The George Washington University
Institute for Biomedical Engineering Presents the First
SYMPOSIUM ON BIOMEDICAL
ENGINEERING AND COMPUTING

April 7, 2008
Continental Ballroom, Marvin Center
www.ibe.gwu.edu

The *Symposium on Biomedical Engineering and Computing* will showcase the best in interdisciplinary research going on at GW in engineering, science, and medicine focused on biomedical engineering and biomedical computing. The symposium will also feature speakers from key federal programs that sponsor research in biomedical engineering and computing. A poster session will feature a variety of research being conducted at GW by faculty and students. The objective of the Symposium is to explore common grounds for fruitful collaborative activities that cut across discipline boundaries.

The welcoming remarks will be given by President Steven Knapp.
Please register by sending an email to cs@gwu.edu

Organizing Committee:

James Hahn, Director, Institute for Biomedical Engineering, Professor and Chair, Department of Computer Science
Xiuzhen (Susan) Cheng, Assistant Professor, Department of Computer Science
Rajat Mittal, Associate Professor, Department of Mechanical and Aerospace Engineering
Raymond Walsh, Professor, Department of Anatomy and Regenerative Biology
Vesna Zderic, Assistant Professor, Department of Electrical and Computer Engineering

The Institute for Biomedical Engineering

The Institute for Biomedical Engineering is one of the original seven *Signature Programs* of excellence identified by the George Washington University for strategic investment of resources. The mission of GWIBE is to maximize collaborations of the diverse and interdisciplinary efforts by groups and individuals involved in biomedical engineering and computing through consolidation of resources under one umbrella. GWIBE is committed to achieving and maintaining the leadership in cutting-edge research and innovative education. The ultimate aim of GWIBE is to advance the quality of medical treatment and clinical outcomes, improve the quality of life for health care patients, and to reduce the cost of health care through advances in engineering and scientific applications in medicine

Agenda

8:00am	**Continental Breakfast and Poster Session**
8:30am-9:00am	**Opening Remarks** **James Hahn**, Ph.D., Symposium Chair, Director, Institute for Biomedical Engineering **Don Lehman**, Ph.D., Executive Vice President for Academic Affairs **Steven Knapp**, Ph.D., President. George Washington University
9:00am-9:30am	**Keynote 1** *Introduction by **Timothy Tong**, Ph.D., Dean School of Engineering and Applied Science* **Lana Shekim**, Ph.D., Director, Voice & Speech Programs, DSP NIDCD/National Institutes of Health
9:30am-10:50am	**Session 1** *Session Chair: **Steven Patierno**, Ph.D. Professor, Department of Pharmacology, Executive Director, George Washington University Cancer Institute* "Computer-based Tools for Phonosurgery" **Steven Bielamowicz**, M.D., Professor, Department of Surgery **Rajat Mittal**, Ph.D., Professor, Department of Mechanical and Aerospace Engineering "Image-Guided Surgery" **James Hahn**, Ph.D., Professor, Department of Computer Science **Ge Jin**, D.Sc., Research Scientist, Department of Computer Science "Endoscopic Optical Coherence Tomography" **Jason Zara**, Ph.D., Assistant Professor, Department of Electrical and Computer Engineering "Localized Spontaneous Activation of Cardiac Tissue During Acute Ischemia and Reperfusion" **Matt Kay**, D.Sc., Assistant Professor, Department of Electrical and Computer Engineering **Narine Sarvazyan**, Ph.D., Associate Professor, Department of Pharmacology and Physiology
10:50am-11:00am	**Break**

11:00am-11:30am	**Keynote 2** *Introduction by* ***Anne Hirshfield****, Ph.D., Associate Vice President for Health Research, Compliance, and Technology Transfer* **Semahat Demir**, Ph.D., Program Director, Biomedical Engineering Program, National Science Foundation
11:30am-12:50pm	**Session 2** *Session Chair:* ***Murray Loew****, Ph.D., Professor, Department of Electrical and Computer Engineering* "Investigating the Origin and Evolution of Human Biomechanics" **Brian Richmond**, Ph.D., Associate Professor, Department of Anthropology **Nicole Griffin**, Department of Anthropology **Erin Marie Williams**, Department of Anthropology "From Biology to Medicine: Ambient Mass Spectrometry of Live Cells and Tissues" **Akos Vertes**, Ph.D., Professor, Department of Chemistry, Biochemistry and Molecular Biology "A Clustering-Based Approach to Predict Outcome in Cancer Patients" **Xiuzhen Cheng**, Ph.D., Assistant Professor, Department of Computer Science **Donald Henson**, M.D., Project Manager, GW Cancer Institute "Genomic Scale Microarray Analysis Identifies Bcl-Inhibitors As Potential Drug Coatings For Endovascular Stents" **Tim McCaffrey**, Ph.D., Professor, Department of Biochemistry and Molecular Biology
1:00pm-3:00pm	**Lunch and Poster Session**

