

# 5th Annual Mountain West Biomedical Engineering Conference



## Final Program

September 11th and 12th, 2009  
Grand Summit Hotel  
The Canyons Resort  
Park City, Utah

# Program of Events

## Friday, September 11, 2009

1:30 - 3:30 p.m.	Registration	Ballroom Lobby
1:30 - 3:30 p.m.	Poster/Exhibit Setup	Parlors 1 and 3/Ballroom Lobby
3:30 - 4:45 p.m.	Podium Session I	Parlor 2
	<i>Developments in Magnetically Levitated Rotary Blood Pumps</i>	
	Pratap Khanwilkar, Ph.D., MBA, WorldHeart Inc.	
	<i>Experimental and Modeling Studies on Strain-Modulated Membrane Capacitance and Conductance in Cardiac Tissue</i>	
	Thomas McNary, University of Utah, Biomedical Engineering	
	<i>Biomechanical Characterization of the Glycocalyx of Lung Microvascular Endothelial Cells</i>	
	Kathleen Job, University of Utah, Biomedical Engineering	
	<i>An Evaluation of the Accuracy of Computer Assisted Surgery in Preoperatively Planned Periacetabular Osteotomies</i>	
	Christine Abraham, SFGH Biomechanical Testing Facility, Orthopaedic Surgery	
	<i>Fabrication of 3D Laminated Scaffolds with Perfusion Channels for Use in a Custom Built Bioreactor</i>	
	James Kennedy, University of Utah, Biomedical Engineering	
4:45 - 5:15 p.m.	Break/Refreshments	Ballroom Lobby
5:15 - 6:30 p.m.	Podium Session II	Parlor 2
	<i>Self-Assembled Hydrogels from Poly(HPMA) Grafted with Pendant <math>\beta</math>-Sheet Peptide Domains</i>	
	Larisa Radu-Wu, University of Utah, Biomedical Engineering	
	<i>Human Neocortical Electrical Activity Recorded on Nonpenetrating Microwire Arrays: Applicability for Neuroprostheses</i>	
	Spencer Kellis, University of Utah, Electrical Engineering	
	<i>PEG co-Peptide Hydrogels Via Thiol-Norbornene Photopolymerization for the Study of Cancer Cell Migration</i>	
	Benjamin Fairbanks, University of Colorado, Chemical and Biological Engineering	
	<i>The Effect of Electronically Steering a Phased Array Transducer on Prefocal Heating with Respect to Treatment Time</i>	
	Urvi Vyas, University of Utah, Biomedical Engineering	
	<i>A Novel Polymer Coated Antimicrobial Releasing Bone Graft to Combat Device-Centered Infections</i>	
	Amanda Brooks, Ph.D., University of Utah, Pharmaceuticals and Pharmaceutical Chemistry	
6:30 - 7:30 p.m.	Keynote Address	Parlor 2
	<i>Near-infrared Fluorescence Imaging in Humans</i>	
	Eva M. Sevick-Muraca, Ph.D., UT Health Science Center at Houston	
7:30 - 10:00 p.m.	Evening Reception	Ballroom Lobby
	- Entertainment provided by <i>The Blue Wailers</i>	

# Program of Events

## Saturday, September 12, 2009

7:30 - 8:30 a.m.	Breakfast Buffet	Outdoor Pavilion
8:30 - 9:30 a.m.	Podium Session III	Parlor 2
	<i>"Fitness For Use", the Center of ePTFE Implantable Medical Product Design at Gore</i>	
	Cody Bliss, Ph.D., Product Specialist, W.L. Gore & Associates	
	Phil Triolo, Ph.D.	
	<i>Technology Development Case Study: University of Utah Spins Out State of the Art Catheter Technology</i>	
	Mark Adams, Veritrac	
9:30 - 10:30 a.m.	Poster Session	Parlors 1 and 3
	Refreshments	Ballroom Lobby
10:30 - 11:30 a.m.	Distinguished Lecture	Parlor 2
	<i>New Technologies in Cardiovascular Medicine -- A View from Silicon Valley</i>	
	Peter Fitzgerald M.D., Ph.D., FACC, Stanford University	
11:30 - 11:45 a.m.	Poster & Podium Awards	Parlor 2
	Poster/Exhibit Takedown	Parlors 1 and 3

