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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 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 sciences, electrical engineering, medicine, physiology, pharmacology, veterinary biomedical sciences, and veterinary medicine and surgery come together to 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 function, cystic fibrosis, exercise, kidney failure, membrane transport, muscular dystrophy, neurohumoral control of the circulation, shock, vascular wall biology, and biomedical engineering. 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. Thirty three Dalton Investigators provide service to the University, the State of Missouri, and the nation through membership on committees, peer review panels and editorial boards of scientific journals. During the period of this report, our investigators published over 100 manuscripts in nationally recognized journals and books and gave over 100 scientific 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.

**DCRC Internal Advisory Board**
Lex Akers, Ph.D., Professor and Chair of Electrical Engineering
Jack O. Burns, Ph.D., Vice Provost for Research
John D. David, Ph.D., Professor and Chair of Biological Sciences
Gerald L. Hazelbauer, Ph.D., Professor and Chair of Biochemistry
Allan W. Jones, Ph.D., Professor and Chair of Physiology
M. Harold Laughlin, Ph.D., Professor and Chair of Veterinary Biomedical Sciences
Cecil P. Moore, Ph.D., Professor and Chair of Veterinary Medicine and Surgery
Arnold L. Smith, M.D., Professor and Chair of Molecular Microbiology and Immunology

**DCRC External Advisory Board**
Kenneth Baldwin, Ph.D., Professor of Physiology & Biophysics, University of California at Irvine
Alan Kim Johnson, Ph.D., Professor of Pharmacology & Psychology, University of Iowa
Saulo Klahr, M.D., Professor of Medicine and Director of Nephrology, Washington University School of Medicine
Luis Reuss, M.D., Professor and Chair, Physiology and Biophysics, University of Texas Medical Branch
Dalton Investigators
Richard J. Bartlett, PhD: Adjunct Associate Professor, Dalton Cardiovascular Research Center

Edward H. Blaine, PhD, DSc(Hon): Director of Dalton Cardiovascular Research Center, Professor of Physiology and of Pharmacology

Frank W. Booth, PhD: Professor of Veterinary Biomedical Sciences

Douglas K. Bowles, PhD: Assistant Professor of Veterinary Biomedical Sciences

Chang Wen Chen, PhD: Assistant Professor of Electrical Engineering

Lane L. Clarke, DVM, PhD: Associate Professor of Veterinary Biomedical Sciences

J. Thomas Cunningham, PhD: Assistant Professor of Physiology

William E. Dale, PhD: Research Assistant Professor and Assistant Director of Dalton Cardiovascular Research Center

Joseph L. Dixon, PhD: Research Associate Professor, Dalton Cardiovascular Research Center

Kevin D. Gillis, DSc: Assistant Professor of Electrical Engineering and of Physiology

Calvin C. Hale, PhD: Associate Professor of Veterinary Biomedical Sciences

Marc Hamilton, PhD: Assistant Professor of Veterinary Biomedical Sciences

Eileen M. Hasser, PhD: Associate Professor of Veterinary Biomedical Sciences

Meredith Hay, PhD: Associate Professor of Veterinary Biomedical Sciences, Associate Director of Research, MU Research Reactor

Cheryl M. Heesch, PhD: Associate Professor of Veterinary Biomedical Sciences

Virginia H. Huxley, PhD: Professor of Physiology

Tzyh-Chang Hwang, PhD: Associate Professor of Physiology

Allan W. Jones, PhD: Associate Director, Dalton Cardiovascular Research Center; Professor and Chair of Physiology
Ramesh Khanna, MD, FACP: Professor of Medicine

Joe N. Kornegay, DVM, PhD: Professor and Dean of the College of Veterinary Medicine

M. Harold Laughlin, PhD: Professor and Chair of Veterinary Biomedical Sciences, Professor of Physiology

Mark A. Milanick, PhD: Professor of Physiology

Karl D. Nolph, MD: Curator’s Emeritus Professor of Medicine

Elmer M. Price, PhD: Associate Professor of Veterinary Biomedical Sciences

Michael J. Rovetto, PhD: Professor of Physiology

Leona Rubin, PhD: Associate Professor of Veterinary Biomedical Sciences

James C. Schadt, PhD: Associate Professor of Veterinary Biomedical Sciences

Arnold L. Smith, MD: Professor and Chair of Molecular Microbiology and Immunology

Margaret J. Sullivan, PhD: Research Assistant Professor of Physiology

Ronald L. Terjung, PhD, Dhc: Professor and Associate Chair, Veterinary Biomedical Sciences

Richard Tsika, PhD: Associate Professor of Veterinary Biomedical Sciences and of Biochemistry

Zbylut J. Twardowski, MD: Professor of Medicine

Xiaqin Zou, PhD: Research Assistant Professor of Biochemistry
Research Areas
Biomedical Engineering
Investigators: Chen, Gillis, Huxley, Hwang, Jones, Milanick, Rubin, Sullivan, Zou

Cardiovascular Imaging
Investigators: Chen

Cystic Fibrosis
Investigators: Clarke, Hwang, Milanick, Price, Smith

Exercise/Inactivity Including Atherosclerosis, Muscle Biology, Obesity, Type II Diabetes, and Vascular Biology

Membrane Transport
Investigators: Clark, Gillis, Hale, Huxley, Hwang, Milanick, Price, Rovetto, Rubin, Zou

