

NENAD BURSAC

Duke University

Dept. of Biomedical Engineering
3000 Science Drive
Hudson Hall, Room 136
Durham, NC 27708
<http://bursaclab.bme.duke.edu>

Phone: (919) 660-5510
Fax: (919) 684-4488
E-mail: nbursac@duke.edu
Lab website:

OCCUPATION

09/03-present **Assistant Professor**
Dept. of Biomedical Engineering, Duke University, Durham, NC

EDUCATION

10/00-08/03 **Postdoctorate**
Dept. of Biomedical Engineering, Johns Hopkins University, Baltimore, MD
Advisors: Leslie Tung, PhD, Kam Leong, PhD

09/95–06/00 **Ph.D. in Biomedical Engineering**
Dept. of Biomedical Engineering, Boston University, Boston, MA
Research done in laboratory of Dr. Robert Langer at MIT
GPA 3.96 / 4.00
Advisor: Solomon R. Eisenberg, PhD
Thesis Topic: Engineered Cardiac Tissue: A Novel In Vitro Model for Electrophysiological Studies of Cardiac Muscle

09/89-06/94 **B.S. (Engineering Diploma) in Electrical Engineering**
University of Belgrade, Belgrade, Yugoslavia.
Focus on Automatics and Control
GPA 9.82 / 10.00 (top 3 out of 850 students)
Advisor: Stevan Matausek, PhD
Thesis topic: Modeling of the Adaptive Control Systems in Industrial Plants

HONORS AND AWARDS

2009 Stem Cell Innovation Award, Duke University
2006- Column writer for IEEE EMB magazine
2005-2008 Scientist Development Grant, AHA
2002 Trainee Abstract Award, AHA, Chicago
2002 BMES merit award
2002 Honorably Mentioned Finalist, Young Investigator Award Competition, NASPE, San Diego
2000-2003 Johns Hopkins BME Departmental Distinguished Postdoctoral Fellowship
2000-2002 American Heart Association Postdoctoral Fellowship
1999-2000 William B. Walsh Award for Excellence in Biomedical Engineering
1994-1995 Teaching Fellowship, Tufts University, Medford, MA
1990-1994 National Scholarship for Outstanding Young Students, Yugoslavia
1986-1994 National Awards, Olympiads in Mathematics, Physics and Control Systems, Yugoslavia

RESEARCH EXPERIENCE

Postdoctoral fellowship

00-03 Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD

- Use cell micropatterning and optical mapping techniques to develop novel 2-D cardiac myocyte networks with controlled micro- and macrostructure
- Apply optical mapping of impulse propagation to study induction, termination, and acceleration of “reentrant arrhythmias in the dish” by programmed electrical pacing
- Investigate electrophysiological effects of genetic up- and down-regulation of potassium currents in cultures of cardiac myocytes
- Develop 3-D polymer scaffolds with oriented microarchitecture to support anisotropic growth of engineered cardiac tissue for experimental studies and repair of cardiac damage
- Study role of electrical stimulation in induction of hypertrophied cardiac cell phenotype, and in enhanced yield and differentiation of mouse embryonic stem cells into excitable cell lineages inside tissue engineering bioreactors

Research Assistantship

95-00 Department of Biomedical Engineering, Boston University, Boston, MA;

Massachusetts Institute of Technology and Harvard-MIT Division of Health Sciences and Technology, Cambridge, MA, Laboratory of Prof. Robert Langer

- Optimized structural and functional properties of three-dimensional engineered cardiac tissue by varying the biochemical and physical parameters of cultivation
- Developed the experimental setup and data processing software for extracellular and intracellular studies of the mechanisms of impulse propagation in engineered cardiac tissues
- Investigated use of engineered cardiac tissue constructs as a novel in vitro model system for pharmacological and electrophysiological studies of cardiac muscle

94-95 Department of Electrical Engineering, Tufts University, Medford, MA

New England Medical Center, Boston, MA; Laboratory of Prof. Vo Van Toi

- Conducted patient surveys and investigated effects of the drug use on the optical transfer function in humans

Summer Internship

7-9/00 Advanced Tissue Sciences, La Jolla, CA

- Developed perfusable polymer scaffolds for tissue engineering

6-8/95 Massachusetts Institute of Technology, Cambridge, MA

- Applied image analysis to assess histological features of engineered cartilage tissue

7-8/93 Tokyo Metropolitan Institute of Technology, Tokyo, Japan

- Investigated use of fractals in pattern recognition

7-8/92 Laboratory for Electronics and Robotics, University of Belgrade, Belgrade, Yugoslavia

- Designed hardware for optically sensitive oxygen concentration measurements

TEACHING EXPERIENCE

04-09 Duke University, Durham, NC

- Lectured BME 101/201, Electrobiolology
- Developed and lectured BME 248, Quantitative Cell and Tissue Engineering
- Participated in lecturing MCB/CBI 208 Stem Cell Biology
- Participated in lecturing EGR 10, Introduction to Engineering
- Organized BME 311, Graduate Seminar Series
- Directly supervised 18 undergraduate, 4 MS, 6 PhD students, and 3 postdoctoral researchers

- Graduated 3 MS and 1 PhD student, with 3 PhD students to graduate in 2010
 - Served as a committee member for additional 11 PhD students
- 00-03 Johns Hopkins University, Baltimore, MD
- Supervised 4 undergraduate and 3 graduate students in cardiac electrophysiology and tissue engineering projects
- 97-00 Harvard-MIT Division of Health Sciences and Technology, Cambridge, MA
- Supervised a team of two undergraduate students in the cardiac tissue engineering project
- 94-95 Department of Electrical Engineering, Tufts University, Medford, MA
- Lectured, tutored and graded undergraduate electrical engineering lab courses, including introduction in programming languages, and biomedical instrumentation.
- 93-94 College of Electrical Engineering, University of Belgrade, Belgrade, Yugoslavia
- Tutored undergraduate courses, including advanced mathematics, linear electronics, control systems, and signal processing.

