

**Exploring the Intersections of Interdisciplinary
Biomedical Research**

**Oak Ridge National Laboratory
ORNL Conference Center
Rooms 202A-B-C
March 18-19, 2009**

**Program Schedule (updated 3/13/09)
Wednesday, March 18, 2009**

- 7:00 **Bus departs for ORNL**
- 7:00 – 8:00 **Arrival / Continental Breakfast**
- 8:00 – 8:30 **Welcome and Administrative Comments**
Barbara Beckerman, Acting Director, Biomedical Science and Engineering Center
Jeff Nichols, PhD, Deputy Associate Laboratory Director, Computing and
Computational Sciences Directorate

Thomas Zacharia, PhD, Associate Laboratory Director, Computing and Computational
Sciences Directorate
- 8:30 – 9:15 **Keynote Speaker – Brian Athey, PhD, University of Michigan**
*Keeping up with Bioinformatics and Computational Biology as applied to
Biomedicine—Where has it been? Where is it going?*
- 9:15 – 9:45 **Plenary Speaker – Session 1 Biomedical Informatics**
Imaging in the Age of Medical Bioinformatics
Robert Nishikawa, PhD, University of Chicago
- 9:45 – 10:30 **General Session – Biomedical Informatics**
Learning Cue Phrase Patterns from Radiology Reports Using a Genetic Algorithm
Robert Patton, PhD, ORNL

Dosimetric Optimization of Interstitial Gene Therapy Delivery Systems
Ken Wong, PhD, Georgetown University

Biomedical Innovations: Lessons Learned During the MCAMS Discovery Process
Ann McCaughan, BSN RN PhD(c), Chief Operating Officer, Noninvasive Technologies
- 10:30 – 10:45 **Break**
- 10:45 – 12:00 **General Session – Biomedical Informatics, cont'd.**
MRI Brain Extraction Using a Graph Cut Based Active Contour Model
Noha El-Zehiry, PhD(c), University of Louisville

Decoding Neural Activity from an Intracortical Implant in Humans with Tetraplegia
Chad E. Bouton, M.Sc., Battelle Memorial Institute

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General Session – Biomedical Informatics, cont'd.

Defense Health Information System as Case Study for National Health IT
Seong Ki Mun, PhD, Virginia Tech

Blast-Related Traumatic Brain Injury Research Gaps
Michael J. Leggieri, Director, DoD Blast Injury Program Coordinating Office, U.A. Army
Medical Research and Materiel Command

12:00 – 1:30 **Working Lunch**

12:30 – 1:00 **Speaker – COL Gregory Johnson**, Chief, Medical Modernization, Air Combat
Command,, *Status of the Medical Modernization Program in the Air Force Air
Combat Command* ; Barbara Beckerman and Gary Alley, ORNL, *BSEC
Overview*

1:00 – 1:15 **General Discussion**

1:15 – 1:30 **Break**

1:30 – 2:00 **Plenary Speaker – Session 2 Modeling and Simulation**
The Physiome: Genes to Organism, Modeling Toward Human Health
Jim Bassingthwaite, PhD, University of Washington

2:00 – 3:00 **General Session – Modeling and Simulation**

Systems Biology and Multi-Scale Modeling of the Heart
Andrew McCulloch, PhD, University of California, San Diego

Opportunities for Computational Modeling in Quantitative Cancer Imaging
Tom Yankeelov, PhD, Vanderbilt University

*Combined Experimental and Modeling Approach to Cell Motility and its Role in Tumor
Growth Dynamics*
Peter Cummings, PhD, Vanderbilt University

*Roles of the Microenvironment and Feedback Signaling Loops in Stabilizing Disease
States*, Martin Beckerman, PhD, Y-12 National Security Complex

3:00 – 3:15 **Break**

3:15 – 4:00 **General Session – Modeling and Simulation, cont'd.**

Discrete Event Models in Biology: Problems, Solutions, and Food for Thought
James J. Nutaro, PhD, ORNL

Diagnosis of Heart Rhythm Disorders Based on ECG Signal Analysis
Xiaopeng Zhao, PhD, University of Tennessee