Muscular Dystrophy
Investigators: Bartlett, Kornegay

Nephrology Including Hypertension, Renal Failure, Diabetic Nephrology, and Peritoneal Dialysis
Investigators: Blaine, Dale, Khanna, Nolph, Twardowski

Neurohumoral Control of the Circulation Including Hypertension, Heart Failure, and Salt and Water Homeostasis
Investigators: Blaine, Cunningham, Dale, Hasser, Heesch, Hay, Price, Schadt, Sullivan
Research Funding
Sources of Funding in 2000

- National Institutes of Health: 73%
- National Science Foundation: 2%
- Cystic Fibrosis Foundation: 4%
- NASA: 3%
- Industry: 7%
- American Heart Association: 6%
- Other: 5%

Dalton Investigator Grant Funding Received in 2000

Year 2000 Investigator Funding

- Grant Funds – Direct Costs: $8,666,100
- Grant Funds – Indirect Costs: 2,860,163
- Fellowships: 338,700

Total Funding: $11,433,485

Grant Funds committed to Dalton Investigators as of August 2001: $42,338,909
Dalton Principal Investigator Research Grants
(Year 2000 total costs)

American Diabetes Association
“Coronary Artery Disease and Smooth Muscle Cell Ca2+ Signaling in Diabetic Humans” Michael Sturek $69,583

American Heart Association
“Calcium-Dependent Mitogenic Signaling of a P2Y Nucleotide Receptor Expressed in Dedifferentiated Vascular Smooth Muscle Cells” Michael Sturek $16,000

“Cardiovascular Control of Vasopressin Release” Thomas Cunningham $20,000

“Central Cardiovascular Control During Blood Loss” James Schadt $38,251

“Effects of Stress on Cardiovascular Control During Blood Loss” James Schadt $52,200

“Gating and Blocking of CFTR Chloride Channels” Tzyh-Chang Hwang $32,120

“Influence of Exercise and Hyperlipidemia/Hypercholesterolemia in Coronary Vascular Pro- and Anti-Oxidant Gene Expression” Harold Laughlin $26,000

“Mutation of the Cardiac-Sodium Exchanger Regulatory Site” Calvin Hale $38,500

“Myoplasmic Calcium Regulation is Altered in Vascular Smooth Muscle Cells Distal to Chronic Coronary Artery Occlusion” Harold Laughlin $16,000

“Neurophysiology of Forebrain Neurons Involved in the Central Regulation of Blood Pressure” Thomas Cunningham $38,500

“Neurotransmitter Regulation of Forebrain Projections to the Supraoptic Nucleus: Calcium Imaging in a Slice of Preparation” Margaret Sullivan $65,000

“Role of Metabotropic Glutamate Receptors in Arterial Baroreflex” Eileen Hasser $25,500

“Role of Ubiquitin-Proteasome Pathway in Vascular Wall Metabolism and Atherosclerosis” Joseph Dixon $38,900

“Smooth Muscle Calcium Regulation: Cardioprotective Effects of Exercise in Diabetic Swine with Coronary Artery Disease” Michael Sturek $18,000

“The Na, K-AT Phase: Molecular Mechanisms Involved in Cardiac Glycoside Inhibition, Ion Transport and Confrontation Changes” Elmer Price $100,000
**Amgen, Inc.**
“A Study Evaluating the Initiation and Titration of Fixed Doses of Novel Erythropoiesis Stimulating Protein (NESP) Therapy in Subjects with Chronic Renal Insufficiency” Ramesh Khanna $24,990

**AstraZeneca**
“Candesarten Cilextil (Candesarten) in Heart Failure Assessment of Reduction in Mortality and Morbidity (CHARM)” H.K. Reddy $17,000

**Association Francaise Contre Les Myopathies**
“Expression of Human Dystrophin in Skeletal Muscle of Dystrophic Animals” Richard Bartlett $89,260

**Baylor College of Medicine**
“Role of GH/IGF-1 Axis, Loading, and Exercise on Muscle Mass” Frank Booth $44,400

“Role of Growth Hormone Secretagogues and Exercise on Muscle Homeostasis under Microgravity” Frank Booth $67,131

**Bioenergy**
“Post Contraction Adenine Nucleotide Recovery” Ronald Terjung $49,193

**Chiron Corporation**
“Collateral Blood Flow Increases with FGF-2 in Rats with Peripheral Arterial Insufficiency: Influence of Dosing Regimens Protocol” Ronald Terjung $59,001

**Collateral Therapeutics**
“Collateral Blood Flow IV” Ronald Terjung $102,779

“Collateral Blood Flow V” Ronald Terjung $75,881

“Collateral Blood Flow VI” Ronald Terjung $87,017

**Covance**
“The Effects of Sustained-Release Moxonide on Mortality and Morbidity in Patients with Congestive Heart Failure” H.K. Reddy $32,500

**Cystic Fibrosis Foundation**
“Correction of Delta F508 CFTR Processing” Lane Clarke $60,000

“NBF1 and Restoration of Anion Secretion in F508 Cells” Lane Clarke $64,216

“Molecular Mechanism of Action of NS004 on CFTR” Tzyh-Chang Hwang $49,140

“Phosphate Regulation of Delta F508 CFTR” Tzyh-Chang Hwang $68,750

“Role of Human Beta-Defensin-2 in Cystic Fibrosis Bronchitis” Arnold Smith $91,796
MU Research Board
“Central Cardiovascular Control During Blood Loss” James Schadt $22,500