Keynote 1 9:00 AM -9:30 AM

Lana O. Shekim
Program Director for the Voice and Speech Programs in the Division of a Scientific Programs (DSP)
National Institute on Deafness and Other Communication Disorders
National Institutes of Health
Bethesda, Maryland

The presentation will introduce the National Institutes of Health (NIH) and specifically to the National Institute on Deafness and Other Communication Disorders (NIDCD). Current trans-NIH activities will be showcased: NIH Road Map, NIH Neurosciences Blueprint and others of interest to engineers and bioengineers. NIDCD-specific scientific programs, especially activities in the Voice and Speech program, will be highlighted. The presentation will attempt to demystify the NIH and encourage prospective grant applicants to submit proposals for NIH funding. Engineers are invited to collaborate across academic disciplines. Such collaboration would increase discovery of bio-medical and bio-behavioral solutions, reduce the burden of diseases and improve public health of the US and abroad.

Dr. Lana Shekim is the Program Director for the Voice and Speech Programs in the Division of a Scientific Programs (DSP) at the National Institute on Deafness and Other Communication Disorders (NIDCD). She is responsible for the supervision of a comprehensive research program in voice and speech sciences and disorders and advises the Institute Director in determining program priorities and recommendations for funding. She joined the NIH in 2001.

Prior to joining the NIH, she served on the faculty of the George Washington University in Washington, DC and directed the Speech-Language Pathology Service at the GWU Medical Center. Dr. Shekim's clinical experience, gained mostly in academic medical centers, is in the management of individuals with acquired neurologic communication disorders. She earned her doctorate from the University of Florida in Gainesville where she examined language dissolution in Alzheimer's disease. Dr. Shekim completed postdoctoral training in Cognitive Neuropsychology at Johns Hopkins University. She is a certified member of the American Speech-Language-Hearing Association (ASHA) and is a board certified member of the Academy of Neurologic Communication Disorders and Sciences (ANCDS). Dr. Shekim is a member of the ASHA International Issues Board (IIB).

Session 1   9:30 AM -10:50 AM

Computer-based Tools for Phonosurgery

Rajat Mittal, Ph.D., Professor, Department of Mechanical and Aerospace Engineering
Steven Bielamowicz, M.D., Professor, Department of Surgery
The George Washington University

Vocal cord paralysis and paresis are debilitating conditions leading to difficulty with voice production. The alterations in voice production are usually severe enough to impede the individual's ability to work and to conduct normal social interactions. Medialization laryngoplasty is a surgical procedure designed to restore voice in patients with glottal insufficiency due to incomplete vocal fold adduction during voicing. The underlying objective of the procedure is to implant a uniquely configured structural support lateral to the paretic vocal fold through a window cut in the thyroid cartilage of the larynx. The implant provides vocal fold support by placing the vocal fold into a more medial position, i.e. medialization. We are currently working on a NIH sponsored R01 grant which is focused on developing computational tools that can assist with the planning of this surgical procedure. The near-term goal of the project is to develop novel tools and approaches that can eventually improve the clinical outcomes of the particular procedure. However, the long-term significance of the project is to solve fundamental scientific problems associated with the biomechanical modeling and simulation of voice production. Results from this research will be presented.

Rajat Mittal is Professor of Mechanical and Aerospace Engineering at the George Washington University and Director of the GW Center for Biomimetics and Bioinspired Engineering (COBRE). His research interests are in the fields of computational fluid dynamics, biomedical engineering, bioinspired engineering and flow control.

