Washington, DC
- 6-12-15 “Architecture of Chimeric Spheroids Controls Drug Transport” 14<sup>th</sup> Annual World Preclinical Congress, Tackling Translational Challenges, 3D Cellular Models, Revitalizing Phenotypic Screening, Featured Presentation, Boston, MA
- 10-21-15 “Can We Build Organs?” Medical Device Group Boston, Forum 3D Printing: It’s Changing Everything, Waltham, MA
- 11-04-15 “The Bio-Pick, Place and Perfuse (Bio-P3) a New Instrument for Building Tissues and Organs” Innovation Showcase, Technology Ventures Office, Brown University, Providence, RI
- 11-10-15 “Designer 3D Spheroids for Testing Drugs and Drug Uptake”. 3<sup>rd</sup> Annual Functional Analysis & Screening Technologies Congress, 3D Cell Culture: Organoid, Spheroid, & Organ-on-a-Chip Models. Cambridge Healthcare Institute, Cambridge, MA

- 11-17-15 “Architecture of Chimeric 3D Spheroids Controls Drug Transport” Department of Pathology, Lifespan, Rhode Island Hospital, Providence, RI
- 01-11-16 “Bio-Printing, Can We Build Organs” Tech Sandbox, Metro West Innovation Hub, Hopkinton, MA
- 4-21-16 “The Bio-Pick, Place and Perfuse: A New Instrument for Layer-By-Layer Tissue Engineering” Keynote Speaker. The 8<sup>th</sup> International Conference on Microtechnologies in Medicine and Biology, Seoul, South Korea
- 6-16-16 “Overcoming the Challenges of Quantitative High-Throughput Confocal Microscopy of 3D Spheroids” Keynote Speaker. 3D Models From In Vitro to In Silico, 15<sup>th</sup> Annual World Preclinical Congress, Boston, MA
- 9-15-16 “Quantitative High-Throughput Confocal Microscopy of 3D Spheroids” High Content Imaging & Analysis User Group Meeting, Perkin Elmer, Inc, Hopkinton, MA
- 10-12-16 “Building Tissues *In Vitro*” Brown University Superfund Research Program 2016 Annual Retreat, Brown University, Providence, RI
- 2-6-17 “Quantitative High-Throughput Confocal Microscopy of 3D Spheroids” SLAS 2017, Society for Laboratory Automation and Screening, International Conference and Exhibition, Washington, DC
- 2-23-17 “Can We Build Organs?” Rhode Island College, Department of Biology, Providence, RI
- 3-17-17 “A Modular Prefab Approach to Building Macrotissues” Select Biosciences BioEngineering 2017: BioMEMS/Microfluidics, 3D Bioprinting, Tissue Engineering and Synthetic Biology Conference, Boston, MA
- 3-20-17 “Design of 3D Spheroids for Testing Drugs and Toxicants” Department of Chemistry, University of Rhode Island, Kingston, RI
- 4-25-17 “Addressing the Challenges to Quantitative High Resolution, High Throughput Confocal Imaging of 3D Spheroids” Select Biosciences, High Content & Phenotypic Screening, Cambridge, United Kingdom
- 5-17-17 “The Bio-Pick, Place and Perfuse: A New Instrument for Building Living Tissues.” 3D Printing in Science, European Congress, Select Biosciences, Hannover, Germany
- 9-15-17 “The Bio-Pick, Place and Perfuse: A Prefab Approach to Building Macrotissues Layer-by-Layer”. 2<sup>nd</sup> Indiana University- Perdue University Indianapolis- Johns Hopkins University Symposium “Progress in Scaffold-free Biofabrication” IUPUI, Indianapolis, Indiana

- 10-19-17 “The Bio-Pick, Place and Perfuse: A New Instrument for Building Macrotissues from Prefabricated Parts”. Soft Matter Symposium, University of Florida, Gainesville, FL
- 2-6-18 “Challenges of Quantitative High-Throughput Confocal Microscopy of 3D Spheroids” SLAS 2018, Society for Laboratory Automation and Screening, International Conference and Exhibition, San Diego, CA
- 10-19-19 “Harm or Heal: Toxicity in the Modern World” Family Weekend Lecture, Brown University, Providence, RI
- 11-8-19 “Assembly of Macrotissues Using Cell-Dense Building Parts” Diabetic Lower Extremity Symposium, Harvard Medical School, Boston, MA
- 01-24-20 “Harm or Heal: Toxicity in the Modern World” Office of Vice President of Research Staff Luncheon, Brown University, Providence, RI
- 03-24-20 “Harm or Heal: Toxicity in the Modern World” Grand Challenges, Nanotechnology: It’s a Small World, University of Rhode Island, South Kingston, RI
- 10-20-22 “Fibroblasts, Fibrosis and a New 3D Model to Measure Biomechanics of the ECM” Center for Biomedical Engineering Seminar Series, Brown University, Providence, RI
- 2-2-23 “Fibroblasts, Fibrosis and a New 3D Model to Measure Biomechanics of the ECM” Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH

## **h. Papers read**

## **i. Other**

### **Patents**

1. Morgan, J.R. and Mulligan, R.C. United States Patent #4,868,116, “Introduction and Expression of Foreign Genetic Material in Epithelial Cells.” Issued September 19, 1989.
2. Morgan, J.R. and Mulligan, R.C. United States Patent #4,980,286, “In Vivo Introduction and Expression of Foreign Genetic Material in Epithelial Cells.” Issued December 25, 1990.
3. Morgan, J.R. and Mulligan, R.C. European Patent EP0228458, “Epithelial Cells Expressing Foreign Genetic material.” Issued January 14, 1991.
4. Pins, G. and Morgan, J.R. United States Patent #6, 479, 072 “Microfabricated Membranes and Matrices.” Issued November 12, 2002.

5. Lee, W., Yarmush, M., Morgan, J.R. “Methods for Removal, Purification and Concentration of Viruses, Methods of Therapy Based Thereupon.” United States Patent #6, 861, 001. Issued March 1, 2005.
6. LeDoux, J.M., Yarmush, M.L, Morgan, J.R. United States Patent #6,884,613. “Selective Precipitation of Viruses with Polymers.” Issued April 4, 2005.
7. Lee, W., Yarmush, M., Morgan, J.R. United States Patent #7,160,464 . “Methods for Removal, Purification and Concentration of Viruses, Methods of Therapy Based Thereupon.” Issued January 9, 2007.
8. LeDoux, J.M., Yarmush, M.L, Morgan, J.R. United States Patent #7,592,170. “Selective Precipitation of Viruses Using Polyelectrolytes.” Issued September 22, 2009.
9. Jarrell, J.D. and Morgan, J.R. United States Patent #8,080,223. “Method of Making a Composite from Metal Oxide and Polymer Precursors.” Issued December 20, 2011.
10. Morgan, J.R. and Napolitano, A. P. United States Patent #8,361,781. “Cell Aggregation and Encapsulation Device and Method.” Issued January 29, 2013.
11. Dean, D., Morgan, J.R. and Rago A. United States Patent # 8,501,476. “Assays and Methods for Fusing Cell Aggregates.” Issued August 6, 2013.
12. Morgan, J.R., Chai, P., Napolitano, A. P., Mathiowitz, E., Dean, D. European Patent #1976972. “Cell Aggregation and Encapsulation Device and Method.” Issued March 12, 2014.
13. Achilli, T.M., Youssef, J., Morgan, J.R. “Mechanotransduction by the Synergistic Action of Heterotypic Cell Interactions” United States Patent # 9,243,278 Issued January 26, 2016.
14. Achilli, T.M., McCalla, S., Tripathi, A., Morgan, J.R. “Differential Effects of Drugs on Transport in a Multi-layered 3D Spheroid Model” United States Patent #9,468,680. Issued October 18, 2016.
15. Chai, P., Mathiowitz, E., Morgan, J.R., Napolitano, A. P. “Methods and Devices for Encapsulating Cells.” United States patent filed January 24, 2016.
16. Blakely, A., Morgan, J.R., Murphy, J., Patterson, W., Tripathi, A. “Device for Engineering Thick Living Tissues”. United States Patent #9,771,554, Issued September 26, 2017.
17. Morgan, J.R., Chai, P., Napolitano, A. P., Mathiowitz, E., Dean, D. “Methods and Devices for Encapsulating Cells” United States Patent #9,587,213, Issued March 7, 2017.

18. Morgan, J.R., Manning, K.L., Ip, B. “Funnel-Guided Microtissue Stacking and Manipulation.” International Patent Application PCT/US2019/016683. Filed February 05, 2019.
19. Boekelheide, K., Morgan, J.R, Hall, S., Hui, L., and Ip, B. “A Multi-Compartment Device Containing Three Dimensional (3D) Microtissues for Toxicity Testing”. International Patent Application PCT/US2020/012986, Filed January 9, 2020.
20. Ip, B., and Morgan, J.R. “Decellularized Extracellular Matrix Morsels, Methods Making and Methods of Using Same” Filed December 23, 2020, U.S. Provisional Patent Application No. 63/129,966.
21. Morgan, J.R., and Wilks, BT. “Quantifying Cell-Derived Changes In Collagen Synthesis, Alignment, And Mechanics In A 3d Connective Tissue Model” Filed February 28, 2022 U.S. Provisional Patent Application No. 63/314,815.
22. Moalli, P., Sung, V. and Morgan, J.R. “ Biofabrication of Vaginal Support Using Vaginally Derived Cells.” Filed January 31, 2023. U.S. Provisional Patent Application No. 63/482,371.

