



2nd Annual Mountain West
Biomedical Engineering Conference

September 15-16, 2006
Snowbird Cliff Lodge
Snowbird, Utah

Sponsored by:

The Department of Bioengineering, University of Utah

W.L. Gore and Associates, Inc.



15 September, 2006

Welcome to the 2006 Mountain West Biomedical Engineering Conference at Snowbird, Utah. In this Program, you will find:

- Program Agenda
- Biographies of Keynote Speakers
- List of Podium Presentations
- List of Poster Presentations

The conference is designed to highlight some of the biomedical engineering and science at the major academic institutions in Utah, to provide a forum for graduate and postdoctoral students to report their work, and to strengthen the network of bioengineers, scientists, and entrepreneurs in the mountain west.

I would like to thank Dean G. Naughton and Professor A. Schwartz for traveling to Utah to share some of their research and insights. I would also like to thank W.L. Gore and Associates for financial support, the conference organizing committee and administrative team (P. Kiser, B. Mann, J. Weiss, L. Porter, K. Terry), and the faculty, staff and students participating in logistics of the meeting.

Enjoy the events,

Richard Rabbitt
Professor and Chair
Department of Bioengineering
University of Utah

The on-line version of the program includes abstracts (see <http://www.bioen.utah.edu>).

Agenda

Location: Level B, Snowbird Cliff Lodge

Day 1. Friday, September 15, 2006

5:00-7:00 pm	Registration	Ballroom Lobby
6:00-7:00	Poster Setup	Ballroom 2
7:00-8:00	Keynote Address: Gail K. Naughton <i>Tissue Engineering: The Triumphs and Hurdles from Lab Bench to Market</i>	Ballroom 3
8:00-10:00	Opening Reception	Ballroom 2 & Lobby

Day 2. Saturday, September 16, 2006

8:00-9:00 am	Continental Breakfast	Golden Cliff
9:00-10:45	Podium Session I	Ballroom 3
10:45-11:00	Break	Ballroom Lobby
11:00-12:00	Distinguished Lecture: Andrew Schwartz <i>Useful Signals From Motor Cortex</i>	Ballroom 3
12:00-1:30 pm	Lunch	Golden Cliff
1:30-3:30	Podium Session II	Ballroom 3
3:30-4:00	Break	Ballroom Lobby
4:00-6:00	Poster Session	Ballroom 2 & Lobby
6:00-8:00	Closing Reception	Ballroom 2 & Lobby
8:00 pm	Poster Takedown	



Gail K. Naughton, Ph.D.

Keynote Address: Friday, September 15, 2006, 7:00 p.m., Snowbird Cliff Lodge, Ballroom 3
Tissue Engineering: The Triumphs and Hurdles from Lab Bench to Market

Gail K. Naughton has been the Dean of the College of Business Administration at San Diego State University since August 2002. Prior to that, she spent more than 15 years at Advanced Tissue Sciences, where she was the company's co-founder and co-inventor of its core technology. During her tenure there, Dr. Naughton held a variety of key management positions, including president, chief operating officer, chief scientific officer and principal scientist. While serving as an officer and director of the Company, Dr. Naughton oversaw the design and development of the world's first up-scaled manufacturing facility for tissue engineered products, established corporate development and marketing partnerships with companies including Smith & Nephew, Ltd., Medtronic and Inamed Corporation, was pivotal in raising over \$350M from the public market and corporate partnerships, and brought four products from concept through FDA approval and market launch. Dr. Naughton holds over 90 U.S. and foreign patents and has been extensively published in the field of tissue engineering. In 2000, Dr. Naughton received the 27th Annual National Inventor of the Year award by the Intellectual Property Owners Association in honor of her pioneering work in the field of tissue engineering.

In addition to her duties at San Diego State University, Dr. Naughton serves as a director for several not-for-profit foundations. She also sits on the scientific and industry advisory boards of leading universities including the Georgia Institute of Technology, and is a member of the Board of Directors of the California Health Institute, the San Diego World Trade Center, and the San Diego State University Corporate Governance Institute as well as being a member of the Mayor's Science & Technology Council, and Rotary International. She is currently on the board of one private biotechnology company: DermTech International and two public companies, C.R. Bard, Inc. and SYS Technologies Inc.

Dr. Naughton earned her Ph.D. in Basic Medical Sciences and her M.S. in histology from the New York University Medical Center. She earned an executive MBA in 2001 from the Anderson School at the University of California, Los Angeles.



