To contact the CBAC, please address correspondence to:

Cardiac Bioelectricity & Arrhythmia Center
Washington University in St. Louis
Whitaker Hall, Room 290
1 Brookings Drive
Campus Box 1097
St. Louis, Missouri, 63130-4899
Phone: 314.935.7887
Fax: 314.935.8168
http://cbac.wustl.edu

Faculty and Membership

An interdisciplinary approach to studying and treating rhythm disorders of the heart

http://cbac.wustl.edu
CBAC Mission

The Cardiac Bioelectricity and Arrhythmia Center, CBAC, is an interdisciplinary center whose goals are to study the mechanisms of rhythm disorders of the heart (cardiac arrhythmias) and to develop new tools for their diagnosis and treatment. Cardiac arrhythmias are a major cause of death (over 300,000 deaths annually in the US alone; estimated 7 million worldwide) and disability, yet mechanisms are poorly understood and treatment is mostly empirical. Through an interdisciplinary effort, CBAC investigators apply molecular biology, ion-channel and cell electrophysiology, optical mapping of membrane potential and cell calcium, multi-electrode cardiac electrophysiological mapping, Electrocardiographic Imaging (ECGI) and other non-invasive imaging modalities, and computational biology (mathematical modeling) to study mechanisms of arrhythmias at all levels of the cardiac system. Our mission is to battle cardiac arrhythmias and sudden cardiac death through scientific discovery and its application in the development of mechanism-based therapy.

Research Interests

Our research aims at understanding the mechanisms that underlie normal and abnormal rhythms of the heart at various levels, from the molecular (ion channel) and cellular to the whole heart. We are also developing a novel noninvasive imaging modality (Electrocardiographic Imaging, ECGI) for the diagnosis and guided therapy of cardiac arrhythmias. Through the development of detailed mathematical models of cardiac cells and tissue, we are investigating the mechanisms and consequences of genetically-inherited cardiac arrhythmias, impaired cell-to-cell communication, and abnormal spread of the cardiac impulse in the diseased heart (e.g. myocardial infarction). ECGI imaging is currently being tested, evaluated and applied in patients with various heart conditions.
Guatam K. Singh, M.D., M.R.C.P.
Pediatric Cardiologist, St. Louis Children’s Hospital
Director of The Preventive Cardiology Clinic (SLCH)
Associate Professor of Pediatrics
Director, Imaging Research
Co-Director, Echocardiography Laboratory
Washington University School of Medicine
Email: singh_g@wustl.edu
Phone: 314.454.4504
http://peds.wustl.edu/

Timothy W. Smith, Ph.D., M.D.
Associate Professor of Medicine, Internal Medicine
Cardiovascular Division
Washington University School of Medicine
Cardiac Electrophysiologist
Barnes-Jewish Hospital
Email: jnerbonn@wustl.edu
Phone: 314.454.79824
http://cardiology.wustl.edu/faculty/smitht.html

Jason W. Trobaugh, D.Sc.
Research Instructor, Department of Electrical and Systems Engineering
Washington University in St. Louis
Email: jasont@wustl.edu
Phone: 314.935.7549
http://ese.wustl.edu/~jasont

George Van Hare, III, M.D.
Louis Larrick Ward Chair, Pediatric Cardiology
St. Louis Children’s Hospital
Director of Pediatric Cardiology
Washington University School of Medicine
Email: vanhare_g@wustl.edu
Phone: 314.454.4217
http://peds.wustl.edu/Faculty/Vanhare_G/

Support and Facilities
Research is supported through grants to affiliated faculty. Funding agencies include: NIH, AHA, VA, Whitaker Foundation and NSF. A number of projects are funded through industrial support (pharmaceutical- and device-related studies). Facilities include state-of-the-art laboratories for genetics, molecular biology, cellular and subcellular electrophysiology, optical mapping of action potentials and cell-calcium, multi-electrode mapping of cardiac electrical activity, and theoretical and computer simulations using supercomputing. Studies can also be conducted in clinical facilities for MRI, CT and Ultrasound imaging, and for electrophysiology studies and arrhythmia treatment during cardiac catheterization and surgery. Please visit our website located at http://cbac.wustl.edu.
Projects