### **Patented Scientific Products in the Marketplace**

1. ViraDuctin™, Retrovirus Transduction Kit, sold by Cell Biolabs, Inc.  
United States Patent #6,884,613.
2. 3D PetriDish®, sold by Microtissues, Inc. and Sigma-Aldrich, Inc.  
United States Patent #8,361,781.

### **6. Research in Progress**

My research group continues to be at the forefront of investigating the cellular and molecular rules of cell-to-cell aggregation that drives the self assembly of mono-dispersed cells into 3D microtissues and the use of 3D microtissues for toxicity testing, drug discovery and tissue engineering. Using micro-molded nonadhesive hydrogels, a novel technology developed by my lab (patents in US, Japan and EU), we are investigating differences between cell types in the extent and dynamics of self assembly, the ability of cells to self assemble complex branching microtissues (e.g., honeycombs) and the ability of a mixture of two different cell types to self-sort, whereby one cell type forms the inner core and the other cell type forms the outer coating of a 3D microtissue. We have used 3D microtissues to develop a new quantitative method of measuring drug transport into 3D spheroids and using this to investigate the role of inhibitors of efflux pumps whose upregulation can be the cause of multi-drug resistance in cancer. We have used these 3D microtissues to devise a model for toxicity testing focusing on human granulosa cells of the ovary. And, recently we have developed a 3D ring-shaped microtissue using human fibroblasts that synthesize and secrete a human ECM. We can measure the biomechanics of these tissue rings and are investigating its use a model of fibrosis and other defects of the human ECM. Lastly, we are using 3D microtissues as potential building blocks with an eye towards the

tissue engineering of larger more complex tissues and someday organs. To help advance this emerging field, we have devised novel automation technologies needed to manufacture these tissues.

## **7. Service:**

### **(i.) To the University**

- 2002 - 2007 Founding Program Director, Graduate Program in Biomedical Engineering, Brown University, Providence, RI
- 2002 Member, Safety Committee for Division of Biology and Medicine, Brown University, Providence, RI
- 2004 Member, Faculty Search Committee, Interdisciplinary Initiative in Soft Materials, Brown University, Providence, RI
- 2005 Member, Committee to Review the Engineering Graduate Curriculum, Brown University, Providence, RI
- 2005 Member, Ad hoc Alliance for Nanoscale Innovation Steering Committee, Brown University, Providence, RI
- 2005 Member, Faculty Search Committee, Interdisciplinary Initiative in Soft Materials, Brown University, Providence, RI
- 2006 Member, Faculty Search Committee, Department Pathobiology, Brown University, Providence, RI
- 2006- 2008 Member, Graduate Council, Graduate School, Brown University, Providence, RI
- 2006- 2007 Member, Faculty Search Committee, Department Molecular Pharmacology, Physiology and Biotechnology, Brown University, Providence, RI
- 2007- 2008 Member, Faculty Search Committee, Department Molecular Pharmacology, Physiology and Biotechnology, Brown University, Providence, RI
- 2008 Member, Faculty Search Committee, Department Molecular Cell Biology, Brown University, Providence, RI
- 2011 Member, Faculty Search Committee, Biomedical Engineering, School of Engineering, Brown University, Providence, RI
- 2012 Member, Faculty Search Committee, Department Molecular Pharmacology, Physiology and Biotechnology, Brown University, Providence, RI

2012 Member, Faculty Search Committee for Chair, Department of Obstetrics and Gynecology, Warren Alpert Medical School of Brown University, Providence, RI

2013 Member, Steering Committee for Multi-photon Core Facility

2013 Member, Faculty Search Committee, Two Positions in Biomedical Engineering, School of Engineering, Brown University, Providence, RI

2013 Member, Faculty Search Committee, Neuroengineering, School of Engineering, Brown University, Providence, RI

2007 - 2016 Co-Director, Center for Biomedical Engineering, Brown University, Providence, RI

2015 Member, Faculty Advisory Committee, Executive Masters in Science and Technology Leadership Degree,

2015 - Member, Molecular Pathology Core Advisory Committee, Brown University, Providence, RI

2014 Founding Member, Center to Advance Predictive Biology, Brown University, Providence, RI

2017-2021 Director, Biotechnology Graduate program, Brown University, Providence, RI

2021 Member, Biotechnology Masters Steering Committee, Brown University, Providence, RI

2021 Member, Committee to Develop Therapeutic Sciences Graduate, Brown University, Providence, RI

2021- Member, Biology Curriculum Committee, Brown University, Providence, RI

2018- Director, Center for Alternatives to Animals in Testing, Brown University, Providence, RI

<u>Past Postdoctoral Fellows</u>	<u>Year</u>	<u>Current Position</u>
Jaegwan Lee, Ph.D.	1991-1992	Professor, Chung-Ang University, Seoul, Korea
Jongwon Lee, Ph.D.	1992-1993	Professor, Taegu Catholic University School of Medicine, Taegu, Korea

Xiao-Ming Lu, Ph.D.	1991 - 1993	Research Scientist, Shriners Hospital for Children, Boston, MA
Howard Matthew, Ph.D.	1992 - 1994	Professor, Wayne State University, Detroit, MI
Sabine Eming, M.D./Ph.D.	1993 - 1996	Professor, Dermatology, University Koeln, Koeln, Germany
Daniel Medalie, M.D.	1994 - 1996	Assistant Professor, Case Western Reserve, Cleveland, Ohio
Maura Collins, Ph.D.	1995 - 1996	Associate Professor, Worcester State College, Worcester, MA
Deborah Quinn, M.D.	1995 - 1997	Assistant Professor in Pulmonary Medicine, Massachusetts General Hospital, Boston, MA
Charles Roth, Ph.D.	1995 - 1996	Associate Professor, Rutgers University, New Brunswick, NJ
Peter Stefanovich, M.D.	1995 - 1996	Instructor, Harvard Medical School, Boston, MA
H-G Machens, M.D.	1997 - 1997	Professor, Plastic Surgery, Hannover Medical School, Hannover, Germany
A. Gagnani, M.D./Ph.D.	1998 - 1998	Associate Professor, Plastic Surgery, University of Sao Paulo, Sao Paulo, Brazil
Stylianos Andreadis, Ph.D.	1996 - 1998	Professor, State University of New York, Buffalo, NY
Ray Samuels, M.D., Ph.D.	1996 - 1998	Instructor, Orthopedic Surgery, Children's Hospital, Boston, MA
William Lee, Ph.D.	1996 - 1999	Vice President R&D and Regulatory Affairs AST Products, Inc., Billerica, MA
George Pins, Ph.D.	1996 - 1999	Professor, Worcester Polytechnic Institute, Worcester, MA
Joseph Le Doux, Ph.D.	1998 - 1999	Professor, Georgia Institute of Technology, Atlanta, GA
Rashid Mohammed, Ph.D.	1999 - 2001	Postdoctoral Fellow, Beth Israel Hospital, Boston, MA



Karen Hamoen, M.D./Ph.D.	1998 – 2001	Resident, University of Utrecht Medical School, Utrecht, The Netherlands
Jane Tjia, Ph.D	2001 – 2002	Senior Scientist, InterCytex, Inc., Burlington, MA
Hinne Rakhorst, M.D.	2000 – 2002	Resident, Plastic Surgery, Erasmus University, Rotterdam, The Netherlands
Margaret Porembski, M.D.	2000 – 2002	Resident, General Surgery, Medical College of Pennsylvania, Philadelphia, PA
Christiane Sobral, M.D.	2002 – 2004	Resident, Plastic Surgery, University of Sao Paulo, Sao Paulo, Brazil
Gulsun Erdag, M.D.	2000 – 2004	Assistant Professor, Johns Hopkins University Baltimore, MD
Xudong Cao, Ph.D.	2002 – 2005	Associate Professor, University of Ottawa, Ottawa, Canada
Anelisa Companer, M.D.	2003 - 2005	Assistant Professor, University of Sao Paulo, Sao Paulo, Brazil
Stephan Krotz, M.D. Specialist,	2009 – 2010	Reproductive Endocrinology & Infertility Advanced Fertility Center, Houston, TX
Lorin Jakubek, Ph.D	2011-2012	Postdoctoral Associate, Sanofi, Cambridge, MA
Jacquelyn Youssef, Ph.D.	2005-2012	Assistant Professor (Research), Brown University, Providence, RI
Andrew Blakely, M.D.	2012-2014	Surgical Resident, Rhode Island Hospital, Providence, RI
Blanche Ip, Ph.D.	2016-2018	Assistant Professor, Brown University, Providence, RI
<u>Past Doctoral Students</u>	<u>Year</u>	<u>Current Position</u>
Joseph Horwitz	1991-1993	Head, Cell Culture Development, NIH Gaithersburg, MD
Joseph Le Doux	1993-1997	Associate Professor, Georgia Institute of Technology, Atlanta GA