Andrew Schwartz, Ph.D.

Distinguished Lecture: Saturday, September 16, 2006, 11:00 a.m., Snowbird Cliff Lodge, Ballroom 3

Useful Signals From Motor Cortex

Dr. Schwartz received his PhD in physiology from the University of Minnesota in 1984. As a postdoctoral fellow, he worked with Apostolos Georgopoulos from 1984-1987 at Johns Hopkins, where they studied motor cortical representations of reaching. Schwartz was then appointed to a staff scientist position at the Barrow Neurological Institute where he developed a behavioral paradigm to study cortical activity during drawing movements. During this period and with collaborators at Arizona State University, he began work on cortical neural prosthetics which he continued after he moved to the Neurosciences Institute in 1995. Since 2002, he has been a professor at the University of Pittsburgh where he has continued to develop cortical prosthetics along with investigations of how drawing movement is represented in frontal cortex.

Podium Session I

9:00 Automated mapping and stimulation of motoneurons accessed by penetrating microelectrode arrays in nerve

AM Wilder, BR Dowden, KS Guillory, S Hiatt, RA Normann, GA Clark
Department of Bioengineering, University of Utah

9:15 Time resolved dielectric flow cytometry

J Wyrick, G Dittami, S Dharia, R Rabbitt
Department of Bioengineering, University of Utah

9:30 Selective activation of feline hamstring muscles via intrafascicular stimulation of the sciatic nerve muscular branch

BR Dowden, AM Wilder, D McDonnall, NAT Brown, GA Clark, RA Normann
Departments of Bioengineering and Orthopaedics, and School of Computing, University of Utah

9:45 Brain tissue reaction surrounding planar silicon penetrating microelectrode arrays varies as a function of depth in the rat cerebral cortex

BK Leung, TP Williamson, XK Chen, AL Pollock, PA Tresco
Department of Bioengineering, University of Utah

10:00 Simultaneous myocardial bulk tissue impedance measurement and high resolution epicardial potential mapping during prolonged coronary occlusion.

S Shome, RS MacLeod
Department of Bioengineering, Cardiovascular Research and Training Institute, and Scientific Computing and Imaging Institute, University of Utah

10:15 Characterization of the intracellular trafficking and distribution of HPMA copolymers after microinjection in ovarian carcinoma cells

JD Callahan, P Kopečková, J Kopeček
Department of Bioengineering, University of Utah

10:30 Delivery of siRNA targeting VEGF-R1 using PEI-g-PEG-RGD polymer carrier provides a putative anti-angiogenic therapy.

JH Brumbach, SW Kim
Department of Pharmaceutics and Pharmaceutical Chemistry, University of Utah

Podium Session II

1:30 The orientation of endothelial tubulogenesis is affected by cyclic strain in a frequency-dependent manner

M Iwamoto, J Jensen, V Chernyshev, Y-T Shiu
Department of Bioengineering, University of Utah

1:45 Quantitative myocardial distribution volume: First-pass kinetics and steady-state tissue enhancement

N Pack, EVR DiBella
Department of Bioengineering and UCAIR, Department of Radiology, University of Utah

2:00 3D Geometry of sulfated glycosaminoglycans in collagen: Analysis of transmission electron microscopy data

HB Henninger, SA Maas, RT Whitaker, JA Weiss
Departments of Bioengineering, Orthopedics, and Scientific Computing and Imaging Institute, University of Utah

2:15 Comparison of myocardial fiber structure among mouse, rabbit and sheep

EM Dacus, Y Jiang, EW Hsu
Department of Bioengineering, University of Utah; Department of Biomedical Engineering, Duke University

2:30 Contrast enhanced MRI guided photodynamic therapy for non invasive treatment of cancer

A Vaidya, T Ke, Y-E Sun, E-K Jeong, Z-R Lu
Departments of Pharmaceutics and Pharmaceutical Chemistry, and Radiology, University of Utah

2:45 Propagation and electrical impedance changes due to ischemia and reperfusion in mouse hearts

Q Liang, K Sohn, BB Punske
Cardiovascular Research and Training Institute and Department of Bioengineering, University of Utah

3:00 An ImmunoChip for simultaneous detection and measurement of antiepileptic drugs

X Yang, J Janatova, JD Andrade
Department of Bioengineering, University of Utah

3:15 Achieving reliable microarray analysis results using competitive hybridization