NASA
“Signaling of Muscle Atrophy with Unloading” Frank Booth $265,215

“Vascular Control of Skeletal Muscle Blood Flow After Simulated Microgravity” Harold Laughlin $22,000

National Institutes of Health
“Angiogenic Growth Factors in Exercising Skeletal Muscle” Ronald Terjung $30,916

“Baroreceptor Neurons - Metabotropic Receptor Modulation” Meredith Hay $67,500

“Cardiovascular and Renal Physiology, Pharmacology and Biochemistry” Virginia Huxley $199,056

“Cardiovascular Control of Vasopressin Release” Thomas Cunningham $238,208

“Cardiovascular Regulation-Hindlimb Unweighted Animals” Eileen Hasser $231,728

“Circumventricular Organs: Gender & Hypertension” Meredith Hay $279,865

“Cystolic Modulation of Plasma Membrane Ion Transport” Mark Milanick $206,755

“Exercise and Coronary Adenosine Activated K Currents” Douglas Bowles $93,520

“Exercise Training and Peripheral Arterial Insufficiency” Ronald Terjung $300,335

“Exercise, Diabetes and Coronary Smooth Muscle Ca2+” Michael Sturek $339,315

“Gating of the CFTR C1 Channel by ATP Hydrolysis” Tzyh-Chang Hwang $102,200

“Hypertension Mechanisms and Vascular Ion Exchange” Allan Jones $287,791

“Metabotropic Glutamate Receptors and Baroreflex Function” Eileen Hasser $220,666

“Neural Systems of Body Fluid Homeostasis and AVP Release” Thomas Cunningham $28,091

“Neural Systems Regulating Vasopressin Release” Thomas Cunningham $67,500

“Ovarian Hormone Metabolites and Neural Circulatory Control” Cheryl Heesch $159,826

“Porcine Models of Coronary Artery Disease in Diabetes” Michael Sturek $449,978
“Regulation of Baroreceptor Afferent Transmission” Meredith Hay $151,719
“Regulation of the Secretion of ApoB-Lipoprotein” Joseph Dixon $196,918
“Regulatory Site Modifications of the Cardiac Na-Ca Exchanger” Calvin Hale $51,100
“Running Induced Increase in Muscle LPL mRNA” Marc Hamilton $200,925
“Training: Muscle Blood Flow and Capillary Dynamics” Harold Laughlin $237,728
“Vascular Biology: Exercise Training and Coronary Disease” Harold Laughlin $1,482,898
“Satellite Stem Cell Biology” Frank Booth $176,314
“Invasive Noncapsulated H. Influenza” Arnold Smith $290,000
“Molecular Aspects of Microbial Pathogenesis” Arnold Smith $167,210
“Adenine Nucleotide Metabolism in Skeletal Muscle” Ronald Terjung $315,101
“Altered Mechanical Loads and Skeletal Muscle Phenotype” Richard Tsika $340,750
“Exercise Hypertrophy and Control of Myosin Induction” Richard Tsika $195,200
“Exercise-Induced Growth of Skeletal Muscle” Frank Booth $204,450
“Role of Angiotensin II in Skeletal Muscle Hypertrophy” Frank Booth $37,516
“CFTR and Alimentary Epithelial Acid/Base Transport” Lane Clarke $140,731
“CFTR and Duodenal Anion Transport” Lane Clarke $217,500
“Molecular Pathophysiology of Cystic Fibrosis” Tzyh-Chang Hwang $204,965
“Cellular Free Radical Toxicity Mechanisms” Olen Brown $227,669
“Ca Sensing for Exocytosis” Kevin Gillis $237,550
“The Role of Estrogen in the Male Reproductive Tract” Lane Clarke $53,089

National Science Foundation
“Cellular Electrophysiology on a Chip” Kevin Gillis $273,879
**Muscular Dystrophy Association**
“Investigative Therapeutics in a Canine Model of Duchenne Muscular Dystrophy” Joe Kornegay  
$82,000

**Pharmacia, Inc.**
“Cox-2 Gene Transfer” Michael Sturek  $50,000

“Material Evaluation Agreement: Cox 2 Inhibitors in Anti-Atherogenic Therapy” Michael Sturek  
$58,400

**Proctor & Gamble**
“VEGF-Mediated Collateral Blood Flow” Ronald Terjung  $85,720

**Scios, Inc.**
H.K. Reddy  $52,911

“Treatment of Peripheral Arterial Disease with VEGF121” Ronald Terjung  $80,665

**SmithKline Beecham**
“A Multicenter, Randomized, Double-Blind, Placebo-Controlled Study to Determine the Effect of Carvedilol on Mortality and Morbidity in Patients with Severe Chronic Heart Failure”  
H. K. Reddy  $12,562

**Whitaker Foundation**
“Computerized Characterization of Left Ventricle Shape and Dynamics “ Chang Wen Chen  
$21,179

“Techniques for Membrane Capacitance Measurements in the Presence of Non-Linear Conductances” Kevin Gillis  $79,502
Fellowships

**American Heart Association**
“Estrogen Modulation of Angiotensin II and Vasopressin-Mediated Effects on Area Postrema Neuronal Activity”  Jayabala Pamidimukkala (Meredith Hay, sponsor)  $26,000

