Dalton Cardiovascular Research Center

2013

Front picture is a nighttime shot of Dalton Cardiovascular Research Center.

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The Dalton Cardiovascular Research Center (DCRC) supports the objectives of the University of Missouri in its mission of teaching, research and service. Yet it is unique in its commitment to interdisciplinary collaborative research and teaching among various colleges, schools and departments across the Columbia campus. Under the auspices of DCRC, scientists from the fields of biochemistry, biological engineering, biological sciences, biomedical sciences, electrical engineering, medicine, pharmacology, physiology, physics, and veterinary medicine and surgery all come together and apply their particular expertise to research problems.

Our commitment to collaboration is grounded in the belief that interactions among scientists of diverse backgrounds will lead to multidisciplinary research producing meaningful, far-reaching results. Research programs at DCRC include investigations into cardiac functions, cystic fibrosis, exercise, kidney failure, membrane transport, muscular dystrophy, neurohumoral control of the circulation, shock, vascular wall biology, diabetes, hypertension, biomedical engineering, protein-protein interactions, and tumor angiogenesis. Because the mission of DCRC is to promote interaction and collaboration, no single group completely defines the research activity of its members.

The center is committed to excellence in cardiovascular research and in the education of students and fellows. Our investigators provide service to the University, the State of Missouri, and the nation through memberships on committees, peer review panels and editorial boards of scientific journals. During the period of this report, our Resident and Non-Resident Investigators have over $50 million in active research funding, have published 153 manuscripts in nationally recognized journals and books and gave 44 invited presentations.

The Dalton Cardiovascular Research Center is accredited by both the American Association for the Advancement of Laboratory Animal Care and the American Association of Laboratory Animal Sciences.

The Internal Advisory Committee:

Dr. Gerald A. Meininger, Chair
Dr. Mike Hill
Dr. Alan Jones
Dr. Ed Blaine
Dr. Virginia Huxley
Dr. Ron Terjung
Dr. Kevin Gillis

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Dr. Kevin Gillis
Dr. Tzyh-Chang Hwang
Dr. Luis A. Martinez-Lemus
Dr. David Kline

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Dr. Kevin Gillis

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Dr. Luis Polo-Parada
Dr. Kevin Gillis
Dr. Lane Clarke

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Interdisciplinary Research Interests Groups

Biomedical Engineering
Investigators: M.J. Davis, Ding, Gillis, Gu, Hill, Huxley, Hwang, Jones, Meininger, Milanick, Polo-Parada, Segal, Zou, Sun

Cystic Fibrosis
Investigators: Clarke, Hwang, Milanick, Soma, Zou, Bompadre

Exercise/Inactivity Including Atherosclerosis, Muscle Biology, Obesity, Type II Diabetes, and Vascular Biology
Investigators: Booth, Bowles, Hasser, Hill, Huxley, Jones, Korthuis, Laughlin, Martinez-Lemus, Meininger, Polo-Parada, Rubin, Segal, Soma, Terjung, Sun, Fay, Sowers

Membrane Transport
Investigators: Clarke, Gillis, Gu, Huxley, Hwang, Milanick, Polo-Parada, Rovetto, Rubin, Zou, Bompadre

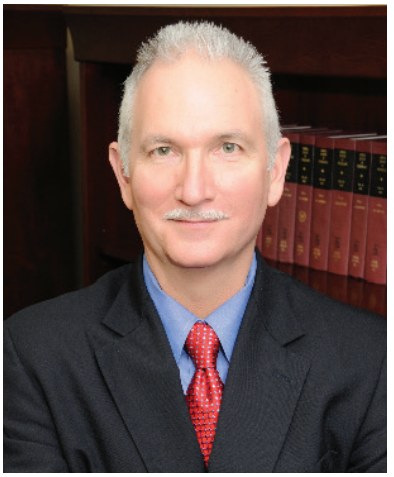
Microcirculation
Investigators: M.J. Davis, Ding, Hill, Huxley, Korthuis, Laughlin, Martinez-Lemus, Meininger, Segal, Sun

Neurohumoral Control of the Circulation Including Ageing, Hypertension, Heart Failure, Respiration and Salt and Water Homeostasis
Investigators: Blaine, Ding, Fadel, Hasser, Heesch, Kline, Meininger, Milanick, Segal, Kvochina

Tumor Angiogenesis
Investigators: G.E. Davis, Hyder, Liang

Cardiac Muscle, Development & Disease
Investigators: Baines, Krenz, Meininger, Sun, Polo-Parada, Rubin

Director



Gerald A. Meininger

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Education:
PhD University of Missouri-Columbia,
MS & BS Central Michigan University

Appointments:Director Dalton Cardiovascular Research Center
Margaret Proctor Mulligan Professor in Medical Research
Professor, Department of Medical Pharmacology and Physiology
Adjunct Professor, Department of Biomedical Sciences
Adjunct Professor, Department of Physics

Research

Research interests in my laboratory have been focused on vascular physiology and cell biology, with an emphasis on the microvasculature. Currently active areas of research include: 1.) Cell adhesion, extracellular matrix and cell signaling in the vascular wall; 2.) Mechanotransduction in vascular cells; 3.) Regulation of vascular and cardiac responses to tissue injury by extracellular matrix derived signals; 4.) Cellular and molecular mechanisms responsible for mechanotransduction; 5.) Mechanisms of vascular remodeling; 6.) Mechanisms responsible for the myogenic properties of vascular smooth muscle; 7.) Application of fluorescence microscopy and 3D-image analysis for studies of microvascular cell biology and the cyto-architecture and function of the microvessel wall; and 8.) Mechanisms of blood flow autoregulation.

Laboratory models include studies of both the intact microcirculation and of isolated arterioles, freshly dispersed or cultured vascular smooth muscle cells, endothelial cells and cardiac muscle cells. Examples of technical approaches include pharmacology of the intact microvasculature and isolated microvessels; ability to manipulate pressure and flow in isolated microvessels; vessel culture and transfection; immuno-cytochemistry of the microvessel wall and isolated cells; three dimensional fluorescence imaging using confocal, multiphoton or wide field microscopy in combination with deconvolution; atomic force microscopy combined with fluorescence microscopy (TIRF and FRET), and software development for high through-put analysis and display of atomic force microscopy force data.

An emphasis over the last several years has been to understand the role of the extracellular matrix, adhesion molecules and the cytoskeleton in regulation of vascular and cardiac cells, especially in the control of contractile function. A fundamental aim of this work has been to determine to what extent this matrix-adhesion-cytoskeletal axis may be involved in mechanotransduction phenomena that underlie the vascular myogenic response, flow-dependent responses of the endothelium and vascular remodeling. Advances in hybridizing atomic force microscopy with fluorescence microscopy are permitting higher through-put evaluation of cell surface receptors and their interactions with specific ligands.

Our future plans include continuing to study the role of the extracellular matrix and cell adhesion molecules in the regulation of vascular and cardiac cell function. We are extending our studies of mechanotransduction down to the level of single molecular interactions between integrins and extracellular matrix molecules, as well as to the mechanical dynamics of single focal contacts.

Associate Director

Michael A. Hill

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Education:
PhD & MS University of Melbourne

Appointment: Professor, Department of Medical Pharmacology and Physiology; Associate Director, Dalton Cardiovascular Research Center

Research

Our laboratory has a principal interest in understanding the signaling mechanisms that underlie the vasoconstrictor response of an arteriole following an acute rise in intraluminal pressure (myogenic response). Our studies have examined the roles of a number of vascular smooth muscle signaling molecules including various kinases and intra-cellular Ca2+. More recently these studies have been extended to include approaches aimed at determining the relationships between pressure induced changes in smooth muscle membrane potential and the resulting signaling events that ultimately lead to the contractile response.

In addition to basic studies on myogenic signaling, we are also studying how myogenic tone interacts with other vasoregulatory mechanisms (principally, endothelial-dependent dilation) and how myogenic response is altered in diabetes mellitus.

Principal Investigators

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Education:
B.Sc. University of Bath, Great Britain
PhD University of South Alabama

Appointment: Assistant Professor, Department of Biomedical Sciences

Research

Mitochondrial dysfunction is often an underlying cause of myocardial disease. In particular, cardiac pathologies such as ischemia/reperfusion injury, heart failure, diabetic cardiomyopathy, anti-cancer agent-induced cardiotoxicity, etc., are associated with rapid and dramatic increases in mitochondrial permeability.

These changes in permeability lead to ATP depletion, excessive production of reactive oxygen species, and ultimately swelling and rupture of the organelle, thereby instigating a molecular chain of events that leads to cardiomyocyte death. The long-range goal of the lab is to understand how specific mechanisms of mitochondrial-driven death can be targeted for the prevention of myocardial disease.

Edward H. Blaine

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Education:
PhD, MA & AB University of Missouri-Columbia

Appointment: Professor, Department of Medical Pharmacology and Physiology

Research

Currently, the primary focus of my laboratory is the underlying cause of hypertension that is associated with an adverse uterine environment. It is well documented that offspring of mothers who have undergone a variety of stressful circumstances during pregnancy may give birth to offspring who suffer from conditions such as hypertension, type II diabetes, and metabolic syndrome as adults. This phenomenon is known as fetal programming or the fetal origin of adult disease. One characteristic of these susceptible offspring is a reduced nephron number and several investigators have suggested that the lack of a full nephron complement is the underlying cause of the adult onset hypertension. How the reduction in nephron number causes or contributes to hypertension is not known. We are presently working on the hypothesis that there is a differential loss of nephrons. Based on inherent heterogeneity, loss of more "salt-losing" nephrons and retention of more "salt-saving nephrons" results in an overall tendency for the kidney of these offspring to retain sodium and, therefore, be more susceptible to hypertension as adults.

Our work involves whole animal studies which detail changes in the kidney's ability to excrete sodium and whether changes in ability to excrete a sodium load is a function of changes in glomerular filtration, sodium reabsorption, or both. These studies are conducted in conscious, freely moving animals to obtain data that is not compromised by anesthesia or restraint. We are also studying changes in renal morphology, especially distribution of the loops of Henle, using immunohistochemistry techniques.

We continue our interest in neuroendocrine regulation of fluid balance and cardiovascular function, with emphasis on hypertension and heart failure. We are particularly interested in the actions of angiotensin II and vasopressin on brain cardiovascular centers. Our recent work has demonstrated two distinct actions of angiotensin on blood pressure regulation: acutely, angiotensin has its primary effect directly on vascular smooth muscle, while chronically, the hypertensive effects of angiotensin are mediated through activation of central nervous system pathways. Not only are the circumventricular organs important, but other brain areas are activated during acute and chronic angiotensin infusion. Our next step is to map the distribution of heightened nervous system activity in the peripheral vascular beds that is associated with chronic angiotensin hypertension. We are also investigating receptor regulation and post receptor signaling associated with angiotensin infusion.

We are also interested in the role of the renin-angiotensin system in diabetic nephropathy and the mechanism by which drugs that inhibit this system are effective in preventing renal damage.

Silvia G. Bompadre

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Education:
PhD in Physics from University of Washington

Appointment: Assistant Professor, Department of Physics

Research
Research in my laboratory focuses on understanding how the CFTR (Cystic Fibrosis Transmembrane conductance Regulator) chloride channel works at the molecular level and how mutations in CFTR cause defective functions. The final goal is to apply the acquired knowledge in therapeutic design for cystic fibrosis . Combining electrophysiology and fluorescence spectroscopy techniques with molecular biology and molecular modeling, studies are set to study CFTR's structure/function which in turn can help design specific compounds for specific disease-associated mutants.

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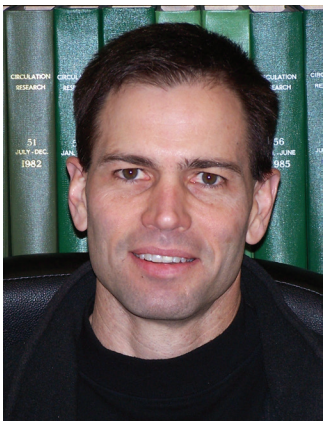
Education:
PhD University of Iowa, BS Denison University

Appointments: Professor, Department of Biomedical Sciences
Adjunct Professor, Department of Medical Pharmacology and Physiology and Department of Nutrition and Exercise Physiology

Research
Research interests in my laboratory currently focus on two areas.

First, we are addressing the question: what is the identity of genes in the nucleus accumbens that motivate rats that were bred to be "born-to-run" to have long distances of voluntary running in wheels, as compared to other rats that were bred to mimic "couch potato" behavior by having low distances of voluntary running?

Second, we are tackling the questions: 1) does voluntary running in wheels produce higher peak lifetime aerobic capacities than in rats without wheels for voluntary running; 2) does voluntary running attenuate primary aging-induced loss of aerobic capacity; and 3) which genes are responsible for the previous two questions?



Doug Bowles

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Education:
PhD University of Texas-Austin

Professor, Department of Biomedical Sciences
Adjunct Professor, Medical Pharmacology and Physiology

Research

The goal of our lab's research is to understand how ion channels affect the role of coronary smooth muscle (CSM) in vascular pathology, i.e. atherosclerosis and post-angioplasty restenosis. Our major research question is how physical activity/exercise and sex hormones alter ion channel function in coronary smooth muscle to affect the onset and progression of coronary vascular disease.

Currently, the major focus is on two distinct channels, the intermediate-conductance, calcium-activated K channel (IKCa1) and channels underlying store-operated calcium entry, most likely TRPC channels. We are interested on these as they are upregulated during CSM phenotype modulation that occurs during vascular injury. Our lab strives for a molecule to animal approach using cultured and native cells, intact vessels and in vivo models. The primary model is the swine, as its coronary physiology, anatomy and gene expression profile is most similar to human. Experimental techniques include whole-cell and patch clamp, fluorescent based calcium imaging, isometric vessel recordings, cannulated microvessels, immunoblot, real-time RT-PCR, laser capture microdissection and molecular biology (promoter/reporter constructs, etc) to examine gene regulation by ion channels.

Lastly, we have a state-of-the-art, fully digital cath lab exclusively for large animal (e.g. pig) research. With this we can do angiography, intravascular ultrasound, intracoronary flow and pressure. We can also induce coronary injury/restenosis with balloons and stents. Our goal is to use this to provide direct, in vivo, "translational" endpoints to our cellular/genetic studies.

The results of these experiments will provide novel mechanisms by which a sedentary lifestyle and hormonal status impacts cardiovascular health and well being as well as define potential therapeutic targets for the treatment and prevention of cardiovascular diseases.

Nicola J. Brown, Ph.D.

Adjunct Dalton Investigator
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Education:
PhD: University of Sheffield
BS: University of Sheffield

Appointments: Professor of Microcirculation Biology, Head of Academic Surgical Oncology Unit, Head of Microcirculation Research Group, Department of Oncology, Faculty of Medicine Dentistry and Health

Research

My research interests are mechanisms of physiological and pathophysiological angiogenesis in wound healing and tumour progression and the role of anti-angiogenic and anti-vascular strategies for the treatment of angiogenesis dependent disorders.
The principal objective and research strategy of the Microcirculation Research Group is to investigate the mechanisms regulating tumour angiogenesis in preinvasive to invasive cancer progression and how this may be targeted for therapy. The facility contains state-of-the-art specialised fluorescent in vivo microscopy and multiphoton microscopy which allows real-time imaging of blood vessel development, blood flow, leucocyte-endothelial and tumour-endothelial interactions, in a variety of preclinical in vivo models, in addition to a panel of in vitro angiogenesis assays. The clinical study of human tissue, both normal and breast cancer are complemented by laboratory based modeling, both basic and applied

Lane Clarke

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Education:
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Appointments: Professor, Department of Biomedical Sciences

Research

Our laboratory investigates abnormalities of acid-base transporters in cystic fibrosis and other genetic diseases that contribute to epithelial hyperproliferation and dysfunction of secretory cells in the intestinal crypts, i.e., the site of stem cell activity and cell differentiation. Studies of mice with gene-targeted deletion of CFTR (the cystic fibrosis gene) or other acid-base transporters employ in vivo, ex vivo or primary murine or human organoid culture. Mechanistic studies of molecular interactions are performed using cell lines. Functional activity of acid-base or nutrient transporters is measured in real time using fluorescence confocal or conventional microscopy and electrophysiological methods. Gene or protein expression is measured using quantitative real-time PCR, microarrays, immunoblots, immunofluorescence and laser capture microdissection. Currently, three major projects in the laboratory are funded by NIDDK or the Cystic Fibrosis Foundation. The first project investigates the role of CFTR in down-regulating the cell cycle dynamics and Wnt/ -catenin signaling in intestinal stem cells (ISCs). Loss of this regulation in cystic fibrosis (CF) results in intestinal hyperproliferation which likely contributes to the six-fold increase in the incidence of gastrointestinal cancer in the relatively young population of CF patients. The second project investigates the acid-base transporters expressed in ISCs that determine intracellular pH (pHi). Manipulation of pHi is used to control proliferation in a timed manner to offset the "bystander" damage to ISCs resulting from therapeutic doses of chemotherapeutic reagents and radiation during cancer treatment. The third project investigates goblet cell (mucus secreting) dysfunction in the CF intestine, i.e., mucoviscidosis. The goals are to investigate the factors contributing to hyperplasia of goblet cells and the causes of abnormal exocytosis. To facilitate the translational potential of the above projects, our laboratory is developing a human CFTR "rescue" mouse model in which murine CFTR is replaced by the human ortholog of the gene. This humanized CFTR mouse will also enable pharmacological testing of reagents designed to correct defective function CFTR in CF patients and pharmacological/probiotic strategies designed to combat infectious diarrheal diseases in humans.

George E. Davis

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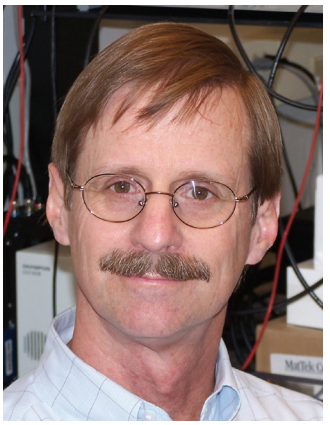
Education:
PhD, MD University of California-San Diego,
BS Arizona State University

Appointment: Professor, Department of Medical Pharmacology and Physiology

Research

My laboratory focuses on the following questions relevant to angiogenesis, wound repair and cancer research:
How do endothelial cells form cell-lined tube structures with lumens in three-dimensional (3D) extracellular matrices?
How do endothelial cells and other cell types such as tumor cells invade 3D matrices?
To what extent do endothelial cells directly or indirectly play a role in tumor invasion and metastasis?
What molecular events control the process of vascular regression?
How do vascular supporting cells, such as pericytes, stabilize vascular tubes?
How do distinct matrix metalloproteinases and their inhibitors control the processes of vascular morphogenesis versus regression in 3D matrices?
How do extracellular matrix fragments (matricryptins) regulate vascular morphogenesis versus regression in normal versus diseased states (such as diabetes)?



Michael J. Davis

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Education:
PhD University of Nebraska
BS University of California, Davis

Appointments: Associate Department Head and Professor, Department of Medical Pharmacology and Physiology

Research

My general area of research is on the mechanisms of mechano-transduction by blood vessels: How does the smooth muscle layer of a blood vessel detect changes in pressure? What cellular proteins and signaling pathways are involved in this process? Currently, our focus is on a signaling axis linking the extracellular matrix with integrin receptors, the cytoskeleton, and ion channels. We focus on two ion channels: the L-type, voltage-gated calcium channel and the large-conductance, calcium-activated (BK) potassium channel that are acutely regulated by integrin signaling in vascular cells.

The experimental approaches used in my laboratory include isolated, perfused microvessel methods and single-cell electrophysiology. We combine these with a variety of imaging methods, including confocal, atomic force, and TIRF microscopy. We also use molecular analyses, such as site-directed mutagenesis and co-immunoprecipitation, to identify and test which integrin-associated proteins are involved in modulation of ionic channels. A related research interest is the role that collecting lymphatic vessels play in the regulation of extracellular fluid balance.

These vessels exhibit spontaneous, phasic contractile behavior that propels lymph centrally. Lymphatic function is dramatically different than that of arterioles and venules and they express isoforms of contractile proteins that suggest lymphatic smooth muscle is a hybrid between cardiac muscle and vascular smooth muscle. We investigate their mechanical properties using servo-controlled systems to study isolated lymphatics from rats and mice under isobaric, isometric and isotonic conditions.

Shinghua Ding

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Education:
PhD & MS State University of New York,
BS Zhejiang University of Technology

Appointment: Assistant Professor, Department of Biological Engineering

Research

Cerebral ischemia (ischemic stroke) is a leading neural disorder that causes brain damage and human death, and has a major impact on public health. Though various mechanisms by which ischemia induce brain damage have been proposed, clinically there is limited therapeutic approach that is effective to brain recovery after ischemia. Therefore, my research generally focuses on seeking and identifying new mechanisms that can reduce brain injury and improving long-term outcomes after stroke. My research focuses on two distinct but related areas: 1) Glial function and role in stroke; 2) Neuronal mechanisms in brain protection in stroke. We use mice (in vivo) and primary cultured cells (in vitro) including neurons and astrocytes isolated from mouse brains as experimental preparations. We use both in vivo and in vitro ischemic models for ischemic study. Approaches including molecular biology, fluorescent imaging including 2-in vivo two-photon (2-P) microscopy, confocal and epi-fluorescent microscopy, biochemistry, electrophysiology, cell culture, and immunocytochemistry are integrated in our research.

Paul J. Fadel

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Education:
PhD University of North Texas,
MS Northeastern University, Health Science Center,
BS Brooklyn College

Appointments: Associate Professor, Department of Medical Pharmacology and Physiology

Research

Our laboratory's research focus entails the investigation of neural cardiovascular control at rest and during exercise in humans with a specific emphasis on the sympathetic branch of the autonomic nervous system. Ongoing studies involve assessing sympathetic responses during various physiological manipulations including isometric and aerobic forms of exercise, lower body negative pressure to simulate the effect of gravity when one stands up, and infusions of pharmacological agents. Studies are performed in normal healthy subjects as well as in patients with various pathophysiological conditions such as heart failure and hypertension. Our laboratory obtains direct measures of sympathetic neural firing using the technique of microneurography. This measurement allows for the assessment of moment-to-moment as well as long-term changes in sympathetic nerve activity. Also, with the application of partial autospectral and time series analyses to muscle sympathetic neurograms we are beginning to investigate the central origin(s) and pattern(s) of sympathetic discharge in humans. Our current research focus is on the neural mechanisms that contribute to exercise-induced sympathoexcitation as well as the peripheral modulators of sympathetically medicated vasoconstriction in contracting skeletal muscle with a particular emphasis on the potential roles of free radicals and changes in nitric oxide signaling in altering these responses. Considering the continually increasing population of elderly individuals, we are beginning to examine age-related alterations in neural cardiovascular control during exercise. Research in this area has been limited and is extremely important considering that an exaggerated blood pressure response to exercise increases the risk for mortality in otherwise healthy adults.

William P. Fay, M.D.