Howard Davis	1998-2002	Chief of Staff to CEO, Biogen, Boston, MA
Anthony Napolitano	2004-2008	Vice President, Plymouth Capital Management Rye Brook, NY
John Jarrell	2005-2008	President and CEO, Materials Science Associates and BioIntraface, Inc, Providence, RI
Dylan Dean	2005-2008	Chief Resident, Emergency Medicine, Oregon Health & Science University, Portland OR
Brian Holt	2005-2011	Senior System Engineer, Amgen, Thousand Oaks CA
Roshni (Patel) Rainbow	2005-2011	Assistant Professor, Queen's University Kingston, ON, Canada
Jacquelyn Youssef	2005-2012	Assistant Professor (Research), Brown University, Providence, RI
Brian Bao	2007-2012	Intern, Oregon Health & Science University Portland, OR
Toni-Marie Achilli	2006-2014	Assistant Dean, Brown University, Providence, RI
Sean Curran	2010-2015	Medical Student, Brown University, Providence, RI
Michael Susienka	2011-2016	Research Scientist, Millipore Sigma, Bedford, MA
Elizabeth Leary	2013-2018	Field Application Scientist, NanoCollect Biomedical Inc, San Diego, CA
Kali Manning	2015-2020	Research Scientist, Ximedica, Providence, RI
Benjamin Wilks	2015-2020	Postdoctoral Fellow, Harvard/ MGH, Boston, MA

Current Doctoral Students

	<u>Department</u>	<u>Project</u>
Caitlin Hopkins	Biotech	3D Model of Fibrosis Using Human Cells

Present Masters Students

	<u>Department</u>	<u>Project</u>
Jayla Millender	Biotech	Effects of LOX Inhibitors on Fibrotic Tissue Rings

Madeline Garza Tissue Rings	Biotech	Effects of growth factor signaling on Fibrotic
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Abigail Schaefer	BME	Biomechanics of Fibrotic Ring Tissues
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Past Medical Students

Year

Project

Peter Chai	2004-2007	Novel Cell Aggregation/Encapsulation Device
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Anthony Del Signore	2006-2007	Gene Expression in 3D Spheroids
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Past Masters Students

Year

Current Position

Adam Rago	2007-2008	Research Scientist, Arsenal Medical, Cambridge, MA
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Don Ho	2006-2008	Postdoctoral Fellow, NIH Bethesda, MD
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Mathew Lech	2006-2008	Research Scientist, Pfizer, Cambridge, MA
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Christine Livoti	2008-2009	Associate, Landmark Ventures, New York, NY
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Katherine Barcay	2012-2013	Business Analyst, ZS Associates, San Francisco, CA
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Kali Manning	2013-2015	Ph.D. student, Brown University, Providence, RI
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Thomas Clinckemaille	2013-2015	Graduated
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Christos Galanis	2013-2015	Ph.D. student, Johns Hopkins University, Baltimore, MD
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Thet Wai	2014-2016	Development Associate, Lin-zhi International, Inc Santa Clara, CA
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Shanni Chen	Biotech	High Throughput Screening with 3D Spheroids
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Sarah Fergione Institute, Yale University, New Haven, CN	2016-2018	Research Technician II, Howard Hughes Medical
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Andrew Howes	2016-2018	Ph.D. student, Brown University, Providence, RI
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Caitlin McCarthy	2016-2018	Ph.D. student, Brown University, Providence, RI
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Gianna Prata	2017-2019	Research Scientist, Natick Solder Lab, Natick, MA
Marianne Kanellias	2017-2019	Research Scientist, Emulate, Inc. Cambridge, MA
Morcos Nakhla	2017-2019	Medical Student, UCLA Medical School
Megan Grant LLC, Boston, MA	2019-2020	Associate Relationship Manager, LifeSci Advisors,
Joshua Manning	2019-2021	Res Associate, Ximedica, Providence, RI
Becka Padgett Cambridge, MA	2019-2021	Res Associate II, Caraway Therapeutics,
Karl Anderson	2019-2021	Senior Res Associate, Moderna, Cambridge, MA
Yanying Wu	2020-2022	
<u>Past Undergraduates</u>	<u>Year</u>	<u>Project</u>
Peter Rachins	2002-2003	Alginate Micro-Encapsulation of Cells
Anne Hazelhurst	2002-2003	Retroviral Vectors Encoding Neurotrophic Factors
Roxanne Wadia	2002-2003	Measuring the Anti-Microbial Properties of Skin
Sandy Chira	2003-2004	Skin Cells on Micro-Fabricated Membranes
James Hwong	2003-2004	Measuring the Contractile Forces of Skin Cells
Blair Smith	2003-2004	Cell Adhesion to a Micro-Fabricated Surface
Peter Chai	2005-2006	Encapsulation of Cellular Micro-Tissues
Azeem Kaka	2006-2006	Design of Reporter Genes for a Living Cell Array
Adam Rago	2006-2007	Design of a Novel Device to Measure Cell Anoikis
Alan Man	2006-2007	3D Micro-tissues of Breast Cancer Cells
Jason Lohmeuller	2006-2007	Effects of RKIP on 3D Micro-tissue Self-Assembly
Brandon Dolly	2007-2008	Drug Delivery from a Percutaneous Device
Evan Werlin	2007-2008	Anti-microbial Properties of a Percutaneous Device

Katie Litts	2008–2008	Blebistatin Effects on Self-Assembled Microtissues
Yihwa Yang	2008–2008	Self-Assembly of Granulosa Microtissues
Brett Weinstock	2007–2009	Self Assembly of Mesenchymal Stem Micro-tissues
Christopher Baker	2008–2009	Silver Release from Novel Anti-bacterial Coatings
Kangyi Zhang	2008–2009	Photoactive Titanium Based Coatings
Amy Chang	2009-2010	Gene Regulation of Encapsulated Cells
Nalin Tejavibulya	2010-2011	Self Assembly of Honeycomb Shaped Microtissues
Margaret Merritt	2010-2011	A 3D Microtissue Model for TBI
Julia Goldner	2010-2011	Hydrogel Substrates with Controlled Cell Adhesion
Kelsey Collins	2011-2011	HHMI Cell Transplantation Team Project
Xianhan Mary Fei	2011-2011	HHMI Cell Transplantation Team Project
Andrew Kim	2011-2011	HHMI Cell Transplantation Team Project
Matthew Leon	2011-2011	HHMI Cell Transplantation Team Project
Joshua Leung	2011-2011	HHMI Cell Transplantation Team Project
Sarah Mancone	2011-2011	HHMI Cell Transplantation Team Project
Michael Pico	2011-2011	HHMI Cell Transplantation Team Project
Eleanor Sharpe	2011-2011	HHMI Cell Transplantation Team Project
Benjamin Wilks	2012-2012	HHMI Drug Discovery Team Project
Chiemeka Onwuanaegbule	2012-2012	HHMI Drug Discovery Team Project
Vira Roudsari	2012-2012	HHMI Drug Discovery Team Project
Laila Handoo	2012-2012	HHMI Drug Discovery Team Project
Eunice Cho	2012-2012	HHMI Drug Discovery Team Project
William Barbosa	2012-2012	HHMI Drug Discovery Team Project
Julia Meyer	2011-2013	Drug Transport in a 3D Model

Gerianne Connell	2013-2013	HHMI Drug Discovery Team Project
Jonathan Juliano	2013-2013	HHMI Drug Discovery Team Project
Margaret Dushko	2013-2013	HHMI Drug Discovery Team Project
Michaela Jacobs	2013-2013	HHMI Drug Discovery Team Project
Claire Rhee	2013-2013	HHMI Drug Discovery Team Project
Stephanie Hojsak	2013-2013	HHMI Drug Discovery Team Project
Timothy Chou	2013-2013	HHMI Drug Discovery Team Project
Alejandro Perez	2013-2013	HHMI Drug Discovery Team Project
Jieyi Cai	2014-2014	HHMI Drug Discovery Team Project
Nimesha Gerlus	2014-2014	HHMI Drug Discovery Team Project
Lucia Hernandez	2014-2014	HHMI Drug Discovery Team Project
Leo Kadota	2014-2014	HHMI Drug Discovery Team Project
Charlotte Kim	2014-2014	HHMI Drug Discovery Team Project
Stephen McShane	2014-2014	HHMI Drug Discovery Team Project
Mary Nguyen	2014-2014	HHMI Drug Discovery Team Project
David Reich	2014-2014	HHMI Drug Discovery Team Project
William Barbosa	2012-2014	Drug Elimination from 3D Microtissues
Benjamin Wilks	2014-2015	Biomechanics of 3D Microtissues for Tissue Repair
Jonathon Juliano	2014-2015	Biomechanics of Blended Microtissues
Andrew Thomson	2016-2016	Bio-Pick, Place and Perfuse Team
Joy Jiang	2016-2016	Bio-Pick, Place and Perfuse Team
Maryam Ahmad	2016-2016	Bio-Pick, Place and Perfuse Team
Morcos Nakhla	2016-2016	Bio-Pick, Place and Perfuse Team
Claire Rhee	2012-2016	A High Throughput 3D Assay for Gap Junctions