Optimal Control Applied to a CPR Model with Chest and Abdominal Pressures
Suzanne Lenhart, PhD, University of Tennessee / ORNL

4:00 – 4:30 **General discussion/ Announcements**

4:30 – 5:00 **Break**

5:00 – 7:00 **Poster session / reception, Conference Center room 202C**



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Poster Presentations (5:30 – 6:00pm)

A. General

A-1 Wellington Ayensu, Jackson State University, *Altered GABAA Receptor Expression as Biomarkers of Mercury Toxicity in Embryo Neurogenesis*

A-2 Barbara Beckerman, Robert Patton, Christopher Symons, April McMillan, Shaun Gleason, Ryan Kerekes, (Oak Ridge National Laboratory) Vincent Paquit, Robert Nishikawa, University of Chicago, *An Overview of the Data Analytics for Medicine Using Semi-Supervised learning (DAMSEL) Program*

A-3 Sharon Bewick, Mingjun Zhang, Ruoting Yang, Department of Mechanical, Aerospace and Biomedical Engineering, University of Tennessee *A Game Theoretic Approach to Understanding the HIV-1 R5 to X4 Coreceptor Switch*

A-4 Jing Wu, Sharon Bewick, Ruoting Yang, Mingjun Zhang, Department of Mechanical, Aerospace and Biomedical Engineering, University of Tennessee, Knoxville *A Hybrid Game Theoretical Approach to Control Drug Delivery in HIV Infection*

A-5 Suzanne Lenhart, University of Tennessee/Oak Ridge National Laboratory, *Opportunities at NimBIOS*

A-6 Deidra Mountain PhD, Stacy Kirkpatrick, David Cassada MD, Scott Stevens MD, Michael Freeman MD, Mitchell Goldman MD, Oscar Grandas MD, University of Tennessee Graduate School of Medicine, *Estrogen and Progesterone Induce Migration, Invasion, and Proliferation of Vascular Smooth Muscle Cells via Matrix Metalloproteinase Regulation*

B. Biomedical Modeling and Simulation

B-1 Susan Basile, Xiaopeng Zhao, Department of Mechanical, Aerospace, and Biomedical Engineering, UT Knoxville, *Modeling And Analysis Of Proximal Tibial Growth Plate Fractures In Adolescents*

B-2 Lee Hively, Nancy B. Munro, Oak Ridge National Laboratory, *Epileptic Seizure Forewarning: SeizAlert*

B-3 Nicholas Dexter, Kara L. Kruse, Jim J. Nutaro, Richard C. Ward, Oscar Grandas MD, Deidra Mountain, Stacy Kirkpatrick, Melinda Klar RN, Oak Ridge National Laboratory and University of Tennessee Graduate School of Medicine Knoxville, *"A Computational Model of Cell Migration in Response to Biochemical Diffusion"*

B-4 Piro Siuti, University of Tennessee, Chang Kyoung Choi, Michigan Tech University, Jason Fowlkes, Mitchel Doktycz and Scott T. Retterer, Oak Ridge National Laboratory *Nano Enabled Synthetic Biology: Nanoporous Picoliter Volume Containers for Studying Biochemical Reactions*

B-5 Ruoting Yang, Sharon Bewick, Mingjun Zhang, Department of Mechanical, Aerospace and Biomedical Engineering, The University of Tennessee, Knoxville, *Optimal Control in Immunodominance*

C. Measurement Sciences and Imaging

C-1 Marcelo Dias, Universidade de São Paulo, Vanessa Vidotti/Universidade de Campinas, Vital Paulino Costa/Universidade de Campinas, Edson Satoshi Gomi/Universidade de São Paulo, *High Definition*



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Optical Coherence Tomography and Standard Automated Perimetry Dataset Generator for Glaucoma Diagnosis

C-2 Meena Kalyanaraman, Scott T. Retterer, Timothy E. McKnight, Nance M. Ericson, Steve L. Allman, James G. Elkins, Anthony V. Palumbo, Martin Keller, Mitchel J. Doktycz, Biosciences Division, ORNL, *Growth Studies Of E.Coli Encapsulated In Alginate Micro-Culture Beads Formed Within a Microfluidic System*