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Education: BS, MD, University of Illinois

Appointments: Professor of Internal Medicine and Medical Pharmacology & Physiology

Research Interests

- Role of leukocyte-derived tissue factor in thrombosis
- Role of plasminogen activator inhibitor-1 (PAI-1) in the proliferative response to vascular injury
- Mechanisms by which C-reactive protein (CRP) modulates thrombosis
- Role of heme oxygenase-1 in thrombosis
- Regulation of fibrinolysis by thrombin activatable fibrinolysis inhibitor (TAFI)

Techniques / Methodology:

- Mouse gene targeting
- Rodent models of human vascular disease
- Structure-function studies of blood coagulation proteins
- Thrombosis models

Research Description

Our research laboratory focuses on the roles of the blood coagulation and fibrinolytic systems in vascular disease. We are interested in the molecular processes that determine acute thrombus formation after vascular injury, as well as those that regulate subsequent thrombolysis. We also are interested in how components of the blood clotting and fibrinolytic systems contribute to the pathogenesis of chronic vascular disorders, such as atherosclerosis and restenosis after percutaneous coronary interventions. We study these issues by a variety of experimental approaches, ranging from in vitro studies with purified proteins to intact animal studies. In particular, we rely heavily on murine models of vascular injury and thrombosis, since they enable us to examine the impact of specific genes on complex biologic processes within the living animal.

Gabor Forgacs

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education: Ph.D., Eotvos Roland University Budapest, 1978

Appointment: Departments of Physics and Astronomy

Research Interests

My research is focused on the physical mechanisms in cell and development biology. In particular we study (both experimentally and by computer modeling) the biomechanical (i.e. viscoelastic) properties of cells and tissues and their relevance to morphogenetic shape transformations. Current activity is concentrated on the application of these physical mechanisms to "organ printing" a fundamentally new approach to tissue engineering, whereby, spherical cell aggregates with composition appropriate for the particular organ (the bioink) are delivered (with a modified ink-jet printer) according to the organ's anatomical blueprint into biocompatible scaffolding gels (the paper).

Shubra Gangopadhyay

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Education:
PhD in physics, Indian Institute of Technology, Kharagpur
MSc in physics, Jabalpur University, Jabalpur
BSc, Jabalpur University, Jabalpur

Appointment: LaPierre Chair and Joint Professor, Departments of Electrical Engineering, Biological Engineering and Physics

Research

Gangopadhyay, an acclaimed researcher in the fields of material science and physics, heads the group. The group has set up a high class research facility — the first of its kind in Missouri — with plans to upgrade and expand the facilities over the next two years.

Research Description
The Gangopadhyay Research Group is an electrical engineering and materials science research facility at the University of Missouri Columbia's College of Engineering and is associated with the International Center for Nano/Micro Systems and Nanotechnology. It is dedicated to expanding the realm of science and technology through optimization of existing techniques and exploration of new dimensions of knowledge. The group's research includes discovering, integrating, and optimizing new materials, processing methods, and characterization techniques. By promoting an interdisciplinary approach, our unique and modern research facility was designed to train, educate and prepare students to join and lead the workforce in innovative solutions to scientific challenges

Kevin D. Gillis

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Education:
DSc, MSEE & BSEE Washington University,
BA St. Louis University

Appointment: Professor Biological Engineering, Professor Medical Pharmacology and Physiology

Research

My main area of interest is understanding the final steps of cell secretion and the modulation of these steps by calcium and second messengers. We use multiple biophysical approaches to assay dynamic aspects of secretion from individual adrenal chromaffin cells. Since calcium and second messengers play a central role in regulating both secretion of hormones and release of neurotransmitter at synapses, the results of our research have an impact on understanding such diverse phenomena as the "fight or flight" response and the formation of short-term memory.

Our research also has a strong engineering component with particular emphasis on developing or refining electrical and optical techniques for studying secretion. In particular, we have been developing microchips with arrays of transparent electrochemical electrodes to measure secretion of catecholamines from individual cells simultaneously with optical measurements. Other techniques in use in the lab include patch-clamp electrophysiology with membrane capacitance measurements as an assay of exocytosis/ endocytosis, photometric measurement of the intracellular Ca2+ concentration with indicator dyes, and photo- release of intracellular Ca2+ from caged compounds.

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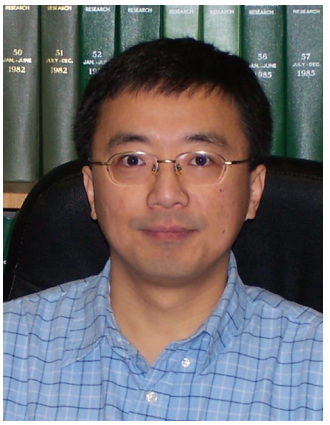
Education:
B.A. & Ph.D., New York University

Appointment: Adjunct Professor, Department of Medical Pharmacology and Physiology. CEO/President: Tensive Controls, Inc.

Research

Our current interests involve two classes of peptides with therapeutic potential: melanocortins and RFamides. Melanocortins are a family of peptides that have a pivotal role in the regulation of vertebrate food intake and metabolism. Drugs with melanocortin receptor activity (agonists or antagonists) show therapeutic potential in obesity and disease-induced cachexia. Cachexia, the focus of our current melanocortin drug development efforts, is a hyper-metabolic state that produces preferential loss of lean body mass and multi-organ failure. Development of melanocortin drugs has been inhibited by the persistent presence of cardiovascular side-effects. We showed that an overlapping RFamide pharmacophore is the cause of melanocortin cardiovascular activity: the melanocortin pharmacophore (HFRW) contains a "synonym" (RW) of the RFamide pharmacophore. We are currently developing anti-cachexia melanocortin-based drugs free of side-effects. As a consequence of this work we have developed new concepts for the detection and regulation of overlapping pharmacophores in drug development.

An unanticipated outcome of our melanocortin research was the observation that RFamides produce electrocardiogram abnormalities resembling the clinical presentation of "sick sinus syndrome." Increasing RFamide peptide doses evoke other arrhythmic predictors of sudden cardiac death, and eventually produce sudden cardiac arrest. Our current goal is to use RFamide ligands to produce experimental models of cardiac arrhythmias, an important medical problem that has eluded model development. Eventually, our goal is to develop RFamide-based anti-arrhythmic drugs.



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Research

We are a newly established nano-biotech laboratory focusing on application of lab-in-hand nanotechnology to the exploration of life science problems and practical biomedical detection. Currently, we utilize various nanopores as receptive probes for single molecule detections. Nanopore refers to a pore structure adopting dimension from one to hundreds nanometer, which can either be formed by naturally-occurred self-assembled protein pore or fabricated by fashion nanotechnology on solid substrates. With the nanopore probe, any analyte, whether it is a single molecule, a molecular complex, or a single viral particle, can reversibly bind to a receptor which is pre-engineered in a properly sized nanopore, and be identified by recognizing the characteristic blocks to the nanopore conductance.

Our laboratory is initially supported by the University of Missouri Startup Fund, Research Board and Research Council. Recently, this laboratory successfully got a National Science Foundation (NSF) Career Award grant in support of a new direction focusing on single molecular protein-oligonucleotide interaction and molecular folding in a nanopore. Specifically, we apply the nanopore technology to the single molecule investigation of dynamic aptamer-protein interactions and related folding processes involved in molecular recognition. Aptamers are engineered DNA/RNA that can specifically recognize broad species of proteins with high affinities, such as HIV-1 Integrase. Upon binding, these powerful molecules can form complex three-dimensional structures and possess sophisticated functions to inhibit pathogen protein, catalyze chemical reactions, control gene expression, and regulate cellular functions, therefore potentially be applied as tools for exploring biological systems. A complete understanding of dynamic processes in aptamer-target interactions and molecular folding is not only important to application-driven rational design, but also gives deep insight into the complexity of various nucleic acid-protein interactions in living cells.

Our research will be significant in the quantitative characterization and precise control of molecular scale components or nanomachinery of living cells by employing fashioning tools that allow us to manipulate complex biological processes in unique ways. Research using nanopore technology can be broadly applied to the study of diverse nucleic acid-protein and protein-protein interactions, which is essential for rational design of small organic molecules that block malfunctions of the cellular machinery, or act as new therapeutic reagents and products for biotechnology and bioengineering applications. This research will also greatly expand the capability of nanopore as the new generation of detection technology for analysis, high-throughput screening, bio-defense, and environmental engineering. In a broader impact, nanopore research will shed light on nanobiotechnology, an interdisciplinary and collaborative area related to biomolecular science, biotechnology, chemical engineering and nanotechnology.

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Research

The primary interest of the laboratory is in central nervous system control of the sympathetic nervous system and blood pressure, and how these reflex systems are modulated under physiological and pathophysiological conditions. Currently, the laboratory is involved in three primary projects.

The primary goal of the first project is to determine the neurotransmitter/receptor mechanisms involved in altered regulation of blood pressure in acute and chronic hypertension. The second project examines potential changes in both cardiovascular regulation and vascular function which may be responsible for cardiovascular deconditioning following prolonged exposure to spaceflight or bedrest. The focus here is on plasticity in specific brain regions that influence cardiovascular control. The third area of investigation focuses on the reflex effects of circulating humoral factors which act in the central nervous system to alter cardiovascular regulation. This project examines the central nervous system neurotransmitters and pathways involved in these effects. These questions are examined utilizing conscious animals which are chronically instrumented for recording of blood pressure, blood flow and sympathetic nerve activity. In addition, anesthetized preparations are utilized for experiments involving electrical and chemical stimulation of specific brain regions, microinjections of neurotransmitter agonists and antagonists, and central neurophysiological recording.

The overall goal of this work is to understand the central nervous system mechanisms underlying cardiovascular regulation in normal and disease states.

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Research

Our laboratory's major focus is to understand how the central nervous system controls arterial blood pressure and how blood pressure is modulated in physiological and pathophysiological states. We evaluate basic mechanisms involved in central nervous system control of autonomic outputs, particularly in brainstem regions which are critical for providing tonic drive to the sympathetic nervous system. We also study how ovarian hormones modulate these basic control mechanisms. Ongoing projects in the laboratory are focused on elucidating the role of central nervous system effects of ovarian hormones and progesterone metabolites in the alterations in control of sympathetic outflow associated with term pregnancy. Once we understand the mechanisms for attenuated sympathoexcitation in normal pregnancy, it may be possible to determine the mechanisms for elevations of arterial blood pressure in hypertensive disorders, where sympathoexcitatory responses are exaggerated. Also, women are generally protected from heart disease and hypertension until the onset of menopause. Understanding the mechanisms for the protective role of ovarian hormones could have important implications for treatment and prevention of cardiovascular disorders.

The possibility that a metabolite of progesterone, 3 -OH-dihydroprogesterone, may play a major role in suppression of sympathoexcitatory responses is especially intriguing. 3 -OH-dihydroprogesterone is the most potent endogenous positive modulator of central nervous system GABAA receptors and physiologically significant levels have been reported in the central nervous systems of both males and females. Experimental approaches include: 1.) measurement of sympathetic nerve activity; 2.) CNS microinjection of putative transmitters and modulators; 3.) extracellular single unit neuronal recording; and 4.) evaluation of neurotransmitter receptor expression in relevant brain regions.

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Appointments:Director of the National Center for Gender Physiology, J.O. Davis Chair of Cardiovascular Research , Professor, Department of Medical Pharmacology and Physiology, Adjunct Professor, Department of Biomedical Sciences

Research

Research Interests: Microvascular transport, in vivo imaging/microscopy, in vivo mass transfer, tissue engineering, mathematical modeling. We focus on the mechanisms controlling solute, water, and gas transfer between circulating blood and metabolizing tissue. Knowledge of the barriers to transport in living tissue is essential for elucidating the processes providing moment-to-moment regulation organ function and the etiology of dysfunctional states. These data facilitate design and implementation of rational strategies for treating diseases with the progressive goals of abating, arresting, and ultimately reversing disease processes.

Solute and water transfer results from "passive" and "cell mediated" mechanisms. Most have studied the passive mechanisms fewer study the cellular processes. From engaging in research in both arenas we find the exchange barrier to be a dynamic structure whose properties vary in time and space over time scales of seconds to days. Our global intent is to use this understanding of transport through pathways of microscopic geometry to investigate the relationship between blood supply and metabolic demand.
We are developing methods to extend these quantitative studies to mammalian microvessels in skeletal muscle, heart, gut, and brain in collaboration with colleagues in DCRC, MPP, Biomedical Sciences at MU and the University of Rochester. Knowing that microvascular exchange is subject to regulation under normal and pathological situations, we collaborate with clinical colleagues (Nephrology, Surgery, Anesthesia, Cardiology, Pulmonary Medicine, Infectious Disease, and Critical Care Medicine) to elucidate the cellular and molecular mechanisms involved in structuring and restructuring the barrier under conditions of peritoneal dialysis, following endurance exercise training, in coronary occlusive vessel disease, neurogenic edema, diabetes, cancer metastasis, and conditions of remote organ (brain) injury following burn. The combined clinical and basic science expertise provides the possibility of realizing our goal of designing and implementing treatments of permeability dysfunction. Consequent to the collaborative interactions at MU and in light of fundamental sex-related differences in physiological function and pathophysiology observed by us and others, we established the National Center for Gender Physiology. This virtual center is acting as a focus for research scientists at MU and collaborating institutions and augments the services provided by DCRC.

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Research

CFTR (Cystic Fibrosis Transmembrane conductance Regulator) is a chloride channel that plays a critical role in secretion and absorption of water and electrolytes across epithelia. Since CFTR channels are also expressed in cardiac myocytes and are found to shorten action potential duration and induce repetitive activity, they are implicated to be arrhythmogenic. One unique feature of the CFTR protein as an ion channel is that the free energy of ATP hydrolysis is harvested to drive the conformational changes that open and close the channel. Studies using mutant CFTR and various ATP or phosphate analogs have suggested a model that ATP hydrolysis at two nucleotide binding sites is tightly coupled to the opening and closing of the channel pore. Our understanding of the molecular basis of the coupling mechanism, however, remains primitive. Unresolved questions include: What is the stoichiometry of ATP binding/hydrolysis to gating transitions? How are the biochemical states in ATP hydrolysis cycles translated to the open and closed states in the gating transitions? Which part of the protein forms the aqueous pore? What is the relationship between the gate and the pore? These are the fundamental questions that interest a broad spectrum of physiologists.

A combinational approach is being adopted to tackle the molecular physiology of CFTR chloride channels. Different configurations of the patch-clamp techniques will be used to record CFTR channel activity so that both the cytoplasmic and extracellular sides of the channel are accessible to channel blockers, modifiers, or channel openers. Structure-guided mutagenesis approaches will be employed to study the functional consequences of single amino acid substitutions on gating and permeation/blocking. State-dependent chemical modifications of engineered cysteines allow us to explore the dynamic protein conformational changes during gating transitions. The aims of our ongoing research are: 1. To understand the role of ATP binding and hydrolysis in controlling the opening and closing transitions of CFTR. 2. To probe the CFTR pore with permeant and impermeant anions. 3. To explore the structure/function relationship between the gate and the pore of CFTR. 4. To characterize how CFTR activators act to increase the activity of CFTR. 5. To apply structure-based drug design to identify chemicals that can correct trafficking defects in CF-associated mutations. A clear understanding of the molecular mechanism of CFTR function will aid in the design of pharmacological agents for therapeutic intervention in cystic fibrosis, secretory diarrhea and cardiac arrhythmia.

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Appointment: Professor, Department of Biomedical Sciences

Research

The main aim of our laboratory is to identify steroid hormone dependent molecular targets that can be utilized for anti-angiogenic therapy of endocrine dependent disease such as the breast, uterine, and prostate cancer. Formation of new blood vessels, or angiogenesis, is crucial for normal processes such as embryonic development, wound healing, and endometrial regeneration following menstruation. Angiogenesis is also essential for tumor growth, and metastasis. An emerging field in cancer therapeutics is the targeting of new blood vessels to curtail tumor growth. Our laboratory is currently focusing on the role of steroid hormones, clinically relevant anti-hormones, and endocrine-disruptors to understand the basic mechanisms involved in hormone driven angiogenesis in breast, and uterine tissue. We are currently focusing on the role of estrogens, progestins, and their nuclear receptors in controlling the expression of potent angiogenic growth factors (e.g. VEGF and its receptors) at both molecular and cellular level. Another focus of the laboratory is to investigate the molecular mechanisms of steroid hormone action at the level of gene transcription. We are especially interested in the role of natural and synthetic ligands that have diverse biological effects in different target tissues (e.g. SERMS such as tamoxifen). Many synthetic ligands (agonists/antagonists) are consumed by millions of women all over the world for oral contraception, hormone replacement therapy, or treatment of breast cancer. Consumption of some of these ligands lead to increased risk of breast and/or uterine abnormalities, including cancer. We anticipate that understanding the molecular basis/pharmacology of ligand-nuclear receptor interactions will allow development of better therapeutic modalities for treatment of hormone dependent tumors, as well as endometriosis, osteoporosis and infertility.

Allan Jones

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Research Description

Jones' research program currently focuses on mechanisms of membrane regulation and vascular smooth muscle function leading to abnormalities associated with hyper-lipidemia as well as adaptative mechanisms during exercise training. He is studying mechanisms of adenosine transport and adenosine regulation of smooth muscle responses to acute metabolic depression in porcine coronary arteries. These studies have shown a novel mechanism by which smooth muscle generated adenosine has an autocoid function during an ischemic response. Mechanisms being pursued relate to adenosine interaction with receptors and subsequent cellular events causing relaxation, as well as adenosine interaction with a target enzyme, AMP kinase, which in turn regulates both cell metabolism and functional responses. It has been observed that exercise training may alter the sensitivity of vascular smooth muscle in the porcine coronary arteries especially in males. Gender studies have also been initiated.

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Appointment: Associate Professor, Department of Biomedical Sciences

Research

Our laboratory focuses on the autonomic nervous system, in particular the cardiovascular and respiratory system. These vital systems operate to keep our bodies within "normal" physiological limits to preserve homeostasis. When challenged acutely or chronically with low environmental oxygen levels (hypoxia) respiration, blood pressure and heart rate compensate to maintain arterial blood gas levels. This can happen during high altitude assent or disease states such as sleep apnea by activation of the chemoreceptor reflex. Additionally, arterial blood pressure is maintained during swings in pressure by the baroreceptor reflex. Both reflex pathways result from activation of neurons in the peripheral and central nervous system. Determining the mechanism of action of these reflex pathways during health and disease is the focus of the laboratory.

Several techniques are used to elucidate these mechanisms. These include 1) radiotelemetry in conscious animals to measure respiration, blood pressure or heart rate; 2) immunohistochemical localization of ion channels and neurotransmitter receptors to specific regions of the nervous system and individual neurons; 3) patch clamp techniques in isolated neurons for recording current flow through ion channels and 4) electrical recording of synaptic transmission in brainstem slices.
Using these techniques, we have recently discovered that chronic intermittent hypoxia, a model for obstructive sleep apnea, elicits a form of neural adaptation or plasticity in the brainstem. This includes changes in neurotransmitter release from presynaptic chemoreceptor afferent neurons as well as postsynaptic action potential firing. We are currently determining the mechanism of this altered neurotransmitter release.

Ronald J. Korthuis

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Professor, Department of Medical Pharmacology and Physiology
George L. and Melna A. Bolm Distinguished Chair in Cardiovascular Health

Research

Our research focuses on the mechanisms underlying the inflammatory responses to ischemia and reperfusion (I/R) and how blood vessels in the microcirculation (arterioles, capillaries and venules) can be preconditioned to resist the deleterious proinflammatory effects of I/R. When the blood supply is reduced (ischemia) and then subsequently reestablished (reperfusion), the ability of arterioles to regulate the distribution of blood flow is impaired, many capillaries fail to perfuse (capillary no-reflow), and white blood cells and platelets become adherent to and emigrate across the walls of postcapillary venules. Once in the tissues, these inflammatory phagocytes attack parenchymal cells, thereby exacerbating injury induced by ischemia. In addition, the permeability of the cells lining capillaries and postcapillary venules is increased, leading to edema formation. We are studying how white blood cells which adhere to and emigrate across the walls of postcapillary venules, alter vasoregulatory function in arterioles, cause no-reflow in capillaries, and increase permeability in postcapillary venules.

Laboratory models include study of the intact microcirculation using intravital microscopy coupled with computerized image analysis, examination of vasomotor responses in isolated arterioles, assessment of cell adhesion and permeability in single postcapillary venules, and evaluation of cell signaling mechanisms in cultured endothelial cells. A wide variety of mutant mouse models (gene knockout and transgenic overexpression), coupled with pharmacologic approaches, immunocytochemistry of the microvessel wall and cultured cells, western blotting and RT-qPCR to measure protein and mRNA expression, quantitative assessment of adhesion molecule expression using a dual radiolabeled monoclonal antibody technique, and three-dimensional fluorescence imaging using confocal microscopy are used to explore signaling mechanisms cultured cells, isolated microvessels, and intact microcirculatory networks in vivo.

A major area of emphasis over the last several years has been to understand how exposing tissues to preconditioning stimuli such as nitric oxide donors, calcitonin gene-related peptide, or by ingestion of ethanol (at doses equivalent to drinking one to two alcoholic beverages) 24 hours prior to the onset of prolonged ischemia followed by reperfusion prevents postischemic microvascular and parenchymal cell dysfunction. A fundamental aim of this work is to determine the signaling mechanisms that are activated in response to these preconditioning stimuli to upregulate gene expression for proteins that mediate the development of the anti-inflammatory and anti-thrombogenic phenotype in postischemic tissues.

Our future plans include continuing the examination of the mechanisms whereby microvascular function is protected in preconditioned states by focusing on the role of the extracellular matrix and cell adhesion molecules, ion channel function and extravascular constituents such as mast cells in these responses. In addition, we are exploring how leukocytes, which adhere almost exclusively in postcapillary venules in our models, alter the function of upstream arterioles in tissues exposed to ischemia and reperfusion.

Maike Krenz

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MD Germany

Appointment: Assistant Professor, Department of Medical Pharmacology and Physiology

Research

Congenital heart defects remain the most common birth defect, occurring in about 1% of live births and constituting the leading cause of infant deaths in the US. Over the past decade, genetic analyses of families with congenital heart disease have directed us to the molecular causes of certain defects. In particular, gain-of-function mutations in the protein tyrosine phosphatase Shp2 have recently been discovered in families with Noonan syndrome. In the majority of cases, NS follows autosomal dominant inheritance and is characterized by short stature, facial dysmorphia, skeletal anomalies, and congenital heart disease. Among the heart defects, pulmonary valve stenosis and hypertrophic cardiomyopathy are most prominent. Understanding the exact cellular mechanism(s) by which dysfunction of Shp2 causes valve malformation may provide the basis for future development of novel therapeutic approaches in congenital heart disease.

To study the pathomechanisms of heart malformations, we have been creating genetically altered mouse models that recapitulate human congenital heart disease. In particular, our mouse models are designed to express the mutant proteins in a time- and tissue-specific manner. These models can then be used to study in detail which developmental steps in the heart play a role in the disease process. Subsequently, we can dissect the downstream signaling pathways through which mutant Shp2 mediates its effects in vivo. For example, we were recently able to show that the ERK pathway is both necessary and sufficient for the development of valve defects in a Noonan Syndrome mouse model. Furthermore, we use tissue culture approaches to investigate the effects of Shp2 mutations on the cellular and biochemical level to complement the in vivo mouse studies.