David Reich	2015-2016	Quantitative Confocal Microscopy of 3D Spheroids
Andrew Thomson	2016-2018	Bioprinting in Tissue Engineering

<u>Current Undergraduates</u>	<u>Year</u>	<u>Project</u>
Emre Toner	2020	Effects of PDGF on Fibrotic Tissue Rings

Ph.D. Committees:

<u>Name</u>	<u>Year</u>	<u>Department/Institution</u>
Gregory Oehrtman	1995	Chemical Engineering Massachusetts Institute of Technology
Joseph LeDoux	1998	Chemical Engineering/Rutgers University
Lily Chu	1998	Chemical Engineering Massachusetts Institute of Technology
Jennifer Godbee	2002	Biotechnology/Brown University
Michael Schumm	2002	Biotechnology/Brown University
Nausheen Rahman	2003	Biotechnology/Brown University
Jill O'Loughlin	2003	Biotechnology/Brown University
Diana Ferris	2004	Biotechnology/Brown University
Hyun Joon Paek	2005	Biotechnology/Brown University
Gary Withey	2005	Biomedical Engineering/Brown University
John McMurdy	2005	Biomedical Engineering/Brown University
Jiangfeng Fei	2005	Biomedical Engineering/Brown University
Guochun Wang	2005	Biomedical Engineering/Brown University
Michael Harrison	2005	Biotechnology/Brown University
Mathew Kerby	2006	Biomedical Engineering/Brown University
Bonnie Lau	2006	Pathobiology/Brown University

Maureen McCamley	2006	Biomedical Engineering/Brown University
Huinan Liu	2006	Biomedical Engineering/Brown University
Peter Morello	2007	Biotechnology/Brown University
Vanesa C. Sanchez	2007	Pathobiology/Brown University
Jing Lu	2007	Biomedical Engineering/Brown University
Ercan Batur	2007	Biomedical Engineering/Brown University
Bryan Laulicht	2008	Biotechnology/Brown University
Joshua Reineke	2008	Biotechnology/Brown University
Grace Li	2008	Biomedical Engineering/Brown University
Jan Bruder	2008	Biotechnology/Brown University
Danya Decouteau	2008	Biomedical Engineering/Brown University
Chenjie Xu	2008	Chemistry/Brown University
Celinda Kofron	2008	Biomedical Engineering/Brown University
Jennifer Mitchell	2010	Biomedical Engineering/Brown University
Kenneth Moribito	2010	Biomedical Engineering/Brown University
Daniel Cho	2010	Biotechnology/Brown University
Elejdis Kulla	2010	Biomedical Engineering/Brown University
UT Ting-Dingle	2011	Biomedical Engineering/Brown University
Gozde Durmus	2012	Biomedical Engineering/Brown University
Jennet Toyjanova	2012	Solid Mechanics/Brown University
Margaret Vantangoli	2012	Pathobiology/Brown University
Cristina Lopez- Fagundo	2013	Biomedical Engineering/Brown University
April Rudd	2013	Pathobiology/Brown University
Stephanie Angione	2013	Biomedical Engineering/Brown University



Christopher Baker	2014	Biotechnology Program/Brown University
Verida Leandra	2014	Biotechnology Program/Brown University
Hetal Marble	2016	Molecular Pharmacology and Physiology, Brown U
Molly Boutin	2016	Biomedical Engineering/Brown University
Nick Kaiser	2016	Biomedical Engineering/Brown University
Thomas Valentin	2016	Biomedical Engineering/Brown University
Nicholas Labriola	2016	Biomedical Engineering/Brown University
Alysha Simmons	2016	Pathobiology/Brown University
Robert Gutierrez	2018	Biomedical Engineering/Brown University
Adam Snider	2020	Biomedical Engineering/Brown University
Zixi Lin	2021	Biomedical Engineering/Brown University
Celeste Welch	2021	Biomedical Engineering/Brown University
Abhid Zein-Sabatto	2021	Biomedical Engineering/Brown University
Adriana Salazar Coariti	2022	Biomedical Engineering/Brown University

Sc.M. Committees:

<u>Name</u>	<u>Year</u>	<u>Department/Institution</u>
Madhukar Patel	2007	Biomedical Engineering/Brown University
Matthew Seward	2007	Biomedical Engineering/Brown University
Ryan Kum	2007	Biomedical Engineering/Brown University
Matthew Lech	2008	Biomedical Engineering/Brown University
Don Ho	2008	Biomedical Engineering/Brown University
Adam Rago	2008	Biomedical Engineering/Brown University
Christine Livoti	2009	Biotechnology Program/Brown University
Bethany Desroches	2009	Biotechnology Program/Brown University

Jennifer Pallay	2009	Biomedical Engineering/Brown University
Allison Taggart	2012	Biomedical Engineering/Brown University
Elaina Atherton	2013	Biotechnology Program/Brown University
Boyan Pavlov	2014	Biotechnology Program/Brown University
Sarah Mizra	2014	Biotechnology Program/Brown University
Andrew Harrell	2016	Biotechnology Program/Brown University
Thet Wai	2016	Biomedical Engineering/Brown University
Oladele Ojo	2017	Biotechnology Program/Brown University
Britany Link	2017	Biotechnology Program/Brown University
Brandon Armstead	2018	Biotechnology Program/Brown University
Mitchel Sibley	2018	Biotechnology Program/Brown University
Caitlin Hopkins	2018	Biotechnology Program/Brown University
Sarah Fergione	2018	Biotechnology Program/Brown University
Andrew Howes	2018	Biotechnology Program/Brown University
Alex Markowski	2020	Biomedical Engineering/Brown University
Megan Grant	2020	Biotechnology Program /Brown University
Ramisa Fariha	2020	Biomedical Engineering/Brown University
Sylvia Sarnik	2021	Biomedical Engineering/Brown University
Mathew Demers	2022	Biotechnology Program /Brown University
Yanying Wu	2022	Biotechnology Program /Brown University
Raj Sharan	2022	Biotechnology Program /Brown University
Anoop Reddi	2022	Biotechnology Program /Brown University

## **(ii) To the Profession**

### Committees

- 1988 - 1989 Chairman, Institutional Biosafety Committee, Somatix Corporation, Cambridge, MA
- 1990 - 1991 Chairman, Animal Care and Use Committee, Somatix Corporation, Cambridge, MA
- 1993 - 1999 Facility Manager, Shriners Burns Institute Research Center, Cambridge, MA
- 1991 - 1992 Chairman, Ad hoc Planning Committee for Relocation to Cambridge, Shriners Hospital for Children, Boston, MA
- 1994 - 2000 Member, Subcommittee on Review of Research Proposals, Massachusetts General Hospital, Boston, MA
- 1995 - 1996 Chairman, Search Committee for Faculty in Wound Healing, Center for Engineering in Medicine, Massachusetts General Hospital, Boston, MA
- 1995 - 1996 Member, Planning Group for Center of Excellence in Bioengineering at Massachusetts General Hospital
- 1995 - 2001 Chairman, Operations Committee, Shriners Hospital for Children Research Center
- 1995 - 2002 Member, Scientific Council, Center for Engineering in Medicine, Massachusetts General Hospital
- 1996 - 2002 Member, Graduate Committee, Division of Health Sciences & Technology, Harvard-Massachusetts Institute of Technology
- 2000 - 2002 Member, Shriners Hospital for Children, Skin Bank Medical/Scientific Advisory Committee
- 2000-2009 Member External Advisory Committee, Georgia Tech/Emory University National Science Foundation Engineering Research Center, Center for the Engineering of Living Tissues
- 2001 Member, Advisory Editorial Board, – “Engineering in Medicine & Biology” publication series, Artech House Publishers
- 2005- 2007 Member, Scientific Advisory Board, NIH supported BioMEMS Resource Center, Massachusetts General Hospital, Boston, MA
- 2010-2014 Member, Editorial Board, *Biofabrication*, Institute of Physics Publishing, Bristol, UK