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# Speaker Biographies

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## **Eva M. Sevick-Muraca, PhD**

Dr. Eva Marie Sevick is currently Professor and Cullen Chair in Molecular Medicine and Director of the Centre for Molecular Medicine at the University of Texas Health Science Center. She has a background in Chemical Engineering and was an NIH postdoctoral fellow in the Department of Biochemistry and Biophysics at the University of Pennsylvania. She is actively leading two Phase I clinical trials on lymphatic disorders and has published over 100 manuscripts in peer-reviewed journals worldwide. Dr. Sevick has served on several external committees. Presently, she is on the editorial board of 'IEEE Transactions on Medical Imaging'. She was recently awarded the 'University of Texas STARS' award for her contribution.

## **Peter J. Fitzgerald, MD, PhD, FACC**

Dr. Peter Fitzgerald is the Director of the Center for Cardiovascular Technology and Director of the Cardiovascular Core Analysis Laboratory (CCAL) at Stanford University Medical School. He is an Interventional Cardiologist and has a PhD in Engineering. He is Professor in both the Departments of Medicine and Engineering at Stanford. Presently, Dr. Fitzgerald's laboratory includes 14 postdoctoral fellows and graduate engineering students focusing on state-of-the-art technologies in Cardiovascular Medicine. He has led or participated in over 95 clinical trials, published over 300 manuscripts/chapters, and lectures worldwide.

Peter has been principle/founder of eleven medical device companies in the San Francisco Bay Area. He has transitioned eight of these start-ups to large medical device companies. He serves on several boards of directors, advised dozens of medical device startups as well as multinational healthcare companies in the design and development of new diagnostic and therapeutic devices in the cardiovascular arena. In 2001, Peter co-founded LVP Capital, a venture firm, focused on medical device and biotechnology start-ups in San Francisco. In 2007, he co-founded, TriVentures, which is an incubator for early state medical technology in Israel.

# Poster Session

Saturday 9:30 - 10:30 a.m

1. Estimation of Regional Biomechanical Properties within a Population Using a Representative Surface Average  
*A Alexander, M Harris, A Anderson, J Weiss, M Prastava, S Joshi*
2. Development of a Basal Ganglia Model to Predict Better Methods of Deep Brain Stimulation for Treatment of Parkinson's Disease  
*C Anderson and A Dorval*
3. Multi-scale Recordings for Neuroprosthetic Control of Finger Movements  
*JJ Baker, W Bishop, S Kellis, T Levy, P House, B Greger*
4. Parallel Monolithic Fluid-Structure Interaction Simulations for Blood Flow in Arteries  
*AT Barker, XC Cai, Y Wu*
5. Variance of Femoral Bow in the Sagittal Plane Based on Age, Gender and Ethnicity for Percutaneous, Osseointegrated Implants  
*C Baschuk, T Shelton, R Bloebaum, K Bachus*
6. Valve Rupture Pressure Findings of a Novel Ocular Capsule Drug Ring for the Treatment of Age-Related Macular Degeneration  
*CJ Bishop, H Sant, RM Burr, S Molokhia, BK Ambati*
7. Inhibition of Mammalian Target of Rapamycin Induces Phenotypic Reversion in Three-Dimensional Cultures of Malignant Breast Epithelial Cells  
*R Booth, S Kwon, E Monson*
8. Mesenchymal Stem Cell Delivery in a Thermo-reversible Hydrogel  
*B Borden, J Yockman, SW Kim*
9. Estimations of Flexoelectric Generated Inner Ear Hair Bundle Displacement  
*KD Breneman and RD Rabbitt*
10. Surface Tension of Actin Proteins at the Air/Water Interface  
*YC Chen, A Elangovan, A Ostafin, JJ Magda*
11. The Foreign Body Response to Nerve Cuff Implantation is Associated with Persistent Inflammation and Changes in Fiber Composition of the Encapsulated Nerve  
*MB Christensen, MJ Bridge, PA Tresco*
12. Improved Perfluorocarbon Oxygen Carriers for Tissue Engineering  
*R Condie, G Prestwich, H Hopf*
13. Using Reflection Interference Contrast Microscopy to Study the Effect of Surface Plasma Protein Composition on Platelet-Surface Interactions  
*L Corum, A Cook, V Hlady*
14. Click-based Hydrogels for Spatially Directed Cell Function  
*CA DeForest, ES Sims, KS Anseth*
15. Single-Cell Electric Impedance Topography  
*S Dharia, G Dittami, R Rabbitt*