Image Guided Surgery for Medialization Laryngoplasty

James Hahn, Ph.D., Professor and Chair, Department of Computer Science
Ge Jin, D.Sc. Research Scientist, Department of Computer Science
Steven Bielamowicz, M.D., Professor, Department of Surgery
The George Washington University

Over the last two decades, image-guided technology has revolutionized routine surgical procedures in the operating theater. The motivation behind this research is to provide image guidance to the medialization laryngoplasty, a surgical procedure designed to improve the voice function of the patient with vocal fold paresis and paralysis. Currently, the surgeon relies on experience and intuition to place the implant in the desired location, thus it is subject to a significant level of uncertainty. An intraoperative image-guided system will help the surgeon to accurately place the implant at the desired location. One of the fundamental challenges in image guided system is to accurately register the preoperative radiological data to the intraoperative anatomical structure of the patient.

We introduce a surface based registration method to register the preoperative 3D CT data to the intraoperative surface of larynx. To accurately model the exposed surface area, a structured light based stereo vision technique is used for the surface reconstruction. We combined the gray code and multi-line shifting patterns to reconstruct the intraoperative surface of the larynx. To register the point clouds from the intraoperative stage to the preoperative 3D CT data, an anatomical feature based ICP method is proposed to quickly register the two surfaces. The proposed approach is capable of registering the laryngeal cartilage surface with no damage to the anatomical structure. We used computer controlled machine vision cameras, LCD projector and rapid 3D printing device to develop our prototype system. Although, the proposed method is specifically designed for the medialization laryngoplasty, our experimental framework can be applied to other image guided surgical applications.

James Hahn is currently the Director for the Institute for Biomedical Engineering and Professor and Chair in the Department of Computer Science. He has been interested in basic research within the broad scope of computer graphics as well as their application in a number of important domains. He has led the development of a number of surgical training simulators and image-guided surgical procedures. He is the founding director of the Institute for Computer Graphics (ICG), Motion Capture and Analysis Laboratory, and the Institute for Biomedical Engineering.

Ge Jin received the BS degree in computer science from Peking University in 1997 and MS degree in computer science from Seoul National University in 2000. He received Doctor of Science degree from the George Washington University in 2007. Currently, he is a postdoctoral research scientist in the department of computer science at the George Washington University. His primary research interests fall in the field of computer graphics, medical image processing, image guided surgery, computer vision and computer animation. He is a member of the IEEE, SPIE, MICCAI and ACM SIGGRAPH.

Endoscopic Optical Coherence Tomography

Jason Zara, Ph.D., Assistant Professor, Department of Electrical and Computer Engineering
The George Washington University

This talk will focus on new scanning technologies and clinical applications of endoscopic optical coherence tomography (OCT). OCT is a near infrared imaging modality analogous to ultrasound that can produce very high resolution images (10 Âµm or less) up to 2 mm deep into tissue. One of the most promising applications of OCT is the use of endoscopic imaging probes that can be used to bring the infrared light to the surface of mucosal tissues for cancer detection. For this reason, OCT imaging probes need to be very compact to fit inside the body in a minimally invasive manner. To approach this issue we are working on novel polyimide MEMS scanning methods for endoscopic imaging applications. In addition, we are also investigating the use of existing endoscopic OCT scanning technologies to image and diagnose bladder cancer. In addition to developing novel probes, we are very interested in using texture analysis and other computer-aided diagnostic methods to aid in cancer detection and staging using OCT images. This talk will present the basics of OCT, the technology and preliminary results used in our new scanning probes, and also present the use and early results of OCT in bladder cancer detection.

Dr. Jason Zara received his Ph.D. in Biomedical Engineering from Duke University in 2001 and a B.S. in Bioengineering from the University of Illinois at Urbana-Champaign in 1996. He has been an Assistant Professor in Electrical and Computer Engineering at GWU since September 2002. His research interests include medical imaging instrumentation and applications of MEMS and microfabrication technologies to medical applications. Imaging modalities of interest include Optical Coherence Tomography (OCT) and high frequency ultrasound.