## Meetings

- 1996            Session Co-Chairperson, 5th World Congress of Chemical Engineering, Cell Transplantation and Gene Therapy Symposium, San Diego, CA; 14-17 July
- 2000            Session Co-Chairperson, Annual Meeting of the Biomedical Engineering Society, Seattle, WA; 11-14 October
- 2007            Organizer and Member Scientific Advisory Board, Regional Bioengineering and Biotechnology Conference, University of Massachusetts, Dartmouth, MA
- 2010            Panelist, Medical Device Manufacturers Match Making Event, March 16<sup>th</sup>, Rhode Island Center for Innovation and Entrepreneurship (RI-CIE), Providence, RI
- 2010            Session Co-Chair, “Bioprinting of cells, proteins, and biologics.” 2010 International Conference on Biofabrication, Philadelphia, PA
- 2013            Session Chair, Functional Analysis & Screening Technologies Congress, Engineering 3D Tissues. Cambridge Healthcare Institute, Cambridge, MA
- 2015            Session Chair, 3D Cellular Models, Revitalizing Phenotypic Screening as part of 14<sup>th</sup> Annual World Preclinical Congress, Tackling Translational Challenges, Boston, MA
- 2015            Session Chair, 3<sup>rd</sup> Annual Functional Analysis & Screening Technologies Congress, 3D Cell Culture: Organoid, Spheroid, & Organ-on-a-Chip Models. Cambridge Healthcare Institute, Cambridge, MA

## Reviewer

- 1993            *Biotechnology & Bioengineering*
- 1994 - 2002    Whitaker Foundation
- 1994            North Carolina Biotechnology Center Grants Program
- 1996            Massachusetts General Hospital, Nessel Gene Therapy Center Fellowship Program
- 1996            *Journal of Cellular Engineering*
- 1996 - 1997    *Human Gene Therapy*

1997 National Institute of Health, Small Business Innovative Research Study  
Section

1997 Dystrophic Epidermolysis Bullosa Research Association

1997 *Transplantation*

1997 *Nature Biotechnology*

1997 - 1998 Massachusetts General Hospital, Cutaneous Biology Research  
Center/Wellman Laboratories of Photomedicine Collaborative Program

1997 - 1998 *Tissue Engineering*

1997 - 1999 *Journal Investigative Dermatology*

1998 *Gene Therapy*

1998 *Cell Transplantation*

2000 Pittsburgh Tissue Engineering Initiative Technology Development  
Fund Seed Grant Program

2000 Veterans Health Administration

2000 *Journal Biological Chemistry*

2001 - *Annual Review of Biomedical Engineering*

2001 Cystic Fibrosis and Genetic Diseases Gene Therapy Center Grant,  
University of Pennsylvania School of Medicine

2005-2006 *Carbon*

2006 Developmental Grant Review Committee, Lifespan Office of Research,  
Rhode Island Hospital, Providence, RI

2006 *Journal Biomedical Materials Research*

2006 *Nature*

2009 Natural Sciences and Engineering Research Council of Canada,  
Ottawa, CN

2010 Veterans Administration, Rehabilitation Research and Development Service

2010 *Wound Repair and Regeneration*

2013            *TECHNOLOGY*  
2014            *Tissue Engineering*  
2014            *Lab on a Chip*  
2014-           Reviewer, Research Grants, Shriners Hospital for Children, Boston, MA  
2016            *Regenerative Medicine*  
2017            *Biofabrication*

#### Editor

1993            Editor - Gene Therapeutics Issue, Advanced Drug Delivery Reviews  
1998- 2008    Department Editor - Tissue Engineering, "Science & Medicine"  
2013-           Editorial Board Member, TECHNOLOGY  
2013-           Associate Editor, Challenges in Regenerative Medicine, Research Publisher, Inc

#### Consulting

2000            Consultant, Somatix Therapy Corporation  
2001            Consultant, Lipocyte, Inc.  
2001            Consultant, BioDelivery Sciences, Inc.  
2002            Consultant, Cell Based Delivery, Inc.  
2004- 2007    Consultant, eMembrane, Inc.

#### **(iii) To the Community**

09-19-07      “Brown Scientists Take the Petri Dish to New Dimensions”,  
Brown University press release  
<http://news.brown.edu/pressreleases/2007/09/petri-dish-new-dimensions>  
10-10-07      A Macro Idea in Micro Living”, Article in the Providence Journal  
by Benjamin N. Gedan  
02-02-09      “Cell-Building Discovery Could Reduce Need for Some Animal Research”  
Brown University press release  
<http://news.brown.edu/pressreleases/2009/02/microtissue>

- 03-30-09 “Are the Lab Rat’s Days Numbered?” Article in the Boston Globe by Colin Nickerson
- 08-03-09 “His Building Blocks May Make Organs in the Future” Article in the Providence Journal by G. Wayne Miller
- 09-29-09 “Adding Another Dimension to Biomedicine” Article in the Providence Business News by Mary L. Howe
- 01-21-10 “The 3D Petri Dish: Innovation from Brown University” Lecture, Rotary International, Pawtucket Chapter, Pawtucket, RI.
- 02-17-10 “Funding for Science Boosts RI Economy.” Commentary in Providence Journal by Peter Alfonso and Clyde Briant
- 09-19-10 “Researchers Build ‘Artificial Ovary’ to Develop Oocytes into Mature Human Eggs”  
Brown University press release  
<http://news.brown.edu/pressreleases/2010/09/ovaries>
- 12-17-10 Creation of the first bioartificial ovary, by a team of Brown researchers, named one of *Time* magazine’s “Top 10 Medical Breakthroughs” of 2010 and also included on the *Boston Globe*’s “Best of the New” list for 2010.  
[www.time.com/time/specials/packages/article/0,28804,2035319\\_2034529\\_2034518,00.html](http://www.time.com/time/specials/packages/article/0,28804,2035319_2034529_2034518,00.html)
- 4- 7-11 “Tissue Engineers Use New System to Measure Biomaterials, Structures.”  
Brown University press release.  
<http://news.brown.edu/pressreleases/2011/04/tissue>
- 1-30-12 “In Lab, Pannexin 1 Restores Tight Binding of Cells Lost in Cancer”  
Brown University press release.  
<http://news.brown.edu/pressreleases/2012/01/tumor>  
American Society of Biochemistry and Molecular Biology  
<http://www.asbmb.org/News.aspx?id=15848>
- 2-16-12 “Researchers Make Living Model of Brain Tumor”  
Brown University press release.  
<http://news.brown.edu/pressreleases/2012/02/glioma>
- 7-31-13 “Breakthrough”. Video Taped Interview, My Backyard Campaign sponsored by the Rhode Island Foundation.  
MyBackyardRI.com
- 12-31-13 “Aiming to Instill a State of Pride”. Front page article in the Providence Journal by Andy Smith

- 12-16-14 “Three Faculty Named Fellows of the National Academy of Inventors”  
Brown University press release.  
<https://news.brown.edu/articles/2014/12/nai>
- 12-22-14 “New Technology Makes Tissues, Someday Maybe Organs”  
Brown University press release.  
<http://news.brown.edu/articles/2014/12/biop3>
- Video posted by National Science Foundation  
<http://science360.gov/obj/video/a6f8ed71-75ce-4325-8784-f07937f3333d/new-technology-makes-tissues-someday-organs>
- 10-2-15 “An Accessible Approach to Making a Mini-Brain”  
Brown University press release.  
<https://news.brown.edu/articles/2015/10/minibrain>
- 11-9-15 “Tissue Engineers Recruit Cells to Make Their Own Strong Matrix”  
Brown University press release.  
<https://news.brown.edu/articles/2015/11/ecm>
- 9-19-16 “Brown Team Building Tools to Help Build Tissues” Providence Business News  
[http://pbn.com/Brown-team-developing-tools-to-help-build-tissues,116548?search\\_filter=+Jeffrey+R.+Morgan&search\\_filter\\_mode=keyword&sub\\_type=stories.packages](http://pbn.com/Brown-team-developing-tools-to-help-build-tissues,116548?search_filter=+Jeffrey+R.+Morgan&search_filter_mode=keyword&sub_type=stories.packages)
- 3-8-17 “Importance of Very Large Numbers in Organ Engineering” Advanced Math classes, Johnston High School, Johnston, RI and tour of Morgan lab at Brown University with discussion of Bio-Pick, Place and Perfuse instrument
- 6-16-17 “Can We Build Organs” Stem2Schools, student STEM group, Sharon High School, Sharon, MA
- 9-20-17 “Brown University Scientists to Play Key Roles in New Coastal Research Consortium”  
Brown University press release  
<https://news.brown.edu/articles/2017/09/epscor>
- 2-1-22 Brown researchers develop new model to investigate fibrosis treatments without use of animals” Brown University Press release  
<https://www.brown.edu/news/2022-02-01/fibrosis>

## **8. Academic honors, research grants, fellowships, honorary societies, listed chronologically.**

### **Academic honors**

- 1977 Departmental Award for Outstanding Achievement in Biology, Syracuse University, Syracuse, NY



- 1979 National Research Service Award in Viral Oncology
- 1983 - 1986 Damon Runyon Walter Winchell Postdoctoral Fellowship
- 1986 - 1988 Cancer Research Institute Postdoctoral Fellowship
- 1996 European Association of Plastic Surgeons Honorary Lecture
- 1996 La Roche-Posay International Foundation Prize
- 2009 Innovator of the Year, Providence Business News
- 2011 Innovation of the Year, Providence Business News
- 2015 Fellow, National Academy of Inventors
- 2016 Fellow, American Institute of Medical and Biological Engineering