16. Review of In Vivo Evaluations of Pennes Bioheat Equation and Creating a Database for Critically Evaluating Thermal Models of Perfused Human Tissue  
*C Dillon, A Payne, U Vyas, Y Wang, R Roemer*
17. Evoking and Resolving Quantal Neurotransmitter Release on a Microchip  
*GM Dittami, SS Dharia, JJ Wyrick, A Pungor, RD Rabbitt*
18. Muscle-Selective Block Using Intrafascicular High-Frequency Alternating Current  
*BR Dowden, HAC Wark, RA Normann*
19. Optimization of the Vapor Phase Polymerization of PEDOT:Tosylate  
*C Eichinger and G Malliaras*
20. Adaptive Filtering Optimization of Stimulation Parameters for Multi-Electrode Interleaved Stimulation  
*MA Frankel, VJ Mathews, SG Meek, GA Clark, RA Normann*
21. Piezoresponse Atomic Force Microscopy of Prestin-transfected HEK-293 Cells  
*M Frerck, M Moras, M Tabib-Azar, R Rabbitt*
22. The Influence of Poly(ethylene oxide) Surface Density Gradients on Human Serum Albumin Adsorption  
*N Gooch and V Hladky*
23. Synthesis, Characterization and Biological Evaluation of PEGylated Gold Nanorods  
*A Gormley, J Hui, A Malugin, A Ray, H Ghandehari*
24. Silk-elastinlike Protein Polymers Improve the Efficacy of Gene Therapy of Head and Neck Tumors  
*K Greish, J Frandsen, S Scharff, J Gustafson, H Ghandehari*
25. Continuous Detection and Classification of Individuated Finger Movements Using Linear Discriminant Analysis of Wireless EMG  
*SJ Hanrahan, JJ Baker, EJ Scheme, DT Hutchinson, BE Greger*
26. Finite Element Prediction of Cartilage Contact Stresses in Human Hips  
*M Harris, A Anderson, B Ellis, S Joshi, C Peters, J Weiss*
27. A Novel Image Processing Method to Calculate and Quantify Structural Remodeling of the Left Atrium  
*TS Haslam, JJE Blauer, NS Burgon, YA Adjei-Poku, D Barlow, SN Rao, NF Marrouche, RS MacLeod*
28. Successful Targeting of Pancreatic Cancer Stem Cells in a Peritoneal Carcinoma Model of Metastasis  
*RF Herde, PP Gray, SK Kawada*
29. Development and Testing of a Novel, 4D Maximum A Posterior (MAP) Image Reconstruction Algorithm  
*J Hinkle, PT Fletcher, B Wang, B Salter, S Joshi*
30. Fibroblast Fusion Creates Multi-nucleated Giant Cells  
*DJ Holt and DW Grainger*
31. Propagation Direction of Inter-ictal Spikes Recorded in Human Neocortex on a Fixed-Geometry Micro-electrode Array  
*PA House, E Dudek, B Greger*