M. Harold Laughlin

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Research

I focus my research on cardiorespiratory effects of exercise. The primary goal is understanding of the effects of exercise training on the coronary circulation and skeletal muscle vascular beds. Exercise training produces increases in the capacity of myocardial and skeletal muscle vascular beds to transport oxygen and other nutrients. The training induced changes in vascular transport capacity are associated with growth of new capillaries, enlargement of artieries and veins, and alterations in factos that control blood flow in the heart and skeletal muscle. The laboratory is currently investigating the mechanisms responsible for these changes. Studies are conducted with: isolated hearts, isolated muscle tissue, single blood vessels and in conscious, chronically instrumented animals during exercise. To allow examination of the relationships among vascular adaptations and the response of the myocytes to training induced increases in the functional demands of the muscles, the effects of training on biochemical and histological characteristics of the muscles are also measured. The biochemical systems examined include: the metabolic pathways involved in supplying the myocytes with ATP, the contractile proteins, the systems responsible for controlling intracellular Ca++ levels and endothelin nitric oxide synthase. Most of our current experiments are focused on endothelial cell biology. We are determining the effects of physical activity on endothelial phenotype in normal animals and in models of vascular disease. We are also using genetically modified pigs to examine the role of endothelial nitric oxide synthase in the impact of endothelial cell phenotype on vascular health.

Yayun Liang

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Research

The concept of specific molecular targeting has been applied to the development of innovative cancer-treatment strategies. At present, two main approaches are available for use in clinical practice: therapeutic monoclonal antibodies and small-molecule agents. Both antibodies and small-molecule compounds are therefore promising tools for target-protein-based cancer therapy. Mutations in p53 or the p53 pathway are thought to play a key role in promoting tumor cell survival and tumor cell resistance to chemotherapeutic drugs. Therefore restoring p53 function in tumors has been pursued as a promising strategy for cancer therapy. Furthermore, Tumor cell survival, growth, and metastasis require persistent blood vessel growth or angiogenesis. A tumor cannot grow beyond the size of about 1mm in diameter without acquiring new blood vessels to nurture it. Hence, targeting tumor blood vessels and tumor angiogenesis has been as a new strategy for treatment cancer.

The aims of Liang's research are to 1) Develop innovative cancer-treatment strategies targeting mut-p53, tumor angiogenesis, and tumor blood vessels with novel antibodies and small molecules in advanced breast cancer models; 2) Define molecular signaling pathways involved in inhibition of tumor angiogenesis and induction of tumor cell apoptosis; and (c) Define the role of VEGF in tumor angiogenesis, growth, metastasis, and drug resistance.

Luis Martinez-Lemus

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Research

My research is focused on the mechanisms responsible for the architectural transformation of blood vessels also known as vascular remodeling. Vascular remodeling is a hallmark for numerous cardiovascular diseases, yet numerous questions remain to be answered regarding this process. What stimuli drive the remodeling process? How do blood vessels detect those stimuli? What are the mechanisms initiating the remodeling and under which conditions are they counterproductive participating in disease states?

Currently funded research in my laboratory is focused at determining the changes in the position and function of cells within the intact blood vessel wall that occur in response to common mechanical and vasoactive biochemical stimuli. Our studies indicate that cells within the vascular wall rapidly change their position in response to stimulation in as little as four hours. This adaptive cell behavior appears to allow the vessel to maintain a reduced diameter for extended periods of time with reduced levels of activation and energy expenditure. An additional goal is focused at determining the changes in the structure and compliance of the extracellular matrix that occur during the initial stages of the remodeling process.

Mark Milanick

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University of St. Andrews, Scotland Math/Pharmacology
University of Chicago, Illinois Ph.D. Biophysics
Yale University, Connecticut postdoctoral Physiology

Appointment: Professor, Department of Medical Pharmacology and Physiology

Research Interests

Erythrosensors, Approaches for resource poor areas, Educational Innovations, Membrane Transport kinetics

Research Description

Erythrosensors
Our long term goal is to encapsulate glucose sensitive near infrared fluorescent dye inside red blood cells (erythrocytes). Return red cells to patient. Patient can monitor glucose levels non-invasively using a pulse oximeter type of detector for half of the lifetime of the red cells. Since the red cells live about 100 days, this means the erythrosensors only need to be made and injected about every 2 months.
This project is being done in collaboration with Tim Glass, Xiaole Shao, and Nick Cooley (Chemistry, MU) and Ken Meissner and Sarah Ritter (Bioengineering, Texas A&M).
Engineering erythrocytes to be erythrosensors: first steps. Milanick MA, Ritter S, Meissner K.
Blood Cells Mol Dis. 2011 Aug 15;47(2):100-6.
Encapsulation of FITC to monitor extracellular pH: a step towards the development of red blood cells as circulating blood analyte biosensors. Ritter SC, Milanick MA, Meissner KE. Biomed Opt Express. 2011 Jul 1;2(7):2012-21.

Approaches for resource poor areas

1. Soymilk: an effective and inexpensive blocking agent for immunoblotting. Galva C, Gatto C, Milanick M. Anal Biochem. 2012 Jul 1;426(1):22-3.
2. We are developing dipsticks for measuring levels of stress markers, including salivary cortisol and amylase for home use, as well as for detection of pesticides.
3. We have developed an educational laboratory exercise examining enzyme activity using acetylcholinesterase activity from grocery store frozen fish.
Why is that dog paralyzed? A problem-based case & laboratory exercise about neuromuscular transmission. Milanick, M., Graham, K. & Wessel, M. (2013). American Biology Teacher, 75, 36–39.

Educational innovations

1. We have published several education articles that use novel approaches to interest students in various scientific activities.

- Fact or Fiction? General Chemistry Helps Students Determine the Legitimacy of Television Program Situations. Mark A. Milanick* and Ruth L. Prewitt J. Chem. Educ., April 19, 2013
- Units, Jargon, G-forces and Squirting Blood. Milanick, MA. The Physics Teacher 50, 410, 2012.
- Changes of membrane potential demonstrated by changes in solution color. Milanick M. Adv Physiol Educ. 2009 Sep;33(3):230.
- Fluorescence Using Turmeric Mark A. Milanick J. Chem. Educ., 2011, 88 (3), pp 260.

2. We have developed novel interactive course offerings, including

- Ethics Education through Enactment, Engagement and Empowerment (Graduate)
- The Science of Sex, Drugs, and Rock'n'Roll (Undergraduate, non-majors)
- Clinical Biodetection (Graduate)

Membrane Transport Kinetics

We were funded for about 18 years by NIH for studies on membrane transport. Some of the highlights include

- Eosin, a Potent Inhibitor of the Plasma Membrane Ca Pump, Does Not Inhibit the Cardiac Na-Ca Ex changer
- Kinetic characterization of tetrapropylammonium inhibition reveals how ATP and Pi alter access to the Na+-K+-ATPase transport site
- Extracellular protons regulate the extracellular cation selectivity of the sodium pump.
- Probing the extracellular release site of the plasma membrane calcium pump.
- Na-Ca exchange: evidence against a ping-pong mechanism and against a Ca pool in ferret red blood cells.
- Proton fluxes associated with the Ca pump in human red blood cells.
- Na-Ca exchange in ferret red blood cells.
- Proton inhibition of chloride exchange: asynchrony of band 3 proton and anion transport sites?
- Proton-sulfate co-transport: mechanism of H+ and sulfate addition to the chloride transporter of human red blood cells.

Luis Polo-Parada

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PhD Case Western Reserve University, MS University of Connecticut,
BS School of Physics and Mathematics, National Polytechnic Institute

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Research

The heart is the first organ to form during embryogenesis, and its function is critical for the proper development and survival of the embryo. Although some information on ion-transport genes and their protein products in normal and diseased myocardial tissue is available, little is known about the role of cardiac extracellular matrix (ECM) proteins during cardiac development or in healthy and diseased adult hearts. My interest is to elucidate the role of the ECM in the ionic-transport proteins and molecular basis of cardiac regional electrical specialization during development and in the adult heart.
My recent studies of neural cell adhesion molecule (NCAM) null mice have indicated that NCAM plays a fundamental role in the transmitter release mechanism in neuroendocrine cells through mediation of granule recruitment. Other studies have shown that NCAM plays a functional role in the proper segregation of cell during development of islets of Langerhans in the pancreas. My interest is to elucidate whether NCAM or other cell adhesion molecules, are directly involved in the proper organization of the islets of Langerhans and in glucose-mediated insulin secretion. I also intend to investigate, whether the expression of any of these cell adhesion molecules is affected in diabetic type II patients and animal models of the disease.

Leona J. Rubin

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MS Rutgers University.
PhD University of Colorado Health Sciences Center.

Research

Dr. Rubin is a basic scientist whose research has always focused on understanding cellular signaling pathways. She began her research career at MU exploring second messenger signaling involved in control of cardiovascular function. Rodent models were employed to explore how immune mediators, released during inflammatory conditions (endotoxemia/sepsis) cause myocardial failure and/or vascular dysfunction through modulation of the activity of specific cellular targets such as potassium and calcium channels or contractile proteins. More recent work explored the signaling mechanism impacted by specific therapeutic modalities such as the anesthetic, ketamine which appears able to protect cardiovascular function during inflammatory states. Related studies utilized a swine model of atherosclerosis and the influence of gender to determine whether exercise had beneficial effects on receptor mediated signaling pathways and function of coronary smooth muscle. Studies that explored cellular signaling pathways involved in vascular metabolic vasodilation which is essential to match blood flow to tissue energy demands during exercise or disease impairment led the research to examine the role of AMP kinase, then a novel signaling pathway. Dr. Rubin's studies were the first to explore the role of AMPK in vascular smooth muscle function and metabolic vasodilation. These studies continue in the laboratory with the addition of the AMPK knock out mouse model. A serendipitous finding for this model was an interaction between AMPK alpha-1 KO and the C57Bl6 mouse strain which presents with significant cardiac hypertrophy that resembles physiologic hypertrophy. Current and future studies are directed at understanding the signaling pathway impacted by this interaction to better understand the cellular pathways that underlie exercise and disease-induced cardiac hypertrophy.

Steven S. Segal

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Appointment: Professor, Department of Medical Pharmacology and Physiology

Research

Our research is focused on understanding how oxygen delivery increases in response to metabolic demand. During exercise, the recruitment of skeletal muscle fibers (motor units) generates electrical and chemical signals in endothelial cells and smooth muscle cells of the microvessels that control the distribution and magnitude of muscle blood flow. Our experiments center on elucidating the cellular and molecular events which initiate these signals, how such signals are transmitted from cell to cell to orchestrate vasodilation and vasoconstriction in microvascular networks, and how these integrative processes are governed by the nervous system. Intravital video microscopy enables direct observations of blood flow control in the mammalian microcirculation. Histochemistry and vascular casting are used to quantify the architecture of neural and microvascular networks. Intracellular recording with dye labeling reveals cell-specific electrical signals which determine the contractile status of smooth muscle and its regulation by the endothelium. Calcium imaging provides unique insight into cellular responses which reflect the activity of ion channels and key regulatory enzymes. Complementary studies of isolated microvessels and their constitutive cells enable even greater resolution of specific regulatory processes. Pharmacology, immunolabeling, and Real-Time Polymerase Chain Reaction are used to resolve the functional expression of proteins which mediate cell-to-cell coupling through gap junctions and electrical signaling through ion channels.

Collaborative studies using transgenic mice afford unique insight into how particular signaling pathways affect control processes within the microcirculation. In turn, these basic relationships are athways affect control processes within the microcirculation. In turn, these basic relationships are being explored in light of how aging affects microvascular structure and function. Opportunities for graduate and postdoctoral training include: molecular physiology of vascular cells, electrical and optical monitoring of cell signaling, microsurgery and microdissection, intravital video microscopy, conventional and immunohistochemistry, evaluation of gene expression, and modeling the biophysical properties of cells and tissues.

Yoshiro Sohma

Office: 263 DCRC
Phone: 573-882-0938
E-mail: somay@missouri.edu

Education:
PhD and MD Osaka Medical College

Appointment: Visiting Professor, Department of Medical Pharmacology & Physiology

Research

I have a broad research interest that covers the molecular physiology and biophysics of ion channels and transporters, and their role in the physiological function of cells/tissue. I have studied the permeation and gating of a large-conductance, Ca2+-activated, voltage-dependent potassium (BKCa) channel. BKCa channels are ubiquitously expressed in many different tissues and are known to be sensitive to membrane potential, intracellular calcium, magnesium, pH. These channels are also activated by CO and sensitive to O2 associated with heme-oxygenase2 and, moreover, some slice-variants respond to membrane stretch. Based on these findings, BKCa channels are suggested to play an important role in integrating cell signals, a recently proposed new function of an ion channel. I am also involved in a Japanese-based collaborative project undertaking a comprehensive study of the GABAergic system in peripheral tissues (not the central nervous system) and work on GABAA receptor channels and GABAB-mediated modulation of K+ and Ca2+ channels in peripheral tissues. In the Dalton Cardiovascular Research Center, I study the molecular mechanism of gating and permeation of the CFTR chloride channel, a member of the ATP-Binding Cassette (ABC) transporter superfamily, in collaboration with Dr. Tzyh-Chang Hwang. Our work has made a significant contribution to the recent advances in the biophysical understanding of the ATP-dependent gating mechanism in CFTR, and has provided great insight into a possible common functional mechanism that can be applied to the whole ABC transporter superfamily. The structure of the membrane spanning domain (MSD) in CFTR is known to be similar to that in the P-glycoprotein drug efflux pump. We therefore believe that understanding MSD structure/function in CFTR will lead to a better understanding of multi-drug resistance (MDR) proteins. In addition to investigating the biophysics of the CFTR molecule itself, I am also interested in studying the functional interactions of CFTR with other membrane proteins and lipids. This should help in our understanding of the complicated regulatory mechanisms that underlie physiological functions in cell membrane. I have also employed computer modeling to simulate ion transport processes in epithelial cells (e.g., bicarbonate transport in pancreatic duct cells). This approach is very useful to bridge information from molecular biophysics and cell/tissue physiology to the research field of epithelial transport. I believe that by taking such a general and comprehensive approach to the study of different channels/transporters and channel/transporter-mediated physiological systems, induces a 'positive cooperative effect' which accelerates each research project, and which also gives us a novel scientific standing point of view for the channel sciences.

Jim R. Sowers

Office: D109 Diabetes Center UHC
Phone: 882-0999
E-mail: sowersj@missouri.edu

Education:
MD University of Missouri-Columbia,
BS Central Missouri State University

Appointment: Director of the MU Diabetes and Cardiovascular Center, Professor, Department of Medicine, Professor, Department of Medical Pharmacology and Physiology

Research

Fifty million people have high blood pressure and are prone to developing Type 2 diabetes. Dr. Sowers, directs the MU Diabetes and Cardiovascular Center and is associate dean for clinical research. His work addresses the link between high blood pressure and diabetes to better understand how to prevent and cure the diseases, which are growing problems in the United States.

Zhe Sun

Office: 250 Dalton Cardiovascular Research Center
Phone: 573-884-2499
E-mail: sunzh@missouri.edu

Education:

BS in chemical engineering, Chengdu University of Science & Technology, China
MS in chemical engineering, Sichuan Union University, China
PhD in bioengineering, University of Toledo, Ohio

Research

Sun's primary interest is in development of novel techniques towards understanding the dynamics of cellular interactions with the extracellular matrix (ECM). The goal is to access the cellular dynamics from both biochemical and biophysical perspectives in real-time, for example to monitor the intracellular signaling, cell adhesion with extracellular matrix proteins and the cellular mechanical activities etc.

The approaches used include live cell fluorescence imaging and FRET to monitor cellular signaling events and specific molecular interactions, and atomic force microscopy (AFM) methods to monitor the cellular mechanical activities and the interaction force between cell and ECM (usually falls in pN~nN range). As an integrated part of these studies, Sun is also interested in developing software for image processing, data analysis and computational modeling of the cellular force transmission. By integrating these techniques together, the understanding of the nature of the cell-ECM interactions will be furthered.

Ronald Terjung

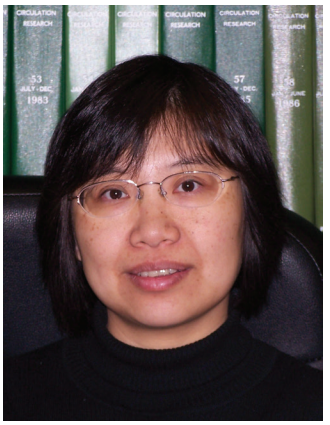
Office: E101VMED
Phone: 882-2635
E-mail: terjungr@missouri.edu

Education:
PhD University of Iowa, MA San Jose State College,
BS Wheaton College

Appointment: Associate Dean of Research, Department of Biomedical Sciences, Professor, Department of Biomedical Sciences, Adjunct Professor, Department of Medical Pharmacology and Physiology

Research

Adenine nucleotide (And = ATP + ADP + AMP) metabolism occupies a pivotal role in cell regulation, particularly for skeletal muscle where contractile activity increases ATP hydrolysis rate manyfold. The control of [ATP] in contracting muscle depends upon: 1.) the control of energy supply pathways; 2.) And degradation reactions; 3.) And synthesis reactions from precursors; and 4.) contractile activity which determines the rate of ATP hydrolysis. He is evaluating differences in And metabolism among skeletal muscle fiber types, critical responses to exercise, and adaptations induced by chronic exercise. Enhanced physical activity represents an important treatment for persons with peripheral arterial insufficiency and leads to meaningful adaptations that increase exercise tolerance. These adaptations include neovascular development to improve a) blood/tissue exchange properties within muscle (enhanced capillarity) and b) flow capacity to active muscle (collateral vessel expansion). The exercise-induced increase in collateral blood flow likely involves the angiogenic growth factors (e.g. bFGF, VEGF). These potent cytokines stimulate neovascularization in experimental ischemia in vivo. His working hypothesis is that neovascularization occurs in response to tissue "need" established by flow deficits (ischemia) and/or by increased demands for vascular support (exercise). His research is evaluating: 1.) the interactions between ischemia, exercise and exogenously infused recombinant angiogenic growth factors; 2.) the functional significance of the vascular adaptations; and 3.) the tissue events related to neovascularization.



Xiaoqin Zou

Office: 222D DCRC
Phone: 573-882-6045
E-mail: xiaoqinz@missouri.edu

Education:
PhD University of California, San Diego,
BS Wuhan University

Appointment: Associate Professor, Department of Biochemistry

Research

The molecular interactions that drive ligand-protein binding are a key to quantitatively understanding the basis of molecular recognition and to designing therapeutic interventions through rational drug design. Drug molecules usually act by binding to specific target proteins. Drug candidates that have high binding affinities can be identified by their geometric and chemical complementarity to the target in a process analogous to solving a "jigsaw puzzle," if the target structure is known. An energy model that can give rapid and accurate evaluation of the molecular interaction strength is thus essential for selecting plausible candidate compounds from a chemical database consisting of hundreds of thousands of molecules. We are developing novel and efficient algorithms to calculate binding free energies for ligand-receptor complexes. The derived energy models will be applied to protein-substrate interactions, protein-protein interactions, and structure-based drug design. We are also developing new docking algorithms to account for protein flexibility. Methods used in our laboratory include computer modeling, simulation and graphics display. A second line of research in the laboratory is quantitative studies on structure-function relationship of membrane proteins. Structures of membrane proteins will be predicted using homology modeling and structure alignment techniques. Structural information often suggests mechanisms of protein function, which will be experimentally tested in collaboration with other Dalton Investigators.

APPENDICES

PUBLICATIONS

PRESENTATIONS

SEMINARS

ACTIVE GRANTS & CONTRACTS

PROFESSIONAL SERVICE ACTIVITIES

Christopher Baines

Publications:

Hiemstra JA, Liu S, Ahlman MA, Schuleri KH, Lardo AC, Baines CP, Dellsperger KC, Bluemke DA, Emter CA. A new twist on an old idea: a 2-dimensional strain assessment of cyclosporine as a therapeutic alternative for heart failure with preserved ejection fraction. Physiol Rep. 2013; 1:e00174. doi:10.1002/phy2.174.

McCommis KS, Douglas DL, Krenz M, Baines CP. Cardiac-specific hexokinase 2 overexpression attenuates hypertrophy by increasing pentose phosphate pathway flux. J Am Heart Assoc. 2013; 2:e000355.

Gutierrez-Aguilar M, Baines CP. Physiological and Pathological Roles of Mitochondrial SLC25 Carriers. Biochem J. 2013; 454:371-86

Presentations

9/24/13 "Mitochondrial Permeability Transition Pore-Dependent Cell Death." Heart Failure Society of America Annual Meeting, Orlando, FL, September.

7/2/13: "Oxidative Stress and Programmed Necrosis." International Society for Heart Research, World Congress Meeting, San Diego, CA.

4/10/13: "Complement 1q Binding Protein, Or Why a Cardiac Guy is Looking at Cancer." Department of Pathology, Louisiana State University Health Sciences Center, New Orleans, LA.

Active Grants:

Current:

R01HL094404 (PI: Baines) 12/2008-11/2013
NIH/NHLBI $1,250,000 direct costs
"Molecular Identity of The Cardiac Mitochondrial Pore"
Role: PI

AHA Predoctoral Award (PI: McCommis) 7/2011-6/2013
AHA Midwest Affiliate $52,000
"Investigating Hexokinase-2-mediated cardioprotection"
Role: Sponsor

Prostate Cancer Development Award (PI: Baines) 9/2012-9/2013
US Department of Defense $75,000 direct costs
"Inhibiting Mitophagy as a Novel Mechanism to Kill Prostate Cancer Cells"
Role: PI

Research Council Award (PI: Baines) 4/2012-3/2013
University of Missouri $7,500 direct costs
"Identifying C1qbp binding drugs as potential anti-cancer agents"
Role: PI

Sponsored Research Agreement (PI: Baines) 7/2012-6/2013
Stealth Peptides, Inc. $17,765
"Mechanisms of Cytoprotection by SPI-20 and MTP-131 peptides"
Role: PI

Professional Services

2013 (Spr.): MIM/BioSci-9432 Molecular Biology II (2 lectures, 16 students)

(Sum): Veterinary Research Scholars Program (Co-Director, 36 students)

(Fall): V_BSCI-5506 Veterinary Cell Biology (Director, 17 lectures, 129 students)
V_BSCI-8085 Problems in Vet Biomedical Sciences (1 lecture, 5 students)
VPB-8436 Pathogenic Mechanisms in Veterinary Pathobiology (3 lectures, 14 students)
MPP 9430 Cardiovascular Physiology (2 lectures, 5 students)

2013-to date: Member, Biomedical Sciences Research Advisory Committee
2012-to date: Member, Biomedical Sciences Graduate Program Admissions Committee
2012-2013: Member, Biomedical Sciences Assistant/Associate Professor Search Committee
2010-2013: Director, Biomedical Sciences Seminar Series

Division/College

2013: Facilitator, VET orientation for incoming veterinary students
2013: Grant Reviewer, Phi Zeta Awards
2013: Poster Judge, Phi Zeta Research Day
2012-to date: Co-Director, Veterinary Research Scholars Program, College of Veterinary Medicine
2012-to date: Member, VOLUM Committee, College of Veterinary Medicine
2009-to date: Member, Research Committee, College of Veterinary Medicine
2013-to date: Member, Melvin L. Marcus Young Investigator Award Committee, American Heart Association
2013-2014: Chair, Ischemia, Cardioprotection & Mitochondria Interest Group, North American Section of the International Society for Heart Research
2012-to date: Member, Cardiovascular Disease Student Scholarship Committee, American Heart Association
2012-to date: Member, Early Career Investigator Committee, North American Section of the International Society for Heart Research
2012-2017: Member, Council of the North American Section of the International Society for Heart Research

Inducted into Phi Zeta Veterinary Honor Society

Edward Blaine

Professional Service

Graduate Education Committee, Dept. Med. Pharm./Phys, 2004-present

Problem-based Learning Curriculum

Continuous teaching contributions since 1992

2012-2013 Tutor Blocks 1,2,3,5,8, M4 mentor

Microcirculation (Graduate Course)

Renal Physiology (Graduate Course)

Neurohumoral Control of the Circulation (Graduate Course)

Salt and Water Homeostasis (Undergraduate Course)

Herpetology, Physiological Ecology (Undergraduate Course)

Silvia Bompadre

Active Grants

Fluorescence microscopy studies of CFTR channels $23,000 (9/1/2012 – 8/31/2013) PI: Silvia G. Bompadre MU Research Board Grant

Single-molecule studies of CFTR channels $14,500 PI: Silvia G. Bompadre MU Summer Research Fellowship

Professional Service

Reviewer

University of Missouri Research Board
Research Grants Council (Hong Kong)
Frontiers in Pharmacology
Computational Biology

Member of the Arts & Sciences Diversity Committee (2012-present).