**Research grants**

Current Research Funding

- 2018-2021 National Institute of Health/Research Triangle Institute  
Co-Principal Investigator  
Biofabrication of Uterosacral Ligaments (BioUSL)  
Total Direct Costs \$60,300
- 2018-2020 National Science Foundation  
Principal Investigator  
PFI-TT: Automated Manufacturing of Tissue Engineered Small Diameter Vessels  
Total Direct Costs \$130,556
- 2017-2022 National Science Foundation  
Co-Principal Investigator  
RII Track-1: Enhancing Rhode Island’s Coastal Environment to Enable Growth  
in a Blue Economy  
Total Direct Costs \$1,759,979
- 2017-2022 National Institute of Health, NIEHS  
Principal Investigator  
Human 3D Microtissues for Toxicity Testing via Integrated Imaging, Molecular  
and Functional Analyses  
Total Direct Costs \$401,985
- 2019 – 2021 Brown Biomedical Innovations to Impact  
Principal Investigator

## Manufacture of Novel Human Tissues for Surgical Repair and Regeneration

2020-2021    Advanced Regenerative Medicine Institute (ARMI)  
Principal Investigator  
Automated Assembly of Tissues and Organs

### Past Research Funding

1991 - 1991    National Institute of Health /Small Business Innovative Research Grant  
Principal Investigator  
Cell-Based Delivery of Wound Healing Growth Factors  
Total Direct Costs \$50,000

1991 - 1991    National Institute of Health / Small Business Innovative Research Grant  
Principal Investigator  
Measuring the Disablement of Retroviral Vectors  
Total Direct Costs \$50,000

1992 - 2004    National Institute of Health /PO1  
Director, Molecular Biology Core  
Use of Genetically Modified Skin to Treat Disease  
Total Direct Costs \$989,075

1993 - 1998    National Institute of Health  
Principal Investigator  
Genetic Modification of Epidermal Stem Cells of the Skin  
Total Direct Costs \$325,000

1995 - 1997    Shriners Hospital for Children  
Principal Investigator  
Gene Therapeutics for Respiratory Complications Following Smoke  
Inhalation  
Total Direct Costs \$370,836

1996 - 1996    Shriners Hospital for Children  
Principal Investigator  
Towards a Cure for Epidermolysis Bullosa, an Inherited Blistering Skin  
Disease  
Total Direct Costs \$50,000

1996 - 1996    Shriners Hospital for Children  
Principal Investigator  
Development of an Animal Model for Keloids/Hypertrophic Scars  
Total Direct Costs \$50,000

1996 - 1997    Shriners Hospital for Children  
Principal Investigator

Genetically Modified Epidermal Keratinocytes  
Total Direct Costs \$181,718

1997 - 1998 LifeCell, Inc.  
Principal Investigator  
Composite Grafts of AlloDerm with Patterned Surface of Allogeneic  
Keratinocytes  
Total Direct Costs \$35,000

1995 - 1997 Shriners Hospital for Children  
Co-Principal Investigator  
Susceptibility to Infection Following Thermal Injury  
Total Direct Costs \$290,863

1998 – 1998 Center for Engineering in Medicine/MGH  
Principal Investigator  
Evaluation of Factors Affecting the Efficiency of Recombinant Retrovirus-  
Mediated Gene Transfer  
Total Direct Costs \$35,000

1997 - 1999 Shriners Hospital for Children  
Principal Investigator  
Determination of Cytokine Mediated Autocrine/Paracrine Controls of the  
Cells of the Dermis  
Total Direct Costs \$271,011

1997 - 1999 National Science Foundation  
Co-Principal Investigator  
The Role of Proteoglycans in Retroviral Mediated Gene Transfer  
Total Direct Costs \$99,860

1998 - 2000 Shriners Hospital for Children  
Principal Investigator  
A Universal Allograft for the Burned Patient  
Total Direct Costs \$386,727

1995 - 2000 Shriners Hospital for Children  
Co-Principal Investigator  
The Modulation of the Acute Phase Response Using Antisense Technology  
Total Direct Costs \$800,910

2000 - 2002 Shriners Hospital for Children  
Principal Investigator  
Acellular Dermis with Autologous Keratinocytes as a Composite Skin Substitute  
in Burn Resurfacing and Reconstruction  
Total Direct Costs \$284,759

1997 - 2002 Shriners Hospital for Children

Co-Principal Investigator  
Control of Fibroblast Activation in Hypertrophic Scar  
Total Direct Costs \$612,480

2001 - 2003 Shriners Hospital for Children  
Principal Investigator  
Microfabrication of a Basement membrane: Applications in the Tissue  
Engineering of Skin Structures  
Total Direct Costs \$238,721

1999 - 2004 National Institute of Health  
Principal Investigator  
Modulating the Local Immune Microenvironment to Prolong Allograft Survival  
Total Direct Costs \$544,825

2002 - 2004 Shriners Hospital for Children  
Co-Principal Investigator  
Anhydrobiotic Engineering of Living Skin Substitutes  
Total Direct Costs \$333,505

2004 - 2005 National Institute of Health  
Co-Principal Investigator  
Biocompatibility at the Nanoscale  
Total Direct Costs \$50,000

2006 - 2007 National Collegiate & Innovators Alliance  
Principal Investigator  
Novel 3D Cell Culture Device for Drug Discovery and Biopharmaceutical  
Production  
Total Direct Costs \$15,236

2007-2008 International Foundation for Ethical Research  
Principal Investigator  
Microtissues in Micromolded Hydrogels: Reducing Animal Use with In Vitro  
Tissue Analogues  
Total Direct Costs \$12,500

2005 - 2008 National Institute of Health  
Co-Principal Investigator  
Living Cell Arrays for Real Time Functional Genomics  
Total Direct Costs \$ 403,212

2004 - 2009 Veterans Administration  
Principal Investigator  
Optimizing the Soft Tissue seal Around a Percutaneous Osseointegration Device  
Total Direct Costs \$833,493

2005 - 2009 National Science Foundation

Co- Principal Investigator  
Micropatterned Nanotopography Chips for Probing the Cellular Basis of  
Biocompatibility and Toxicity  
Total Direct Costs \$1,321,535

2010-2010 CR Bard Foundation, Inc.  
Principal Investigator  
“CR Bard Scholars Program for Undergraduate Research”  
Total Direct Costs \$9,000

2009 - 2010 Rhode Island Science & Technology Award  
Principal Investigator  
An Application of the 3-D Petri Dish: The Human Artificial Ovary  
Total Direct Costs \$200,000

2009-2012 National Institute of Health  
Principal Investigator  
Directed Self Assembly of Complex Branching Micro-Tissues  
Total Direct Costs \$450,000

2005 – 2011 National Science Foundation  
Investigator  
Materials Research Science and Engineering Center  
Micro- and Nano- Mechanics of Materials  
Total Direct Costs \$1,508,745

2010-2012 Department of Defense  
Co-Principal Investigator  
Engineering Replacement Tissues with Amniotic Stem Cells  
Total Direct Costs \$230,530

2011-2012 National Institute of Health /Small Business Innovative Research Grant  
Co-Principal Investigator  
Cell-based Model for Electrical Stimulation Safety Studies  
Total Direct Costs \$32,661

2011-2011 CR Bard Foundation, Inc.  
Principal Investigator  
CR Bard Scholars Program for Undergraduate Research  
Total Direct Costs \$9,000

2010-2012 Airlift Foundation  
Consortium PI  
**In Vitro Optimization and Large Animal Study of Anti-Infective, Bioactive  
Intramedullary (IM) Nails**  
Total Direct Costs \$87,000

2012-2012 CR Bard Foundation, Inc.