32. Microcontact Printing of Protein Gradients for Neuronal Pathfinding  
*TW Hsiao, PA Tresco, V Hlady*
33. Differential Gel Electrophoresis Analysis of the Embryonic Heart  
*N Hu, EB. Clark, M Yoshigi*
34. Functionalized Polymer Surfaces for Local T Cell Immunosuppression  
*P Hume and K Anseth*
35. Percutaneous Implants with Porous Metal Dermal Barriers: A Study of Infection Rate  
*D Isackson, NAT Brown, KN Bachus*
36. The Effects of Cyclic Stretch on Sprouting Angiogenesis  
*MN Inamoto, J Wilkins, YT Shim*
37. Modulation of Viscoelasticity and HIV Transport as a Function of pH in a Reversibly Crosslinked Hydrogel  
*JJ Jay, S Shukair, K Langheinrich, MC Hanson, GC Cianci, TJ Johnson, MR Clark, TJ Hope, PF Kiser*
38. Multivalent Synthetic Lectin as gp120 Glycan Targeted Microbicide Entry Inhibitor  
*JJ Jay, BE Lai, DG Myszka, A Mahalingam, K Langheinrich, DF Katz, PF Kiser*
39. Segmented Polyurethane Intravaginal Rings for the Sustained Combined Delivery of Antiretroviral Agents Dapivirine and Tenofovir  
*T Johnson, K Gupta, T Albright, P Kiser*
40. Methods for Analyzing Deformation of In Vitro Tissue Models During Simulated Acupuncture Therapy  
*M Julius, D Shreiber, H Buettner*
41. Imaging of Connexin 43 Distribution in Cardiac Tissue: Experimental Protocol, Data Analysis and Preliminary Results  
*DP Lackey, RA Lasher, RW Hitchcock, FB Sachse*
42. Bacterial Surface Contact and Adhesion on Polymer Biomaterials  
*H Lakounga, M Ceylan, R Asmatulu, M Schneegurt*
43. Continuous Tissue Stiffness Monitoring in a Modified T-Flask Bioreactor  
*RA Lasher, MK Parikh, RW Hitchcock*
44. Surface Characterization of Reactive Surface Patterns and Their Selective Bio-immobilization Reactions  
*F Liu, H Takahashi, D Grainger*
45. An Overload Protection Device for Percutaneous, Osseointegrated Implants for Amputees  
*AI Lobo and KN Bachus*
46. A Comparison of Folate Receptor Activity in IBD Induced Mouse Models  
*S Low, WP Low, C Leamon, J Lu*
47. Modulation of Polyaromatic Hydrocarbon Toxicity by Carbon Nanomaterials Assess the Rescue Effects by Nano-Carbon Materials on Phenanthrene Toxicity in Solution  
*S Lu, C Jones, D Grainger*

48. fMRI Resting-State Connectivity Using Non-negative Matrix Factorization  
*Y Mao and B Li*  
50. DREAM's Role in Chronic Pain Following Spinal Injury  
*JJ Martinez, L Dong, BA Winkelstein*
49. Controlled Release of Transforming Growth Factor Beta 1 from PEG Hydrogels  
*JD McCall, CC Lin, KS Anseth*
50. Nanochemically Aligned Astrocytes Transmit Guidance Cues to Overlying Neurites Through Discrete Arrays of Apical Surface Membrane Bound Ligands  
*F Meng, JL Skousen, V Hlady, PA Tesco*
51. 20 Channel Coil Array for High Resolution Magnetic Resonance Imaging of the Optic Nerve  
*E Minalga, JR Hadley, DL Parker*
52. Exendin-4/Polymer Conjugate Extends Insulin Output from Encapsulated Pancreatic Islets  
*D Mishra, V Nadithe, YH Bae*
53. Nanoemulsion/Microbubble Platform for Controlled and Targeted Drug Delivery  
*KH Nam, DA Christensen, AM Kennedy, N Rapoport*
54. Multimeric heparan sulfate modulates FGF signaling in zebrafish development  
*TKN Nguyen, VM Tran, ES Veien, RI Dorsky, CB Chien, B Kuberan*
55. Biomechanical Characterization of the Pulmonary Capillary Endothelial Glycocalyx Using Atomic Force Microscopy  
*R O'Callaghan, K Job, V Hlady, R Dull*
56. Utah bioDesign's An Asynchronous Approach to Team Based Learning  
*M Parikh, K Broadhead, R Hitchcock*
57. Nerve Containment System for the Utah Slanted Electrode Array  
*CR Petty, E Gibbons, R Normann, GA Clark, B Christensen, P Tesco*
58. Measurement of Poisson's Ratio and Transverse Strain in Rat Tail Tendon During Stress Relaxation  
*SP Reese and JA Weiss*
59. Towards Analysis of Growth Trajectory through Multi-modal Longitudinal MR Imaging  
*N Sadeghi, M Prastawa, JH Gilmore, W Lin, G Gerig*
60. Subject Specific 3- segment Musculoskeletal Foot Model driven by Gait Motion Analysis Data  
*P Sarasvat, B MacWilliams*
61. Reversibly Crosslinked Gold Nanoparticle - Hyaluronan Hydrogels for Vessel Construct Bioprinting  
*A Skardal, J Zhang, L McCoard, S Ootamasathien, GD Prestwich*
62. Utilization of Embedded Systems for Monitoring Patients with Osseointegrated Implants to Detect Imminent Prosthesis Failure  
*M Skinner, B Keate, K Bachus*