Frank Booth

Publications

Zwetsloot KA, Childs TE, Gilpin LT, Booth FW. Non-passaged muscle precursor cells from 32-month old rat skeletal muscle have delayed proliferation and differentiation. Cell Prolif. 46:45-57, 2013.

Roberts MD, Bayless DS, Company JM, Jenkins NT, Padilla J, Childs TE, Martin JS, Dalbo VJ, Booth FW, Rector RS, Laughlin MH. Elevated skeletal muscle irisin precursor FNDC5 mRNA in obese OLETF rats. Metabolism. 62:1052-1056, 2013.

Linden MA, Meers GM, Ruebel ML, Jenkins NT, Booth FW, Laughlin MH, Ibdah JA, Thyfault JP, Rector RS. Hepatic Steatosis Development with Four Weeks of Physical Inactivity in Previously Active, Hyperphagic OLETF Rats. Am J Physiol Regul Integr Comp Physiol. 304:R763-771, 2013.

Padilla J, Jenkins NT, Roberts MD, Arce-Esquivel AA, Martin JS, Laughlin MH, and Booth FW. Differential changes in vascular mRNA levels between rat iliac and renal arteries produced by cessation of voluntary running. Exp Physiol. 98:337-347, 2013

Roberts MD, Brown JD, Company JM, Oberle LP, Heese AJ, Toedebusch RG, Wells, KD, Cruthirds CL, Knouse JA, Ferreira JA, Childs TE, Brown M, Booth FW. Phenotypic And Molecular Differences Between Rats Selectively-Bred To Voluntarily Run High Versus Low Nightly Distances. Am J Physiol Regul Integr Comp Physiol. 304:R1024-1035, 2013.

Padilla J, Jenkins NT, Lee S, Zhang H, Cui J, Zuidema MY, Zhang C, Hill MA, Perfield JW 2nd, Ibdah JA, Booth FW, Davis JW, Laughlin MH, Rector RS. Vascular transcriptional alterations produced by juvenile obesity in Ossabaw swine. Physiol Genomics. 45:434-446, 2013

Fain JN, Company JM, Booth FW, Laughlin MH, Padilla J, Jenkins NT, Bahouth SW, Sacks HS. Exercise training does not increase muscle FNDC5 protein or mRNA expression in pigs. Metabolism.62:1503-1511, 2013.

Company JM, Roberts MD, Toedebusch RG, Cruthirds CL, Booth FW. Sudden decrease in physical activity evokes adipocyte hyperplasia in 70- to 77-day-old rats but not 49- to 56-day-old rats. Am J Physiol Regul Integr Comp Physiol. 305:R1465-78, 2013.

Active Grant

National Institutes of Health. Vascular biology: exercise training and coronary disease. P01 HL52490-12. Co-PI on project 1 of program project.

Professional Services

Editorial Board, Journal of Applied Physiology, 1980-1993; 1996-1999; 2005-present
Editorial Board, American Journal of Physiology: Cell Physiology, 1994-present

SERVICE ON DEPARTMENTAL COMMITTEES
Departmental Faculty Promotions and Tenure Committee 2008-present

Editorial Board, American Journal of Physiology: Regulatory, integrative and Comparative Physiology
Editorial Board, Physiological Genomics, 2005-present
Editorial Board, Section III: Health and Disease, Scandinavian Journal of Medicine and Science in Sports, 2006-present
SERVICE ON COLLEGE OF VETERINARY MEDICINE (1999-PRESENT) COMMITTEES
Faculty Responsibility Committee, 2005-present

SPONSORSHIP OF CANDIDATES FOR POSTGRADUATE DEGREE

SPONSORSHIP OF POSTDOCTORAL FELLOWS

Douglas Bowles

Publications

Tharp, D.L, J.R. Ivey, R.L. Shaw and D.K. Bowles. Ovariectomy increases L-type Ca2+ channel activity in porcine coronary smooth muscle. Menopause. In press. PMID:24104606

de Beer, V.J., D. Merkus, S. Bender, D.L. Tharp, D.K. Bowles, D.J. Duncker and M.H. Laughlin. Familial hypercholesterolemia impairs exercise-induced systemic vasodilation due to reduced NO bioavailability. J. Appl. Physiol. (1985). 2013 Oct 24. PMID: 24157527

Bender, S., V.J. de Beer, D.L. Tharp, E.D. van Deel, D.K. Bowles, D.J. Duncker, M.H. Laughlin and D. Merkus. Reduced contribution of endothelin to the regulation of systemic and pulmonary vascular tone in severe familial hypercholesterolaemia. J. Physiol. In press. PMID: 24421352

Active Grants

R44 HL097485-01 (Chen, PI; Bowles, Co-I) 9/1/11-7/31/14 8%
NIH/NHLBI: SBIR $237,000 ADC
Improved long-term biocompatibility of coronary stents by plasma coating process
Major goals: Develop a superior plasma coating for stents

Mizzou Advantage (Fay, PI; Bowles, Co-I) 4/1/10-3/31/15 2.5%
MU $50,000 ADC
Targeting Plasminogen Activator inhibitor-1 to Inhibit Neointimal Hyperplasia
Major goals: Develop a novel DES

RO1 (Fay, PI; Bowles, Co-I) 10/1/10-7/301/14 5%
NIH/NHLBI $250,000 ADC
Roles of Plasminogen Activator Inhibitor-1 and Vitronectin in Failure of Coronary Revascularization

T32 AR048523 (Terjung, PI; Bowles, Mentor) 7/1/09-6/30/14 *2%
NIH/NIAMS $243,386 ADC
Exercise and Health: Integration from Molecule to Patient
Major goals: Provide pre- and post-doctoral training in the area of exercise and activity

T32 RR007004 (Franklin, PI; Bowles, Mentor) 7/1/11-6/30/16 *2%
NIH/NCRR $321,084 ADC
Postdoctoral Training in Comparative Medicine
Major goals: The major goal of this project is to provide graduate research training in comparative medicine

Mizzou Advantage (Fay, PI; Bowles, Co-I) 4/1/10-3/31/15 2.5% MU $50,000 ADC Targeting Plasminogen Activator inhibitor-1 to Inhibit Neointimal Hyperplasia Major goals: Develop a novel DES

Professional Service

Departmental

2012-pres.	Associate Chair, Biomedical Sciences
2012-pres.	Chair, Biomedical Sciences Doctoral Faculty Nomination Committee
2012-2013	Co-Director of Graduate Studies, Biomedical Sciences
2010-pres.	Biomedical Sciences Faculty Mentoring Committee (Dr. Emter)
2009-pres.	Chair, Biomedical Sciences Faculty Mentoring Committee (Dr. Baines)
2005-pres.	Promotion and Tenure Advisory Committee
2005-pres.	Chair, Biomedical Sciences Faculty Mentoring Committee (Dr. Kovarik)

College

2012-2015	CVM Promotion and Tenure Committee
2009-2013	CVM Faculty Policy Committee
2005-present	CVM Graduate/Resident Training Committee
2003-present	Research Mentor, Comparative Medicine Training Program

2011-14 Nominating Committee, CV Section, American Physiological Society

Editorial boards

2012-pres. Editorial Board of Scientifica

Manuscript Review

2006-pres.	Reviewer, Journal of Vascular Research
2003-pres.	Reviewer, Journal of Physiology
2001-pres.	Reviewer, Cardiovascular Research

Nicola Brown

Publications

Brown NJ and Reeves KJ. Angiogenesis, hypoxia and bone metastasis. Invited book chapter Bone Cancer: Progression and Therapeutic Approaches Second Edition 2013

Brown NJ, Higham SE, Perunovic B, Arafa M, Balasubramanian S, Rehman I. (2013) Lactate Dehydrogenase-B is silenced by promoter methylation in high frequency of human breast cancers. PLoS One 8: e57697.

Chen Y-Y, Brown NJ, Jones R, Lewis CE, Mujamanni AH, Muthana M, Seed MP, Barker MD (2013) A peptide derived from TIMP-3 inhibits multiple angiogenic growth factor receptors and tumour growth and inflammatory arthritis in mice. Angiogenesis, 23 Sept 13, Epub ahead of print.

Brookes ZL, Stedman EN, Brown NJ, Hebbes CP, Guerrini R, Calo G, Reilly CS, Lambert DG (2013). The Nociceptin/Orphanin FQ Receptor Antagonist UFP-101 Reduces Microvascular Inflammation to Lipopolysaccharide In Vivo. PLoS One Sep 23; 8(9): e74943

Staton CA, Koay I, Wu JM, Hoh L, Reed MW, Brown NJ (2013) Neuropilin-1 and neuropilin-2 expression in the adenoma-carinoma sequence of colorectal cancer. Histopathology 62: 908-91

5Reeves KJ, Hou J, Higham SE, Sun Z, Trzeciakowsi JP, Meininger GA, Brown NJ. (2013) Selective measurement and manipulation of adhesion forces between cancer cells and bone marrow endothelial cells using Atomic Force Microscopy (AFM). Nanomedicine (London) 8:921-934.

Professional Service

Medical Research Council Clinical Training & Fellowship Panel 2006 –
Editorial Board Journal of Vascular Research 2005 -
Photochemistry and Photobiology 2003-

Current Projects

Mechanisms of angiogenesis in preinvasive and invasive breast cancer
Role of neural guidance molecules in physiological and pathophysiological angiogenesis
Vascular targeting in breast cancer and sarcomas - funded by the Breast Cancer Campaign and Yorkshire Cancer Research
Role of angiogenesis in bone metastasis - funded by EU Framework VI consortium PROMET and Yorkshire Cancer Research
Vascular targeting and imaging - funded by Cancer Research UK/EPSRC/DOH
Role of stress proteins in the breast tumour microenvironment - funded by the Breast Cancer Campaign

Lane Clarke

Publications

Liu, J, Walker, NM, Williams, AM, Clarke, LL. Defective and ectopic exocytosis by goblet cells in the CF mouse intestine. Pediatr. Pulmonol. Suppl. 36: 257-8, 2013.

Presentations

2013 -Symposium Speaker: Role of anion transport in the intestine, 36th European CF Conference, Lisbon, Portugal. June 14, 2013

-Symposium Speaker: Biology of Primary and iPSC Intestinal Organoids, 27th North American Cystic Fibrosis Conference. Salt Lake City, UT. October 17, 2013

Active Grants

Cystic Fibrosis Foundation; "Defective Goblet Cell Degranulation in Cystic Fibrosis Enteroids"; 04/01/2013-03/31/2015; $86,600, Sponsor

05/12-04/16 National Institutes of Health; "CFTR and Acid-Base Transporters in Regenerating Intestinal Crypts", $1,619,473, R01 DK48816–14-17, PI.

04/11 - 3/13 Cystic Fibrosis Foundation; "Abnormal Regulation of Goblet Cells in the Cystic Fibrosis Intestine", $194,400, PI.

Cystic Fibrosis Foundation Therapeutics, Inc.; "Humanized DF508 CFTR Mouse Model"; 04/01/2013-03/31/2014; $75,951, PI

Professional

1997 - present	American Gastroenterology Association
1995 - present	American Physiological Society
1982 - present	American Veterinary Medical Association
1982 - present	D.V.M Professional licensure
2011- present	NAVMEC/Education Committee
2012 - 2014	CVM COR Grant review committee

2003-2014 Spring	V5051 Gastrointestinal Physiology 2 cred. hr. Course Coordinator (24 lectures and 8 laboratories; 64 – 117 professional students)
1998-2014 Spring	V508/V5508 Veterinary Pharmacology 2 cred. hr. Instructor (4 lectures; 64 – 102 professional students)
1996-2014 Spring	V BSC 8421 Veterinary Physiology 4 cred. hr. Instructor (24 lectures and 8 laboratories; 1 – 7 graduate students)
2004 – 2014 Spring	V BSCI 8085 Multidisc. Approaches to Biomed.Sci. 2 cred. hrs. Instructor (1 lecture; 2 – 8 graduate students)

2009-present	Graduate Policy Advisory Committee, Member
2009-2013	Chair, faculty mentor for Dr. David Kline
2012-present	Biomedical Sciences Doctoral Faculty Nomination Committee
2012- 2014	Chair, Biomedical Sciences Reproductive/Endocrine Faculty Search Committee
2013 - 2014	Member, Biomedical Sciences Pharmacology Faculty Search Committee
2004–present	Cystic Fibrosis Foundation, Research and Training Committee, Regular Member
2011-present	Regular member, NIH Study Section - Clinical, Integrative and Molecular Gastroenterology (CIMG)
2013	Abstract reviewer, Airways Physiology and Pathophysiology/ Airways Defense, Cystic Fibrosis Foundation
2013	Chairperson, Special Study Section - Ancillary Studies to Intestinal Stem Cell Consortium - ZDK1-GRB08 (J1)

George Davis

Publications

Lanahan A.A., Zhang X., Fantin A., Zhuang Z.W., Felix Y.Y.Y., Speichinger, K.R., Prahst, C., Zhang, J., Davis, G.E., Toomre, D., Ruhrberg, C., and Simons, M. (2013) The Neuropilin-1 cytoplasmic domain is required for VEGF-A-dependent arteriogenesis, Dev. Cell, 25:156-168.

Kim, D.J., Martinez-Lemus, L.A., and Davis, G.E. (2013) EB1, p150Glued and Clasp1 control endothelial tubulogenesis through microtubule assembly, acetylation and apical polarization, Blood, 121:3521-3530.

Davis, G.E., Kim, D.J., Meng, C., Norden, P.R., Speichinger, K.R., Davis, M.T., Smith, A.O., Bowers, S.L.K., and Stratman, A.N. (2013) Control of vascular tube morphogenesis and maturation in 3D extracellular matrices by endothelial cells and pericytes, Methods Mol. Biol., 1066:17-28.

Morin, K.T., Smith, A.O., Davis, G.E., and Tranquillo, R.T. (2013) Aligned human microvessels formed in 3D fibrin gel by constraint of gel contraction, Microvasc. Res., 90:12-22.

Smith, A.O., Bowers, S.L.K., Stratman, A.N., and Davis, G.E. (2013) Hematopoietic stem cell cytokines and fibroblast growth factor-2 stimulate human endothelial cell-pericyte tube co-assembly in 3D fibrin matrices under serum-free defined conditions, PLoS One, 8:e85147.

Bowers, S.L.K., Meng, C., Davis, M.T., and Davis, G.E. (2014) Investigating human vascular tube morphogenesis and maturation using endothelial cell-pericyte co-cultures and a doxycycline-inducible genetic system in 3D extracellular matrices, Methods Mol. Biol., in press.

Active Grants

NIH-NHLBI - R01 G.E. Davis- PI, B. Weinstein- Coll. Investigator, S.C. Peck, Coll. Investigator, "Genes regulating capillary morphogenesis and apoptosis" 7/01/08- 6/30/13, $250,000/ yr.

NIH-NHLBI- R01 G.E. Davis- PI, "Hematopoietic stem cell cytokine control of developmental vascularization" 1/01/11- 12/31/14. $250,000/ yr.

NIH- NHLBI- R01 G.E. Davis- PI, M.J. Davis Coll. Investigator, "Pericyte proteinase inhibitors and EC tube stabilization" 1/12/10- 11/30/13, $250,000/ yr.

NIH-NHLBI- R01 R.T. Tranquillo-PI, G.E. Davis Coll. Investigator, "Biopolymer-guided human stem cell assembly for engineered myocardium. 9/05/11- 5/31/15., $65,000/ yr.

Professional Service

Professional Society Memberships
American Society for Investigative Pathology
American Association for the Advancement of Science
American Society for Cell Biology
North American Vascular Biology Organization

Ad hoc reviewer for the following granting agencies:
American Cancer Society
Spinal Cord Research Foundation
National Institutes of Health, Pathology A Study Section
American Heart Association, Western States Affiliate
ZRG1 CVRS-L Special Emphasis Panel
ZRG1 CVRS-B Special Emphasis Panel (Challenge grants)
ZRG1 VH C (02) Special Emphasis Panel

Ad hoc reviewer for the following journals:

American Journal of Physiology
Cancer
Experimental Cell Research
Journal of Virology
Clinical and Experimental Metastasis
Journal of Cell Biology
Science
Brain Research
Developmental Brain Research
Journal of Leukocyte Biology
American Journal of Pathology Journal of Cell Science
Trends in Cardiovascular Medicine
Atherosclerosis, Thrombosis and Vascular Biology
Journal of Vascular Biology
FASEB Journal
Molecular and Cellular Biology
Cancer Research
BBA-Cancer
Arthritis and Rheumatism
Current Biology
Blood
Microcirculation
Proc. Natl. Acad. Sci. USA
Development
Developmental Dynamics
Molecular Biology of the Cell

Michael J. Davis

Publications

Fairfax ST, Padilla J, Vianna LC, Davis MJ, Fadel PJ: Spontaneous bursts of muscle sympathetic nerve activity decrease femoral vascular conductance in resting humans (Am J Physiol: HCP 304(5):H759-766, 2013) (Cited by Faculty 1000)

Scallan JP, Wolpers HJ, Davis MJ: Rapid lymphatic constriction in response to elevated output pressure is conducted across inter-lymphangion valves. J Physiology 591(2):443-459, 2013 (Highlighted article)

Yang Y, Sohma Y, Ella SR, Nourian Z, Braun AP, Korthuis RJ, Davis MJ, Hill MA: Accessory β1 subunits differentially modulate the Ca2+ sensitivity of BK channels in microvascular myocytes (J Physiology, 2013)

Zhang R-Z, Wang W, Gashev AA, Muthuchamy M, Zawieja DC, Davis MJ: Maximum shortening velocity of lymphatic muscle approaches that of striated muscle. Am J Physiol: HCP 305:H1494-H1507, 2013.

Active Grants

Source:	NIH R01 HL-089784	
Role:	Principal Investigator	25% effort
Title:	Cellular Mechanisms of Lymphatic Muscle Contractility	
Amount:	$1,100,000 (direct costs) for 5/01/08-4/30/13 (in no-cost extension)	

Source:	NIH P01 HL-095486, Project 2	
Role:	Project Leader	25% effort
Title:	Regulation of Microvascular Smooth Muscle Ca2+ and BK Channels by the ECM-Integrin-Cytoskeletal Axis	
Amount:	$265,000/yr direct costs for 4/1/2010-3/31/15	

Source:	NIH R01 HL-092241	
Role:	Co-investigator, (Michael A. Hill, P.I.)	10% effort
Title:	Signaling Mechanisms for Myogenic Tone in Skeletal Muscle Arterioles: Role of BKCa	
Amount:	$1,250,000 for 7/1/09-6/30/13 (in no-cost extension)	

Source:	NIH R01 AG-030578	
Role:	Co-I, (A. Gashev, P.I.)	5% effort
Title:	Mechanisms of age-related alterations in lymphatic pumping	
Amount:	$1,000,000 for 6/1/08-5/31/13 (in no-cost extension)	

Source:	NIH R01 HL-079460	
Role:	Co-investigator, (George E. Davis, P.I.)	5% effort
Title:	Pericyte Proteinases and EC Tube Stabilization	
Amount:	$1,250,000 for 9/1/09-8/31/13 (in no-cost extension)	

Source: NIH P01 HL-095486, Project 1
Role: Co-investigator, (G. Meininger, P.I.) 5% effort
Title: Regulation of Microvascular Smooth Muscle Contraction by the ECM-Integrin-Cytoskeletal Axis
Amount: $265,000/yr direct costs for 4/1/2010-3/31/15

Source: NIH R01 HL-120867
Role: Principal Investigator 30% effort
Title: Mechanisms of lymphatic valve and pump dysfunction in lymphedema
Amount: $1,250,000 direct costs for 12/1/13-11/30/18 (resubmitted 11-5-13)

Source: NIH R01 HL-087308 (renewal)
Role: Co-investigator, (George E. Davis, P.I.) 5% effort
Title: Molecular Control of EC Lumen Formation by MT-1 MMP
Amount: $1,250,000 direct costs for 12/1/12-11/30/17

Professional Services

2004- Associate Member, Smooth Muscle Research Group, University of Calgary, Alberta, Canada
2005- Margaret Proctor Mulligan Professor of Medical Research, Dept. of Medical Pharmacology & Physiology, University of Missouri, Columbia, MO

Vice-chair, Dept. of Medical Pharmacology & Physiology;
Adjunct Professor, Dept. of Internal Medicine;
Adjunct Professor, Dept. of Veterinary Biomedical Sciences;
Adjunct Professor, Dept. of Biological Engineering;
Investigator, Dalton Cardiovascular Research Center, University of Missouri
Microcirculatory Society: Member, 1983-
American Physiological Society: Member, 1986-
Biophysical Society: Member, 1990-

American Society for Biochemistry and Molecular Biology: Member, 2001-
North American Vascular Biology Organization: 1997-98, 2010-
The Physiological Society: 2011-

Editorial Boards:
American Journal of Physiology: Heart & Circulatory Physiology, 1991-99; 2001-10; 2013-
Journal of Vascular Research, 2001-
Microcirculation, 1994-2009
Frontiers in Vascular Physiology, 2010-
NHLBI P01 and R01 Special Emphasis Panels (ad hoc), 1991, 1996, 1999, 2004, 2005, 2008, 2009, 2013

Shinghua Ding

Publications

Hailong Li, Nannan Zhang, Grace Sun, Shinghua Ding*. Inhibition of the group I mGluRs reduces acute brain damage and improves long-term histological outcomes after photothrombosis-induced ischemia. ASN NEURO 5(3), e00117, 2013. PMID:23772679.

Shinghua Ding. Astrocytic Ca2+ signaling and its role in ischemia. In: Glutamate and ATP at interface of metabolism and signaling in the brain (Advances in Neurobiology Series, Springer, 2013).

Presentations

Invited speaker for symposium titled 'Mitochondrial Ca2+ signaling in life and death of glial cells'. Presentation title: "Interplay between mitochondrial and cytosolic Ca2+ signaling in astrocytes during ischemia". XI European Meeting on Glial Cell Function in Health and Disease. Berlin Germany, July 3-6, 2013

Active Grants

13GRANT17020004 (Grant-in-aid) SHINGHUA DING (PI) 07/01/2013-06/30/2015
American Heart Association-Midwest Affiliate Title: Mechanistic study of neuronal protective role of PBEF in cerebral ischemia The goal of this project is to study the mechanism of PBEF in neuronal protection in ischemia with focus on the role of PBEF in mitochondrial function and biogenesis. Role: PI R01NS069726

SHINGHUA DING (PI) 05/15/2010-04/30/2015 NINDS/NIH Title: The Role of Gliotransmission in Cerebral Ischemia The goal of this project is to determine whether astrocytes play a role through gliotransmission in neuronal excitotoxicity and brain damage after ischemia using two-photon (2-P) microscopy, electrophysiology and immunocyto- and histo- chemistry. Role: PI

Professional Service

June 15, 2009-present: Member of safety committee of Dalton Cardiovascular Research Center.