PROFESSIONAL AFFILIATIONS

Biomedical Engineering Society (BMES)
 American Heart Association (AHA)
 American Association for the Advancement of Science (AAAS)
 Cardiac Electrophysiology Society
 Biophysical Society
 American Physiological Society

INVITED JOURNAL REVIEWER

Circulation Research
 Cardiovascular Research
 Stem Cells
 Advanced Materials
 Antioxidants & Redox Signaling
 Biomaterials
 Biophysical Journal
 Nature Protocols
 Journal of Cardiovascular Electrophysiology
 American Journal of Physiology (Heart and Circulatory Physiology)
 Tissue Engineering
 IEEE Transactions of Biomedical Engineering
 Chaos
 Journal of Biomedical Materials Research A
 Critical Reviews in Biomedical Engineering
 Acta Biomaterialia
 MCB Molecular and Cellular Biomechanics
 Annals of Biomedical Engineering
 Cell Transplantation
 Regenerative Medicine

INVITED GRANT REVIEWER

NIH-NHLBI STTR/SBIR grant review panel 2007
 American Heart Association grant review panel 2007-2009
 NIH-NIBIB BTSS grant review panel 2008-2009

NIH-NHLBI SBIR/STTR special emphasis panel 2009
Lytmos/FDOH grant review panel 2008
Singapore Stem Cell Consortium (SSCC) grant review panel 2008-2009
NIH-NHLBI C-TRIP grant review panel, 2009

INVITED BOOK CHAPTERS

- 1) **Bursac, N.** (2006) “Cardiac Tissue Engineering: Matching Native Architecture and Function to Develop Safe and Efficient Therapy “, *The Biomedical Engineering Handbook*, 3rd edition, Tissue Engineering and Artificial Organs, Chapter 56, p. 1-24.
- 2) Tung, L., **Bursac, N.**, Aguel, F. (2004) “Rotors and Spiral Waves in Two Dimensions”, *Cardiac Electrophysiology: From Cell to Bedside*, Zipes, D.P. and Jalife, J. (editors) 4th edition, p. 336-344.

INVITED SPEAKER

- 1) “Engineering a Three-dimensional Structure: Are We There Yet?”, American Heart Association Scientific Sessions, Orlando, FL, November 17, 2009.
- 2) “Roles of Tissue Structure and Heterocellular Interactions in Cardiac Electrical Function”, Department of Physiology and Biophysics, Case Western University, Cleveland, OH, November 2, 2009.
- 3) “Stem Cells and Engineered Tissues for Functional Heart Repair”, MetroHealth Medical Center, Case Western University, Cleveland, OH, November 3, 2009.
- 4) “Stem Cell-based Cardiac Therapies In Vitro: Interaction Begets Function”, Cardiovascular Research Center Seminar Series, Massachusetts General Hospital, Boston, MA, September 22, 2009.
- 5) “Cardiac Cell and Tissue Engineering Using Stem Cells”, Department of Biomedical Engineering, Northwestern University, Chicago, IL, May 21, 2009.
- 6) “Imaging Engineered Tissue Constructs”, Heart Rhythm Society, Scientific Sessions, Boston, MA, May 16, 2009.
- 7) “Cardiac Cell and Tissue Engineering and Electrophysiology”, Department of Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, April 26, 2009.
- 8) “Engineering Cardiac Structure-Function Relationships in 2 and 3 Dimensions”, March 26, Center for Arrhythmia Research, University of Michigan, Ann Arbor, MI, March 26, 2009.
- 9) “Cell and Tissue Engineering for Basic Cardiac Research and Therapeutic Applications”, Biomedical Engineering Department, Cornell University, Ithaca, NY, March 11, 2009.
- 10) “Cell and Tissue Engineering Therapies for Heart Disease”, Graduate Seminar Series, Duke University, Durham, NC, January 12, 2009.
- 11) “In Vitro Assays for Studying the Capacity of Donor Cells to Repair Cardiac Tissue Damage”, AHA Scientific Sessions, New Orleans, LO, November 7, 2008.
- 12) “Cardiac Electrophysiology in a Dish”, Cardiovascular Symposium, Duke University, NC, June 2, 2008.
- 13) “Using Cell and Tissue Engineering to Aid Stem Cell Therapies for Heart Disease”, NYU Cardiology Grand Rounds, New York, NY, Mar 14, 2008.
- 14) “Designing a Cardiac Tissue Patch with Native Structure and Function”, The Institute of Biological Engineering Annual Conference, Chapel Hill, NC, March 7, 2008.
- 15) “Towards Rational Design of Cardiac Cell Therapies”, Miller School of Medicine, University of Miami, Miami, FL, January 31, 2008.
- 16) “Design of 2-D and 3-D Cardiac Tissues with Controllable Architecture and Function”, Gordon’s Research Conference on Cardiac Arrhythmia Mechanisms, Ventura, CA, Mar 20, 2007.