63. Microelectrodes with Reduced Surface Area Show Reduced Macrophage Activation and Neuronal Loss  
*JL Skousen, B Winslow, ME Merriam, GE Perlin, KD Wise, PA Tresco*
64. Studying the Invasiveness and Fate of Gold Nanoshells on the Alveolar Macrophage Cells  
*VP Svarup, G Murillo, Y Huang, RG Mehta, SW Bisnoi*
65. Parametric Study in Microfluidic RNA Hybridization  
*O Tasci and B Gale*
66. The Relationship between Metabolic and Electrophysiological Gradients during Long-Duration Ventricular Fibrillation in the Open-Chested Dog  
*T Taylor, P Venable, M Warren, J Warren, A Zaitsev*
67. Single Cell Trapping in Larger Microwells Capable of Supporting Cell Spreading and Proliferation  
*R Teller, M Morgan, AN Sachs, J Samorezov, Y Shen, JY Park, S Takayama*
68. PAMAM-Camptothecin Conjugate Inhibits Proliferation and Induces Apoptosis in Colorectal Carcinoma Cells  
*G Thiagarajaná, A Ray, A Malugin, H Ghandehari*
69. Spacio-temporal Mapping of Luminance Detection Thresholds of Visual Field of Nonhuman Primates  
*K Torab, T Davis, R Normann*
70. Semi Automatic Initial Pose Generation for 2-D to 3-D Registration of Knee Implants  
*A Vardhan, SA Banks*
71. Heterogeneous Progression to Conduction Failure in Epicardial Optical Maps during Ventricular Fibrillation and Ischemia in Isolated Canine Heart  
*PW Venable, TG Taylor, J Warren, MD Warren, AV Zaitsev*
72. Flow Velocity Characterization in Hemodialyzer using Magnetic Resonance Imaging  $\hat{\epsilon}$  Arterial Spin Labeling  
*Y Wang and DL Parker*
73. Real-time Wireless Control of a Virtual Prosthetic Arm Via Decodes of Peripheral Nerve Activity  
*DJ Warren, NM Ledbetter, RJ Kier, A Sharma, LW Rieth, F Solzbacher, RR Harrison, GA Clark*
74. Diffusion Tensor MRI Reconstruction From Undersampled Data  
*C Welsh, E Hsu, E DiBella*
75. Improving the Insertion Process of Microwire Arrays  
*A Willsie and A Dornal*
76. Chronic Microelectrode Implantation is Accompanied by Deceased Neurogenesis in the Dentate Gyrus  
*B Winslow, ME Merriam, G Perlin, KD Wise, PA Tresco*
77. A Novel Type III Polyketide Synthase from *Aspergillus Oryzae*  
*J Zeng, D Yu, J Zhan*

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