- Principal Investigator  
CR Bard Scholars Program for Undergraduate Research  
Total Direct Costs \$9,000
- 2013-2013 CR Bard Foundation, Inc.  
Principal Investigator  
CR Bard Scholars Program for Undergraduate Research  
Total Direct Costs \$9,000
- 2012-2013 Johnson & Johnson Innovation Partnership Award  
Principal Investigator  
A Novel Method to Quantify Drug Transport in 3D and Identify New More  
Effective Inhibitors of Efflux Pumps  
Total Direct Costs \$50,000
- 2013-2014 Johns Hopkins University  
Principal Investigator  
A New 3D In Vitro Model of Chemical Transport Across the Human Placenta  
Total Direct Costs \$15,000
- 2013-2014 Brown Institute for Brain Science  
Investigator  
A Bioengineered Model of Stem Cell Manipulation and Cell Transplantation for  
Neurological Diseases  
Total Direct Costs \$30,000
- 2014-2017 National Science Foundation  
Principal Investigator  
MRI Development of a Bio-Pick and Place Instrument for the Fabrication of 3D  
Organs from Complex Shaped Living Building Parts  
Total Direct Costs \$994,385
- 2014-2014 CR Bard Foundation, Inc.  
Principal Investigator  
CR Bard Scholars Program for Undergraduate Research  
Total Direct Costs \$9,000
- 2011-2014 National Science Foundation  
Co-Principal Investigator  
From Reconstituted Actin Networks to 3D Multi-cellular Microtissues: Multi-  
scale Models and Experiments on Contractility in Active Cytoskeletal Networks  
Total Direct Costs \$ 268,279

Proposals Submitted

## 9. Teaching: Chronologically

- 06-19-93      Instructor, "An Overview of Proto-Oncogenes." Massachusetts General Hospital, Boston, MA, 20 surgical house officers, 5 hrs /year preparation time, 2 hr/year contact time.
- 06-26-93      Instructor, "An Overview of Cell Signaling Processes." Massachusetts General Hospital, Boston, MA, 20 surgical house officers, 5 hrs /year preparation time, 2 hr/year contact time.
- 05-18-95      Lecturer, "Genetic Engineering of Skin Grafts." Engineering in Medicine, Seminar Series at the Massachusetts General Hospital, Boston, MA, faculty, 5-10 graduate students, 10-20 postdoctoral fellows, 3 hrs /year preparation time, 1 hr/year contact time.
- 10-02-95      Lecturer, "Materials Engineering and Molecular Biology in Artificial Skin Development." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 01-16-96      Lecturer, "Differential Connective Tissue Formation: Effects of Cell Associated versus Secreted Isoforms of PDGF-BB." Research Seminar, Massachusetts General Hospital, Boston MA, faculty, 5-10 Gastrointestinal Unit, graduate students, 10-20 postdoctoral fellows, 3 hrs /year preparation time, 1 hr/year contact time.
- 10-10-96      Lecturer, "Engineering Genetic Strategies For Tissue Repair." HST 590, Biomedical Engineering Seminars, Section on Molecular and Cellular Processes, Massachusetts Institute of Technology Cambridge, MA, 30-40 graduate students, 4hrs /year preparation time, 2 hr/year contact time.
- 01-17-97      Lecturer, "Genetic Control of Paracrine and Autocrine Controls of the Skin." Department of Pathology/Research North Seminar Series, Beth Israel Hospital, Boston, MA, faculty, 5-10 graduate students, 10-20 postdoctoral fellows, 3 hrs /year preparation time, 1 hr/year contact time.
- 03-04-97      Lecturer, "Industrial Round Table." HST 596, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 03-06-97      Lecturer, "Growth Factor Gene Therapy for Wound Healing of the Skin." Biomedical Colloquium Series, Graduate Programs In Biomedical Science, Bouve College of Pharmacy and Health Sciences, Northeastern University, Boston, MA, faculty, 30-40 graduate students, 2 hrs/year preparation time, 1 hr/year contact time.

- 04-17-97      Lecturer, "Gene Delivery to Keratinocytes." Genetics 208, Gene Therapy: Principles and Practice, Harvard Medical School, Boston, MA, 12 graduate students, 5 medical students, 4hrs/year preparation time, 2 hr contact time.
- 09-09-97      Lecturer, "Advances in Artificial Skin Development." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 02-24-98      Lecturer, "Industrial Round Table." HST 596, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 02-26-98      Lecturer, "Surgical Grand Rounds." Massachusetts General Hospital, Boston, MA, faculty, 20-30 residents, 5-10 medical students, 2 hrs /year preparation time, 1hr/year contact time.
- 09-15-98      Lecturer, "Burn Surgery and Tissue Engineering." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 03-16-99      Lecturer, "Industrial Round Table." HST 596, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 09-21-99      Lecturer, "Burn Surgery and Tissue Engineering." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 11-03-99      Lecturer, "Skin Biology and Engineering." Seminar Series in Biomedical Science and Engineering, Center for Engineering in Medicine, Massachusetts General Hospital, Boston, MA, faculty, 5-10 graduate students, 10-20 postdoctoral fellows, 3 hrs /year preparation time, 1 hr/year contact time.
- 11-23-99      Lecturer, "Composite Skin Experience." Surgical Grand Rounds, Massachusetts General Hospital, Boston, MA, faculty, 20-30 residents, 5-10 medical students, 3 hrs/year preparation time, 1 hr/year contact time.
- 09-13-00      "Gene Therapy: Construction and Delivery of Viral Vectors." Bioprocess Engineering: Fundamental and Real World Perspectives, 16:155:532 (02) Rutgers University, New Brunswick, New Jersey.



- 09-19-00      Lecturer, "Burn Surgery and Tissue Engineering." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 09-21-00      Lecturer, "Improving Cultured Skin Performance by Stimulating the Innate Immune Response." Surgical Grand Rounds, Massachusetts General Hospital, Boston, MA, faculty, 20-30 residents, 5-10 medical students, 3 hrs/year preparation time, 1 hr/year contact time.
- 10-19-00      Lecturer, "Industrial Round Table." HST 596 Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 1995 – 2006    Course Director and Instructor, HST 505: Laboratory in Molecular and Cellular Sciences, Center for Engineering in Medicine, Massachusetts General Hospital, Harvard-MIT Division of Health Science & Technology, 5 Continuing Medical Education students and 10-12 postdoctoral fellows and graduate students, 60 hrs/year preparation time, 20 hrs/year contact time.
- 03-12-01      Workshop Leader, "Tissue Engineering and Microdevices." Experiencing the Frontiers of Biomedical Technology, The Harvard-MIT Division of Health Sciences and Technology, Boston, MA, faculty, 22 mixed professionals: venture capitalists, personnel from various media, senior medical device experts, senior research personnel, 24 hrs/year preparation time, 6 hr/year contact time.
- 10-18-01      Lecturer, "Tissue Engineering of Skin." Donor Appreciation Program, Shriners Burns Hospital, 20 mixed professionals and laypersons, 2 hrs preparation time, 1 hr/year contact time.
- 10-18-01      Lecturer, "Burn Surgery and Tissue Engineering." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA, 30-40 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 01-28-02      "Tissue Engineering of Skin." Tissue Engineering II: Biomedical and Biotechnological Application, 14:125:492, Rutgers University, New Brunswick, NJ.
- 04-16-02      Lecturer, "Living Skin Equivalents." BIO 108 Organ Replacement, Brown University, Providence, RI, 60 undergraduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 12-03-02      Lecturer, "Advances in Gene Therapy." BIO 217 Receptors, Channels and Signaling, Brown University, Providence, RI, 8 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.

- 12-04-02 Lecturer, "Introduction to Gene Therapy." BIO 17 Biotechnology in Medicine, Brown University, Providence, RI, 50 undergraduate students, 3 hrs /year preparation time, 1 hr/year contact time.
- 10-28-03 Lecturer, "Burn Surgery and Tissue Engineering." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA 12 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 11-17-03 Lecturer, "Viral-Mediated Gene Delivery." BIO 211 Drug and Gene Delivery, Brown University, Providence, RI, 6 undergraduate and graduate students, 4 hrs /year preparation time, 1.5 hr/year contact time.
- 03-01-04 Lecturer, "Cells and Cell Culture." BIO 114 Tissue Engineering, Brown University, Providence, RI, 20 undergraduate students, 4 hrs /year preparation time, 1.5 hr/year contact time.
- 04-20-04 Lecturer, "Living Skin Equivalents." BIO 108 Organ Replacement, Brown University, Providence, RI, 60 undergraduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 05-06-04 Lecturer, "Drug Delivery in Dermatological Diseases." BIO 274 Organ System Pharmacology, Brown University Medical School, Providence, RI, 80, 2<sup>nd</sup> yr medical students, 6 hrs /year preparation time, 1.5 hr/year contact time
- 03-07-05 Lecturer, "Cell Adhesion." PH199/BI194 Biophysical Techniques, Brown University, Providence, RI, 24, grad and undergraduate students, 6 hrs /year preparation time, 1.5 hr/year contact time.
- 05-03-05 Lecturer, "Drug Delivery in Dermatological Diseases." BIO 274 Organ System Pharmacology, Brown University Medical School, Providence, RI, 80, 2<sup>nd</sup> yr medical students, 6 hrs /year preparation time, 1.5 hr/year contact time.
- 11-08-05 Lecturer, "Burn Surgery and Tissue Engineering." HST 595, Tutorial in Medical Engineering and Medical Physics, Massachusetts Institute of Technology, Cambridge, MA 12 graduate students, 4 hrs /year preparation time, 2 hr/year contact time.
- 04-18-06 Lecturer, "Potential Impact of Nanotechnology on Skin." EN 292 Small Wonders: The Science, Technology and Human Health Impacts of Nanotechnology", Brown University, Providence, RI, 30, graduate and undergraduate students, 6 hrs /year preparation time, 1.5 hr/year contact time.
- 04-20-06 Lecturer, "Engineering the Materials/Biointerface Using Phage Display Technology." EN 292 Small Wonders: The Science, Technology and Human Health Impacts of Nanotechnology", Brown University,

Providence, RI, 30, graduate and undergraduate students, 6 hrs /year  
preparation time, 1.5 hr/year contact time.