- Molecular structure and electrophysiological function of cardiac ion channels
- Development of mathematical models of cardiac ion channels, cells and tissues
- Regulatory pathways in cardiac cells
- Mechanisms of hereditary cardiac arrhythmias
- Arrhythmias in myocardial ischemia and infarction
- Cell-to-cell communication and action potential propagation in the diseased heart
- Structure and function of the atrio-ventricular node
- Mechanisms of cardiac (ventricular and atrial) fibrillation and new strategies for defibrillation
- Development and application of a novel imaging modality for cardiac arrhythmias
- Mechanisms of cardiac resynchronization therapy for heart failure

Education and Training Goals

An important goal of CBAC is to enhance and promote education and training in biomedical engineering, life sciences, and clinical medicine. The cross-disciplinary structure of CBAC facilitates a synergistic relationship between training, research and clinical medicine. The educational component of CBAC builds on graduate programs in the Department of Biomedical Engineering and the Medical School. Through CBAC, graduate students and scientists in engineering and life sciences can participate in clinical lectures, seminars, case presentations and clinical procedures such as diagnosis and treatment of arrhythmias in the catheterization laboratory. Similarly, post-M.D. clinical fellows can participate in lectures and seminars in the basic science departments and in research projects in the basic science laboratories.
Richard W. Gross, M.D., Ph.D.
Professor of Medicine, Chemistry, and Developmental Biology; Director, Division of Bioorganic Chemistry and Molecular Pharmacology (Joint Appointment with the School of Medicine)
Email: rgross@wustl.edu
Phone: 314.362.2690
http://www.chemistry.wustl.edu

Patrick Y. Jay, M.D., Ph.D.
Assistant Professor of Pediatrics and Genetics
Washington University School of Medicine
Email: jay_p@kids.wustl.edu
Phone: 314.362.2174
http://research.peds.wustl.edu

R. Gilbert Jost, M.D.
Elizabeth Mallinckrodt Professor of Radiology; Chairman, Department of Radiology, Director, Mallinckrodt Institute of Radiology
Email: jostg@wustl.edu
Phone: 314.362.7100
http://www.mir.wustl.edu/

Sándor J. Kovács, Jr., Ph.D., M.D.
Professor of Medicine, Cell Biology and Physiology; Adjunct Professor of Physics and Biomedical Engineering; Director and Founder, Cardiovascular Biophysics Laboratory, Washington University School of Medicine
Email: sjk@wuphys.wustl.edu
Phone: 314-362-8909
http://cardiology.wustl.edu/

Leonid Livshitz, Ph.D.
Research Assistant Professor, Biomedical Engineering, Cardiac Bioelectricity & Arrhythmia Center
Washington University in St. Louis
Email: lmlivshitz@wustl.edu
Phone: 314.935.8163
http://research.engineering.wustl.edu/~lmlivshitz

Douglas L. Mann, M.D.
Lewin Professor and Chief, Cardiovascular Division
Washington University School of Medicine
Cardiologist-in-Chief, Barnes Jewish Hospital
Email: dmann@dom.wustl.edu
Phone: 314.362.8908
http://cardiology.wustl.edu/

Tony J. Muslin, M.D., F.A.H.A.
Oliver M. Langenberg Distinguished Professor of the Science and Practice of Medicine; Professor of Cell Biology and Physiology; Director, Center for Cardiovascular Research; Director Cardiology Research Fellowship Program
Email: igor@wustl.edu
Phone: 314.935.8612
http://bme.wustl.edu/

Arye Nehorai, Ph.D.
Department Chair and Professor
Eugene and Martha Lohman Professor of Electrical Engineering
Washington University in St. Louis
Email: nehorai@ese.wustl.edu
Phone: 314.4935.7520