“Interaction of AngII and L-Glu on Area Postrema Voltage-Gated and Calcium Activated Potassium Channel”  Zhicheng Li (Meredith Hay, sponsor)  $28,000

“Mutation of the XIP Domain of the Cardiac-Sodium Exchanger”  Julie Bossuyt (Calvin Hale, sponsor)  $28,000

“Regulation of Electroneutral Salt and Water Absorption in Intestinal Epithelium”  Lara Gawenis (Lane Clarke sponsor)  $16,000

“The Role of Phosphorylation/Dephosphorylation in Trafficking of the Cystic Fibrosis Transmembrane Conductance Regulator (CFTR)”  Zhen Zhou (Tzyh-Chang Hwang, sponsor)  $26,000

**American Physiological Society**
“Regulation of Lipoprotein Lipase mRNA by the 3’ Untranslated Region”  Grady Campbell (Frank Booth, sponsor)  $35,500

**Cystic Fibrosis Foundation**
“Ion Transport Deregulation in the Murine CF Intestine, Study of Sodium Chloride Absorption”  Xavier Stien (Lane Clarke, sponsor)  $33,500

“A Novel Model and System for Studying CFTR Processing”  Stacie Raymond (Elmer Price, sponsor)  $43,200

**National Institutes of Health**
“Central Mechanisms of Area Postrema Sympathoinhibition”  Patrick Mueller (Eileen Hasser, sponsor)  $45,560

**United Negro College Fund**
“Regulation of CFTR Gating by cAMP-Dependent Protein Kinase Phosphorylation”  Allan Powe (Tzyh-Chang Hwang, sponsor)  $35,000

Total Fellowship Funding Received:  $338,700
Educational Opportunities
The Dalton Cardiovascular Research Center offers an excellent training program for graduate and undergraduate students, postdoctoral fellows, and other professionals. Students have the opportunity to attend research seminars, interact with internationally recognized scientists, and to take part in research supervised by Dalton investigators.

Thirty-one postdoctoral fellows, 17 graduate students, and six undergraduate students were supervised by Dalton Investigators in the year 2000.
### Postdoctoral Fellows

<table>
<thead>
<tr>
<th>Student</th>
<th>Advisor</th>
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<tbody>
<tr>
<td>Lionel Bey</td>
<td>Dr. Marc Hamilton</td>
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<tr>
<td>Veterinary Biomedical Sciences</td>
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<tr>
<td>Silvia Bompadre</td>
<td>Dr. Tzyh-Hwang Hwang</td>
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<tr>
<td>Physiology</td>
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<tr>
<td>Julie Bossuyt</td>
<td>Dr. Calvin Hale</td>
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<td>Veterinary Biomedical Sciences</td>
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<td>Peng Chen</td>
<td>Dr. Kevin Gillis</td>
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<td>Electrical Engineering</td>
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<td>Martin Childers</td>
<td>Dr. Joe Kornegay</td>
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<td>Veterinary Biomedical Sciences</td>
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<tr>
<td>Arvinder Dhalla</td>
<td>Dr. Leona Rubin</td>
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<td>Zhiquiang Fan</td>
<td>Dr. Frank Booth</td>
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<td>Charles Foley</td>
<td>Dr. Cheryl Heesch</td>
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<td>Scott Gordon</td>
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<tr>
<td>Regina Grindstaff</td>
<td>Dr. Thomas Cunningham</td>
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<td>Naveed Haq</td>
<td>Dr. Ramesh Khanna</td>
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<tr>
<td>Nephrology</td>
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<td>Christine Heaps</td>
<td>Dr. Douglas Bowles</td>
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<td>Veterinary Biomedical Sciences</td>
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<tr>
<td>Natalia Karasseva</td>
<td>Dr. Richard Tsika</td>
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<td>Veterinary Biomedical Sciences</td>
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<td>Lyudmila Kvchina</td>
<td>Dr. Leona Rubin</td>
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<td>Veterinary Biomedical Sciences</td>
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<td>Han Li</td>
<td>Dr. Ronald Terjung</td>
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<tr>
<td>Zeyi Li</td>
<td>Dr. Ronald Terjung</td>
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<td>Physiology</td>
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</table>
Mingxiang Liao
Veterinary Biomedical Sciences
Dr. Richard Tsika