- 17) "Controlling the Engineered Cardiac Tissue Architecture and Function in Two and Three Dimensions", Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, Dec 4, 2006.
- 18) "Cardiomyoplasty: Prospect of Human Stem Cells", North Carolina Tissue Engineering Interest Group, Raleigh, Durham, NC, October 17, 2005.
- 19) "Experimental and Computational Studies on Complex Spiral Waves in 2-D Cardiac Substrates", American Physics Society, Los Angeles, CA, March 25, 2005.
- 20) "Cardiac Arrhythmias in Cell Cultures with Controllable Architecture, Weill Medical College, Cornell University, New York, NY, April 12, 2004.
- 21) "Engineering 2- and 3-Dimensional Cardiac Tissues with Anisotropic Architecture", North Carolina Tissue Engineering Interest Group, Raleigh, Durham, NC, September 30, 2004.
- 22) "Engineering the Synthetic Heart Tissues with Predefined Geometry and Function, Duke University Durham, NC, September 5, 2003.
- 23) "Engineering Synthetic 2- and 3-Dimensional Networks of Cardiac Cells with Predefined Architecture and Electrophysiological Function", Guidant, St. Paul, MN, April 17, 2003.
- 24) "Designing the 2- and 3-Dimensional Cardiac Cell Networks with Predefined Structure-Function Relationships", HST/MIT, Boston, MA, March 3, 2003.
- 25) "Engineering the 2- and 3-Dimensional Cardiac Muscle Tissues with Controlled Structure-Function Relationships", Duke University, Durham, NC. February 6, 2003
- 26) "Use of Engineered 3-D Cardiac Tissue to Study Electrophysiology of Cardiac Muscle", BMES Annual Meeting, Seattle, WA, October 13, 2000.
- 27) "Engineered Cardiac Tissues: Models for Electrophysiological Studies", Langer's Seminar Series, Massachusetts Institute of Technology, Cambridge, MA, May 23, 2000.
- 28) "Engineered Cardiac Tissue: Model System for Functional Studies of Cardiac Muscle", Advanced Tissue Sciences, La Jolla, CA. March 24, 2000.
- 29) "Cardiac muscle tissue engineering", Department of Biomedical Engineering, Johns Hopkins University, February 7, 2000.

PUBLICATIONS

- 1) Bian, W., Liao, B., Badie, N., **Bursac, N.** (2009) "Mesoscopic Hydrogel Molding to Control the 3D Geometry of Bioartificial Muscle Tissues", in press, *Nature Protocols*.
- 2) **Bursac, N.**, Kirkton, R.D., McSpadden, L., Liao, B. (2009) "Characterizing Functional Stem Cell-Cardiomyocyte Interactions", in press, *Regenerative Medicine*.
- 3) McSpadden, L.C., Kirkton, R.D., **Bursac, N.** (2009) "Electrotonic Loading of Anisotropic Cardiac Monolayers by Unexcitable Cells Depends on Connexin Type and Expression Level", *American Journal of Physiology (Cell Physiol)*, Vol. 297(2), p. C339-351.
- 4) Pedrotty, D.M., Klinger, R.Y., Kirkton, R.D., **Bursac N.** (2009) "Cardiac Fibroblast Paracrine Factors Alter Ion Channel Expression and Electrical Propagation of Neonatal Rat Cardiomyocytes in Vitro", *Cardiovascular Research*, Vol. 83(4), p. 688-697.
- 5) Badie, N., **Bursac, N.** (2009) "Novel Micropatterned Cardiac Cell Cultures with Realistic Ventricular Microstructure", *Biophysical Journal*, Vol. 96(9), p. 3873-3885.
- 6) **Bursac N.** (2009) "Cardiac Tissue Engineering Using Stem Cells", *IEEE Engineering in Medicine and Biology Magazine*, Vol. 28(2), p. 80-86.
- 7) Bian, W., **Bursac, N.** (2009) "Engineered Skeletal Muscle Tissue Networks with Controllable Architecture", *Biomaterials*, Vol. 30(7), p. 1401-1412.
- 8) Liao, I-C., Liu, J.B., **Bursac, N.**, Leong, K.W. (2008) "Effect of Electromechanical Stimulation on the Maturation of Myotubes on Aligned Electrospun Fibers", *Cellular and Biomolecular Engineering*, Vol. 1(2-3), p. 133-145.