August 18, 2009-present: Member of safety committee of College of Engineering.

September 2011- present: Member, Library Committee, College of Engineering.

Member of Membership Committee, American Society for Neurochemistry. March 2011-March 2015.

Reviewers for multiple Journals

2013-Peer review study section member for BRAIN 5, American Heart Association (AHA).

2013-2016: Chair of the Membership Committee for American Society of Neurochemistry (ASN).

2011-2013: Member of the Membership Committee for American Society of Neurochemistry (ASN).

Paul J. Fadel

Publications

Boyle LJ, Credeur DP, Jenkins NT, Padilla J, Leidy HJ, Thyfault JP, Fadel PJ. Impact of reduced daily physical activity on conduit artery flow-mediated dilation and circulating endothelial microparticles. J Appl Physiol 115(10):1519-25, 2013.

Padilla J, Jenkins NT, Laughlin MH, Fadel PJ. Blood pressure regulation VIII: resistance vessel tone and implications for a pro-atherogenic conduit artery endothelial cell phenotype. Eur J Appl Physiol. (in press), 2013.

Deo SH, Jenkins NT, Padilla J, Parrish AR, Fadel PJ. Norepinephrine increases NADPH oxidase-derived superoxide in human peripheral blood mononuclear cells via α-adrenergic receptors. Am J Physiol Regul Integr Comp Physiol. 305(10):R1124-32, 2013.

Miyazawa T, Horiuchi M, Komine H, Sugawara J, Fadel PJ, Ogoh S. Skin blood flow influences cerebral oxygenation measured by near-infrared spectroscopy during dynamic exercise. Eur J Appl Physiol. 113(11):2841-8, 2013.

Fadel PJ. Neural control of the circulation during exercise in health and disease. Front Physiol. Aug 26;4:224, 2013.

Fairfax ST, Padilla J, Vianna LC, Holwerda SH, Davis MJ, Fadel PJ. Influence of spontaneously occurring bursts of muscle sympathetic nerve activity on conduit artery diameter. Am J Physiol Heart Circ Physiol. Sep;305(6):H867-74, 2013.

Greaney JL, Schwartz CE, Edwards DG, Fadel PJ, Farquhar WB. The neural interaction between the arterial baroreflex and muscle metaboreflex is preserved in older men. Exp Physiol. Oct;98(10):1422-31, 2013.

Mikus CR, Boyle LJ, Borengasser SJ, Oberlin DJ, Naples SP, Fletcher J, Meers GM, Ruebel M, Laughlin MH, Dellsperger KC, Fadel PJ, Thyfault JP. Simvastatin impairs exercise training adaptations. J Am Coll Cardiol. S0735-1097(13)01403-4, 2013.

Fairfax ST, Holwerda SW, Credeur DP, Zuidema MY, Medley JH, Dyke II PC, Wray DW, Davis MJ, Fadel PJ. The role of α-adrenergic receptors in mediating beat-by-beat sympathetic vascular transduction in the forearm of resting man. J Physiol, 15;591(Pt 14):3637-49, 2013.

Jenkins NT, Padilla J, Boyle LJ, Credeur DP, Laughlin MH, Fadel PJ. Disturbed Blood Flow Acutely Induces Activation and Apoptosis of the Human Vascular Endothelium. Hypertension. 61(3):615-21, 2013.

Fairfax ST, Padilla J, Vianna LC, Davis MJ, Fadel PJ. Spontaneous Bursts of Muscle Sympathetic Nerve Activity Decrease Leg Vascular Conductance in Resting Humans. AJP (Heart Circ Physiol), 304(5):H759-66, 2013.

Presentations

The Balancing Act: Simultaneous Regulation of Arterial Blood Pressure and Blood Flow during Exercise. Experimental Biology, Boston, Ma (4/13).

Peripheral vascular health: Is physical activity required? Division of Cardiology, University of Missouri, Columbia (2/13).

Active Grants

"Aging, Sex, and Neural Cardiovascular Control during Dynamic Exercise," National Institutes of Health, R01 HL093167, 30% effort, PI: Paul Fadel, 8/08-8/14, $1,250,000.

"Exercise and Health: Integration from molecule to patient," National Institutes of Health, T32-AR048523, PI: Ronald Terjung, Mentor: Paul Fadel, 7/09-6/14, $1,000,000.

Professional Services

Ad-hoc Manuscript Reviewer- Medicine and Science in Sports and Exercise (6/01-present)
Experimental Physiology (2/03-present)
AJP: Regulatory, Integrative and Comparative Physiology (8/03-present)
Journal of Applied Physiology (12/03-present)
European Journal of Applied Physiology (9/04-present)
AJP: Heart and Circulatory Physiology (12/04-present)
Journal of Physiology (5/05-present)
Experimental Biology and Medicine (10/06-present)
Hypertension (5/07-present)
Brain Research (8/09-present)
Annals of Neurology (12/09-present)
Editorial Board- Experimental Physiology (11/12-present)
Journal of Applied Physiology (1/11-present)
European Journal of Applied Physiology (1/10-present)
Frontiers in Exercise Physiology (7/10-present)
Ad-hoc Grant Reviewer- Alberta Heritage Foundation for Medical Research
University of Missouri Research Board
Natural Sciences & Engineering, Research Council of Canada
University of Missouri, School of Medicine Scientific Peer Review Committee (1/08-present)
Medical Pharmacology and Physiology Seminar Committee (9/08-present)
American Physiological Society, Neural Control & Autonomic Regulation Section Steering Committee (7/12-present)

William Fay

Publications

Mittal M, Fay WP: Almost everyone over 50 should be put on a statin to reduce the risk of cardiovascular disease: A contrarian view. Missouri Medicine. 2013;110:339-41.

Ji Y, Weng Z, Strawn TL, Fay WP: Pharmacological inhibition of plasminogen activator inhibitor-1 attenuates intima hyperplasia in vein grafts. Arterioscler Thromb Vasc Biol, Abstract 177, 2013.

Ji Y, Strawn TL, Szalai AJ, Fay WP: C-Reactive Protein Increases Tissue Factor Expression and Promotes Thrombosis in Vein Bypass Grafts. Circulation 2013 128:A15833-A15833.

Presentations

"Control of Vascular Signaling by Plasminogen Activator Inhibitor-1 and Vitronectin: A Delicate Balance," Cardiovascular Day, University of Missouri, February 19,2013.

"Plasminogen Activator Inhibitor-1 Deficiency – A Cause of Abnormal Bleeding…and Much More," 15th Bleeding and Thrombosing Diseases Conference, Mayo Clinic, August 8, 2013.

Active Grants

NIH R01
"Roles of Plasminogen Activator Inhibitor-1 and Vitronectin in Failure of Coronary Revascularization"
PI: W. Fay (25% effort) 9/1/10-8/31/14. $250,000 annual direct costs. Impact/Priority Score: 12; %ile score: 1.0

NIH/NHLBI Program Project Grant
"Molecular Genetics of Coagulation Disorders" PI: D. Ginsburg
Dr. Fay is Co-Investigator (10% effort) on Project 3: ("Thrombosis and Hemostasis in Host Defense from Bacterial Infection", PI: H. Sun) 4/1/09-3/31/14 ($223,863 annual direct costs of Project 3)

NIH R44
"Improved long-term biocompatibility of coronary stents by plasma coating process"
PI: M. Chen. Dr. Fay is Co-Investigator (10% effort) 09/01/2011-02/28/2014.

NIHR44
"Prevention of Vein Graft Intimal Hyperplasia with Human Apyrase"
PI: R. Chen. Dr. Fay is Co-Investigator (10% effort) 0/1/12-9/30/13

Professional Services

2010-	School of Medicine Advisory Committee on Research Space
2011-	Blue Ribbon Commission, School of Medicine
2012-2013	Research Portfolio Taskforce Committee

Vice-Chair of Department, 2006-present
Administrative Advisory Committee, 2005-present
Space Committee, 2005-present
RIF Committee, 2005-present

Journal Review

American Journal of Physiology: Advances in Physiology Education
American Journal of Physiology: Cell Physiology
American Journal of Physiology: Heart and Circulatory Physiology
American Journal of Physiology: Regulatory, Integrative, and Comparative Physiology
Circulation Research
Journal of Applied Physiology
Journal of Vascular Research
Microcirculation
PLoS ONE

Shubra Gangopadhya

Publications

S Mukherjee, B Ramalingam, K Gangopadhyay, S Gangopadhyay, "Stability of Sub—2 nm Pt Nanoparticles on Different Support Surfaces", Journal of The Electrochemical Society 161 (4), F493-F499, 2014.

S Mukherjee, B Ramalingam, S Gangopadhyay, "Hydrogen Spillover at sub-2 nm Pt Nanoparticles by Electrochemical Hydrogen Loading", Journal of Materials Chemistry A, in press, 2014.

SC Hamm, S Basuray, S Mukherjee, S Sengupta, JC Mathai, GA Baker, Shubhra Gangopadhyay, "Ionic conductivity enhancement of sputtered gold nanoparticle-in-ionic liquid electrolytes", Journal of Materials Chemistry A 2 (3), 792-803, 2014.

Sangho Bok, Venumadhav Korampally, Charles M. Darr, William R. Folk, Luis Polo-Parada, Keshab Gangopadhyay, Shubhra Gangopadhyay "Femtogram-level Detection of Clostridium botulinum Neurotoxin Type A by Sandwich Immunoassay Using Nanoporous Substrate and Ultra-bright Fluorescent Suprananoparticles", Biosensors and Bioelectronics, 41, 409–416, 2013.

Jie Gao, Lei Sun, Huixu Deng, Cherian J Mathai, Shubhra Gangopadhyay, Xiaodong Yang, Experimental realization of epsilon-near-zero metamaterial slabs with metal-dielectric multilayers", Applied Physics letters, 103 (5), 051111, 2013.

Haisheng Zheng, Balavinayagam Ramalingam, Venumadhav Korampally, and Shubhra Gangopadhyay, "Large sensitivity enhancement in semiconducting organic field effect transistor sensors through incorporation of ultrafine platinum nanoclusters", Applied Physics Letters, 103 (19), 193305, 2013.

Steven C. Hamm, Sagnik Basuray, Somik Mukherjee, Shramik Sengupta, Joseph C. Mathai, Gary A. Baker and Shubhra Gangopadhyay, "Ionic Conductivity Enhancement of Sputtered Gold Nanoparticle-in-Ionic Liquid Electrolytes", Journal of Materials Chemistry A, in press, 2013.

Clay S. Staley, Kristofer E. Raymond, Rajagopalan Thiruvengadathan, Steven J. Apperson, Keshab Gangopadhyay, Sean M. Swaszek , Robert J. Taylor and Shubhra Gangopadhyay, "Fast Impulse Nanothermite Solid Propellant Miniaturized Thrusters", Journal of Propulsion and Power, in press, 2013.

Thiruvengadathan Rajagopalan, Venumadha korampally,Arka Ghosh, Nripen Chanda, Keshab Gangopadhyay and Shubhra Gangopadhyay, "Nanomaterial processing using self assembly---bottom-up chemical and biological approaches", Reports on progress in Physics,76, 066501-066555, 2013.

Balavinayagam Ramalingam Balavinayagam Ramalingam, Somik Mukherjee, Cherian J Mathai, Keshab Gangopadhyay, and Shubhra Gangopadhyay, "Sub-2 nm size and density tuneable platinum nanoparticles using room temperature tilt-target sputtering, Nanotechnology, 24, 205602-205615, 2013.

Bryant C. Harris, Venumadhav Korampally, Craig Weilbaecher, Sheila Grant, Luis Polo-Prada,and Shubhra Gangopadhyay, "Protease Sensing on Novel High Surface Area Organosilicate Nanoporous Films", Sensors and Actuators: B. Chemical, 176, 351– 359, 2013.

Lee Byung-Doo, Thiruvengadathan Rajagopalan, Puttaswamy Sachidevi, Smith M Brandon, Gangopadhyay Keshab, Gangopadhyay Shubhra, Sengupta

Shramik, "Ultra-rapid elimination of biofilms via the combustion of a nanoenergetic coating", BMC Biotechnology, 13 (1), 1-9, 2013.

Presentations

WN Wang, WJ An, B Ramalingam, S Mukherjee, DM Niedzwiedzki,s. Gangopadhyay, p. Biswas, "Facile development of platinized TiO2 thin films by gas phase deposition methods for CO2 photoreduction", ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY 245, 2013.

A Pathak, S Basuray, J Mathai, D Menke, K Gangopadhyay, P Cornish, S. Gangopadhyay, "Fluorescence Enhancement and Single Molecule Fluorescence Detection on Nanogap Embedded Plasmonic Gratings fabricated using HD-DVD", Bulletin of the American Physical Society 58, 2013.

Active Grants

NSF ECCS-123217, $ 360,000:"Trace Vapor Detection of Explosives using Molecularly Imprinted Organic Field Effect Transistors and Metal Nanoparticles", Award Period: 9/1/2012-5/31/2015. Role: PI.

NEMS/MEMS Works, LLC $30,000: "Combustion of Liquid Fuel Enhanced by CuO/Al nanothermite", 08/01/2013-12/31/2013 Role: PI

Interdisciplinary Intercampus Research Program (IDIC), UM System, $50,000, "Plasmonic Nanostructures and Optical Metamaterials Enhanced High Efficiency Solar Cells, 9/1/2013-8/31/2014, Role:Co-PI.

Coulter Translational Partnership, $30,000. "Nanostructured Antimicrobial Coatings for Implanted Devices", Award period 11/30/2012-8/31/2013. Role PI.

THE BOEING COMPANY $80,000:"Window repair", Award Period:5/1/2012-8/31/2013.

NSF ECCS-1102070 $ 359,350: Nanostructured High Surface Area Sensor Systems for Enhanced Detection, Award Period: 6/1/2011-5/31/2014. Role: Co-PI.

NANOTECHNOLOGY ENTERPRISES INC/US Army $779,000: Integration and Commercialization of Sensor Nanotechnology for Explosive Detection 08/01/2011-03/31/2013 Role: Co-I

NSF ECCS-0901566 GOALI $372K: Nanothermite Based Micro Shockwave Generators and Nanoparticles for Targeted and Efficient Gene/Drug Delivery Role: PI. The objective of this research is to develop a novel digitally controlled micro shockwave generator by integrating nanothermites with MEMS. Award Period: 8/09-7/13.

Office of Naval Research N00014-11-C0392 $1.6M: University of Missouri Railgun Program. Role: Co-I. Award Period: 03/11-03/13

Professional Service

American Chemical Society

IMaterial Research Society

Institute of Electronics and Electrical Engineers

American Physical Society

Sep. 2003 - present LaPierre Chair Professor, Department of Electrical and Computer Engineering, University of Missouri, Columbia, Missouri (MU)

Sep. 2003 - present Joint Professor, Department of Physics and Astronomy, MU

Sep. 2003 - present Joint Professor, Department of Biological Engineering, MU

April 2006 - present Director, International Center for Nano/Micro Systems and Nanotechnology, MU

Kevin Gillis

Publications

Ghosh, J., X., Gillis, K.D. Electroporation followed by electrochemical mearurement of quantal transmitter release from single cells using a paterned microelectrode. Lab on a Chip 13: 2083-2090, 2013.

Hettie, K.S., Liu, X., Gillis K.D., and Glass, T.E. Selective Catecholamine Recognition with NeuroSensor 521:A Fluorescent Sensor for the Visualizaiton of Norepinephrine in Fixed and Live Cells. ACS Chem Neurosci 4: 918-923, 2013.

Presentations

"Development of microchip devices to study quantal exocytosis from individual cells", technical University of Denmark, Copenhagen, Denmark, 9/2013

Active Grants

NIH, SBIR (to ExoCytronics LLC), $671,743 (subcontract to MU: $212,101), "Development of a prototype system for assaying exocytosis from individual cells", PI, 09/11 – 05/13.

NIH, R01, $543,546 (MU portion), "A scalable nxn electrochemical detector array platform with on-chip amplifiers for massively parallel recordings of quantal transmitter release events.", co-I (PI: M. Lindau, Cornell Univ.), 09/11-04/15

Professional Service

Journal Reviewer: Nature**,** Science, Neuron, EMBO Journal, Biophysical Journal, Journal of Theoretical Biology, Journal of Neuroscience

Founding Director, Center for Molecular and Cellular Engineering

Chief Mentor, FIRST FRC Robotics team 3792 "Army Ants" sponosred by Columbia Area Career Center (Columbia Public Schools)

Graduate Student Advisor

Kenneth Gruber

Professional Service

Current: Founder and CEO/President, Tensive Controls, Inc., a biotech pharmaceutical company supported by grants from the NIH/NCI SBIR program, North Carolina State SBIR matching funds, and the IRS/HHS Qualifying Therapeutic Discovery Project program. Professor Emeritus of Biological Sciences, California State Polytechnic University, Pomona, CA; Adjunct Professor, Dalton Cardiovascular Research Center and Department of Medical Pharmacology and Physiology, University of Missouri, Columbia, MO

2004-Present Lytmos Group, Inc

American Physiological Society
Association Pour les Exchanges Scientifique
Internationaux (Honorary Member)

Li-Qun Gu

Publications

Kang I, Wang Y, Reagan C, Fu Y, Wang MX, Gu LQ. Designing DNA interstrand lock for locus-specific methylation detection in a nanopore. Sci Rep. 2013 Oct 18;3:2381. doi: 10.1038/srep02381.

Tian K, Gu LQ. Nanopore single-molecule dielectrophoretic detection of cancer-derived MicroRNA biomarkers. Conf Proc IEEE Eng Med Biol Soc. 2013;2013:6821-4

Gu LQ, Wang Y. Nanopore single-molecule detection of circulating microRNAs. Methods Mol Biol. 2013;1024:255-68.

Tian K, He Z, Wang Y, Chen SJ, Gu LQ. Designing a polycationic probe for simultaneous enrichment and detection of microRNAs in a nanopore. ACS Nano. 2013 May 28;7(5):3962-9

Active Grants

Coulter Foundation Bridging Fund at MU Coulter Foundation $111,800 (+$25,000 for commercialization strategy) 07/01/2012-06/30/2013 PI

Eileen Hasser

Publications

Functional evidence for nitric oxide involvement in the cardiovascular and autonomic modulation by the PVN in conscious rats. Ozahyr de Andrade O, Friskey SA, Martins-Pinge M, Hasser, EM
FASEB J. 2013

Nucleus tractus solitarii (nTS) is required for phrenic long term facilitation (pLTF) after acute intermittent hypoxia (AIH) Ostrowski D, Kleiber AC, Heesch CM, Kline DD, Hasser EM. FASEB J. 2013

Catecholaminergic neurons projecting to the paraventricular nucleus (PVN) of the hypothalamus are essential for adjustments to cardiorespiratory challenges. King, TL, Ruyle BC, Heesch CM, Kline DD, Hasser EM. FASEB J. 2013

Nucleus tractus solitarii (nTS) reactive oxygen species (ROS) contribute to acute intermittent hypoxia (AIH)-induced phrenic nerve long-term facilitation (pLTF). Kleiber, AC., Ostrowski, D, Kline, DD, Heesch, CM, and Hasser, EM. FASEB J. 2013

Acute Hypoxia progressively activates nucleus tractus solitarii (nTS) neurons that project to the rostral ventrolateral medulla (RVLM) or hypothalamic paraventricular nucleus (PVN)
Ruyle BC, Heesch CM, King, TL, Kline DD, Hasser EM. FASEB J. 2013

Role of nucleus tractus solitarii (nTS) hydrogen sulfide (H2S) in hindlimb unloaded rats
Hasser, EM, Heesch, CM, and Kline, DD. FASEB J. 2013

Hydrogen sulfide (H2S) in nucleus tractus solitarii (nTS) modulates the cardiorespiratory system and its response to hypoxia. Kline DD, Hasser EM. FASEB J. 2013

Chronic intermittent hypoxia (CIH, 3d) attenuates glutathione peroxidase expression (Gpx1) and function in the caudal nucleus tractus solitarii (cnTS). Barr SL, Phaup JG, Kline DD, Hasser EM, Heesch CM. FASEB J. 2013

Acute hypoxia (AH) increases Fos -IR in nNOS and AVP cells in the paraventricular nucleus of the hypothalamus (PVN). Coldren M, McCalmon S, King TL, Kline DD, Hasser EM, Heesch CM
FASEB J. 2013

Presentations

Experimental Biology, April 2013

Active Grants

RO1 HL098602 07/15/2010-06/30/2014
Plasticity of nTS output neurons in acute and chronic hypoxia
National Institutes of Health
Role: (Multi PI with Cheryl M. Heesch and David D. Kline)
Annual: $491,679 Total Direct/yr ($163,283.00-EMH Direct): Total: 2,830,531

R01 HL091164 (Cheryl M. Heesch, PI)
Central nervous system plasticity in sympathoinhibition in pregnancy
National Institutes of Health
Role: Co-I
Annual: $250,000 Direct costs

"Cardiovascular regulation in hindlimb unweighted Rats" 04/01/07-03/31/13 $225,000 (no cost extension)
NIH-R01-HL53306 (E. Hasser, P.I.) (Heesch: Co-Investigator, 10% effort)

Research Board
Cardiovascular Deconditioning: the role of Astrocytes
Role: PI
Annual: $58,062

Professional Service

Committees
- Departmental- GPAC, New Faculty Mentoring Committee, Outreach Committee
- College - Promotion and Tenure Committee
- University - Animal Care and Use Committee, Cardiovascular Day Organizing Committee

Manuscript Review
American Journal of Physiology (Heart Circulatory Physiology)
American Journal of Physiology (Regulatory Comp & Integ Physiology)
Journal of Physiology
Brain Research
Journal of Applied Physiology
Experimental Physiology
Journal of Neuroscience
Neuroscience

Grant Review
Research Board, University of Missouri

Cheryl Heesch

Publications

Owens CM, Marga F, Forgacs G, Heesch CM. Biofabrication and testing of a fully cellular nerve graft. Biofabrication. 2013 Dec;5(4):045007. doi: 10.1088/1758-5082/5/4/045007. Epub 2013 Nov 6.

King TL, Kline DD, Ruyle BC, Heesch CM, Hasser EM. Acute systemic hypoxia activates hypothalamic paraventricular nucleus-projecting catecholaminergic neurons in the caudal ventrolateral medulla. Am J Physiol Regul Integr Comp Physiol. 2013 Nov 15;305(10):R1112-23. doi: 10.1152/ajpregu.00280.2013. Epub 2013 Sep 18.