Pam Lloyd
Physiology
Dr. Ronald Terjung

Patrick Mueller
Veterinary Biomedical Sciences
Dr. Eileen Hasser

Carol Okamura
Veterinary Biomedical Sciences
Dr. Joe Kornegay

Allan Powe
Physiology
Dr. Tzyh-Chang Hwang

Barry Prior
Physiology
Dr. Ronald Terjung

Stacie Raymond
Dalton Cardiovascular Research Center
Dr. Elmer Price

Jie Ren
Physiology
Dr. Ronald Terjung

Xavier Stien
Dalton Cardiovascular Research Center
Dr. Lane Clarke

Dharmesh Vyas
Veterinary Biomedical Sciences
Dr. Frank Booth
Dr. Ronald Terjung

Christopher Woodman
Veterinary Biomedical Sciences
Dr. Elmer Price

Elzbieta Wysocka
Physiology
Dr. Joseph Dixon

Bao Jian Xue
Dalton Cardiovascular Research Center
Dr. Meredith Hay

Yan Yang
Physiology
Dr. Leona Rubin

Y. Yu
Electrical Engineering
Dr. Chang Wen Chen

Zhen Zhou
Physiology
Dr. Tzyh-Chang Hwang
## Graduate Students

<table>
<thead>
<tr>
<th>Student</th>
<th>Advisor</th>
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<tbody>
<tr>
<td><strong>Aaron Aaker</strong></td>
<td>Dr. Harold Laughlin</td>
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<tr>
<td>Veterinary Biomedical Sciences</td>
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<tr>
<td><strong>Kirk Abraham</strong></td>
<td>Dr. Ronald Terjung</td>
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<td>Physiology</td>
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<tr>
<td><strong>Jeffrey Brault</strong></td>
<td>Dr. Ronald Terjung</td>
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<td><strong>Jianfei Cai</strong></td>
<td>Dr. Chang Wen Chen</td>
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<td><strong>Lei Cao</strong></td>
<td>Dr. Chang Wen Chen</td>
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<td><strong>James Dunning</strong></td>
<td>Dr. Kevin Gillis</td>
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<td><strong>Li Fan</strong></td>
<td>Dr. Chang Wen Chen</td>
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<td><strong>Lara Gawenis</strong></td>
<td>Dr. Lane Clarke</td>
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<td>Veterinary Biomedical Sciences</td>
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<td><strong>Chad Hancock</strong></td>
<td>Dr. Ronald Terjung</td>
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<tr>
<td>Physiology/Veterinary Biomedical Sciences</td>
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<tr>
<td><strong>Caroline Hoang</strong></td>
<td>Dr. Meredith Hay</td>
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<td>Veterinary Biomedical Sciences</td>
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<tr>
<td><strong>Sonia Houston</strong></td>
<td>Dr. Virginia Huxley</td>
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<td><strong>Catherine Regni</strong></td>
<td>Dr. Xiaoqin Zou</td>
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<td><strong>William Schrage</strong></td>
<td>Dr. Harold Laughlin</td>
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<td><strong>Sangeetha Udayasankar</strong></td>
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<td>Dr. Chang Wen Chen</td>
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<td><strong>Jianjie Wang</strong></td>
<td>Dr. Virginia Huxley</td>
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<tr>
<td><strong>Patricia Williamson</strong></td>
<td>Dr. Margaret Sullivan</td>
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<td>Biochemistry</td>
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## Undergraduates

<table>
<thead>
<tr>
<th>Student</th>
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</thead>
<tbody>
<tr>
<td>Monica Bell</td>
<td>Dr. Cheryl Heesch</td>
</tr>
<tr>
<td>Arts &amp; Sciences/Anthropology</td>
<td></td>
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<tr>
<td>Hope Gole</td>
<td>Dr. Meredith Hay</td>
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<tr>
<td>Agriculture</td>
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<td>Saumil Karavadia</td>
<td>Dr. Edward Blaine</td>
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<td>Susan Marren</td>
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<td>Arts &amp; Sciences</td>
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<tr>
<td>Tina Parks</td>
<td>Dr. Lane Clarke</td>
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<td>Animal Sciences</td>
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<td>Bonnie Taylor</td>
<td>Dr. Calvin Hale</td>
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<td>Biological Sciences</td>
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<tr>
<td>Tara Wiggins</td>
<td>Dr. Lane Clarke</td>
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<td>Biological Sciences</td>
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Seminar Series
“IGF-I Rescues Old Skeletal Muscle Failing to Regrow from Disuse Atrophy”
Frank Booth
University of Missouri-Columbia
Columbia, Missouri

“Intracellular and Extracellular pH Microdomains in Colonic Epithelium:
Unusual Mechanisms for Regulation of Sodium Absorption”
Marshall H. Montrose
Indiana University
Indianapolis, Indiana

“Role of the Glycocalyx in Endothelial Cell Ligand Receptor Interaction”
Paul van Haaren
University of Amsterdam
Amsterdam, The Netherlands

“Progression of Renal Disease”
Saulo Klahr
Washington University School of Medicine
and Barnes Jewish Hospital
St. Louis, Missouri

“Do Sympathetic-Angiotensin Interactions Contribute to Long-Term Control of
Arterial Pressure?”
John W. Osborne
University of Minnesota
St. Paul, Minnesota

"Inferring roles of SNARE proteins in exocytosis from fast kinetic
measurements on adrenal chromaffin cells"
Erwin Neher
Max-Planck-Institute for
Biophysical Chemistry,
Göttingen, Germany
Publications
Abstracts

Booth


Bowles


Heaps, C.L. and D.K. Bowles. K+ channel contribution to adenosine-induced vasodilation is gender specific. FASEB J. In press.

Clarke


**Cunningham**


Gillis

Hale

Hasser
Mueller PJ, Foley CM, Vogl HW, Friskey SA, Hay M. and Hasser, E.M. Cardiovascular response to a group III mGluR agonist in the nucleus of the solitary tract (NTS) does not involve actions at glycine receptors. FASEB J. 2000)
Stanton JJ, Foley CM, Cunningham JT, Price EM, Hasser EM, and Heesch CM. Alterations in GABAA receptor a1 and a2 subunit expression in the supraoptic (SON) and paraventricular (PVN) nuclei in pregnant rats. FASEB J. 2000.