- 9) Bian, W., **Bursac, N.** (2008) "Tissue Engineering of Functional Skeletal Muscle: Challenges and Recent Advances", *IEEE Engineering in Medicine and Biology Magazine*, Vol. 27(5), p. 109-113.
- 10) Pedrotty, D.M., Badie, N., Klinger, R., Kardashian, A., Hinds, S., **Bursac, N.** (2008) "Structural Coupling between Cardiomyocytes and Non-cardiomyocytes: Quantitative Comparisons Using a Novel Micropatterned Cell Pair Assay", *American Journal of Physiology (Heart and Circ Physiol)*, Vol. 295(1), p. H390-H400.
- 11) Kirkton, R.D., **Bursac, N.** (2008) "Genetic Engineering and Stem cells: Combinatorial Approaches for Cardiac Cell Therapy", *IEEE Engineering in Medicine and Biology Magazine*, Vol. 27(3), p. 85-88.
- 12) Klinger, R., **Bursac, N.** (2008) "Cardiac Cell Therapy In Vitro: Reproducible Assays for Comparing the Efficacy of Different Donor Cells", *IEEE Engineering in Medicine and Biology Magazine*, Vol. 27(1), p. 72-80.
- 13) **Bursac, N.** (2007) "Stem Cell Therapies for Heart Disease: Why Do We Need Bioengineers?", *IEEE Engineering in Medicine and Biology Magazine*, Vol. 26(4), p. 76-79.
- 14) **Bursac, N.**, Loo, Y., Leong, K.W., Tung, L. (2007) "Novel Anisotropic Engineered Cardiac Tissues: Studies of Electrical Propagation", *Biochemical and Biophysical Research Communications*, Vol. 361(4), p. 847-853.
- 15) Zhang, Z.S., Tranquillo, J., Naplioueva, V., **Bursac, N.**, Grant, A.O. (2007) "Sodium Channel Kinetics Changes that Produce Brugada Syndrome or Progressive Cardiac Conduction System Disease", *American Journal of Physiology (Heart and Circulatory Physiology)*, 292(1), p. H399-407.
- 16) Tranquillo, J.V., **Bursac, N.** (2006) "The Role of Restitution in Pacing Induced Spiral Wave Acceleration", *Conf Proc IEEE Eng Med Biol Soc.* Vol. 1, p. 3919-3922.
- 17) Sathaye, A., **Bursac, N.**, Sheehy, S., Tung, L. (2006) "Electrical Pacing Stabilizes Developmental Changes in Action Potential and Conduction Velocity of Cultured Neonatal Rat Ventricular Myocyte Monolayers", *Journal of Molecular and Cellular Cardiology*, Vol. 41(4), p. 633-641.
- 18) **Bursac, N.**, Tung, L. (2006) "Acceleration of Functional Reentry by Rapid Pacing in Uniformly Anisotropic Monolayers of Cardiac Myocytes: Formation of Novel Multi-Wave Functional Reentries", *Cardiovascular Research*, Vol. 69(2), p. 381-390.
- 19) Pedrotty, D., **Bursac, N.**, "Cardiomyoplasty: Prospect of Human Stem Cells" (2005), *IEEE Engineering in Medicine and Biology Magazine*, Vol. 24(3), p. 125-127.
- 20) Kong, CR., **Bursac, N.**, Tung, L. (2005) "Mechanoelectrical Excitation by Fluid Jets in Monolayers of Cultured Cardiac Myocytes. *J Appl Physiol*, Vol. 98(6), p. 2328-2336.
- 21) **Bursac, N.**, Aguel, F., Tung, L. (2004) "Multi-arm Spirals in a Two-Dimensional Cardiac Substrate", *Proceedings of National Academy of Science*, Vol. 101(43), p. 15530-15534.
- 22) **Bursac, N.**, Papadaki, M., White, J.A., Eisenberg, S.R. Vunjak-Novakovic, G., Freed, L.E. (2003) "Cultivation in Rotating Bioreactors Promotes Maintenance of Cardiac Myocyte Electrophysiology and Molecular Properties", *Tissue Engineering*, Vol. 9(6), p. 1243-1253.
- 23) Iravanian, S., Nabutovsky, Y., Kong, C., Saha, S., **Bursac, N.**, Tung, L. (2003) "Functional Reentry in Monolayers of Neonatal Rat Cardiac Cells", *American Journal of Physiology (Heart and Circ Physiol)*, Vol. 285(1), p. H449-456.
- 24) **Bursac, N.**, Parker, K., Iravanian, S., Tung, L. (2002) "Cardiomyocyte Cultures with Controlled Macroscopic Anisotropy: A Model for Functional Electrophysiological Studies of Cardiac Muscle", *Circulation Research*, Vol. 91, p. e45-e54.

