2009 First Annual ORNL Biomedical Science & Engineering Conference: Exploring the Intersections of Interdisciplinary Biomedical Research

(BSEC)

Oak Ridge, Tennessee, USA
18 – 19 March 2009

IEEE

IEEE Catalog Number: CFP0947G-PRT
ISBN: 978-1-4244-3837-2

TABLE OF CONTENTS

KEYNOTE SPEAKER

"Keeping up with Bioinformatics and Computational Biology as Applied to Biomedicine- Where has it Been? Where is it Going?" 1
B. Athey

PLENARY SPEAKER- SESSION 1 BIOMEDICAL INFORMATICS

"Imaging in the Age of Medical Bioinformatics" 3
R. Nishikawa

GENERAL SESSION- BIOMEDICAL INFORMATICS

Learning Cue Phrase Patterns from Radiology Reports Using a Genetic Algorithm 4
R.M. Patton, B.G. Beckerman, T.E. Potok

"Dosimetric Optimization of Interstitial Gene Therapy Delivery Systems" 8
K.H. Wong

"Biomedical Innovation Lessons Learned During the MCAMS Discovery Process" 10
A. McCaughan

GENERAL SESSION- BIOMEDICAL INFORMATICS CONT'D

"MRI Brain Extraction using a Graph Cut Based Active Contour Model" 12
N. El-Zehiry

"Decoding Neural Activity from an Intracortical Implant in Humans with Tetraplegia" 14
C. Bouton

"Defense Health Information System as a Case Study for National Health IT" 15
S.K. Mun

"Blast-Related Traumatic Brain Injury Research Gaps" 17
M.J. Leggieri Jr.

"Status of the Medical Modernization Program in the Air Force Air Combat Command" 19
G. Johnson

PLENARY SPEAKER- SESSION 2 MODELING AND SIMULATION

"The Physiome: Genes to Organism, Modeling Toward Human Heatlh" 20
J. Bassingthwaighte

Systems Biology and Multi-Scale Modeling of the Heart 22
A.D. McCulloch

Computational Modeling in Quantitative Cancer Imaging 25
T.E. Yankeelov, N.C. Atuegwu, J.C. Gore

"Combined Experimental and Modeling Approach to Cell Motility and its Role in Tumor Growth Dynamics".....29
P. Cummings

Role of the Microenvironment and Feedback Signaling Loops in Stabilizing Disease States.....31
M. Beckerman

GENERAL SESSION- MODELING AND SIMULATION, CONT'D

"Discrete Event Models in Biology: Problems, Solutions, and Food for Thought".....35
J.J. Nutaro

A Review of Diagnosis Methods for Heart Rhythm Disorders.....36
H. Xia, X. Zhao, J. Bains, D.C. Wortham

"Optimal Control Applied to a CPR Model with Chest and Abdominal Pressures".....40
S. Lenhart

KEYNOTE SPEAKER

"Translating Novel Engineering Concepts into Biomedical Research Programs and Clinical Medicine".....41
E. Chaum

PLENARY SPEAKER- SESSION 3 MEASUREMENT SCIENCES & IMAGING

"Development of Computational Methods for Neurobiological Research".....43
S.S. Gleason

Modeling Traumatic Brain Injury *In Vitro*: Functional Changes in the Absence of Cell Death.....44
Z. Yu, B.S. Elkin, B. Morrison III

Nano-Biophotonics: From Laboratory Research to Biomedical Diagnostics.....48
V. Tuan

Dendritic Locations and Dendritic Spine Morphology Determine Effectiveness of Thalamocortical Pathways in the Auditory Cortex.....50
R.J. Richardson, J.A. Blundon, I.T. Bayazitov, S.S. Zakharenko

GENERAL SESSION- MEASUREMENT SCIENCES & IMAGING, CONT'D

Molecular Photovoltaics and the Optical Activation of Neural Cells.....54
E. Greenbaum, M.S. Humayun, B.R. Evans, T. Kuritz, I. Lee, C.P. Pennisi

A Non-Contact Hemodynamic Status and Location System.....57
B. McGrath, C.F. De Marr, E. McGrath, A. McCaughan

Shear Sensor for Lower Limb Prosthetic Applications.....61
S. Kishore, G.I. Rowe, A.J. Simon, G.K. Klute, W.R. Ledoux, A.V. Mamishev