Martins-Pinge MC, Mueller PJ, Foley CM, Heesch CM, Hasser EM. Regulation of arterial pressure by the paraventricular nucleus in conscious rats: interactions among glutamate, GABA, and nitric oxide. Front Physiol. 2013 Jan 9;3:490

Active Grants

"Central nervous system plasticity in 06/01/09- 03/31/13~$250,000 Sympathoinhibition on pregnancy" (annual direct) National Institutes of Health (R01 HL091164) (Role: Principal Investigator, 20% effort)

"Plasticity of nTS output neurons in acute and chronic hypoxia" 07/01/10-06/30/15 $491,679 National Institutes of Health (R01 HL098602) Multi-Investigator Role: PD/PI = E.M. Hasser, C.M. Heesch, D.D. Kline [CMH direct $163,512] (1.8 Calendar months/ each)

"Cardiovascular regulation in hindlimb unweighted Rats" 04/01/07-03/31/13 $225,000 (no cost extension) NIH-R01-HL53306 (E. Hasser, P.I.) (Role: Co-Investigator, 10% effort)

"Adaptation of brainstem circuits to chronic hypoxia" NIH R01 HL085108-01 04/15/08-04/14/13 $250,000 (annual direct) (D.D. Kline, P.I.) (Role: Co-Investigator, 1person/month effort)

Professional Service

Departmental:
02/06- present: Junior Faculty Mentoring Committees, Dept. Biomed ScI.
Ileana Constantinescu (Committee Chair)
Kathy Kuel-Kovarik (Committee Member)

College:
12/10 – present CVM COR Grant Review Committee
8/11 – 7/14 CVM Faculty Policy Committee (Ex Officio)

University:
09/03-present Executive Committee, Interdisciplinary Neuroscience Program
8/11 – 7/14 College of Vet Med Representative to Faculty Council
8/11 – 7/14 Faculty Affairs Committee, Univ. of Missouri Faculty Council

Manuscript Peer Review: American Journal of Physiology/ Heart & Circ. Physiol (1) , Autonomic Neuroscience: Basic & Clinical (1), Brazilian J Med. (1), Experimental Physiology (1), Journal of Applied Physiology (1), Journal Neurophysiology (1)

Editorial Board: 06/10- present: Review Editor, Frontiers in Physiology: Frontiers in Integrative Physiology

Committee/mentorship listing:
Dept. Vet. Biomed. Sci, Univ. of Missouri

8/2011 – present	(Kevin) Max Coldren (Ph.D., Adviser, Dr. Cheryl Heesch)
2008 -- present	Luise King (Ph.D., Adviser, Dr. Eileen Hasser)

Dept. of Medical Pharmacology & Physiology, School of Medicine, Univ. of Missouri

2012 – present	Shenghua Yuan (Ph.D., Adviser, Dr. Steven Segal)

Dept. of Physics, University of Missouri

9/11 – present	Chris Owens (Ph.D.,Adviser, Dr. Gabor Forgacs)

Interdisciplinary Neuroscience Program

7/2010 – present	Randall Brown (M.S., Adviser, Dr. Cheryl Heesch)

Honors College, Senior Honors Research Project

1/2012 – present	Sean McCalmon (Adviser, Cheryl Heesch)
8/2012 – present	Joshua Abernathy (Adviser, Cheryl Heesch)

Michael Hill

Publications

Naser, N., Murphy, T.V., Januszewski A.S., Brown, B.E., Jenkins, A.J. Hill, M.A. and Murphy, T.V. Glycated albumin impairs endothelial cell Ca2+ mobilization via a ROS-dependent mechanism. Frontiers in Vascular Physiology 4:38- , 2013.

Yang, Y., Sohma, Y., Nourian, Z., Ella, S.R., Davis, M.J., Braun, A.P and Hill. M.A. Mechanisms Underlying regional differences in Ca2+ sensitivity of BKCa in arteriolar smooth muscle. J. Physiol. 591:1277-1293, 2013.

Padilla, J., Jenkins, N.T., Lee, S., Zhang, H., Cui J., Zuidema, M.Y., Zhang, C. (deceased), Hill, M.A., Perfield II, J.W, Ibdah, J.A., Booth, F.W., Davis, J.W., Laughlin, M.H. and Rector, R.S. Juvenile obesity in Ossabaw swine produces artery-specific transcriptional changes. Physiological Genom. (In Press, 2013).

Presentations

Hill, M.A. Joint Meeting of NAVBO and Microcirculatory Society, Cape Cod, MA (to be held Oct 2013)

Grants

NIH RO1HL077566– 03/31/2013
Mechanism of Reperfusion-Induced Endothelial Cell Injury This project is focused on cellular alterations in ischemia-reperfusion injury that lead to cardiac and microvascular dysfunction. Role, Principal Investigator; Effort 15%

National Institutes of Health 1 R01 HL092241
"Signaling Mechanisms Underlying Myogenic Tone in Arterioles of Skeletal Muscle: Role of BKCa"
Total Award: $1,000,000 (Direct Costs) Period: 7/2009 – 6/2013. This project focuses on the role of the large conductance K+ channel (BKCa) in regulation myogenic tone in skeletal muscle arterioles. Specific emphasis is placed on heterogeneity in BKCa regulation in differing vascular beds. Principal Investigator: Michael A. Hill, Ph.D., Effort 27.5%

National Institutes of Health 1 P01 HL095486-01A1
Project Title: Mechanisms of Microvascular Control and Coordination in Health and Disease Period: 5/2010 – 4/2015 Principal Investigator: Gerald A. Meininger, PhD. Co-Investigator Project 1 (10% time) Michael A. Hill, Ph.D. Co-Investigator Project 2 (5% time) Michael A. Hill, Ph.D. Director of Core C (10% time) Michael A. Hill, Ph.D.

NIH RO1HL085119 – 3/31/2016
Role of Cytokine-induced Inflammation in Endothelial Dysfunction in Diabetes Total Award (Current Period): $1,000,000 (Direct Costs) The major focus of this proposal is on vascular dysfunction in a rodent model of type 2 diabetes. Specifically focusing on how cytokines and immune cells contribute to abnormal function of endothelial cells and alter vasomotor responsiveness. Principal Investigator; Michael A. Hill, Ph.D., Effort 22.5%

Professional Service

2006 – present Associate Director
Dalton Cardiovascular Research Center
University of Missouri

2006 – present Professor of Physiology (Tenured)
Dalton Cardiovascular Research Center
Department of Medical Pharmacology and Physiology
University of Missouri

2007 – present Adjunct Professor
Department of Biological Engineering
University of Missouri

2011 – present Distinguished Research Fellow
RMIT University
Melbourne, Vic 3083.

External Joint Appointments (Current):

2011 – present Visiting Professor
Luzhou Medical College
Luzhou, China

Postdoctoral/Research Fellow Trainees Supervised

Associate Editor:
- Frontiers in Vascular Physiology (2010 – present)

Editorial Boards:
- American Journal of Physiology: Heart and Circulatory Physiology (1/96 - 12/98; 1/13 - present)
- Microcirculation (1/2002 – present)
- Journal of Vascular Research (2007 – present)
- Frontiers in Vascular Pharmacology (2010 – present)
- Frontiers in Vascular Physiology (2010 – present)

Professional Societies
Microcirculatory Society
American Physiological Society
Australian and New Zealand Microcirculatory Society
Australian Physiological Society
Australian-American Fulbright Alumni
American Association for the Advancement of Science

Biophysical Society

2012 – present	University of Missouri, Research Council
2011 – present	Coordinator of MOU/Exchange agreement between Suzhou Medical College, China and DCRC, University of Missouri.
2007 – present	Seminar Committee, Dep't of Medical Pharmacol. and Physiol. University of Missouri
2006 – present	Internal Review Committee, Dalton Cardiovascular Research Ctr
2012 - present	Joint Programming Committee Representative (APS, CV Section)
2012 - present	International Committee, American Physiological Society.
2012 – 2013	President, Microcirculatory Society, USA (effective 5/2012).
2011 – present	International Liaison Committee, Microcirculatory Society, USA.
2011 – present	Long Range Planning Committee, Chair, Microcirculatory Society, USA.
2010 – present	Steering Committee, CV Section, American Physiological Society
2010 – present	Development Committee, Microcirculatory Society, USA.

TEACHING, SUPERVISION AND RELATED ACTIVITIES

2006 – present Lecturer/discussion leader in Microcirculation graduate course (topics relating to endothelial cell/smooth muscle interactions)

2008 – present Problem Based Learning Facilitator (University of Missouri) for medical student education (Years 1 and 2). Block content related to metabolism, endocrinology, cell biology and cardiovascular.

2009 – present Advanced Imaging Techniques, Skills in Biomedical Research graduate course

Virginia Huxley

Publications

Glinskii OV, Huxley VH, Glinskii VV, Rubin LJ, Glinsky VV. Pulsed estrogen therapy prevents post-OVX porcine dura mater microvascular network weakening via a PDGF-BB-dependent mechanism. PLoS One. 2013 Dec 9;8(12):e82900.

Scallan JP, Davis MJ, Huxley VH. Permeability and contractile responses of collecting lymphatic vessels elicited by atrial and brain natriuretic peptides. J Physiol. 2013 Oct 15;591(Pt 20):5071-81.

Huxley VH. Open and shut case for Rho A? The questions of when, where and how the small GTPase mediates the permeability of endothelial junctions. Cardiovasc Res. 2013 Aug 1;99(3):378-9.

Lu X, Huxley VH, Kassab GS. Endothelial barrier dysfunction in diabetic conduit arteries: a novel method to quantify filtration. Am J Physiol Heart Circ Physiol. 2013 Feb 1;304(3):H398-405

Presentations

Department of Pharmacology and
Toxicology Seminar Series, Medical College of Georgia,

Active Grants

Current:

NIH R01 DK095501-01A1 "Insulin as a Regulator of Microvascular Exchange Score 20; 9th percentile
06-01-2013 through 05-31-2017; $1,250,000 total direct

Professional Service

1996 - Director, Microvessel Core Facility
1999 - Adjunct Professor, Veterinary Biomedical Sciences, UM-Columbia School of Veterinary Medicine
2003 - Professor, Department of Medical Pharmacology & Physiology, UM-Columbia
2003 - Senior Investigator, Center for Diabetes and Cardiovascular Health
2005 - Director, National Center for Gender Physiology, UM-Columbia
2011 - Director, Pulmonary/Critical Care & Physiology Research Partnership
2011 - Professor, Department of Internal Medicine, UM-Columbia

PRIZES, AWARDS, FELLOWSHIPS:
2012-2015 Associate Editor, Journal of Physiology (London)
2010- Associate Editor, Frontiers in Vascular Physiology
Monthly Division Research Meeting/Journal Club (2011-)

Faculty of 1000, Integrative Physiology	2010-present
Associate Editor	
Frontiers in Vascular Physiology	2010-present
Editorial Board	
American Journal of Physiology: Heart & Circulatory Physiology	1989-2005, 2011-2014
Journal of Vascular Research	1998-present
Asian Biomedicine	2007-present
Guest Reviewer	
American Journal of Physiology:	1983-present
Circulation Research	1986-
Biorheology	1989-
Biophys. Biochem. Acta	1989-
Journal of Applied Physiology	1991-
Journal of Physiology (London)	1991-
Hypertension	1996-
Microcirculation	2004 –
Cardiovascular Research	2005 –
Journal of Pharmacology and Experimental Therapeutics	2007 -
Arteriosclerosis, Thrombosis and Vascular Biology	2008 -
Journal of General Physiology	2009 -
NIH Hypertension and Microcirculation (HM) Study Section	2008-2012
Extra-mural Advisory Boards	
University of Arizona Training Grant Advisory Committee	2006-present
Center for Gender Physiology, Johns Hopkins University	2008-present

Tzyh-Chang Hwang

Publications

Xiaolong Gao., Yonghong Bai, and Tzyh-Chang Hwang. (2013). Cysteine scanning of CFTR's first transmembrane segment reveals its plausible roles in gating and permeation. Biophys. J. 104:786-797.

Kang-Yang Jih, and Tzyh-Chang Hwang. (2013). Vx-770 potentiates CFTR function by promoting decoupling between the gating cycle and ATP hydrolysis cycle. Proc. Nat. Acad. Sci. USA.110:4404-4409.

Tzyh-Chang Hwang and Kevin Kirk. (2013). The CFTR ion channel: gating, regulation, and anion permeation. Cold Spring Harbor Perspective in Medicine. In press.

Yoshiro Sohma, Yin-Jun Yu, and Tzyh-Chang Hwang. (2013) Curcumin and genistein: the combined effects on disease-associated CFTR mutants and their clinical implications. Curr. Pharm. Des. In press.

Active Grants

2008 – 2013 NIHR01, NIDDK, "Molecular pathophysiology of cystic fibrosis", $1,014,155

Professional Service

2004 – present Member, Graduate Educational Committee, Medical Pharmacology and Physiology
2004 - present Member, Tenure and Promotion committee, Dalton Cardiovascular Research Center
2011 – present, Member, Tenure and Promotion committee, School of Medicine

2010 – present Associate Editor, Frontier in Pharmacology of Nature Products
2003 - present Editorial Board, Journal of General Physiology

Salman Hyder

Publications

Mafuvadze, B., Liang, Y., Besch-Williford, C. and Hyder, S. M. (2013) Preventive and therapeutic potetnial of apigenin against progestin-dependent breast cancer. 20th Annual Cardiovascular Day, University of Missouri, MO. (20th Annual Cardiovascular Day, University of Missouri, MO. (Feb 2013)

Mafuvadze, B, Cook, M, Zhang, X, Besch-Williford, C and Hyder, S.M. (2013) Complex effects of dietary apigenin on prevention of MPA-accelerated DMBA-induced mammary tumors in Sprague-Dawley rats. 103rd Annual American Association of Cancer Research Meeting, Washington DC, USA. Abstract # 3696.

Liang, Y., Zou, X., Besch-Williford, C., Johnnes, A. and Hyder , S. M. (2013) Synthetic inhibitors of the cholesterol biosynthetic enzyme oxidosqualene cyclase block proliferation and survival of breast cancer cells. 103rd Annual American Association of Cancer Research Meeting, Washington DC, USA. Abstract #871

Carroll, C., Benakanakere, I., Liang, Y., Besch-Williford, C and Hyder, S.M. (2013) An anticancer agent YC-1 suppresses progestin-stimulated VEGF in breast cancer cells and arrests breast tumor development. Int. J. Oncology, 42: 179-187.

Neubauer, H., Schneck, H., Seeger, H., Cahill, M. A., Liang, Y., Mafuvadze, B., Hyder, S. M., Fehm, T and Mueck, A. O. (2013) Overexpression of PGRMC1 - possible mechanism for increased breast cancer risk using norethisterone in hormone therapy. Menopause, 20: 504-510.

Mafuvadze, B., Cook, M.T., Zhang, Z., Besch-Williford, C. and Hyder, S.M. (2013). Effects of dietary apigenin on tumor latency, incidence and multiplicity in a medroxyprogesterone acetate-accelerated 7, 12-dimethylbenz(a) anthracene-induced breast cancer model. Nutrition and Cancer, 65:1184-1191.

Active Grants

Hyder, S.M. (PI)
"Treatment and prevention of breast cancer using multi-functional inhibitors of cholesterol biosynthesis"
Dept of Defense Breast Cancer Pgm
$500,000-direct cost
6/1/12-5/31/14

Hyder, S. M. (Mentor)
Franklin, C (PI)
NIH T32 RR07004 "Post-doctoral Comparative Medicine Training Grant"
Date: 07/11-06/16 (Direct cost: $169, 266/yr)

Hyder, S.M. (consultant) (Clarke, L PI)
"CFTR and acid-base transporters in regenerating intestinal crypts"
NIH-RO1 $1, 250, 000/direct cost (3/12-2/16)

Awards & honors

Editorial Board: Histology & Histopathology (2002-present)
International Journal of Oncology (elected to editorial board, 2005)
Honorary Visiting Professorship, Luzhou Medical College, China (2011-2016)

University/College/Departmental Committees

Chancellor's Advisory Committee (MU, Chancellor Brady Deaton)
Member, Promotion and Tenure Committee, Dept of Biomedical Sciences, University of Missouri-Columbia
Chair, Appointment and Promotion Committee, DCRC
Member, Dalton Cardiovascular Research Center Scientific Programs Committee
Faculty Responsibility Committee (member), College of Vet Med, MU
Chair, 2013 Cardiovascular Research Day Program Committee
Judge, Health Sciences Research Day, MU School of Medicine (2013)

National/International Service

Grant Review
Invited Reviewer, Florida Health Grants (Bankhead-Coley Cancer Research Program) (Follows NCI process for review)
Invited Reviewer, American Medical Association (Neoplastic Study Section)
Reviewer, Fellowship, International Union Against Cancer
Reviewer (ad hoc) University of Missouri Botanical Center Pilot Projects
Reviewer (ad hoc), University of Missouri internal LOIs to select one for Mary Kay

Foundation grant submission

Manuscript Review
BBA-Molecular Cell Research
Carcinogenesis
Endocrine Related Cancer
Environmental Health Perspective
J Agriculture & Food Chemistry
J Clinical Endocrinology & Metabolism
Oncogene

David Kline

Publications

King TL, Kline DD, Ruyle BC, Heesch CM, Hasser EM (2013) Acute systemic hypoxia activates hypothalamic paraventricular nucleus-projecting catecholaminergic neurons in the caudal ventrolateral medulla. Am J Physiol Regul Integr Comp Physiol. 305(10): R1112-23. doi: 10.1152/ajpregu.00280.2013. PubMed PMID: 24049118; PubMed Central PMCID: PMC3841798.

Austgen JR, Kline DD#* (2013) Endocannabinoids blunt the augmentation of synaptic transmission by serotonin 2A receptors in the nucleus tractus solitarii (nTS). Brain Res. 1537: 27-36. doi: 10.1016/j.brainres.2013.09.006. PubMed PMID: 24041777; PubMed Central PMCID: PMC3827968.

Presentations

FASEB Summer Conference, Neural Mechanisms in Cardiovascular Regulation. July 14-19, 2013, Salishan Lodge, Gleneden Beach, Oregon Title: "Modulation of Sensory Afferent Processing in the Brainstem"

Active Grants

1R01 HL085108-01 (Kline DD) 4/01/2008-03/30/2013 NIH/NHLBI $250,000 direct/yr Adaptation of brain-stem circuits to chronic hypoxia Role: PI

R01HL098602 (Kline DD) 04/01/2010 –03/31/2015 NIH/NHLBI Direct: $499,999 Plasticity of nTS output neurons in acute and chronic hypoxia Role: PI (MultiPI: Kline/Hasser/Heesch)

12POST11670002 (Ostrowski) 07/01/2012-06/30/2014 American Heart Association $46,000/yr
Reactive Oxygen Species in Nucleus Tractus Solitarii Output Neurons: Neuronal Properties Following Intermittent Hypoxia

Professional Service

Committee/mentorship
Teaching Activity: Didactic and Clinical Teaching

Veterinary Physiology 5504, Co-Course Director
Veterinary Physiology 5504, Didactic teaching, 11 lecture hours, 18 laboratory hours, 12 examination hours, 4 review hours, 45 total contact hours, 126 students

Neural Control of the Circulation 9467 (Co-listed MPP 9437), Course Director
Neural Control of the Circulation 9467 (Co-listed MPP 9437), Didactic teaching, 5 lecture hours, 10 presentation hours, 4 examination hours, 19 total contact hours, 5 students

National
2013-pres. Joint Programming Committee (JPC) representative, Hypoxia Interest Group of the American Physiological Society. Responsible for programming Experimental Biology meeting abstracts and oral sessions.

College
2013-pres. Member, Non-Tenure Track Promotion Committee (term ends 2016)
2013-pres. Member, Computer Committee (term ends 2016)

University

Departmental
2013-pres. Director of Graduate Studies (DGS)
Function: Maintain the academic integrity of the Dept. Biomedical Sciences graduate degree program. Promote the educational and career success of individual graduate students. Chair of GPAC committee.
2013-2014 Member, Faculty Search Committee, Dept. of Biomedical Sciences
2009-pres. Member, Research Advisory Committee (RAC)
Committee Function: Review and administer requests from faculty and the Chair for the Departmental Research Incentive Funds (RIF)
2007-pres. Member, Graduate Program Advisory Committee (GPAC)
Committee Function: Review departmental graduate student admission applications; provide advisory functions to current students and graduate policies; mediate conflict between students and their mentors

Ronald Korthuis

Publications

Turlo KA, Scapa J, Bagher P, Jones AW, Feil R, Korthuis RJ, Segal SS, Iruela-Arispe ML. β1-integrin is essential for vasoregulation and smooth muscle survival in vivo. Arterioscler Thromb Vasc Biol. 2013 Oct;33(10):2325-35. doi: 10.1161/ATVBAHA.112.300648. Epub 2013 Jul 25.

Wang WZ, Jones AW, Wang M, Durante W, Korthuis RJ. Preconditioning with soluble guanylate cyclase activation prevents postischemic inflammation and reduces nitrate tolerance in heme oxygenase-1 knockout mice. Am J Physiol Heart Circ Physiol. 2013 Aug 15;305(4):H521-32. doi: 10.1152/ajpheart.00810.2012. Epub 2013 Jun 14.

Yang Y, Sohma Y, Nourian Z, Ella SR, Li M, Stupica A, Korthuis RJ, Davis MJ, Braun AP, Hill MA. Mechanisms underlying regional differences in the Ca2+ sensitivity of BK(Ca) current in arteriolar smooth muscle. J Physiol. 2013 Mar 1;591(Pt 5):1277-93. doi: 10.1113/jphysiol.2012.241562. Epub 2013 Jan 7.

Korthuis RJ, Kalogeris T. TRPing up reperfusion: neutrophil TRPM2 channels exacerbate necrosis and contractile dysfunction in post-ischaemic myocardium. Cardiovasc Res. 2013 Feb 1;97(2):197-9

Active Grants

NIH; HL-095486, Program Project Grant, "Mechanisms of Microvascular Control and Coordination in Health and Disease"; Project Director, Project 3, "Microvascular Dysfunction: Impact of Ischemia-Reperfusion on ECM-Vascular Cell Interaction"; $262,000 per year, April 2010- March 2015.