Localized spontaneous activation of cardiac tissue during acute ischemia and reperfusion

Matthew Kay, PE, D.Sc., Assistant Professor, Department of Electrical and Computer Engineering
Narine Sarvazyan, Ph.D., Associate Professor, Department of Pharmacology and Physiology
The George Washington University

In the United States almost 6.5 million people suffer from coronary heart disease. Episodic angina is newly diagnosed in about 350,000 people each year, with ischemia episodes becoming more frequent as constriction of a coronary artery worsens. During ischemia a sequence of biochemical events is initiated that ultimately leads to cellular dysfunction and necrosis. When blood flow is restored, additional biochemical insults ensue, compounding the injury. Thus, whenever there is a transient decrease or interruption of blood flow, the net injury is the sum of two components - the direct injury occurring during the ischemia and the indirect, or reperfusion injury, which follows. This repetitive ischemia and reperfusion can cause premature beats, sustained arrhythmias, and is thought to be a significant cause of sudden cardiac death.

We have studied the incidence of localized, spontaneous activation of cardiac tissue (premature beats) in rat hearts during acute regional ischemia and reperfusion. We cannulate the left anterior descending coronary artery to provide for independent control of flow to a specific tissue bed. Dual epicardial fluorescence imaging of transmembrane potential and mitochondrial redox state (NADH) is used to record activation sequences as well as the geometry of the ischemic zone at high spatiotemporal resolution. The timing and locations of premature beats are identified and the temporal progression of ischemia is monitored. During ischemia and full-flow reperfusion we have observed that premature beats arise from the border between normal and ischemic tissue. During low-flow reperfusion we have found that the number of premature beats and their spatial dispersion increases dramatically, with most premature beats located within the ischemic bed. Local changes in NADH during low-flow reperfusion revealed a slow recovery of small patches of ischemic tissue and large spatial gradients, indicating the formation of new ischemic boundary zones. We have concluded that a strong correlation exists ($p<0.01$) between the location of premature beats and the spatial gradient of the change in mitochondrial redox state caused by reperfusion.

Matthew Kay, PE, D.Sc., received a Bachelors and Masters degree from North Carolina State University. In 2000 he received a Doctorate degree in Biomedical Engineering from Washington University in St. Louis. He completed Post-Doctoral training at the University of Alabama in Birmingham. Dr. Kay was a research assistant professor at UAB and in the Dept. of Pharmacology and Physiology at The George Washington University before joining the Dept. of Electrical and Computer Engineering at GWU as an Assistant Professor.

Dr. Kay's research is primarily focused upon understanding cardiac electrical activity during normal and disease conditions - with an overall goal of improving heart disease therapies. His expertise is in fluorescence and electrical imaging of heart tissue and cultures of cardiac cells. He uses custom image processing algorithms and computational models to test hypotheses and identify mechanisms of cardiac electrical pathologies. His recent studies have focused upon identifying ischemic mechanisms of ectopic arrhythmias.

Keynote 2 11:00 AM – 11:30 AM

Semahat Demir, Ph.D.
Program Director
Biomedical Engineering
National Science Foundation

Dr. Demir will present (1) the vision, mission, and overview of NSF, (2) NSF's current priority areas, (3) a summary of different NSF funding opportunities, (4) biomedical engineering funding opportunities (4) the NSF Merit Review Criteria.

Dr. Demir has 18 years experience in academic research, 10 years experience in teaching in academia, 2 years experience in medical industry and 3.5 years experience in research funding administration in the US federal government.

Dr. Demir is the Program Director for Biomedical Engineering at NSF. She participates in 10 other NSF and interagency funding programs: Multiscale Modeling (MSM), Collaborative Research in Computational Neuroscience (CRCNS), Integrative Graduate Education and Research Traineeship (IGERT), Dynamic Data Driven Application Systems (DDDAS), Nanoscale Science and Engineering for Nanoscale Explanatory Research (NER) "Multi-scale, Multi-phenomena Theory, Modeling and Simulation at the Nanoscale", Active Nanostructures and Nanosystems, Nanoscale Interdisciplinary Research Teams (NIRT) on Nanoscale Devices and System Architecture and NIH/NSF solicitation for Bioengineering Approaches to Energy Balance and Obesity, Engineering Research Centers (ERCs), Emerging Frontiers Research and Innovation (EFRI) and Research to Aid Persons with Disabilities (RAPD). She has been the solicitation coordinator for the Interagency Opportunities in Multi-Scale Modeling in Biomedical, Biological, and Behavioral Systems for NSF, NIH, NASA and DOE. She initiated and sponsored an international benchmarking study called "Brain Computer Interface". Dr. Demir chairs the Neurotech Working Group for Engineering Directorate. She was a sponsoring program director for the Systems Biology Study and Simulation-based Science Engineering Study. She is an NSF representative on the National Science and Technology Council (NSTC) Subcommittee on Biometrics and Identity Management. She represented NSF Engineering Directorate in the NSF Cyberinfrastructure Learning and Workforce Development Team and NSF Neuroscience and Cognition Initiative. She has been a Science Officer on the NIH Roadmap National Center for Biomedical Computing "Physics-based Simulation of Biological Structures" at Stanford University. Dr. Demir co-chairs NIH Bioengineering Consortium (BECON) Bridges Team. At NSF, she received Program Officer Excellence Award and Director's Award for Collaborative Integration at NSF. She received 55 professional awards and honors.