05-02-06 Lecturer, "Drug Delivery in Dermatological Diseases." BIO 351 Integrative  
Pathophysiology/Pharmacology, Brown University Medical School,  
Providence, RI, 80, 2<sup>nd</sup> yr medical students, 6 hrs /year preparation  
time, 1.5 hr/year contact time.

05-03-06 Lecturer, "Cell Adhesion." PH202/BI194.5 Biophysical Techniques, Brown  
University, Providence, RI, 24, grad and undergraduate students, 6 hrs  
/year preparation time, 1.5 hr/year contact time.

11-17-06 Lecturer, "Genetic Medicine I: Technologies for Gene Transfer." BIO 17  
Biotechnology in Medicine, Brown University, Providence, RI, 100  
undergraduate students, 3 hrs /year preparation time, 1 hr/year contact time.

11-20-06 Lecturer, "Genetic Medicine II: Human Gene Therapy." BIO 170 Biotechnology  
in Medicine, Brown University, Providence, RI, 100 undergraduate  
students, 3 hrs /year preparation time, 1 hr/year contact time.

09-24-07 Lecturer, "Techniques in Synthetic Biology." BIO 1940 Synthetic Biological  
Systems, Brown University, Providence, RI, 30 undergraduate students, 3  
hrs /year preparation time, 1 hr/year contact time.

11-26-07 Lecturer, "Stem Cells." BIO 0170 Biotechnology in Medicine Brown University,  
Providence, RI, 100 undergraduate students, 4 hrs /year preparation time,  
1hr/year contact time.

02-14-08 Lecturer, "Scaffold-free self-assembled 3D Micro-tissues." Bio 1140 Tissue  
Engineering, Brown University, Providence, RI, 15 undergraduate  
students, 4 hrs /year preparation time, 1.5 hr/year contact time.

03-05-08 Lecturer, "Use of Micro-molding for the Self Assembly of Complex Shaped  
Living Micro-tissues." Freshman Seminar, Art/Physics, Brown  
University, Providence, RI, 10 undergraduate students, 3 hrs /year  
preparation time, 1.5 hr/year contact time.

02-09-09 Lecturer, "Scaffold-free self-assembled 3D Micro-tissues", BIO 1140 Tissue  
Engineering, Brown University, Providence, RI, 20 undergraduate  
students, 4 hrs /year preparation time, 1.5 hr/year contact time.

03-15-09 Lecturer, "Non-adhesive Micro-molded Agarose for the Self Assembly of 3D  
Microtissues.", BIO 1120 Biomaterials, Brown University, Providence,  
RI, 22 undergraduate students, 4 hrs /year preparation time, 1.5 hr/year  
contact time.

02-09-10 Lecturer, "Rods, Toroids and Honeycombs: The Directed Self Assembly of  
Microtissues with Complex Geometries.", BIO 1120 Biomaterials, Brown

- University, Providence, RI, 22 undergraduate students, 4 hrs /year preparation time, 1.5 hr/year contact time.
- 02-08-11      Lecturer, "Scaffold-free self-assembled 3D Micro-tissues", BIO 1140 Tissue Engineering, Brown University, Providence, RI, 20 undergraduate students, 4 hrs /year preparation time, 1.5 hr/year contact time.
- 02-12-12      Lecturer, "Scaffold-free self-assembled 3D Micro-tissues", BIO 1140 Tissue Engineering, Brown University, Providence, RI, 20 undergraduate students, 4 hrs /year preparation time, 1.5 hr/year contact time.
- 09-10-12      Lecturer, "Drug Transport in 3D Tumor Spheroids" BIO 2170 Molecular Pharmacology and Physiology, Brown University, Providence, RI, 2-5 graduate students, 4 hrs /year preparation time, 1.0 hr/year contact time.
- 09-27-12      Lecturer, "Scaffold-free self-assembled 3D Micro-tissues", BIO 1140 Tissue Engineering, Brown University, Providence, RI, 20 undergraduate students, 4 hrs /year preparation time, 1.5 hr/year contact time.
- 1/13-16/14    Workshop Leader, IMSD "Defending Your Research Proposal and Critiquing Those of Others". Brown University, Providence, RI, 15 graduate students, 8hr contact time.
- 4/16/14        Lecturer, "Microtissues, Inc: Technology and Business Model", Program in Innovation Management and Entrepreneurship, PRIME, Brown University, Providence, RI, 20 graduate students, 3hr contact time.
- 1/12-15/15    Workshop Leader, IMSD "Defending Your Research Proposal and Critiquing Those of Others". Brown University, Providence, RI, 12 graduate students, 8hr contact time.
- 3/16/15        Lecturer, "Importance of Transporters and Tissue Architecture in Drug Uptake", ENGN 2910S Cancer Nanotechnology, Brown University, Providence, RI, 20 undergraduates/graduate students, 1hr contact time.
- 10/6/15        Lecturer, "Conflict of Interest" Responsible Conduct in Research Training, Brown University, Providence, RI, 50 graduate students, 1hr contact time.
- 3/9/16         Panelist, "Industry-Academia Partnerships: Perils vs Promise" Brown University Superfund Research/Program/NIEHS T32 Workshop, Brown University, Providence, RI, 50 graduate students, 4hr contact time.
- 4/3/17         Lecturer, "Conflict of Interest" Responsible Conduct in Research Training, Brown University, Providence, RI, 50 graduate students, 1hr contact time.
- 4/13/17        Lecturer, "Bringing the 3D PetriDish® to the Marketplace" ENGN 2910G Topics in Translational Research and Technologies, Brown University, Providence, RI, 20 undergraduates/graduate students, 1hr contact time.

- 10/2/17 Lecturer, “Can We Build Organs?” BIOL 0100 Living Biology at Brown and Beyond, Brown University, Providence, RI, 20 undergraduates, 30 minutes contact time.
- 11/1/17 Lecturer, “Can We Build Organs?” BIOL 0170 Biotechnology in Medicine, Brown University, Providence, RI, 100 undergraduates, 60 minutes contact time.
- 9/13/18 Lecturer, “Can We Build Organs?” BIOL 0100 Living Biology at Brown and Beyond, Brown University, Providence, RI, 20 undergraduates, 30 minutes contact time.
- 12/1/17 Lecturer, Designer 3D Spheroids for Testing Drugs and Toxicants”, BIOL 2170 Molecular Pharmacology and Physiology, Brown University, Providence, RI, 7 graduate students, 60 minutes contact time.
- 3/15/18 Lecturer, High Throughput Screening: Automated Biochemical and Biological Experiments”, BIOL 1820 Environmental Health and Disease, Brown University, Providence, RI, 40 undergraduates and graduate students, 60 minutes contact time.
- 10/2/18 Lecturer, “Conflict of Interest” Responsible Conduct in Research Training, Brown University, Providence, RI, 50 graduate students, 1hr contact time.
- 11/28/18 Lecturer, “Designer 3D Spheroids for Testing Drugs and Toxicants”, BIOL 2170 Molecular Pharmacology and Physiology, Brown University, Providence, RI, 7 graduate students, 90 minutes contact time.
- 1/31/20 Lecturer, “Publication, Patent, Company, Product.” ENGN 2910G Topics in Translational Research and Technologies. 15 graduate students, 2 hour contact time.
- 3/12/20 Lecturer, High Throughput Screening: Automated Biochemical and Biological Experiments”, BIOL 1820 Environmental Health and Disease, Brown University, Providence, RI, 40 undergraduates and graduate students, 60 minutes contact time.
- 2/4/22 Lecturer, “Publication, Patent, License, Company, Product.” ENGN 2910G Topics in Translational Research and Technologies. 11 graduate students, 2 hour contact time.
- 2/15/22 Lecturer, “3D Cell Culture: A Model of Ovarian Function.” BIOL 2167 In Vitro Models of Disease. 20 graduate students, 2 hour contact time.
- 2-13-23 Lecturer, “Fibroblasts, Fibrosis and a New 3D Model to Measure Biomechanics of the ECM” BIOL 2167 In Vitro Models of Disease. 20 graduate students, 2 hour contact time.

- 2003- 2014 Course Director, BIOL 2130 Techniques in Molecular and Cellular Sciences,  
24 hrs Brown University, Providence, RI, 11 graduate, 1 undergraduate students,  
/week preparation time, 8 hr/week contact time.
- 2013-2016 Co-Course Director, BIOL 2167 In Vitro Models of Disease, Brown University,  
Providence, RI, 5 graduate students, 3hr/week contact time.
- 2003- Co-Course Director, BIOL 2230/2240 Biotechnology and Biomedical  
Engineering Seminar, Brown University, Providence, RI, 40 graduate students,  
3hr/week contact time.
- 2003 - Course Director, BIOL 1950/1960 Independent Research, Brown University,  
hr/week Providence, RI, 3-4 undergraduates/year, 6 hrs / week preparation time, 3  
contact time.
- 2016- Course Director, BIOL 2180 Importance of Intellectual Property in  
Biotechnology, Brown University, Providence, RI, 12 graduate students,  
3hr/week contact time.

#### **10. Date of preparation of document**

November 8, 2021