C-3 Mark Lenox, Jens Gregor, University of Tennessee, *Computationally Efficient Iterative Transmission Imaging on the Inveon DPET*

C-4 Yaling Liu, Samar Shah, Department of Mechanical and Aerospace Engineering The University of Texas at Arlington, Wenchuang Hu Department of Electrical Engineering The University of Texas at Dallas Jinming Gao, Department of Pharmacology, Harold C Simmons Comprehensive Cancer Center, University of Texas Southwestern Medical Center, *Adhesion Dynamics of Functional Nanoparticles for Nanomedicine Applications*

C-5 Christopher Mann, Benjamin E. Reese, Robert E. Barnett, Mustapha Alaoui, Emil Habibi, Oak Ridge National Laboratory, *Quantitative Analysis of Living Cells by Digital Holographic Microscopy*

C-6 Roman Melnyk, Bahram Dahi, Frank A. DiBianca, Frank A. DiBianca School of Biomedical Engineering and Imaging, College of Medicine, University of Tennessee Health Science Center, *Feasibility Study Of An Oblique 2D Variable Resolution X-Ray CT Detector*

C-7 Jeffrey Nyman, Conor C. Lynch, Elizabeth O'Quinn, Anita Mahadevan-Jansen, Gregory Mundy, Vanderbilt University, *Regulation of Parameters of Bone Quality by MMP-2 and MMP-9*

C-8 Janakiraman Ramachandran, ORISE/ORNL, Justin S. Baba, ORNL *Assessment and Quantitative Analysis of WoodCAT based Characterization of Poplar Wood Samples*

C-9 David Rendon, Frank A. DiBianca, Gary S. Keyes, Dept. of Biomedical Engineering and Imaging, University of Tennessee Health Science Center, *Computational models of Variable Resolution (VRX) CT scanners*

C-10 Jonathan Wall, Tina Richey, Amy Allen, Alan Stuckey, Alan Solomon, Stephen Kennel, University of Tennessee Graduate School of Medicine, *Quantitative Analysis of Amyloid Mass by Segmentation of microPET and CT Images*

C-11 Jennifer Watson, Erik Bowman, Kaan Serpersu, Brad Meccia, Biomedical Engineering Undergraduate Students, University of Tennessee, Boyd Evans, III, Oak Ridge National Laboratory, University of Tennessee, *Optimization of Cell Suspension Material for Stem Cell Therapy in the Treatment of Parkinson's Disease*

D. BSEC Posters and DOE Research Alliance in Math and Science (RAMS) and Science Undergraduate Laboratory Internship (SULI) Posters (not judged)

D-1 BSEC General Poster (Contact: **Barbara Beckerman, Gary Alley**)

D-2 BSEC Biomedical Informatics (Contact: **Barbara Beckerman**)

D-3 BSEC Biomedical Modeling and Simulation (Contact: **Richard Ward**)



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D-4 BSEC Measurement Sciences and Imaging (Contact: **Gary Alley**)

D-5 Joel Outten, **Kara Kruse**, David Cassada MD, John Pacanowski, Jr. MD, Michael Freeman MD, Erin Lennartz, Stephanie Barnes, Jennifer Lilly, Scott Stevens MD, Eleftherios Xenos MD, Mitchell Goldman MD, Department of Surgery, Oak Ridge National Laboratory and University of Tennessee Graduate School of Medicine Knoxville, "*Computational Models of Mechanical Stress in Abdominal Aortic Aneurisms*" (Presenter and contact: **Kara Kruse**)

D-6 Sara Haque, **Kara Kruse**, Michael Zemel, Department of Nutrition, Oak Ridge National Laboratory and University of Tennessee Knoxville, "*Mathematical Modeling of Fatty Acid Oxidation in Skeletal Muscle Cells*" (Presenter and contact: **Kara Kruse**)

D-7 Sara Wezensky, Jillian Gauld, Kara Kruse, Oscar Grandas MD, Fernando Aycinena MD, Melinda Klar RN, Oak Ridge National Laboratory and University of Tennessee Graduate School of Medicine Knoxville. "*Fem-Pop Bypass Grafting: A Retrospective Statistical Study*" (Presenter and contact: **Kara Kruse**)