- 25) **Bursac, N.**, Loo, Y., Irby, M.E., Leong, K.W., Tung, L. (2002) “Polymer Scaffolds for Anisotropic Growth of Engineered Cardiac Tissue”, in *Biomedical Engineering: Recent Developments*. p. 141-142. Vossoughi, J. (Editor).
- 26) Kong, C., Parker, K.K, Sathaye, A., **Bursac, N.**, Entcheva, E., Tung L. (2002) “2,3-butanedione monoxime (BDM) Alters Wavefront Propagation and Functional Anisotropy in Micropatterned Neonatal Rat Cardiac Myocytes”, in *Biomedical Engineering: Recent Developments*. p. 259-260. Vossoughi, J. (Editor).
- 27) Aljuri, A.N., **Bursac, N.**, Marini, R., Cohen, R.J. (2001) “System Identification of Dynamic Closed-Loop Control of Total Peripheral Resistance by Arterial and Cardiopulmonary Baroreceptors”, *Acta Astronautica* Vol. 49 (3-10), p. 167-170.
- 28) Papadaki, M.*, **Bursac, N.***, Langer, R., Merok J., Vunjak-Novakovic, G., Freed, L.E., (2001) “Tissue Engineering of Functional Cardiac Muscle: Molecular, Structural and Electrophysiological Studies”, *American Journal of Physiology (Heart and Circ Physiol)*, Vol. 280(1), p. H168-178 (*equally contributing authors).
- 29) **Bursac, N.***, Papadaki, M.*, Cohen, R.J., Schoen, F.J., Eisenberg, S.R., Carrier, R., Vunjak-Novakovic, G., Freed, L.E. (1999) “Cardiac Muscle Tissue Engineering: Towards an *In Vitro* Model for Electrophysiological Studies”, *American Journal of Physiology, (Heart and Circ Physiol 46)*, Vol. 277, p. H433-444. (*equally contributing authors).
- 30) Carrier, R., Papadaki, M., **Bursac, N.**, Langer, R., Vunjak-Novakovic, G., Freed, L. (1999) "Cardiac Tissue Engineering: Cell Seeding, Cultivation Parameters, and Tissue Construct Characterization", *Biotechnology and Bioengineering*, Vol. 64(5), p. 580-589.
- 31) Christoforou, N., Oskouei, B.N., Estes, P., Hill, C.M., Zimmet, J.M., Bian, W., **Bursac, N.**, Leong, K.W. Hare, J.M., Gearhart, J.D. (2009) “Implantation of Mouse Embryonic Stem Cell-derived Cardiac Progenitor Cells Preserves Function of Infarcted Murine Hearts”, in review.
- 32) Badie, N., Satterwhite, L., **Bursac, N.** (2009) “A Method to Replicate the Microstructure of Heart Tissue Cross-sections Using DTMRI-based Cell Micropatterning”, in review.
- 33) Tranquillo, J.V., Badie, N., Henriquez, C.S., **Bursac, N.** (2009) “Collision-based Spiral Acceleration in Cardiac Media: Roles of Wavefront Curvature and Excitable Gap”, in review.
- 34) Jong, M.K., **Bursac, N.**, Henriquez, C.S. (2009) “A Monolayer Tissue Model with Arbitrary Cell Shapes”, in review.
- 35) Scull, J., McSpadden, L., Badie, N., **Bursac, N.** (2009) “Novel Dual-Excitation Method for Simultaneous Optical Mapping of V_m and $[Ca^{2+}]_i$ in Cardiac Monolayers”, to be submitted.

CONFERENCE PRESENTATIONS

- 1) Bursac, N. (SPEAKER) “Cardiac Fibroblasts Strongly Affect Cardiac Action Potential Propagation by Paracrine Rather than Coupling Mechanisms”, AHA Scientific Sessions, Orlando, FL, 2009.
- 2) McSpadden, L., Kirkton, R., Bursac, N. “Cell therapies for arrhythmias: genetically engineered coupling determines the effect on anisotropic cardiac conduction”, AHA Scientific Sessions, Orlando, FL, 2009.
- 3) Bian, W., Bursac, N. “Large 3-dimensional Tissue Engineered Cardiac Patch with Controlled Electrical Anisotropy”, AHA Scientific Sessions, Orlando, FL, 2009.
- 4) Liao, B., Bursac, N. “Electromechanically Functional Cardiac Tissue Constructs Engineered from Embryonic Stem Cells”, AHA Scientific Sessions, Orlando, FL, 2009.
- 5) Bursac, N. (SPEAKER) “Engineering a Three-dimensional Structure: Are We There Yet?”, AHA Scientific Sessions, Orlando, FL, 2009.