L Williams, S Blair
Department of Electrical and Computer Engineering, University of Utah

Poster Session

1. Foot Model for Clinical Gait Analysis

P Saraswat, B MacWilliams

Department of Bioengineering, University of Utah; Movement Analysis Laboratory, Intermountain Shriners Hospital for Children

2. A Decision Support System for Anesthesiologists Improves Accuracy When Making a Diagnosis

M Görges, D Westenskow, K Förger

Biomedical Engineering Department, HAW Hamburg; Department of Anesthesiology, University of Utah

3. A Pulsed Schlieren System for Visualizing Beams from Phased-Array HIFU Applicators

DA Christensen, A Chao

Department of Bioengineering, University of Utah

4. Identification of Bone Structure from Effective Measurements

C Bonifasi-Lista, E Cherkaev

Departments of Bioengineering and Mathematics, University of Utah

5. Noninvasive Measurement of MCL Strain with Deformable Image Registration

NS Phatak, Q Sun, SE Kim, DL Parker, RK Sanders, AI Veress, BJ Ellis, JA Weiss

Departments of Bioengineering and Radiology, University of Utah

6. Advances in 3D Nonlinear Inverse Scattering for Transmission Breast Imaging

J Wiskin, D Borup, S Johnson, M Berggren, S Olsen, F Setinsek

Department of Bioengineering, University of Utah; TechniScan, Inc.

7. Design of An Experimental Setup for Confocal Imaging of Cardiac Microstructure

P Jones, W Cascio, FB Sachse

School of Medicine, Cardiovascular Research and Training Institute, and Department of Bioengineering, University of Utah; Brody School of Medicine, East Carolina University

8. Detecting Phase Transitions in Phosphatidylcholine Vesicles by Confocal Raman Microscopy and Self-Modeling Curve Resolution

CB Fox, RH Uibel, GA Myers, JM Harris

Departments of Bioengineering and Chemistry, University of Utah; Process Instruments, Inc.

9. Effect of Chain-Length on Co-Assembling Peptide Based Biomaterials

S Ramachandran, J Trewella, K Gryzynski, YB Yu

Departments of Pharmaceutics and Pharmaceutical Chemistry, Bioengineering, and Chemistry, University of Utah; Department of Molecular Biology and Immunology, University of North Texas

10. Hybridization Behavior of Mixed DNA/Alkylthiol Monolayers on Gold: Characterization by Surface Plasmon Resonance and ³²P Radiometric Assay

S Bevers, P Gong, G Harbers, D Grainger

Department of Bioengineering, University of Utah; Department of Chemistry, Colorado State University

11. Physical Optimization of Hyaluronic Acid Hydrogels and Sponges

J Vanderhooft, JA Scott, GD Prestwich

Departments of Bioengineering and Medicinal Chemistry, University of Utah; Glycosan BioSystems, Inc.

12. Vascularization of Perfused Microfluidic Networks in Collagen Gel

RM Condie, AP Golden, J Tien

Department of Biomedical Engineering, Boston University

13. Novel Hydrogels for Smart Vaginal Microbicide Systems

MC Roberts, MC Hanson, AP Massey, EA Karren, PF Kiser

Department of Bioengineering, University of Utah

14. Hyaluronic Acid-Based Hydrogels for Post-Surgical Adhesion Prevention

A Skardal, Y Liu, GD Prestwich

Departments of Bioengineering, and Pharmaceutics and Pharmaceutical Chemistry, University of Utah

15. Evaluation of Murine Macrophage Cell Models for *In Vitro* Assessment of the Foreign Body Response

L Chamberlain, M Gonzalez-Juarrero, D Grainger

Cell and Molecular Biology Program, Department of Microbiology, Immunology, and Pathology, and Department of Chemistry, Colorado State University

16. Matrix Degradation by Metalloproteases Alters Mechanical Properties During Angiogenesis in Collagen Constructs

L Krishnan, C Underwood, JB Hoying, JA Weiss

Department of Bioengineering and Scientific Computing and Imaging Institute, University of Utah; Regenerative Medicine Program, BIO5 Institute, University of Arizona