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- 7:00 – 8:00** **Arrival / Continental Breakfast**
- 8:00 – 8:30** **Welcome and Administrative Comments**
Gary Alley, Deputy Director, Biomedical Science and Engineering Center
Ken Tobin, PhD, Director, Measurement Science and Systems Engineering Division,
Energy and Engineering Science Directorate

Ted Fox, Deputy Associate Laboratory Director, Energy and Engineering Science
Directorate
- 8:30 – 9:15** **Keynote Speaker – Ed Chaum, M.D., PhD., UT Health Science Center**
***Translating Novel Engineering Concepts into Biomedical Research Programs
and Clinical Medicine***
- 9:15 – 9:45** **Plenary Speaker – Session 3 Measurement Sciences & Imaging**
Development of Computational Methods for Neurobiological Research
Shaun Gleason, PhD, ORNL
- 9:45 – 10:30** **General Session – Measurement Sciences & Imaging**
*Modeling Traumatic Brain Injury In Vitro: Functional Changes In The Absence Of Cell
Death*
Barclay Morrison, PhD, Columbia University

Nano-Biophotonics: From Laboratory Research to Biomedical Diagnostics
Tuan Vo Dinh, PhD, Duke University

*Mapping of Active Inputs on Thalamorecipient Neurons in the Auditory Cortex
Revealed a Novel Mechanism of Effectiveness of Thalamocortical Pathways*
Stanislav Zakharenko, M.D., PhD, St. Jude Children's Research Hospital
- 10:30 – 10:45** **Break**

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10:45 – 11:45 General Session – Measurement Sciences & Imaging, cont'd.

Molecular Photovoltaics and the Optical Activation of Neural Cells
Elias Greenbaum, PhD, ORNL

A Non-Contact Hemodynamic Status and Location System
Braden McGrath, PhD, Non-Invasive Medical Technologies

Shear Sensor for Lower Limb Prosthetic Applications
Kishore Sundara-Rajan, PhD candidate, University of Washington

A case for Non-invasive, Awake, Nonanesthetized, Unrestrained Imaging
Justin Baba, PhD, Oak Ridge National Laboratory

11:45 – 12:00 Break

**12:00 – 1:30 Working Lunch: Government and Industry Perspective: roadmap
discussion**

12:15 – 1:15 Working Lunch, Michael Ackerman, PhD, National Library of Medicine, National
Institutes of Health, Facilitator

Ann McCaughan, BSN RN PhD(c), Chief Operating Officer, Noninvasive Technologies,
Inc.

Grace Peng, PhD, National Institute of Biomedical Imaging and Bioengineering, NIH
*Funding Opportunities at the national Institutes of Health (NIH) and the National
Institute of Biomedical Imaging and Bioengineering (NIBIB)*

Douglas Tadaki, PhD, Naval Medical Research Center
Advanced Surgical Imaging

Semahat Demir, PhD, National Science Foundation

1:15 – 1:30 General Discussion/ Break

1:30 – 3:00 Panel discussion, Brian Athey, PhD, Facilitator

Ed Chaum, Andrew McCulloch, Mark Wilson, Bob Nishikawa, Ann McCaughan, Grace
Peng, Michael Ackerman, Douglas Tadaki, Greg Johnson, Mike Leggieri

3:00 – 3:30 Closing Remarks

3:30 Adjourn



Exploring the Intersections of Interdisciplinary Biomedical Research

Organizing Committee

Chair: Barbara Beckerman, Acting Director, BSEC; Program Manager, Biomedical Engineering, Modeling and Simulation Group, Computational Sciences and Engineering Division

Co-Chair: Gary Alley, Co-Director, BSEC; Group Leader, Monolithic Systems Development Group, Measurement Science and Systems Engineering Division

Conference Coordinator: April McMillan, Research Scientist, Modeling and Simulation Group, Computational Sciences and Engineering Division

Richard C. Ward, Senior Research Scientist, Modeling and Simulation Group, Computational Sciences and Engineering Division

Boyd M. Evans, III, Research Scientist, Monolithic Systems Development Group, Measurement Science and Systems Engineering Division

Shaun S. Gleason, Group Leader, Image Systems and Machine Vision Group, Science and Systems Engineering Division

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