- 6) Liao, B., Bian, W., Christoforou, N., Bursac, N. “Engineering a Functional Embryonic Stem Cell-Derived Cardiac Progenitor Patch”, BMES Annual Fall Meeting, Pittsburgh, PA, 2009.
- 7) Hinds, S., Bian, W., Bursac, N. “Optimized Cell/gel Composition for Engineering of Functional Skeletal Muscle Bundles”, BMES Annual Fall Meeting, Pittsburgh, PA, 2009.
- 8) McSpadden, L., Kirkton, R., Bursac, N. “Electrotonic loading of anisotropic cardiac monolayers by unexcitable cells”, BMES Annual Fall Meeting, Pittsburgh, PA, 2009.
- 9) Bian, W., Liao, B., Bursac, N. “Engineering Functional Anisotropy of Myocardial Tissue by Hydrogel Micromolding”, BMES Annual Fall Meeting, Pittsburgh, PA, 2009.
- 10) McSpadden, L., Scull, J., Bursac, N. “Novel Method for Simultaneous Optical Mapping of V_m and $[Ca^{2+}]_i$ in Cardiac Monolayers”, BMES Annual Fall Meeting, Pittsburgh, PA, 2009.
- 11) Badie, N., Bursac, N. “Mechanisms of Rapid Pacing-Induced Conduction Block in Realistic Micropatterned Ventricular Cross-sections”, BMES Annual Fall Meeting, Pittsburgh, PA, 2009.
- 12) Bursac, N. (SPEAKER) “Imaging Engineered Tissue Constructs”, Heart Rhythm Society, Scientific Sessions, Boston, MA, 2009.
- 13) Bursac, N. (PRESENTER) “Aligned, Electrically Conducting and Contractile Embryonic Stem Cell-Derived Cardiac Tissue Patches”, Keystone Symposium on Cardiac Disease: Development, Regeneration, and Repair, Asheville, NC, 2009.
- 14) Bursac, N. (SPEAKER) “Microfabricated Cardiac Tissue Patch with Tunable Structure and Function”, TERMIS-NA, Annual Conference and Exposition, San Diego, CA, 2008.
- 15) Bursac, N. (SPEAKER) “Structural and Functional Interactions of Stem Cells and Cardiomyocytes”, TERMIS-NA, Annual Conference and Exposition, San Diego, CA, 2008.
- 16) Bian, W., Bursac, N. “Aligned and Differentiated Skeletal Muscle Tissues with Controllable Architecture and Function”, TERMIS-NA, Annual Conference and Exposition, San Diego, CA, 2008.
- 17) Badie, N., Bursac, N. “Micropatterned Ventricular Slice: Role of Realistic Tissue Microstructure in Impulse Conduction”, AHA Scientific Sessions, New Orleans, LO, 2008.
- 18) Klinger, R.Y., Bursac, N. “In vitro Cellular Implantation Assay to Quantitatively Compare the Ability of Different Donor Cells to Electrically Conduct within Cardiac Tissue”, AHA Scientific Sessions, New Orleans, LO, 2008.
- 19) Bursac, N. (SPEAKER) “In Vitro Assays for Studying the Capacity of Donor Cells to Repair Cardiac Tissue Damage”, AHA Scientific Sessions, Pittsburgh, PA, 2008.
- 20) Liao, I.-C., Liu, J.B., Bursac, N., Leong, K.W. (2008) “Synchronized Electrical and Mechanical Stimulation Improves Myotube Maturation on Aligned Nanofibers”, International Conference of Mechanics in Medicine and Biology, St. Louis, MO, 2008.
- 21) Bian, W., Bursac, N. “Functional Skeletal Muscle Tissue Networks Made of Aligned and Differentiated Myofibers”, BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 22) Kirkton, R., Bursac, N. “Genetic Engineering of Electrically Excitable Cells for Experimental Studies and Tissue Repair”, BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 23) Klinger, R., Bursac, N. “In vitro Assay to Study Electrical Propagation of Different Donor Cells within Cardiac Cell Network”, BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 24) McSpadden, L., Kirkton, R., Bursac, N. “Smooth Muscle Actin-Negative Fibroblasts Alter Cardiac Conduction via Cx45 Coupling with Myocytes”, BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 25) Badie, N., Bursac, N. “Micropatterned Ventricular Slice: Role of Realistic Tissue Microstructure in Impulse Conduction”, BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 26) Bursac, N. (SPEAKER) “Reproducible In Vitro Assays to Study Functional Interactions of Stem Cells and Cardiomyocytes”, BMES Annual Fall Meeting, St. Louis, MO, 2008.

- 27) Bursac, N. (SPEAKER) "Engineering 2-D and 3-D Cardiac Muscle Tissues Based on MRI-measured Cardiac Fiber Directions", BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 28) Tranquillo, J.V., Badie, N., Bursac, N. "Negative Curvature as a Mechanism of the Multi-wave Reentry Acceleration", BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 29) Liao, I-C., Liu, J.B., Bursac, N., Leong, K.W. (2008) "Effect of Electromechanical Stimulation on the Maturation of Myotubes on Aligned Electrospun Fibers", BMES Annual Fall Meeting, St. Louis, MO, 2008.
- 30) Christoforou, N., Oskouei, B.N., Hill, C.M., Bian, W., Bursac, N., Leong, K.W., Hare, J., Gearhart, J.D. "Engraftment, Differentiation and Functional Improvement of Cardiac Output Following Transplantation of Mouse Embryonic Stem Cell-derived Cardiac Progenitor Cells in the Infarcted Myocardium", International Society for Stem Cell Research Meeting, Philadelphia, PA, 2008.
- 31) Bian, W., Bursac, N. "Micromolded 3D Cardiac Network Patches with Controllable Anisotropy for Cardiac Repair", American Heart Association Scientific Sessions, Orlando, FL, 2007.
- 32) Pedrotty, DM., Klinger, R., Bursac, N. "Paracrine Factors from Cardiac Fibroblasts Slow Conduction Velocity and Prolong the Action Potential Duration of Cardiomyocytes", American Heart Association Scientific Sessions, Orlando, FL, 2007.
- 33) Bian, W., Bursac, N. "Micromolding of a Functional Cardiac Patch for Heart Repair", NIH Symposium on Cardiovascular Regenerative Medicine, Bethesda, MD, 2007.
- 34) Scull, J., Bursac, N. "Novel Method for Simultaneous Optical Mapping of V_m and $[Ca^{2+}]_i$ in Cardiac Monolayers", BMES Annual Fall Meeting, Los Angeles, CA, 2007.
- 35) Bian, W., Bursac, N. "Micromolded Aligned Skeletal Muscle Tissue Networks", BMES Annual Fall Meeting, Los Angeles, CA, 2007.
- 36) Pedrotty, DM., Kardashian AA, Badie N, Klinger RY, Bursac N. "Cardiac and Donor Cell Interactions in Micropatterned Cell Pairs", BMES Annual Fall Meeting, Los Angeles, CA, 2007.
- 37) Bian, W., Bursac, N. "Micromolding of a 3D Cardiac Network Patch with Controllable Anisotropy", BMES Annual Fall Meeting, Los Angeles, CA, 2007.
- 38) Bursac, N. (SPEAKER) "Design of 2-D and 3-D Cardiac Tissues with Controllable Architecture and Function", Gordon's Research Conference on Cardiac Arrhythmia Mechanisms, Ventura, CA, 2007.
- 39) Bian, W., Bursac, N. "Aligned Skeletal Muscle Tissue Networks with Controllable Porosity and Thickness Engineered by 3D Hydrogel Micromolding", 11th annual Hilton Head workshop on tissue engineering, Hilton Head, SC, 2007.
- 40) Badie, N., Bursac, N. "Micropatterned Heart Slice Cultures for Studies of Intramural Cardiac Electrophysiology", AHA Scientific Sessions, Chicago, IL, 2006.
- 41) McSpadden, L., Yim, E., Leong, K., Bursac, N. "Tissue Engineered 2-Dimensional Model of Cardiac Fibrosis", BMES Annual Fall Meeting, Chicago, IL, 2006.
- 42) Holden, M.L., Ying, Y., Bursac, N., Henriquez, C. "Large-Scale Modeling of Discrete Neonatal Cardiac Tissue Using a Variable Spatial Grid", BMES Annual Fall Meeting, Chicago, IL, 2006.
- 43) Badie, N., Jiang, Y., Hsu, E., Bursac, N. "Tissue Engineered Two-Dimensional Heart Slice", BMES Annual Fall Meeting, Chicago, IL, 2006.
- 44) Tranquillo, J., Bursac, N. "The Role of Restitution in Pacing Induced Spiral Wave Acceleration", IEEE EMBS Meeting, New York, NY, 2006.
- 45) Pedrotty, D., McSpadden, L., and Bursac, N. "Paracrine Factors from Stem Cells Improve Electrical Conduction in Cardiac Tissue", AHA Scientific Sessions, Dallas, TX, 2005.