17. Effect of Dermatan Sulfate Glycosaminoglycans on the Shear and Tensile Material Behavior of the Human MCL

TJ Lujan, CJ Underwood, HB Henninger, BM Thompson, JA Weiss

Department of Bioengineering, University of Utah

18. Engineering the Vocal Fold: Can Mechanical Stimuli Affect Tissue Remodeling

J Wolchuk, PA Tresco

Department of Bioengineering, University of Utah

19. Effects of Insulin and Glucose on the Mouse Heart Electrical Activation During Hypoxia

K Sohn, Q Liang, BB Punske

Cardiovascular Research and Training Institute and Department of Bioengineering, University of Utah

20. Thrombosis Reduction by Surface-Targeted Recombinant Antithrombin III in a Ferric Chloride-Induced Arterial Thrombosis Model

B Leng, SC Bock

Departments of Bioengineering and Internal Medicine, University of Utah

21. Understanding Ventricular Activation Synchrony and its Relationship with the ECG

DR Sutherland, RS MacLeod, BB Punske

Department of Bioengineering, Cardiovascular Research and Training Institute, and Scientific Computing and Imaging Institute, University of Utah

22. Mechano-Electrical Feedback Mechanisms in Cardiac Tissue: Experimental Setup and Preliminary Measurement Results

TG McNary, K Sohn, B Taccardi, FB Sachse

Department of Bioengineering and Cardiovascular Research and Training Institute, University of Utah

23. Heterogeneous SCN5A Distribution Between Ventricles Underlies Conduction Heterogeneities in the Brugada Syndrome

R Veeraghavan, S Poelzing

Cardiovascular Research and Training Institute, University of Utah

24. Endothelial Ets-1 Expression is Dependent on Shear Stress and Confluency

LE Corum, LC Sun, TJ Moore, YT Shiu

Department of Bioengineering, University of Utah

25. Extracting the Material Properties of Multicellular Structures using Large-scale Computational Simulations: Validation with a Surrogate

BA Birchler, JE Guilkey, MD Harris, L Krishnan, JA Weiss

Department of Bioengineering, University of Utah

26. Simulation Study of Brain Source Localization by Conductivity Fitting

S Lew, C Wolters, A Anwander, S Makeig, R MacLeod

Scientific Computing and Imaging Institute and Department of Bioengineering, University of Utah; Westfälische Wilhelms-Universität Münster, Institut für Biomagnetismus und Biosignalanalyse; Max Planck Institute for Human Cognitive and Brain Sciences; Swartz Center for Computational Neuroscience, University of California San Diego

27. Electrical Contributions of Hair Cell Cilia to Mechanotransduction

KD Breneman, SM Highstein, RD Boyle, RD Rabbitt

Department of Bioengineering, University of Utah; Department of Otolaryngology, Washington University School of Medicine; NASA Ames BioVIS Technology Center; Marine Biological Laboratory; Department of Surgery, Division of Otolaryngology, University of Utah

28. Focused RF Ablation Using Magnetic Fluids

O Tasci, I Vargel, A Arat, E Guzel, P Korkusuz, E Atalar

Department of Electrical and Electronics Engineering, Bilkent University; Department of Plastics and Reconstructive Surgery, Kirikkale University School of Medicine; Department of Radiology, Baylor College of Medicine; Department of Histology, Hacettepe University; Departments of Electrical and Computer Engineering, Biomedical Engineering, and Radiology, Johns Hopkins University

29. Synthesis of Constructs for Evaluation of Subcellular Targeting of Photosensitizers

V Cuchelkar, P Kopečková, J Kopeček

Departments of Bioengineering, and Pharmaceutics and Pharmaceutical Chemistry, University of Utah

30. Doxorubicin Loaded pH-Sensitive Micelle Targeting Acidic Extracellular pH of Human Ovarian A2780 Tumor in Mice

ZG Gao, YH Bae, N Rappaport

Departments of Pharmaceutics and Pharmaceutical Chemistry, and Bioengineering, University of Utah

31. Comparison of Tumor Growth and Drug Concentration in Rat Tumors Using Polymeric Micelles in Ultrasonic-Drug Delivery

BJ Staples, WG Pitt, BL Roeder
Brigham Young University

32. Antimicrobial Activity of Silver-Loaded Hyaluronic Acid-3-thiopropionyl hydrazide Middle Ear Ventilation Tubes

D Hoyt, N Etherington, B Wright, A Anderson, D Britt, D Horton, A Park, A Skardal, GD Prestwich
Departments of Biological Engineering and Biology, Utah State University; Departments of Bioengineering, Pediatric Otolaryngology, and Medicinal Chemistry, University of Utah