"A Case for Non-Invasive, Awake, Nonanesthetized, Unrestrained Imaging".....65
J. Baba

"Funding Opportunities at the National Institutes of Health (NIH) and the National Institute of Biomedical Imaging and Bioengineering (NIBIB)" 66
G. Peng

"Advanced Surgical Imaging" 67
D. Tadaki

Presentation: Measurement Sciences & Imaging 68
S. Demir

B. BIOMEDICAL MODELING AND SIMULATION

Modeling and Analysis of Proximal Tibial Growth Plate Fractures in Adolescents 69
S. Basile, X. Zhao

SeizAlert: Seizure Forewarning via Scalp EEG 73
L.M. Hively, N.B. Munro

A Computational Model of Cell Migration in Response to Biochemical Diffusion 76
N.C. Dexter, K.L. Kruse, J.J. Nutaro, R.C. Ward

Cell Free Translation in Engineered Picoliter Volume Containers 80
P. Siuti, S.T. Retterer, C.K. Choi, J.D. Fowlkes, M.J. Doktycz

Optimal Control in Immunodominance 84
R. Yang, S. Bewick, M. Zhang

The R5 to X4 Coreceptor Switch 88
S. Bewick, R. Yang, M. Zhang

A Hybrid Game Theoretical Approach to Control Drug Delivery in HIV Infection 92
J. Wu, S. Bewick, R. Yang, M. Zhang

C. MEASUREMENT SCIENCES AND IMAGING

High Definition Optical Coherence Tomography and Standard Automated Perimetry Dataset Generator for Glaucoma Diagnosis 96
M. Dias, V. Vidotti, V.P. Costa, E.S. Gomi

Controlled Microfluidic Production of Alginate Beads for In Situ Encapsulation of Microbes 100
M. Kalyanaraman, S.T. Retterer, T.E. McKnight, M. Nance Ericson, S.L. Allman, J.G. Elkins, A.V. Palumbo, M. Keller, M.J. Doktycz

Computationally Efficient Iterative Transmission Imaging for the Inveon DPET 104
M.W. Lenox, J. Gregor

Modeling Adhesion Dynamics of Nanoparticles: The Effect of Flow Rates and Ligand Density 108
S. Shah, Y. Liu, W. Hu, J. Gao

Quantitative Analysis of Living Cells by Digital Holographic Microscopy 112
B.E. Reese, R.E. Barnett, M. Alaoui-Ismaili, E. Habibi, C.J. Mann

Feasibility Study of an Oblique 2D Variable Resolution X-ray CT Detector 116
R. Melnyk, B. Dahi, F.A. DiBianca

Deletion of the Gelatinase MMP-2 Affects the Compositional and Biomechanical Properties of Bone 120
J.S. Nyman, C.C. Lynch, S. Thiolloy, C.A. Patil, E.C. O'Quinn, A. Mahadevan-Jansen, G.R. Mundy

Computational Models of Variable Resolution (VRX) CT Scanners 124
D.A. Rendon, F.A. DiBianca, G.S. Keyes

Quantitative Analysis of Amyloid Mass by Segmentation of microPET and CT Images 128
J.S. Wall, T. Richey, A. Allen, A. Stuckey, A. Solomon, S. Kennel

Estrogen and Progesterone Induce Migration, Invasion, and Proliferation of Vascular Smooth Muscle Cells via Matrix Metalloproteinase Regulation 132
D.J. Mountain, S.S. Kirkpatrick, D.C. Cassada, S.L. Stevens, M.B. Freeman, M.H. Goldman, O.H. Grandas

Altered GABAA Receptor Expression as Biomarker of Mercury Toxicity in Embryonic Neurogenesis 136
W.K. Ayensu, R.D. Isokpehi, H.H. Cohly, J.M. Murray, D.J. Webb, P.B. Tchounwou

Optimization of Cell Suspension Media for Use in a Cytometric Neuro-Catheter 139
K. Serpersu, E.C. Bowman, J.A. Watson, B.M. Evans III, G.T. Gillies, H.L. Fillmore

Bio-electrographic Method for Preventive Health Care 143
H. Cohly, N. Kostyuk, R. Isokpehi, R. Rajnarayanan

Potential Role of Cation-Aquaporin Interactions in Autism 147
R. Rajnarayanan, S. Varadharajan, R. Isokpehi, H. Cohly

Author Index