Hay


C.J. Hoang, E.M. Hasser and M. Hay. Expression of metabotropic glutamate receptors (mGluRs) and the cellular effects of their activation in neurons of the nodose ganglia. International Symposium on Baroreceptor Reflexes, Iowa City, IA, 2000.


Heesch


Huxley


Hwang

Jones

Khanna
SH Tan, BF Prowant, R Khanna, KD Nolph, ZJ Twardowski, H Moore.: ESRD Patients Who Delay Initiation of Peritoneal Dialysis (PD) Have Poor Outcomes.

Laughlin

Laughlin MH. Integration of exercise sciences in applied medical training programs and science initiatives: is this the future. The Physiologist 43:370, 2000

**Milanick**
Milanick, M.A., B.J. Wilson, and Wan-Yan Xu. Does the plasma membrane calcium pump (PMCA) have a high field access channel? Biophysical Society, 2000


**Nolph**


**Price**


**Rubin**


**Schadt**

**Sullivan**  

**Terjung**  

**Tsika**  
Twardowski


Journal Articles

Booth

Bowles

Brown

Chen


**Clarke**


**Cunningham**


**Dale**


Dixon

Gillis

Hamilton
Hamilton, M.T., E. Areiqat, D.G. Hamilton and L. Bey. Plasma triglyceride metabolism in humans and rats during aging and physical inactivity. JAPA. In press, Accepted 10/00.

Hasser

Hay


Heesch

Huxley


Hwang

Jones

Khanna


Kornegay

Laughlin


Milanick

**Nolph**


**Price**


**Rubin**

Smith

Sullivan

Terjung

Tsika

Twardowski


Ing TS, Blagg CR, Delano BG, Gandhi VC, Ting GO, Twardowski ZJ, Williams AW, Woredekal YW, Kjellstrand CM: Use of systemic blood urea nitrogen levels obtained 30 minutes before the end of hemodialysis to portray equilibrated, postdialysis blood urea nitrogen values. Hemodialysis Int 2000; 4: 15-17.


Zou
Books and Book Chapters

**Booth**

**Hay**

**Huxley**

**Khanna**

**Nolph**

**Terjung**

**Twardowski**

Awards, Honors and Offices

![Trophy Icon](image-url)
Awards, Honors, and Offices

**Blaine**
Excellence in Medical Education Award  
Editorial Board, American Journal of Physiology  
President, Boone County Board of the American Heart Association

**Booth**
Associate Editor, Journal of Applied Physiology,  
Editorial Board, American Journal of Physiology: Cell Physiology  
Editorial Advisor to Biochemical Journal  
Ad hoc, Respiratory and Applied Physiology Study Section, October 2000  
Ad hoc, NIH Special Emphasis Study Section, November 2000  
NIH reverse site visit for program project grant, November 2000

**Bowles**
Fellow, American College of Sports Medicine

**Brown**
Editorial Board, Biomedical Letters, The Faculty Press, Cambridge, England

**Chen**
Editorial Board, Journal of Computerized Medical Imaging and Graphics  
Editorial Board, Journal of Visual Communications and Image Representation  
Associate Editor, IEEE Trans. Circuits and Systems for Video Technology  
Guest Editor, IEEE Journals on Selected Areas in Communications

**Clarke**
Editorial Board, American Journal of Physiology: Gastrointestinal and Liver Physiology

**Cunningham**
Dorsett L. Spurgeon, MD, Distinguished Medical Research Award. University of Missouri-Columbia School of Medicine, Fall 2000.  
Editorial Board, American Journal of Physiology: Heart and Circulatory Physiology  
Editorial Board, American Journal of Physiology: Regulatory, Integrative and Comparative Physiology

**Hamilton**
Editorial Board: Journal of Applied Physiology

**Hasser**
Associate Editor, American Journal of Physiology, Heart Circ. Physiol.

**Heesch**
Editorial Board American Journal of Physiology: Heart and Circulatory Physiology
**Huxley**
Associate Editor, Microcirculation, Editorial board of Journal of Vascular Research
Chair, USNAS commission to IUPS
National Organizing Committee for IUPS 2005
Delegate, International Union of Physiological Sciences (IUPS), US delegation IUPS Congress,
  Christ Church, NZ 2001
Microcirculatory Society, Long Range Planning Committee
Associate Editor, Microcirculation
Editorial Board, American Journal of Physiology: Heart and Circulatory Physiology
Editorial Board, Microvascular Research
Editorial Board, Microcirculation
Editorial Board, Journal of Vascular Research
NIH DDK Program Project Site Visit, University of Louisiana-Shreveport

**Hwang**
Paul Cranefield Award, Society of General Physiologists
Excellence in Medical Student Education, MU Medical School

**Heesch**
Education Committee, American Physiological Society
  “New Perspectives on Central Nervous Control of Cardiovascular Regulation”
Symposium Speaker—Amer. Physiol. Soc. Conference “Baroreceptor and Cardiopulmonary
  Receptor Reflexes