Dr. Demir has served on the governing boards of 6 technical organizations including IEEE EMB AdCom. Currently she is the Society of Women Engineers (SWE) Director of External Affairs (2006-2008). She has served as a reviewer for 11 journals and publishers. Currently Dr. Demir serves on the editorial board of the International Journal of Biomedical Engineering and Technology (IJBET) and has been the Associate Editor for Industry Affairs of EMB Magazine since 2001.

Before joining NSF, Dr. Demir held the positions of professor of Biomedical Engineering at the Joint Biomedical Engineering Program of University of Memphis and University of Tennessee; Technical Manager and Medical Laser Engineer for Messerschmidt Bolkow Blohm and Rodenstock in Turkey; and research and development engineer in the X-Ray Division of the Medical Engineering Center of Siemens Company in Erlangen, Germany. Dr. Demir's own academic research is in the area of computational bioengineering and has 125 publications and has given 173 invited presentations, keynotes, talks, seminars and workshops.

Semahat Demir received her BS degree in electronics engineering from Istanbul Technical University, MS degree in biomedical engineering from Bosphorous University, and second MS degree and PhD degree in electrical and computer engineering from Rice University. She did her postdoctoral training at Biomedical Engineering Department, Johns Hopkins University.

Session 2 11:30 AM – 12:50 PM

Investigating the Origin and Evolution of Human Biomechanics

Brian G. Richmond, Ph.D., Associate Professor
Nicole Griffin
Erin Marie Williams
Center for the Advanced Study of Hominid Paleobiology
Department of Anthropology
George Washington University

Human anatomy is unique among animals in many respects. While the fossil record provides us with information on the timing and pattern of the origin and evolution of our unique anatomy, these findings raise many questions about their biomechanical significance. This talk explores how biomechanical experiments can test hypotheses about the origins of human gait and manual dexterity. In our ongoing work, we are examining the link between gait kinematics, anatomical joint morphology, and the 3D architecture of trabecular bone to investigate whether or not our early ancestors walked with a gait essentially like ours today. Similarly, motion analysis experiments allow us to test hypotheses about the origins of human manual dexterity by identifying the specific roles of components of the hand and upper limb in making and using primitive stone tools. The evolutionary history of our anatomy can help us understand clinically-relevant aspects of human biomechanics.

Brian Richmond received his B.A. from Rice University in 1990, his PhD from Stony Brook University in 1998, and was a Henry R. Luce Postdoctoral Fellow at The George Washington University from 1998-2000. He joined the Anthropology Department at GWU in 2002. Richmond's research focuses on the evolution and function of human anatomy, specializing in the evolution of human gait and hand function. His search for ape and early human fossils has included work in Turkey and Ethiopia, and he is now conducting fieldwork in Plio-Pleistocene sediments in Kenya. In addition to paleontological fieldwork, his research includes laboratory analyses of gait and hand function, analyses of the relationship between functional activity and bone microstructure, and finite element analyses of biomechanical problems in human evolution.

From Biology to Medicine: Ambient Mass Spectrometry of Live Cells and Tissues

Akos Vertes, Professor, Department of Chemistry
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In the past two decades, we have witnessed the rapid expansion of mass spectrometry to fundamental problems in biochemistry and molecular biology. The new soft ionization sources, matrix-assisted laser desorption ionization and electrospray ionization enabled the fast identification and structural analysis of large biomolecules. These developments spawned the emergence of entire scientific disciplines, such as proteomics, metabolomics and lipidomics. The next challenge for biomedical mass spectrometry is to address the problems encountered in medicine in the trio of diagnosis, treatment and prognosis. To directly affect medical decisions in these fields, mass spectrometry of live specimens is desirable preferably at atmospheric pressure. This talk describes the atmospheric pressure ion sources developed in my laboratory with examples of in vivo investigations of tissues and cells. Recent breakthroughs in the molecular imaging and metabolic profiling of live tissues are discussed with a view on future biomedical applications.