- 46) Pedrotty, D., Bian, W., and Bursac, N. "Cellular Cardiomyoplasty: Investigating Direct Functional Interactions Between Host and Donor Cells", North Carolina Tissue Engineering Interest Group, Raleigh, Durham, NC, 2005.
- 47) Ko, K., McSpadden, L., Scull, J., Badie, N., Bursac, N. "In Vitro Model for Infarct Scar: Optical Mapping of Impulse Propagation", BMES Annual Fall Meeting, Baltimore, MD, 2005.
- 48) Tranquillo, J., Grant, A.O., Zhang, Z.S., Bursac, N. "DK1479 and DK1500 Mutations Result in Brugada Syndrome", BMES Annual Fall Meeting, Baltimore, MD, 2005.
- 49) Tranquillo, J., Capone, A., Bursac, N. "The Role of Restitution and Ion Currents in the Acceleration of Functional Reentry", BMES Annual Fall Meeting, Baltimore, MD, 2005.
- 50) Wang, T., Bursac, N. "Engineering a 3-dimensional Cardiac Tissue Construct with Controlled Anisotropy", BMES Annual Fall Meeting, Baltimore, MD, 2005.
- 51) Pedrotty, D., McSpadden, L., Scull, J., Bursac, N. "Cellular Cardiomyoplasty: Investigating Functional Interactions between Host and Donor Cells", BMES Annual Fall Meeting, Baltimore, MD, 2005.
- 52) Bursac, N. (SPEAKER), Tranquillo, J. "Experimental and Computational Studies on Complex Spiral Waves in 2-D Cardiac Substrates", American Physics Society Annual Meeting, Los Angeles, CA, 2005.
- 53) Bursac, N. (SPEAKER), Aguel, F., Tung, L. "Accelerated Spirals in 2-Dimensional Cultures of Cardiac Myocytes", Conference on Oscillations and Waves in cells and cell networks, Cargese, France, 2004.
- 54) Bursac, N. (PRESENTER), Loo, Y., Irby, M.E., Leong, K., Tung, L. "Electrophysiological Studies in Anisotropic 3D Cardiac Cultures", NASPE Conference, Washington DC, 2003.
- 55) Kong, C.R., Bursac, N., Tung, L. "Mechanoelectrical Excitation in Cultured Monolayers of Cardiac Cells, NASPE Conference, Washington DC, 2003.
- 56) Sathaye, A., Bursac, N., Sheehy, S., Tung, L. "Long Term Pacing Induces Action Potential and Wavelength Prolongation in Cultured Neonatal Rat Ventricular Cell Monolayers", NASPE Conference, Washington DC, 2003.
- 57) Bursac, N. (SPEAKER), Tung, L. "Novel Stable Functional Reentry Patterns Induced by Rapid Pacing in Uniformly Anisotropic Cardiomyocyte Cultures", AHA Scientific Sessions, Chicago, 2002.
- 58) Tung, L., Kong C., Bursac, N., Fasciano, R.W., Riemer, T.L. "Mechanically Induced Changes in Excitability and Arrhythmogenesis", 3rd International Workshop on Cardiac Mechano-Electric Feedback and Arrhythmias, Oxford, Great Britain, 2002.
- 59) Bursac N. (SPEAKER), Loo, Y., Irby, M.E., Leong, K., Tung, L. "Polymer Scaffolds for Anisotropic Growth of Engineered Cardiac Tissue", Southern BMES Conference, Washington DC, 2002.
- 60) Kong C, Parker K.K, Sathaye, A., Bursac, N., Entcheva, E., Tung L. "2,3-butanedione monoxime (BDM) alters wavefront propagation and functional anisotropy in micropatterned neonatal rat cardiac myocytes", Southern BMES Conference, Washington DC, 2002.
- 61) Bursac, N. (SPEAKER), Iravanian, S., Parker, K., Tung, L. "Anisotropic Reentry in Cultured Cardiac Myocytes", Finalist presentation Young Investigator Award Competition, NASPE Conference, San Diego, CA, 2002.
- 62) Iravanian, S., Nabutovsky, Y., Bursac, N., Sumita, S., Tung, L. "Optical Maps of Reentrant Activity in Cultured Monolayers of Neonatal Rat Cardiac Myocytes ", AHA Scientific Sessions, Anaheim, CA, 2001.
- 63) Bursac, N. (SPEAKER), Iravanian, S., Tung, L. "Anisotropic Cultures of Cardiac Myocytes", BMES Annual Fall Meeting, Durham, NC, 2001.