**Jones**
Hugh Stephenson Award for Research, American Heart Association Missouri Affiliate

**Khanna**
Dr. K. S. Chugh, Founders Oration 2002 Award. By the Indian Society of Nephrology
Academic Affairs Committee, American Association of Physicians of Indian Origin
Continuing Medical Education Committee, American Association of Physicians of Indian Origin
Editor, Advances in Peritoneal Dialysis
Editor, Peritoneal Dialysis Today (Highlights of the Annual Conference on Peritoneal Dialysis)
Editor, PD News (Newsletter of the International Society for Peritoneal Dialysis)
Deputy Editor, Peritoneal Dialysis International
Associate Editor, Home Hemodialysis International
Editorial Board, International Journal of Artificial Organs
Editorial Board, Transactions of the American Society for Artificial Internal Organs
Editorial Board, Kidney: A Current Survey of World Literature
Editorial Board, Indian Journal of Peritoneal Dialysis
Editorial Board, American Journal of Kidney Disease

**Laughlin**
Associate Editor, Medicine and Science In Sport and Exercise
Editorial Board, Journal of Applied Physiology
Milanick
Editorial Board, Journal of Membrane Biology

Nolph
Pioneer Continuous Ambulatory Peritoneal Dialysis Award. San Francisco, California.
Editorial Board, Nephron
Editorial Board, Kidney International
Editorial Board, Journal of Dialysis
Editorial Board, Peritoneal Dialysis International (formerly Peritoneal Dialysis Bulletin)
Editorial Board, Contemporary Dialysis
Editorial Board, American Journal of Nephrology
Editorial Board, Dialysis & Transplantation
Editorial Board, Nephrology News & Issues
Editorial Board, Seminars in Dialysis
Editorial Board, Kidney: A Current Survey of World Literature
Editorial Board, Advances in Renal Replacement Therapy (ARRT)
Editorial Board, Journal of the American Society of Nephrology
Editorial Board, Peritoneal Dialysis Today
Editorial Board, Hong Kong Journal of Nephrology (Honorary International Advisor)
Editorial Board, Indian Journal of Peritoneal Dialysis
Editor-in-Chief, Peritoneal Dialysis Today
Associate Editor, Peritoneal Dialysis Bulletin (Peritoneal Dialysis International)
Associate Editor, Nephrology Section Editor - Transactions of the American Society for Artificial Internal Organs
Associate Editor, Advances in Peritoneal Dialysis
Associate Editor, Home Hemodialysis International (Hemodialysis International)

Schadt
Golden Aesculapius Teaching Award, University of Missouri College of Veterinary Medicine
Editorial Boards, American Journal of Physiology: Heart and Circulatory Physiology
Editorial Board, Journal of Applied Physiology

Smith
Service Award for Excellent in Teaching, University of Missouri-Columbia, 2000
Editorial Board, Journal of Infectious Disease

Terjung
Pfizer Award for Research Excellence, June 2000
Gold Chalk Award, MU Graduate Professional Council, April 2000
Member, IUPS Commission on Work and Exercise Physiology. March 1999 to present
American Physiological Society
  Elected Program Chair, Environmental & Exercise Section Steering Committee, 1996-00.
  Elected Section Representative, APS Program Committee, 1996-2000.
American College of Sports Medicine,
  Chair, Research Advisory Committee, 2000-Present
Member, Advisory Committee, August Krogh Institute, University of Copenhagen, Denmark. 1993-Present
Member, IUPS Commission on Work and Exercise Physiology. March 1999 to present

Tsika
Editorial Board, Journal of Applied Physiology

Twardowski
International Society for Hemodialysis, Member Founder, 2000
International Society for Hemodialysis, Interim Secretary, 2000
Member of the Honor Committee of the First International Congress of Nephrology via Internet, January 2000
Member of the Program and Scientific Committees of the 20th National Conference on Peritoneal Dialysis, Chairman of the 6th International Symposium on Home Hemodialysis, San Francisco, California, February 27 - 29, 2000
Editorial Board, Hemodialysis Today, 2000
Patents
Patents

Chen
A Novel Scheme for Transmitting Standard Compressed Visual Information over Error-prone Environment by J. Cai and C.W. Chen. UM Disclosure No. 01UMC033
A Novel Product Coding and Recurrent Alternative Decoding Scheme by L. Cao and C. W. Chen. UM Disclosure No. 01UMC028

Hale
Large Scale Expression and Purification of Recombinant Proteins, U.S. Provisional Application Serial No. 60/218,125 filed July 13, 2000.

Twardowski


c) Australian patent No.: 723137 (Divisional of 49113/96), Application 22565/99, filed March 31, 1999, Date of Sealing: November 30, 2000. Name of Patentee: The Curators of the University of Missouri. Title of Invention: Clot Resistant Multiple Lumen Catheter. Lodgment date: 31 March 1999. Expiry Date: 31 January 2016 (20 years)


Peer Review
**Blaine**
Reviewer, Hypertension
Reviewer, American Journal of Physiology
Reviewer, Cardiovascular Pharmacology
Reviewer, Canad. J. Physiol Pharm.
Ad Hoc Grant Review, Wellcome Trust
Ad Hoc Grant Review, MU Research Board

**Booth**
Ad hoc panel to evaluate NASA Life Sciences Competitive Peer Review Process
Member International Union of Physiological Sciences commission on Work and Exercise Physiology
Chair, Muscle Biology Peer Review Panel, NASA