A Clustering-Based Approach to Predict Outcome in Cancer Patients

Xiuzhen Cheng, Ph.D., Assistant Professor, Department of Computer Science
Donald Henson, M.D., Project Manager, GW Cancer Institute

The TNM (Tumor, Lymph Node, Metastasis) is a widely used staging system for predicting the outcome of cancer patients. However, the TNM is not accurate in prediction, partially due to the fact of deficient staging within and between stages. Based on the availability of large cancer patient datasets, there is a need to expand the TNM. In this talk, we present a general clustering-based approach to accomplish this task of expansion. Our approach admits multiple factors. One major advantage of the approach is that patients within each generated group are homogeneous in terms of survival, so that a more accurate prediction of outcome of patients can be made. A demonstration of use of the proposed method is given for breast cancer patients.

Donald E. Henson, M.D. is Adjunct Professor of Pathology and Adjunct Professor of Epidemiology and Biostatistics at The George Washington University School of Medicine. He is also Co-Director of the Office of Cancer Prevention and Control at The George Washington University Cancer Institute. Board Certified in Pathology, Dr. Henson trained at Rush Presbyterian St Luke's Hospital in Chicago. After a year of post doctoral training, Dr. Henson joined the National Institutes of Health and eventually the Laboratory of Pathology of the National Cancer Institute. In addition to pathology, Dr. Henson has served in the Division of Cancer Prevention as Program Director in the Early Cancer Detection program. Research interests have included the analysis of prognostic factors, diagnostic encoding, and the morphology of precancerous lesions. He has served as a consultant to the World Health Organization and to the Pan American Health Organization. He has also served as Chair of the American Joint Committee on Cancer and Chair of the Cancer Committee of the College of American Pathologists. Dr. Henson has published more than 185 peer reviewed manuscripts and 15 books and manuals including a book on the Pathology of Incipient Neoplasia. Currently, Dr. Henson is Co-Chair of the Washington DC Cancer Consortium, and Chair of the Quality Management Subcommittee at The George Washington University Hospital.

Dr. Cheng's research interests are centered on algorithm design and analysis targeting problems originated from wireless networks and computational medicine. She has been working on a clustering-based prognostic system to predict the outcome of cancer patients. Currently her research is mainly focused on the development and application of machine learning techniques to evaluate and identify risk factors for cancer and conduct clinical outcome and survival prediction. Dr. Cheng was a program director of the National Science Foundation for six months in 2006. She received the NSF CAREER Award in 2004.

Genomic scale microarray analysis identifies Bcl-Inhibitors as potential drug coatings for endovascular stents

Zhaoqing Yang, Ph.D.[1], Dmitry Gagarin, M.D.[1], Ali Ramezani, Ph.D.[2], Robert G. Hawley, Ph.D.[2], and Timothy A. McCaffrey, Ph.D.[1]
The George Washington University Medical Center
[1] Department of Biochemistry and Molecular Biology, & The Catherine Birch McCormick Genomics Center
[2] Department of Anatomy and Cell Biology

The inappropriate survival of cells in the neointima contributes to atherosclerotic plaque progression, while apoptosis in the fibrous cap of lesions contributes to myocardial infarction and stroke. Prior genomic-scale transcript profiling of human carotid artery plaque cells with known sensitivity or resistance to fas-induced apoptosis identified candidate genes involved in lesion cell apoptosis. Retroviral overexpression indicated that several candidate factors were not causative, but that Bcl-XL conferred complete resistance to apoptosis induced by fas ligation. Resistant cells failed to efficiently activate caspase 8, an effect which was also observed in Bcl-XL transfected cells. Small-molecule Bcl-2/XL inhibitors and siRNA knockdown of Bcl-XL markedly sensitized resistant cells to apoptosis, and partially restored caspase 8 activation. Caspase 3, 6, and 9 inhibitors reduced caspase 8 activation and blocked apoptosis. Complete knockdown of caspase 9 did not reduce apoptosis, while knockdown of Bid suppressed apoptosis, suggesting that mitochondrial pathways independent of caspase 9, such as Smac/Diablo or AIF, provide a necessary mitochondrial input to efficient caspase activation. Bcl-XL appears to modulate lesion cell apoptosis by suppressing mitochondrial amplification of caspase activation loops. The results may have direct implications for controlling plaque instability/progression, and identifies a new class of small-molecules to inhibit restenosis.