Professional Service

1. American Physiological Society, Committee on Committees, 2011-2013

2. American Physiological Society, Cardiovascular Section Steering Committee, 2002-2013

3. Association of Physiology Department Chairs, 2004 – present

4. Association of Pharmacology Department Chairs, 2004 - present

5. National Heart, Lung, and Blood Institute: Special Emphasis Panel, November 2011

6. Editorial Advisory Boards:
   American Journal of Physiology: Heart and Circulatory Physiology; 2005 – present
   Cardiovascular Research; 2008 – present
   Circulation Research; 2010 - present

7. Associate Editor: Frontiers in Vascular Physiology: 2010 – present

Maike Krenz

Publications

Heart Failure with Preserved Ejection Fraction: Chronic Low-Intensity Interval Exercise Training Preserves Myocardial O2 Balance and Diastolic Function K Marshall, B Muller, M Krenz, L Hanft, KS McDonald, K Dellsperger, C Emter. J Appl Physiol (2013) 114: 131-147

New approaches to prevent LEOPARD-Syndrome associated cardiac hypertrophy by specifically targeting Shp2-dependent signaling C Schramm, MA Edwards, M Krenz J Biol Chem (2013) 288: 18335-18344 [Epub ahead of print 2013 May 14]

Cardiac-specific hexokinase 2 overexpression attenuates hypertrophy by increasing pentose phosphate pathway flux KS McCommis, DL Douglas, M Krenz, CP Baines J Am Heart Assoc (2013) in press

Proteomic Mapping of Proteins Released During Cardiac Myocyte Necrosis K Marshall, MA Edwards, M Krenz, CP Baines AJP – Cell Physiology (2013) in press

Cell Survival Programs and Ischemia/Reperfusion: Hormesis, Preconditioning, and Cardioprotection M Krenz, CP Baines, T Kalogeris, RJ Korthuis. www.morganclaypool.com, ISBN: 9781615045846 paperback; ISBN: 9781615045853 ebook
DOI: 10.4199/C00090ED1V01Y201309ISP044

Presentations at Meetings

Running a tight Sh(i)p: How a phosphatase controls cardiac homeostasis September 12th 2013, University of Missouri-Columbia, College of Veterinary Medicine, Department of Biomedical Sciences

Active Grants

RB 12-09, Research Board Grant, Krenz (PI)
Title: Role of Akt signaling in heart valve development and disease
02/01/12 – 01/31/13 (total cost $52,000)

1R01HL116525-01, Research Project Grant (R01), NIH/NHLBI, Krenz (PI)
Title: SHP2 controls cardiac stress adaptation
07/24/2013 – 06/30/2017 (total cost $1,437,357) Role: PI

Young Investigator Award, National Ataxia Foundation, Baines (PI)
Title: Development of New Mouse Models of Friedreich's Ataxia
01/01/13 – 12/31/13 (total cost $35,000)
Role: Co-Investigator (5% effort = 0.6 calendar months)

Professional Service

July 2013	Abstract Session Builder for Scientific Sessions 2013
July 2013	Pilot tester for development of new online training for grant reviewers
October 2013	AHA Study Section CVD2, member
November 2013	NIH/NHLBI Special Emphasis Panel (R13/U13), ad hoc member

Trainees:
Primary Advisor / Mentor
2012 – present Co-Mentor / Thesis Advisor, College of Veterinary Medicine, Cardiology Residency Program

Secondary Advisor
2009 – 2013 Dissertation Committee Member
2012 – present Dissertation Committee Member

ad hoc Reviewer

2000 – present Basic Research in Cardiology
Circulation Research
Coronary Artery Disease
FEBS Letters
Frontiers in Integrative Physiology
Journal of Applied Physiology
Journal of Cardiac Failure
Journal of Molecular and Cellular Cardiology
Journal of Vascular Research
Trends in Cardiovascular Medicine
Yonsei Medical Journal

2011 - present Review Editor, Frontiers in Integrative Physiology
2009 – present Member, Dalton Safety Committee
2011 – present Member, Dalton Science Display Committee
2011 – present Member, MPP Graduate Education Committee

School of Medicine
2011 – present MPP representative, School of Medicine Faculty Affairs Council

2013 Session Chair, Cardiovascular Day
2013 – 2014 Member, Cardiovascular Day Organizing Committee

Harold Laughlin

Publications

Padilla J, Jenkins NT, Vierira-Potter J, Laughlin MH. Divergent Phenotype of Rat Thoracic and Abdominal Perivascular Adipose Tissues. Am J Physiol-Reg.2013; in press. PMID:23389108

Linden MA, GM Meers, ML Ruebel, NT Jenkins, FW Booth, MH Laughlin, JA Ibdah, JP Thyfault, and RS Rector. Hepatic Steatosis Development with Four Weeks of Physical Inactivity in Previously Active, Hyperphagic OLETF Rats. Am J Physiol-Reg.2013; in press. PMID: 23467323

Mikus CR, Boyle LJ, Borengasser SJ, Oberlin DJ, Nables SP, Fletcher J, Meers GM, RUebel M, Laughlin H, Fadel JP, Thyfault JP. Simvastatin impairs exercise training adaptations. J Am Coll Cardiol. 2013 Aug 20;62(8):709-714.. PMID:23583255

Roberts MD, Bayless DS, Company JM, Jenkins NT, Padilla J, Childs TE, Martin JS, Dalbo VJ, Booth FW, Rector RS, Laughlin MH. Elevated skeletal muscle irisin precursor FNDC5 mRNA in obese OLETF rats. Metabolish 2013. PMID: 23498898

Padilla J, Jenkins NT, Lee S, Zhang H, Cui J, Zuidema MY, Zhang C, Hill MA, Perfield JW 2nd, Ibdah JA, Booth FW, Davis JW, Laughlin MH Rector RS. Vascular transcriptional alterations produced by juvenile obesity in Ossabaw swine. Physiol Genomics. 2013; in press. PMID: 23592636

Arce-Esquivel AA, Bunker AK, Mikus CR, and Laughlin MH. Insulin Resistance and Endothelial Dysfunction: Macro and Microganiopathy. Type 2 Diabetes. Ed by Kazuko Masuo, ISBN 978-953-51-1171-9, InTech June 26, 2013.

Padilla J, Jenkins NT, Laughlin MH, and Fadel PJ. Blood Pressure regulation VIII: resistance vessel tone and implications for a pro-atherogenic conduit artery endothelial cell phenotype. Eur J Appl Physiol online June 2013.

Bahls M, Sheldon RD, Taheripous P, Clifford KA, Foust KB, Breslin ED, Marchant-Forde JN, Cabot RA, Laughlin, MH, Bidwell CA, and Newcomer SC. Mothers' exercise during pregnancy programs vasomotor function in adult offspring Exp Physiol. In press 2013. PMID:

Jenkins NT, Padilla J, Martin JS, Crissey JM, Rector S, Laughlin MH. Differential vasomotor effects of insulin on gastrocnemius and soleus feed arteries in the OLETF rat model; Role of endothelin-1. Exp Physiol. 2013; in press. PMID: 23995100

Crissey JM, Padilla J, Jenkins NT, Martin JS, Rector RS, Thyfault JP, Laughlin MH. Metformin does not enhance insulin-stimulated vasodilaiton in skeletal muscle resistance arteries of the OLETF rat. Microcirculation. 2013; in press. PMID:23879830

Jenkins NT, Padilla J, Rector RS, Laughlin MH. Influence of regular physical activity and caloric restriction on ß-adrenergic and natriuretic peptide receptor expression in retroperitoneal adipose tissue of OLETF rats. Exp Physiol. 2013; in press. PMID:23833052

Padilla J, Jenkins NT, Laughlin MH, Fadel PJ. Blood pressure regulation VIII: resistance vessel tone and implications for a proatherogenic conduit artery endothelial cell pyhenotype. Eur J Appl Physiol 2013; in press. PMID:23860841

Fain JN, Company JM, Booth FW, Laughlin MH, Padilla J, Jenkins NT, Bahouth SW, Sacks HS. Exercise training does not increase muscle FNDC5 protein or mRNA expression in pigs. Metabolism 2013; in press. PMID:23831442

Bahls M, Bidwell CA, Hu J, Tellez A, Kaluza GL, Granada JF, Krueger CG, Reed JD, Laughlin MH, Van Alstine WG, Newcomer SC. Gene expression differences during the heterogeneous progression of peripheral atherosclerosis in familial hypercholesterolemic swine. BMC Genomics. 2013 Jul 3;14:443. PMID:23822099; PMCID:PMC 3716534.

Padilla J, Jenkins NT, Lee S, Zhang H, Zuidema MY, Zhang C, Hill MA, Perfield JW 2nd, Ibdah JA, Booth FW, Davis JW, Laughlin MH, Rector RS. Vascular transcriptional alterations produced by juvenile obesity in Ossabaw swine. Physiol Genomics 2013; Jun 3;45(11)434-446. PMID: 23592636.

Simmons GH, Padilla J, Jenkins NT, and Laughlin MH. Exercise training and vascular cell phenotype in a swine model of familial hypercholesterolaemia: conduit arteries and veins. Exp Physiol. In press, 2013. PMID: 22542613 [PubMed - as supplied by publisher]

Sheldon RD, Roseguini BT, Laughlin MH, and SC Newcomer. New insights into the physiologic basis for intermittent pneumatic limb compression as a therapeutic strategy for peripheral artery disease. J. Vasc Surg 58:1688-1696, 2013. PMID

Active Grants
National Institutes of Health, R01; "Training: Muscle Blood Flow and Capillary Dynamics; Annual Direct $225,000; Duration: 7/15/10-4/20/14; 25% effort; PI.

Professional Service
Administrative Activity:
Chair of Biomedical Sciences
Curators' Professor

Service Activity:
Member of the Editorial Board, Medicine and Science in Sports & Exercise. 2005 - Present
ASSOCIATE EDITOR: Journal of Applied Physiology. March 1, 2008 – Present

Manuscript Review for Journals:

1980-Present Avia. Space Environ. Med	1980-Present J. Applied Physiol
1980-Present Med. Sci. Sports Exercise	1981-Present Am. J. Physiol.
1985-Present Hypertension	1990-Present Microvascular Research
1993-Present Circulation	1993-Present Circulation Research
1994-Present Microcirculation	

GRANT REVIEW COMMITTEES:
7/1/1990-Present National Institutes of Health Reviewer reserve

Yayun Liang

Publications

Carroll C, Liang Y, Besch-Williford C, Benakanakere I, and Hyder, S.M. (2013) An anticancer agent YC-1 suppresses progestin-stimulated VEGF in breast cancer cells and arrests breast tumor development. Int. J. Oncology, 42: 179-187.

Neubauer H, Schneck H, Seeger H, Cahill M. A., Fehm T, Liang Y, Mafuvadze B, Hyder S.M., and Mueck, A.O. (2013) Overexpression of PGRMC1—possible mechanism for the observed increased breast cancer risk using norethindrone in hormone therapy. Menopause, 20: 504-510.

Presentations

Invited as Guest Lecturer by CV Day Committee, University of Missouri at 20th Annual Cardiovascular Day, Lecture title " Targeting tumor blood vessels and mutant p53 protein: A promising preclinical targeted therapy for combating advanced human breast cancer" in Columbia, Missouri, on February, 2013.

Active Grants

Liang, Yayun (Co-I), Hyder, S. M (PI), "Treatment and prevention of breast cancer using multi-functional inhibitors of cholesterol biosynthesis" Dept of Defense Breast Cancer Pgm. $500,000-direct cost (6/1/12-5/31/14).

Liang, Yayun (Co-I), Hyder, S. M (PI), "Blocking Androgen Receptor Activity with an Inhibitor of Cholesterol Synthesis: A Novel Means of Suppressing Prostate Cancer" Department of Defense Breast Cancer Pgm. Total cost: $151500.00 (6/1/14-5/30/15).

Professional services

9/2012-Present Adjunct Research Associate Professor, Dept. of Biomedical Sciences, College of Veterinary Medicine, University of Missouri, MO, USA
Editorial Board of Chinese Journal of Clinicians (International) (2011-2014)
Active member of American Association for Cancer Research (1997-present)
Active member of Women in Cancer Research (2002-present)
Active member of Minorities in Cancer Research (2009-present)

Luis Martinez-Lemus

Publications

Schenewerk, A., C. Foote, L.A. Martinez-Lemus, and R.M. Rivera. The effect of maternal high fat diet and ART on cardiovascular health and body weight in offspring. Presented at the Rocky Mountain Reproductive Sciences Symposium. Loveland, CO, April 19, 2013.

Staiculescu, M.C., Z. Hong, Z. Sun, F. Ramirez-Perez, G.A. Meininger, L.A. Martinez-Lemus. Lysophosphatidic acid-induced integrin activation in vascular smooth muscle cells requires production of reactive oxygen species. Annual Meeting of the Societies for Experimental Biology. Boston, MA, April 2013. Published in FASEB J., 2013.

Foote, C., F.I. Ramirez-Perez, M.A. Hill, G.A. Meininger, L.A. Martinez-Lemus. Topical application of serotonin + L-NAME in vivo induces inward remodeling of the rat cremasteric 1A arteriole via a mechanism that is antagonized by the addition of cystamine, a competitive inhibitor of transglutaminase II. Annual Meeting of the Societies for Experimental Biology. Boston, MA, April 2013. Published in FASEB J., 2013.

Ramirez-Perez, F.I., A. Schenewerk, C. Foote, G. Zhao, R.M. Rivera, L.A. Martinez-Lemus. Mice produced by the use of assisted reproductive technologies from dams provided a high-fat and –fructose diet have reduced arterial vasodilation responses to acetylcholine. Annual Meeting of the Societies for Experimental Biology. Boston, MA, April 2013. Published in FASEB J., 2013.

Zhao, G., J.A. Castorena-Gonzalez, J.R. Sowers, L.A. Martinez-Lemus. Differential remodeling characteristics of femoral and mesenteric arteries from mice with diet-induced obesity. Annual Meeting of the Societies for Experimental Biology. Boston, MA, April 2013. Published in FASEB J., 2013.

Castorena-Gonzalez, J.A., M.C. Staiculescu, G. Zhao, L.A. Martinez-Lemus. Contribution of the actin cytoskeleton to the viscoelastic characteristics of inwardly remodeled arterioles. Annual Meeting of the Societies for Experimental Biology. Boston, MA, April 2013. Published in FASEB J., 2013.

Martinez-Lemus, L.A., R.A. de la Torre, E.L. Galiñanes, M.J. Perna, G. Zhao, J.A. Castorena-Gonzalez. Arterioles from bariatric patients with diabetes have blunted responses to insulin but not acetylcholine. Annual Meeting of the Societies for Experimental Biology. Boston, MA, April 2013. Published in FASEB J., 2013

Presentations

Mechanisms of vascular wall plasticity in resistance arteries. Kansas City University of Medicine and Biosciences. Kansas City, MO 64112 (December 2013)

Appointed member of the subcommittee for animal studies at the Harry S. Truman Memorial Veterans Hospital, 800 Hospital Dr. Columbia, MO 65201 (December 2013-2016)

Active Grants

National Institutes of Health (NIH) RO1. "Mechanisms of Microvascular Remodeling Progression." Principal Investigator, Luis A. Martinez-Lemus (40% Effort), $2,250,000.00 for 2009-2014. Scored at 120 (3.5%).

National Institutes of Health (NIH) PO1. "Mechanisms of Microvascular Control and Coordination in Health and Disease." Principal Investigator, Gerald A. Meininger. Core Director, Luis A. Martinez-Lemus (15% Effort), $8,470,000.00 for 2010-2014

Professional Service

European Society for Microcirculation
American Physiological Society
Poultry Science Association
Microcirculatory Society: Councilor (2011-2014)
International Society for Resistance Arteries (ISRA) 2014 Tri-annual Conference Organization Committee (2013-2014)

American Physiological Society-Cardiovascular Section: NIH Liaison Committee (2012-2015)

Microcirculatory Society: Membership Committee (2010-2013)

Appointed member of the Dalton Cardiovascular Research Center Safety Committee (2009-Present).
Appointed member of the Appointment and Promotions Committee for non-tenure track faculty within the Dalton Cardiovascular Research Center, University of Missouri-Columbia (2006-Present).

Editorial Board Member for "CardioRenal Medicine," 2012-Present.
Review Editorial Board for "Frontiers in Vascular Physiology," 2010-Present.
Editorial Board member for "Microcirculation," 2010-2015.
Journal of Vascular Research
Arteriosclerosis, Thrombosis, and Vascular Biology
American Journal of Physiology
Heart and Circulatory Physiology
Regulatory, Integrative and Comparative Physiology
Clinical and Experimental Medicine
The Anatomical Record
Experimental Physiology
Poultry Science
BioMed Central Cell Biology
Hospital Practice
Microcirculation
Hypertension
Clinical and Experimental Pharmacology and Physiology

Gerald Meininger

Publications

Aroor A.R., G. Jia, Z. Sun, R. Nistala, G.A. Meininger and J.R. Sowers. Role of tissue renin angiotensin aldosterone system in the development of endothelial dysfunction and arterial stiffness. Frontiers in Cellular Endocrinology, 2013. (In Press)

Jia G., A.R. Aroor, G.A. Meininger, Sowers, J. Glucose, insulin and potential strategies of vascular stiffening. In: Pulse Pressure and Arterial Stiffness in Cardiovascular Prevention, edited by Drs. Michel E. Safar, Michael F. O'Rouke, and Edward D. Frohlich, Springer Science+Business Media, 2013. (In Press)

Sun, Z. and G.A. Meininger. N-cadherin, a vascular smooth muscle cell-cell adhesion molecule: function and signaling for vasomotor control. Microcirculation, 2013. (Submitted)

Hill, M.A. and G.A. Meininger. Smooth muscle cells as the driving force of vascular wall structure: Integrating cytoskeletal and adhesive proteins and tissue engineering concepts. Cardiovascular Research, 2013. (In Preparation)

Stockard, K.A., M.A. Hill, G.A. Meininger and L.A. Martinez-Lemus. The Structure and Function of the Internal Elastic Lamina. Frontiers in Vascular Biology, 2013. (In Preparation)

Presentations

Hong Z., Z. Sun, Z. Li, J.P. Trzeciakowski, G.A. Meininger. Vasoactive agonists alter rhythmic oscillations in vascular smooth muscle cell stiffness and change cytoskeletal architecture. 2013 Linz Winter Workshop on Single-Molecule Research for Biology & Nanoscience, Linz, Austria, February 15-18, 2013.

Sehgel, N.L., Y. Zhu, S. Gao, Z. Sun, J.P. Trzciakowski, Z. Hong, W.C. Hunter, D.E. Vatner, H. Qui, S.F. Vatner, G.A. Meininger. Vascular smooth muscle cell stiffness: a mechanism for increased aortic stiffness in hypertension. 2013 Linz Winter Workshop on Single-Molecule Research for Biology & Nanoscience, Linz, Austria, February 15-18, 2013.

Hong Z., Z. Sun, Z. Li, J.P. Trzeciakowski, G.A. Meininger. Vasoactive agonists induce oscillations in vascular smooth muscle cell stiffness and alter cytoskeletal architecture. Experimental Biology, Boston, MA, April 20-24, 2013.

K.J. Reeves, Z. Hong, Z. Sun, Z. Li, G.A. Meininger. Relationship between vascular smooth muscle cell stiffness and integrin-mediated collagen adhesion in response to specific vasoconstrictors and vasodilators. Experimental Biology, Boston, MA, April 20-24, 2013

Seminars

"Use of confocal microscopy and atomic force microscopy for studies of vascular cell biology", Muscle Biology Research Group, School of Nursing and School of Medicine, University of Kansas-Medical Center, Kansas City, MO, January 2013.

"Studies of communication between extracellular matrix proteins and vascular smooth muscle cells: Biology at the tip of an atomic force microscope", Translational Neuroscience Seminar Series, University of Missouri, Columbia, MO, January 2013.

"Increased aortic stiffness in hypertension: Atomic force microscopy reveals a new mechanism involving vascular smooth muscle cell stiffness and adhesion", Division of Biomedical Sciences, St George's, University of London, June 2013.

"Increased aortic stiffness in hypertension: Revealing a role for Vascular Smooth Muscle Using Atomic force microscopy" Department of Biomedical Sciences, College of Veterinary Medicine, University of Missouri, Columbia, MO, October 2013.

"How well do we understand vascular wall architecture and vascular smooth muscle cell interactions with the extracellular matrix?", Southwest National Primate Research Center, Texas Biomedical Research Institute, San Antonio, TX, November 2013

Active Grants

National Institutes of Health-National Heart, Lung and Blood Institute, P01, Program Project Grant, "Mechanisms of Microvascular Control and Coordination in Health and Disease", Project Director and Principal Investigator, G.A. Meininger (30% effort), with MJ Davis, and RJ Korthuis as project leaders, $5,549,287 direct ($8,471,385 total) for 04/01/2010-03/31/2015.

As Co-Investigator National Institutes of Health-National Heart, Lung and Blood Institute, R01, Intrinsic vascular smooth muscle cell stiffness, Principal Investigator, S. Vatner, Co-Investigator, G.A. Meininger (5%), $213,827 (total for 5 year sub-contract period, direct and indirect), 04/01/10-03/31/15.

National Institutes of Health - National Heart, Lung and Blood Institute, Public Health Service Grant, R01, "Acute mechanisms of vascular remodeling", Principal Investigator, Luis A. Martinez-Lemus, Co-Investigator, G.A. Meininger (10% effort), $1,250,000 (direct) ($1,825,523 total) for 07/01/09-06/30/14.

Professional Service

APS: Conference Committee, Chair, 2011-2013.
Commission II – Circulation/Respiration; Section: Microcirculation; Member 2002-2009; Chair, 2010-2015.
Member, US National Committee to the International Union of Physiological Sciences, 2006-present.

Scientific Journals

Editorships
Editor-in-Chief for Frontiers in Vascular Physiology, January 2010-present.
Co-Editor (US) for Journal of Vascular Research, August 1999-Present.

Editorial Boards

Editorial Board Member for Frontiers in Cardiovascular and Smooth Muscle Pharmacology, 2010-present.
Editorial Board Member for International Journal of Physiology, Pathophysiology and Pharmacology, 2010-present.
Editorial Board Member for Nanotechnology, Science and Applications, 2007-present.
Editorial Board Member for Microcirculation, 1993-1999; 2003-2009; 2010-2012.

Member of the Strategic Planning and Resource Advisory Council (SPRAC), Office of the Chancellor, University of Missouri, July 2012-June 2015.

Member of the Internal Medicine Research Council (IMRC), Department of Internal Medicine, School of Medicine, University of Missouri, September 2012-present.

Member of Advisory Committee Meeting for T90/R90 Clinical Biodetective Training Grant, March 2009-present.

Member of School of Medicine Advisory Committee on Research Space, November 2010-present.

Member of Graduate and Doctoral Faculty at the University of Missouri-Columbia, September 2005-Present.

Member Council of Chairs, School of Medicine, University of Missouri-Columbia, September 2005-Present.

Member Center Directors Council, Office of Research, University of Missouri-Columbia, October 2005-Present.

Member Core Imaging Facility, Dalton Cardiovascular Research Center, University of Missouri-Columbia, September 2005-Present.

Mark Milanick

Publications

Milanick MA and Prewitt RL. Fact or Fiction? General Chemistry Helps Students Determine the Legitimacy of Television Program Situations. Journal of Chemical Education. 90. 904-906, 2013

Active Grants

NIH R21 DK09186 Developing a non-invasive monitoring system using NIR dyes inside erythrocytes
233,719 non-competitive renewal.

Professional Services

Graduate Student Committees

Journal Reviewer: Journal of Physiology

Red Cell Club, 1979-present
National Association of Biology Teachers, 2011-present

2010-present Chair, Campus Minority Affairs Committee
2008-present Departmental Doctoral Faculty Review Committee
2012-present MU Status of Women Committee

Luis Polo-Parada

Publications

Luis Polo-Parada, Gabriel Mettlack, Lauren Peca, Clinton T. Rubin, Florian Plattner and James A Bibb (2013). Enhancement of neuromuscula dynamics and strenght behavior using extremely low magnitude mechanical signals in mice. Journal of Biomechanics. In Press.

Luis Polo-Parada and Amol A. Modgi (2013) .Differences in Expression and Function in the Atrium versus Ventricle of the Sodium-Calcium Exchanger in the Embryonic Chicken Heart," ISRN Physiology, vol. 2013, Article ID 921527, 12 pages, 2013. doi:10.1155/2013/921527.

G. Gutiérrez-Juárez, H. A. Vela-Lira, M. Yánez-Limón, F. J. García-Rodríguez and Luis Polo-Parada (2013). Quantitative photoacoustic spectroscopy in the frequency domain. International Journal of Thermophysics. In Press.