33. Reducible Poly(Amido Ethylenediamine) for Hypoxia-Inducible VEGF Delivery

LV Christensen, CW Chang, JW Yockman, R Connors, DA Bull, SW Kim
Department of Pharmaceutics and Pharmaceutical Chemistry and Department of Surgery, Division of Cardiothoracic Surgery, University of Utah

34. Preparation and Investigation of Octaammonium Polyhedral Oligosilsequixane Globular Dendrimers as Carriers for Gene Delivery

TL Kaneshiro, X Wang, Z-R Lu
Department of Pharmaceutics and Pharmaceutical Chemistry, University of Utah

35. Determining Cytokine Induced Vascular Maturity Through Comparative Gene Expression

LW Hosack, MA Firpo, JA Scott, XZ Shu, GD Prestwich, RA Peattie
Department of Chemical Engineering, Oregon State University; Departments of Surgery and Medicinal Chemistry, University of Utah; Glycosan BioSystems, Inc.

36. A PDMS Diffusion Pump for On-Chip Fluid Handling in Microfluidic Devices

MA Eddings, BK Gale
Departments of Bioengineering and Mechanical Engineering, University of Utah

37. Multilayer MEMS Platform for Single Cell Impedance Spectroscopy and Amperometric Glutamate Detection

GM Dittami, C King, HE Ayliffe, S Dharia, RD Rabbitt
Department of Bioengineering, University of Utah

38. Micro-domain Single Cell Electrophysiology

S Dharia, H Ayliffe, J Braiwaith, C King, G Dittami, J Wyrick, A Pungor, RD Rabbitt
Department of Bioengineering, University of Utah

39. Homogeneous DNA Melting Analysis for Mutation Scanning Using Nanoliter Volumes

SO Sundberg, J Greer, CT Wittwer, RJ Pryor, O Elenitoba-Johnson, BK Gale
Departments of Bioengineering, Mechanical Engineering, and Pathology, University of Utah

40. Design and Optimization of Microheater Array for Biomedical Application

J Kim, BK Gale
Departments of Bioengineering and Mechanical Engineering, University of Utah

41. DNA and Protein Microarray Printing on Silicon Nitride Waveguide Surfaces

P Wu, P Högberg, DW Grainger

Department of Chemistry, Colorado State University

42. Chronic Tissue Reaction Surrounding Planar Microelectrode Arrays is Associated with Inflammation and Neuronal Loss in the Recording Zone

XK Chen, TP Williamson, BK Leung, AL Pollock, PA Tresco

Department of Bioengineering, University of Utah

43. Cortical Reaction to Implanted Planar Silicon Penetrating Microelectrode Arrays Conformally Coated with Polyethylene-glycol is Similar to Uncoated Controls

HF Kavarana, BD Winslow, W-K Yang, MB Christensen, PA Tresco

Department of Bioengineering, University of Utah

44. Early Brain Tissue Reaction Surrounding Michigan-Style Microelectrode Arrays Indicates Extensive Remodeling of Glial and Neuronal Populations Occur During the Foreign Body Response

AL Pollock, BD Winslow, PA Tresco

Department of Bioengineering, University of Utah

45. Cortical Tissue Reaction to a Single Stainless Steel Microelectrode is Similar to that Observed for Planar Silicon Microelectrode Arrays

BD Winslow, H Kavarana, MJ Bridge, PA Tresco

Department of Bioengineering, University of Utah

46. Chronic In-Vivo Recordings with a New Implantable, Wireless Neural Recording Array

F Solzbacher, M Töpfer, L Reith, P Tathireddy, S Kim, M Klein, H Reichl

Department of Electrical Engineering, University of Utah; Fraunhofer Institute for Reliability and Microintegration IZM

47. Spike Patterning in a Stochastic Neural Circuit with Periodic Stimulation: Theory and Experiment on the *Hermissenda* Eye

WH Nesse, GA Clark

Departments of Mathematics and Bioengineering, University of Utah

48. Obtaining Design Specifications for Integrating a Neural Interface into the Cat Sciatic Nerve

MB Christensen, SM Pearce, PA Tresco

Department of Bioengineering, University of Utah

49. EMG-Triggered Eye Blink Neuroprosthesis

D McDonnell, MD Gossman, KS Guillory

Ripple, LLC; Department of Ophthalmology, University of Louisville