Timothy A. McCaffrey, Ph.D. received his B.A. from St. Mary's University, and his Masters and Doctorate from Purdue University. He received Post-Doctoral training at Cornell University Medical College in New York City, where he was promoted to an Assistant and then Associate Professor in the Department of Medicine. He founded the Genomics Core Facility at Weill/Cornell Medical School.

In 2001, he relocated his laboratory to The George Washington University Medical Center where he founded the Genomics Core Facility. In 2004, he was named Director of the Catherine Birch McCormick Genomics Center at GWU and Vice-Chairman for Research and Administration in the Department of Biochemistry and Molecular Biology. The MGC is working to stimulate genomics research at GW by funding pilot research grants, graduate and medical student fellowships, and lecture series.

Dr. McCaffrey's research has been most highly focused on the molecular biology and genetic regulation features and defects in cells that are involved in the development of atherosclerotic lesions. He is working to exploit our understanding of these mechanisms for the development of new drug targets to treat cardiovascular disease, as well as for creating new diagnostic tests for predicting people who are at risk of developing heart disease.

Building on this work, he is going to speak on the role of genomics and our expanding ability to use genetic information to personalize our understanding of disease risk and our ability to target therapeutic interventions to individual patients.

Poster Presentations

Antony S, Wood S, Kaplan D, Hitchins V.	Maintenance of human chondrocyte function by hypoxia and bone morphogenic protein-2.
Bennett D, Loew M.	A new impedance imaging system and dipole basis reconstruction method.
Chichka D, Stephenson J.	Subtalar Joint Modeling.
Ejofodomi O, Zderic V, Lingley-Papadopoulos C, Zara J.	Soft tissue phantom for ultrasonic and optical imaging.
Gabor L, Klein-Seetharaman J, Qi Y.	Evaluation of computational methods in the prediction of protein interactions in Arabidopsis thaliana.
Hasan S, Rotenstreich S.	An organizational framework of personal health records for social networks.
Jin G, Wakid M, Kirmizibayrak C, Carleton T, Yi M, Hahn JK.	Image guided surgery for medialization laryngoplasty.
Johnson D, Zderic V.	Tissue mimicking flow phantom.
Kim JW, Hahn JK.	Make them dance: Music driven dance motion generation.
Kirmizibayrak C, Hahn JK.	Visualization and analysis of Olympic-class swimming.
Lingley-Papadopoulos C, Loew M, Zara J.	Real-time bladder layer recognition - an approach to optical biopsy.
Lingley-Papadopoulos C, Loew M, Zara J.	Progress toward system-independent image analysis: examples from textural analysis in optical coherence tomography.
Loew M, Straub S, McClanahan T, Sharp G.	Automated quantitative morphologic analysis of pancreatic beta-cells by imaging of electron micrographs.
Martell B, Kay M, Swift L, Arutunyan A, Sarvazyan N.	Optical mapping of controlled-flow regional ischemia and reperfusion in Langendorff perfused rat hearts.
Samuels J, Zderic V.	Optimization of HIFU lesion formation at large tissue depths.
Steines D, Manuccia T, Eom KB, Zderic V.	A novel high-intensity focused ultrasound synchronization and driving system.
Swift L, Sarvazyan N, Martell B, Arutunyan A, Kay M.	Heterogeneity of acute cardiac ischemia as an underlying cause of reperfusion arrythmias.

Razjouyan F, Zderic V.	Cost-effective radiation force balance for calibration of therapeutic ultrasound devices.
Williams EM, Gordon AD, Richmond BG.	A kinematics study of upper limb biomechanics during stone tool production.
Xudong Z, Mittal R.	Computational Modeling of Phonation.
Zara J.	Imaging methods for cancer detection in epithelial tissues.
Zara J.	Amplified piezoelectric bimorph scanning mirror.
Zderic V, Swift L, Sangave A, Kay M.	Contrast harmonic ultrasound imaging of myocardial perfusion.