- 64) Iravanian, S., Nabutovsky, Y., Bursac, N., Saha, S., Tung, L. "Contact Fluorescence Imaging of Reentry in Cultured Monolayers of Neonatal Rat Cardiac Cells", BMES Annual Fall Meeting, Durham, 2001.
- 65) Bursac, N. (SPEAKER), Papadaki, M., White, J.A., Eisenberg, S.R., Freed, L.E. "Use of Engineered 3-D Cardiac Tissue to Study Electrophysiology of Cardiac Muscle", BMES Annual Fall Meeting, Seattle, WA, 2000.
- 66) Bursac, N. (PRESENTER), Papadaki, M., White, J.A., Vunjak-Novakovic, G., Eisenberg, S.R., Freed, L.E. "Engineered Cardiac Tissues: A Novel Model System for In Vitro Studies of Cardiac Muscle", Science Day, Boston University, Boston, MA, 2000.
- 67) Aljuri, A.N., Bursac, N., Marini, R., Cohen, R.J. "System Identification of Dynamic Closed-loop Control of Total Peripheral Resistance by Arterial and Cardiopulmonary Baroreceptors", 13th Humans in Space Symposium, IAA and GASMA, Fira, Santorini, Greece, 2000.
- 68) Bursac, N. (SPEAKER), Papadaki, M., Langer, R., Eisenberg, S.R., Vunjak-Novakovic, G., Freed, L.E. "Three-dimensional Environment Promotes in Vitro Differentiation of Cardiac Myocytes", BMES-EMBS 1st Joint Conference, Atlanta, GA, 1999.
- 69) Papadaki, M., Bursac, N., Gupta, P., Langer, R., Vunjak-Novakovic, G., Freed, L.E. "Towards a Functional Tissue Engineered Cardiac Muscle", BMES-EMBS 1st Joint Conference, Atlanta, GA, 1999.
- 70) Papadaki, M., Bursac, N., Langer, R., Vunjak-Novakovic, G., Freed, L.E. "Towards a Functional Tissue Engineered Cardiac Muscle: Effects of Cell Culture Substrate and Medium Concentration", Annual Meeting of the Society of Biomaterials, Providence, RI, 1999.
- 71) Bursac, N. (SPEAKER), Papadaki, M., Cohen, R.J., Schoen, F.J., Eisenberg, S.R., Carrier, R., Vunjak-Novakovic, G., Freed, L.E. "Cardiac Muscle Tissue Engineering: An Electrophysiological Study", BMES Annual Fall Meeting, Cleveland, OH, 1998.
- 72) Papadaki, M., Bursac, N., Langer, R., Schoen, F.J., Carrier, R., Vunjak-Novakovic, G., Freed, L.E. "Engineered Three-dimensional Cardiac Muscle: Structural, Biochemical and Functional Assessment", American Institute for Chemical Engineers Meeting, Miami, FL, 1998.
- 73) Carrier, R.L., Bursac, N., Papadaki, M., Langer, R., Vunjak-Novakovic, G., Freed, L.E. "Bioreactor Design Affects the Structural, Biochemical, and Metabolic Properties of Engineered Cardiac Tissue", American Institute for Chemical Engineers Meeting, Miami, FL, 1998.
- 74) Papadaki, M., Bursac, N., Langer, R., Schoen, F.J., Vunjak-Novakovic, G., Freed, L.E. "In Vitro Reconstitution of Three-dimensional Cardiac Muscle: Composition and Functional Evaluation", North Sea Biomaterials Meeting, The Hague, Netherlands, 1998.
- 75) Carrier, R.L., Papadaki, M., Bursac, N., Langer, R., Rupnick, M., Schoen, F.J., Vunjak-Novakovic, G., Freed, L.E. "Investigation of the Influence of Bioreactor Design on the Structural, Biochemical, and Metabolic Properties of Engineered Cardiac Muscle", American Institute for Chemical Engineers Meeting, Los Angeles, CA, 1997.
- 76) Freed, L.E., Bursac, N., Carrier, R., Martin, I., Papadaki, M., Vunjak-Novakovic, G., "Three-dimensional Cultures of Skeletal and Cardiac-Like Tissues", American Society for Cell Biology Meeting, 1997.
- 77) Carrier, R.L., Bursac, N., Vunjak-Novakovic, G., Langer, R., Rupnick, M., Freed, L.E. "Cardiac Tissue Engineering: Influence of Cell Source and Bioreactor Conditions", World Congress of the International Society for Artificial Organs, Providence, RI, 1997.
- 78) Van Toi V, Abraham H, Bursac N. "Post-LSD Hallucinosi s Is Associated with Decrease in Flicker-Fusion Sensitivities", *Investigative Ophthalmology and Visual Science* (supp), 37(3):3300, 1996.