Bryant C. Harris, Venumadhav Korampally, Craig Weilbaecher, Luis Polo-Parada, Sheila Grant, Shubhra Gangopadhyay. (2013). Protease biosensing on novel high surface area organosilicate nanoporous films. Sensors and Actuators B: Chemical. Volume 176, January 2013, Pages 351–359.

J.E. Alba-Rosales, G Ramos-Ortiz, M. Rodriguez, G Gutierrez-Juarez and L Polo-Parada (2013). In situ Characterization of Laser Ablation by Pulsed Photoacoustic: The Case of Organic Nanocrystal Synthesis. International Journal of Thermophysics. 1394-2, DOI 10.1007/s10765-013-1394-2.

Presentations

Centro Universitario de los Lagos
Universidad de Guadalajara. Mexico
Centro de Investigaciones en Optica-Leon Gto. Mexico

Active Grants

Nano thermite Based Micro shockwave generator and nanoparticles for targeted and efficient Gene/Drug Delivery. Co-Investigator, 50% FTE. Co-Investigator, Shubhra Gangopadhyay, Ph. D. Funded by NSF. 6/2009-6/2012 $375,000 Requested one year extension 6/2013

Professional Service

Advisor Ph. D. Students:

Advisor Post-Doctoral:

- Dr. Asur Guadarrama Santana. University of Mexico. CYCADET. 2012-2013
- School of Medicine Research Council. 2012-2015
- Hearnes Center Committee. 2011-2013
- MU PREP (Post-baccalaureate Research Education Program. 2008-present

This is a program funded by NIH to increase research skills of BA/BS graduates from underrepresented minority or disadvantaged populations or with disabilities in order to enable them to enter and successfully complete PhD programs in the biomedical sciences.

Advisory committee Member of the University of Missouri Doctoral Faculty 2009-2014
Committee on Committees 2013-2016
School of Medicine Research Council. 2012-2015

American Heart Association. Peer Review. Cardiac Bio BCT4. Spring 2013

American Heart Association 2004-present
Society for Neuroscience 1999-present
Biophysical Society 1994-present

Leona J Rubin

Publications

Riociguat for pulmonary hypertension. Ghofrani HA, Simonneau G, Rubin LJ; Authors of CHEST-1 and PATENT-1. N Engl J Med. 2013 Dec 5;369(23):2268. doi: 10.1056/NEJMc1312903. No abstract available. PMID:24304056

Professional Services

Interim Vice Provost for Advanced Studies Dean of The Graduate School

Steven Segal

Publications

Westcott EB and Segal SS. Ageing alters perivascular nerve function of mouse mesenteric arteries in vivo. J Physiol 591.5:1251-1263, 2013. PMC3607869

Behringer EJ, Shaw RL, Socha MJ, W and Segal SS. Aging Impairs Electrical Conduction Along Endothelium of Resistance Arteries Through Enhanced Ca2+-Activated K+ Channel Activation. Arterio Thromb Vasc Biol 33:1892-1901, 2013. PMC3769416 96.

Turlo KA, Scapa J, Bagher P, Jones AW, Feil R, Korthuis RJ, Segal SS and Iruela-Arispe ML. β1-integrin is essential for vasoregulation and smooth muscle survival in vivo. Arterio Thromb Vasc Biol 33:2325-2335, 2013. PMID: 23887637 (PMC Journal – In Process)

Socha MJ and Segal SS. Isolation of Microvascular Endothelial Tubes from Mouse Resistance Arteries. J Vis Exp 81: e50759, 2013 (PMC Journal – In Process) http://www.jove.com/video/50759

Presentations

ASPET Symposium, Experimental Biology 2013 (04/2013; Boston, MA)
Symposium: "Local Ca2+ signals in the endothelium: Key regulators of vascular function & dysfunction"
Presentation: "Multiple Roles of Endothelial Ca2+ Signaling in Resistance Networks"

American Society for Hypertension Conference (05/2013; San Francisco, CA)
Symposium: "Vascular Wall Signaling: How Are Cells Coupled?"
Presentation: "Intercellular Coupling and Neuromodulation of Signaling"

International Gap Junction Conference (07/2013; Charleston SC)
Keynote Lecture: "Intercellular Coordination of Blood Flow Control: Modulation by Aging and Neuroeffector Signaling"

Malpighi Award, European Society for Microcirculation (07/2013; Birmingham, UK)
Plenary Lecture: "Integration and Modulation of Intercellular Signalling Underlying Blood Flow Control"

Vascular Biology 2013 (10/2013; Cape Cod, MA)
Opening Plenary Lecture: "Integrating and Modulating Intercellular Signaling Underlying Blood Flow Control"

"Abschiedssymposium" for H. Hoppeler (11/2013; University of Bern, Switzerland)
Presentation: "Coupling Microvascular Perfusion to Motor Unit Recruitment"

Segal continued

Active Grants

R37 HL041026; National Institutes of Health/NHLBI (Segal, PI)
Title: "Intercellular Coordination of Blood Flow Control"
Current Project Period: 09/01/2008-02/28/2019 (MERIT Award)

R01 HL086483; National Institutes of Health/NHLBI (Segal, PI)
Title: "Microcirculation in Aging Skeletal Muscle"
Current Project Period: 09/01/2007-11/30/2014 (NCTE)

Yoshiro Sohma

Publications

Yu YC, Sohma Y, Takimoto S, Miyauchi T, Yasui M. Direct Visualization and Quantitative Analysis of Water Diffusion in Complex Biological Tissues using CARS Microscopy. Sci. Rep. 3, 2745; DOI:10.1038/srep02745. 09/2013

Turker I, Yu CC, Chang PC, Chen Z, Sohma Y, Lin SF, Chen PS, Ai T. Amiodarone inhibits apamin-sensitive potassium currents. PLoS One. 29;8(7): e70450. 07/2013

Sohma Y, Yu YC, and Hwang TC. Curcumin and Genistein: the combined effects on disease-associated CFTR mutants and their clinical implications. Curr Pharm Des. 19(19): 3521 – 3528. 06/2013

Yang Y, Sohma Y, Nourian Z, Ella SR, Li M, Stupica A, Korthuis RJ, Davis MJ, Braun AP, Hill M. Mechanisms underlying regional differences in the Ca2+ sensitivity of BKCa current in arteriolar smooth muscle. J. Physiol. 591: 1277 – 93. 03/2013

Presentations

Sohma Y, Yamashita H, Uchihashi T, Yasui M, Hwang TC, Ando T (2013) Direct observation of CFTR single molecular fluctuation using high-speed AFM. Symposium "Membrane proteins in renal tubules: from molecules to diseases". 90th Annual Meeting, The Physiological Society of Japan, March 29 – 31, 2013; Tokyo, Japan.

Yamashita H, Aizu S, Kato J, Abe Y, Yasui M, Sohma Y (2013) Direct observation of aquaporin 4 using high-speed AFM. Symposium "Single ion channels updated: from elementary process to disease treatment". 51th Annual Meeting, The Biophysical Society of Japan, September 28 – 30, 2013; Kyoto, Japan.

Active Grants

2010.4 – 2013.3 Grant-in-Aid for Scientific Research (C): 22590212, PI, "ATP-hydrolysis switch hypothesis for mechanism of NBD engine in ABC transporters", funded by the Japan Society for the Promotion of Science.

2013.4 – 2016.3 $160,000., $130,000. Japan Society for the Promotion of Science. Grant-in-Aid for Scientific Research (B): 25293049, PI, "Mechanism of ABC transporters studied by direct observations using high-speed Atomic Force Microscopy".

2013.4 – 2014.3 $15,000., $15,000. Keio Gijuku Fukuzawa Memorial Fund for the Advancement of Education and Research. Research support: PI, "Study for the dynamics of membrane protein complex by high-speed AFM and CARS microscopy".

2011.4 – 2013.3 Research support: PI, "Approach to a novel membrane transport physiology based on a direct observation of water and lipids by a non-linear optical microscopy" funded by Keio Gijuku Fukuzawa Memorial Fund for the Advancement of Education and Research

2011.4 – 2013.3 Grant-in-Aid for Scientific Research on Innovative Areas: 23118714, PI, "Mechanism for utilizing ATP-hydrolysis energy in NBD engine in ABC transporters", funded by the Japan Society for the Promotion of Science.

2012.4 – 2013.3 Individual Research (Special A): PI, "A novel drug developing system based on single molecular live-imaging by high-speed atomic force microscopy" funded by Keio Gijuku Academic Development Funds.

Professional Services

Society of General Physiologist (USA)
Biophysical Society (USA)
The Physiological Society (UK)
Physiological Society of Japan
Biophysical Society of Japan
The Japanese Pharmacological Society

Editorial Board: 2006.4 – present Member, Editorial Board, Journal of the Physiological Society of Japan.

James Sowers

Publications

Hypertension. A Companion to Braunwald's Heart Disease. Second Edition. Hypertension and Diabetes Mellitus: An Update. Sowers JR, Allcock DM, Whaley-Connell AT. Saunders, an imprint of Elevier Inc., Philadelphia, PA, 2013

Active Grants

2012-2016 BLR&D, Interactions of the RAAS and a Western Diet on Insulin Metabolic Actions, James R. Sowers (PI), 650,000

2011-2016 NHLBI, Ang II and Overnutrition and Insulin resistance in Cardiovascular Tissue, James R. Sow ers (PI), $1,250,000.

2009-2014 NHLBI, Ang II and Aldosterone Effects on Insulin Resistance in Cardiovascular Tissue, James R. Sowers (PI), $1,250,000.

Professional Service

Professional consultation (other patient care)
- Public presentations as an expert in endocrinology, metabolism and hypertension and vascular medicine
- No consulting to public agencies, foundations, or professional associations

Journal Editorial activity
Editor In Chief –
Cardiorenal Medicine 2010-present
Associate Editor – Diabetes, Journal of Hypertension 2011-present

Editorial Board Memberships
- o 2006-present Journal of Hypertension
- o 2006-present Journal of American Society of Hypertension
- o 2004-present Cardiovascular Drug Reviews
- o 2002-present American Journal Clinical Hypertension
- o 2002-present American Journal Hypertension
- o 1996-2004 Endocrinology, Nutrition, Metabolism and Cardiovascular Diseases, Journal of Clinical Endocrinology & Metabolism
- o 1994-present Journal of Human Hypertension
- o 1991-present Metabolism
- o 1991- present Hypertension

Editorships - Reviewer
New England Journal of Medicine, Hypertension, Journal of Biological Chemistry, Circulation, Circulation Research, American Journal of Physiology, Diabetes, Journal of Clinical Investigation, Journal of Clinical Endocrinology and Metabolism, Endocrinology, American Journal of Medicine, Archives of Internal Medicine, Annals Internal Medicine, Journal American Medical Association, and others.

Other professionally related service
- NIH, VA Merit Board, American Heart National Reviews Committees
- Department of Veterans Affairs (VA) Joint Biomedical Laboratory Research and Development and Clinical Science Research and Development Scientific Merit Review Board
- VCMB (Vascular Cell Molecular Biology) Study Section - NIH
- Data Monitoring Committee "Combination Angiotensin Receptor Blocker and Angiotensin converting Enzyme Inhibitor for Treatment of Diabetic Nephropathy. Cooperative Studies Program Coordinating Center. VA Connecticut Healthcare System
- Microcirculation Study Section – NIH

National and International Boards and Committees
- Positions held in professional associations
- Educational Committee - High Blood Pressure Council
- Scientific Awards Committee - American Society of Hypertension
- External Advisory Board – COBRE grant "Hypertension and Cardiorenal Disease Research Center, John Hall, University of Mississippi

State and Local Boards and Committees
- University of Missouri Internal Medicine Research Council, Chiar – 2011-present
- SOM Administrators Research Council (ARC) 2004-present
- Truman VA Research and Development Committee 2004-present
- R and D committee; ACCORP Truman VA 2004-present

COMMITTEES AND STUDY SECTIONS
Charter Member VCMB Study Section – NIH – 2010-present

04/2007-Present	Director, Center for Diabetes and Cardiovascular Research, Columbia, Missouri
04/2007-Present	Director, Division of Endocrinology, Diabetes & Metabolism, University of Missouri-Columbia, Columbia, Missouri
04/2007-Present	Vice-Chair for Research, Department of Internal Medicine, University of Missouri-Columbia, Columbia, Missouri

04/2007-Present	Professor of Medicine, Physiology & Pharmacology, University of Missouri-Columbia, Missouri
04/2007-Present	Staff Physician, Medical Service, Truman VA, Columbia, Missouri

Major Professional Societies

American Society Clinical Investigation
Alpha Omega Alpha, Honor Medical Society
American Physiology Society
Society of Vascular Medicine
American Federation of Clinical Research
Fellow, High Blood Pressure Council
American College of Physicians
Endocrine Society
American Diabetes Association
American Society of Hypertension
American College of Physicians (Fellow)
Southern, Western, and Central Society of Clinical Investigation
International Society of Hypertension
International Society of Hypertension in Blacks
Inter-American Society of Hypertension

Zhe Sun

Publications

Aroor AR, Demarco VG, Jia G, Sun Z, Nistala R, Meininger GA, Sowers JR. The Role of Tissue Renin-Angiotensin-Aldosterone System in the Development of Endothelial Dysfunction and Arterial Stiffness. Front Endocrinol (Lausanne). 2013 Oct 29;4:161.. Review.PMID: 24194732

Sehgel NL, Zhu Y, Sun Z, Trzeciakowski JP, Hong Z, Hunter WC, Vatner DE, Meininger GA, Vatner SF. Increased vascular smooth muscle cell stiffness: a novel mechanism for aortic stiffness in hypertension. Am J Physiol Heart Circ Physiol. 2013, Nov; 305(9):H1281-7. PMID: 23709594

Askarova S, Sun Z, Sun GY, Meininger GA, Lee JC. Amyloid-β peptide on sialyl-Lewis(X)-selectin-mediated membrane tether mechanics at the cerebral endothelial cell surface. PLoS One. 2013 Apr 12;8(4):e60972. Print 2013. PMID: 23593361

Reeves KJ, Hou J, Higham SE, Sun Z, Trzeciakowski JP, Meininger GA, Brown NJ. Selective measurement and manipulation of adhesion forces between cancer cells and bone marrow endothelial cells using atomic force microscopy. Nanomedicine (Lond). 2013 Jun;8(6):921-34. PMID:23199365

Clark CG, Sun Z, Meininger GA, Potts JT. Atomic force microscopy to characterize binding properties of α7-containing nicotinic acetylcholine receptors on neurokinin-1 receptor-expressing medullary respiratory neurons. Exp Physiol. 2013 Feb;98(2):415-24. PMID: 22962286

Marius Catalin Staiculescu, Zhongkui Hong,Zhe Sun, Francisco Ramirez-Perez, Gerald A. Meininger, and Luis A Martinez-Lemus (2013) Lysophosphatidic Acid-Induced Integrin Activation in Vascular Smooth Muscle Cells Requires Production of Reactive Oxygen Species FASEB J, 27:678.6

\Nancy Lisa Sehgel, Yi Zhu, Zhe Sun, Zhongkui Hong, William C. Hunter, Dorothy E. Vatner, Gerald A. Meininger and Stephen F. Vatner, (2013), Isolated Vascular Smooth Muscle Stiffness as a Common Mechanism to the Increased Aortic Stiffness of Aging and Hypertension FASEB J April 9, 2013 27:lb687

Kimberley Jayne Reeves, Zhongkui Hong, Zhe Sun, Zhaohui Li and Gerald Alan Meininger, (2013) Relationship between vascular smooth muscle cell stiffness and integrin-mediated collagen adhesion in response to specific vasoconstrictors and vasodilators FASEB J, 27:679.7

Zhongkui Hong, Zhe Sun, Zhaohui Li, Jerome P. Trzeciakowski and Gerald A. Meininger, (2013) Vasoactive agonists induce oscillatory changes in vascular smooth muscle cell stiffness and alter cytoskeletal architecture FASEB J, 2013 27:921.4

Zhe Sun, Min Li, Zhaohui Li, Michael A. Hill and Gerald A. Meininger (2013) N-cadherins Serve as a Mechanotransducer in Mid-Cerebral Artery Smooth Muscle FASEB J, 27:678.8

Sun continued

Yi Zhu, Min Li, Zhe Sun, Zhaohui Li, Zhongkui Hong,and Gerald A. Meininger (2013) Calcium and its role in vascular smooth muscle cell cortical elasticity and adhesion FASEB J,27:lb700

Active Grants

1P01HL095486 (G. Meininger, PI) $ 1,515,000 04/01/2010~03/31/2015
Project Title: Mechanisms of Microvascular Control in Health and Disease
National Institutes of Health- National Heart, Lung and Blood Institute
Role: Co-Investigator, 20% effort

Professional Service

Assistant Research Professor, Dalton Cardiovascular Research Center, University of Missouri-Columbia, November 2005- present Supervisor: Dr. Gerald A. Meininger

Director of the Atomic Force Microscopy Core, Dalton Cardiovascular Research Center, University of Missouri-Columbia, November 2008- present. Supervisor: Dr. Gerald A. Meininger

Sigma Xi, the Scientific Research Society
Microcirculation Society
American Physiological Society

Ad Hoc Reviewer:
American Journal of Physiology: Heart and Circulatory Physiology
Journal of Vascular Research
Journal of Neuroscience Methods
Nature Nanotechnology
Nano-Medicine

Ronald L. Terjung

Publications

Shin JH1, Pan X, Hakim CH, Yang HT, Yue Y, Zhang K, Terjung RL, Duan D. Microdystrophin ameliorates muscular dystrophy in the canine model of duchenne muscular dystrophy. Mol Ther. 2013 Apr;21(4):750-7.

Active Grants

NIAMS T32-AR048523-06 through 10: Exercise and Health: Integration From Molecule to Patient, P.I.: R.L.T. Sum: $1,309,555, 07-01-09 to 06-30-14.

Research Grant: Jesse's Journey. AAV micro-dystrophin therapy in a single intact muscle in GRMD dogs, P.I.: D. Duan. R.L.T: Consultant; Sum: $294,204. 1/1/2011-12/31/2013.

Muscular Dystrophy Assoc of America. Improving AAV potency for DMD gene therapy
P.I.: D. Duan. RLT: Consultant; Sum: $527,670, 2/1/2011 – 1/31/2014

Professional Service

2004-Present Member, Executive Committee, College of Veterinary Medicine

2004-Present Member, Council of Research Advisors, Asst Chancellor for Research

2004-Present Director, Grant Review Program, College of Veterinary Medicine

2004-Present Co-Chair, Search Committee, Clinician Scientists-Mission Enhancement, Division of Cardiology, Dept. of Internal Medicine, College of Medicine

1998/2000/02/04/06/08/10/12 Course Director with Dr. C. Hardin, Control of Energy Metabolism (VBMS/MPP 9431), Joint listed: Biomed Sci and Med Pharm & Physiol: Selected lectures (10 3-hr sessions)

Xiaoqin Zou

Publications

Sheng-You Huang, Chengfei Yan, Sam G. Grinter, Shan Chang, Lin Jiang, Xiaoqin Zou*. Inclusion of the orientational entropic effect and low-resolution experimental information for protein-protein docking in CAPRI. Proteins: Structure, Function and Bioinformatics, Special Issue on 5th CAPRI Evaluations (highly competitive selection), 81: 2183–2191, 2013.

Sam G. Grinter, Chengfei Yan, Sheng-You Huang, Lin Jiang, Xiaoqin Zou*. Automated large-scale file preparation, docking, and scoring: Evaluation of ITScore and STScore using the 2012 Community Structure-Activity Resource Benchmark. Journal of Chemical Information and Modeling, Special Issue on CSAR 2012 Scoring Exercise (invited), 53: 1905–1914, 2013.

Sheng-You Huang, Xiaoqin Zou*. A non-redundant structure dataset for benchmarking protein-RNA computational docking. Journal of Computational Chemistry 34: 311-318, 2013. (Selected as the front cover of the issue.)

Juan Xu, Xie Jie, Chengfei Yan, Xiaoqin Zou, Dongtao Ren, and Shuqun Zhang. A chemical genetic approach demonstrates that MPK3/MPK6 activation and NADPH oxidase-mediated oxidative burst are two independent signaling events in plant immunity. The Plant Journal, doi: 10.1111/tpj.12382 [Epub ahead of print].

Min Li, Shan Chang, Jingyi Shi, Kelli McFarland, Longlin Yang, Xiao Yang, Alyssa Moller, Chunguang Wang, Xiaoqin Zou, Chengwu Chi, Jianmin Cui. Conopeptide Vt3.1_1 preferentially inhibits BK channels containing b4 subunits via electrostatic interactions. Journal of Biological Chemistry, accepted.

Marc F. Lensink, et al. Blind Prediction of Interfacial Water Positions in CAPRI. Proteins: Structure, Function and Bioinformatics, Special Issue on 5th CAPRI Evaluations, DOI: 10.1002/prot.24439. [Epub ahead of print].

Rocco Moretti et al. Community-wide evaluation of methods for predicting the effect of mutations on protein-protein interactions. Proteins: Structure, Function and Bioinformatics, 81:1980-1987, 2013.

Presentations

Zing Conference "Protein and RNA Structure Prediction", Xcaret, Mexico, 2013.

American Physical Society March Meeting, focus session on "Physics of Proteins II: Advances in Protein Folding, Structure, Dynamics and Function", Baltimore, Maryland, 2013.

Department of Physics, SUNY Albany, Albany, New York, 2013.

Active Grants

Funding Agency: NSF Grant # 0953839
Project Title: CAREER: A computational approach to template-based structure selection for protein-protein interactions Funding Period: August 1, 2010 to July 31, 2015 Total Amount: $734,016
Principal Investigator: Xiaoqin Zou

Funding Agency: American Heart Association (Midwest Affiliate) Grant # 13GRNT16990076
Project Title: Structure-based screening and discovery of potentiators for KCNQ1 and IKs channels
Funding Period: July 1, 2013 – June 30, 2015 Total Amount: $143,000
Principal Investigator: Xiaoqin Zou

Professional Services

Biochemistry 4970 (Biochemistry Department, co-taught with David Emerich). This is a capstone course for Biochemistry majors and is a case-based course, which includes written and oral presentations. Fall 2013, 8 students.

International and National Services

o NSF review panel member, 2013
o Program Committee member for IEEE International Conference on Bioinformatics & Biomedicine (BIBM), 2009, 2010, 2012, 2013
o Review Panel member for Annual International IEEE Engineering in Medicine and Biology Society (EMBS) Conference, 2011 – 2013.
o Review an Academic Research Fund grant for Nanyang Technological University, Singapore, 2010, 2013
o Served as a judge for the poster competition of Informatics Symposium, 2012 & 2013.

Campus Services

o Serve as a member in the Campus Parking and Transportation Committee (2011-present).

o Served as a member in the Personnel Committee of the Physics Department (2012-2013).

o Served as the chair of the Third-Year Review Committee of the Physics Department for Assistant Professor Silvia Bompadre (2013).

Experimental and theoretical generation of photoacoustic signal produced by cancer cells. Diagram of the photoacoustic signal generated by a short laser pulse over a cell with low absorbance (top) that do not produce any detectable photoacoustically signal. Mathematical simulation of cell(s) with different absorbance properties and its correspondent photoacoustic signal (middle). Representation of a highly absorbent cell stimulated by a single laser pulse and it correspondent photoacoustic signature (bottom). This image was used by the American Institute of Physics- Advances to promote the article entitled "An experimental and theoretical approach to the study of the photoacoustic signal produced by cancer cells"
Luis Polo-Parada Lab