**Brown**
Peer Review of ATSDR’s Draft Medical Management Guideline on Ammonia
Reviewer, Proceedings of the National Academy of Science
Reviewer, Environmental Health Perspectives
Reviewer, American Journal of Physiology
Reviewer, Heart and Circulatory Physiology
Reviewer, Archives of Biochemistry and Biophysics
Reviewer, Chemical Research in Toxicology
Reviewer, Free Radical Biology and Medicine
Reviewer, Biomedical Letters

**Bowles**
Reviewer, Journal of Experimental Biology
Reviewer, Research Board Grants, University of Missouri System1995-00
Reviewer, Journal of Applied Physiology
Reviewer, American Journal of Physiology: Heart and Circ. Physiology
Reviewer, Medicine & Science in Sports & Exercise

**Chen**
NSF Biomedical Engineering Program Review Panel
NSF ITR Program Wireless Communications Review Panel

**Clarke**
Reviewer, American Journal of Physiology: Gastrointestinal and Liver Physiology
Reviewer, American Journal of Physiology: Cell Physiology
Reviewer, Gastroenterology
Grant Review, Missouri Research Board
Grant Review, Cystic Fibrosis Foundation
Grant Review, National Institutes of Health Ad Hoc Medical Biochemistry Study Section
Cunningham
Reviewer, Hypertension
Reviewer, Brain Research
Reviewer, Brain Research Bulletin
Reviewer, Circulation Research

Dale
Reviewer, Cardiovascular Research

Dixon
Reviewer, Journal of Lipid Research
Reviewer, Journal of Biological Chemistry
Reviewer, Biochimica et Biophysica Acta
Reviewer, Atherosclerosis
Study Section, NIH Study Section Emphasis Panel, Protease Inhibitor Related Atherosclerosis in HIV Infection

Gillis
Reviewer, Nature
Reviewer, Science
Reviewer, Neuron
Reviewer, EMBO Journal
Reviewer, Biophysical Journal
Reviewer, Journal of Theoretical Biology
Ad Hoc Reviewer, NIH
Ad Hoc Reviewer, MU Research Board

Hamilton

Hale
Reviewer, American Journal of Physiology
Reviewer, American Heart Association – Great American Consortium
Reviewer, Biochimica et Biophysica Acta (Amsterdam, The Netherlands)

Hasser
Grant Review, American Heart Association, Heartland Section
Reviewer, American Journal of Physiology
Reviewer, Brain Research
Reviewer, Canadian Journal of Physiology and Pharmacology
Reviewer, Hypertension
Reviewer, Journal of Applied Physiology
Reviewer, Journal of Physiology
Reviewer, Journal of the Autonomic Nervous System
Reviewer, Medicine and Science in Sports and Exercise

**Hay**
Reviewer, American Journal of Physiology, Heart and Circulation
Reviewer, American Journal of Physiology, Regulatory, Integrative
Reviewer, Hypertension
Reviewer, Journal of Neurophysiology
Reviewer, Brain Research
Reviewer, Journal of Autonomic Nervous System
Reviewer, Journal of Applied Physiology
Grant Review: NIH Study Section ECS, American Heart Association National

**Heesch**
Guest Review, Journal of Applied Physiology
Guest Review, Hypertension
Reviewer, Regulatory, Integrative, and Comparative
Reviewer, Journal of Physiology (London)
Grant Review, NIH, Cardiovascular and Renal Study Section (CVB)

**Huxley**
Guest Review, American Journal of Physiology (Heart & Circulation; Cell; Regulatory, Integrative & Comparative; Endocrine & Metabolism)
Guest Review, Circulation Research
Guest Review, Biorheology
Guest Review, Journal of Applied Physiology
Guest Review, Annals of Biomedical Engineering
Guest Review, Hypertension

**Hwang**
Reviewer, Journal of General Physiology
Reviewer, Journal of Biological Chemistry
Reviewer, Biophysical Journal
Reviewer, Journal of Physiology
Grant Review, NIH (GMB, ad hoc member)

**Khanna**
The 2000 ASN Abstract Review Team
International Society for Peritoneal Dialysis Abstract Review Committee
Kornegay
Ad hoc reviewer, Journal of the American Veterinary Medical Association
Ad hoc reviewer, Journal of the American Animal Hospital Association
Ad hoc reviewer, Journal of Neurological Sciences
Ad hoc reviewer, Neuromuscular Diseases
Ad hoc reviewer, Journal of Veterinary Internal Medicine

Laughlin
Reviewer, American Journal of Physiology
Reviewer, Aviation, Space, and Environmental Medicine
Reviewer, Blood Vessels; Circulation
Reviewer, Circulation Research
Reviewer, Hypertension
Reviewer, Microvascular Research
Reviewer, Microcirculation
Grant Reviewer, Office of Naval Research
American Physiological Society Committee on Committees

Milanick
Grant Review, Israeli Science Foundation
Grant Review, American Heart Association Heartland Affiliate Study Section
Grant Review, NIH General Medicine Study Section
Reviewer, American Journal of Physiology
Reviewer, Cell Physiology
Reviewer, Biochimica Biophysica Acta
Reviewer, Biomembranes
Reviewer, Biophysics Journal
Reviewer, Journal of Biological Chemistry
Reviewer, Journal of General Physiology
Reviewer, Journal of Membrane Biology
Reviewer, Journal of Theoretical Biology
Reviewer, Science

Price
Grant Reviewer, American Heart Association Midwest Affiliate Consortium
Reviewer, Molecular Pharmacology
Reviewer, Biochimica et Biophysica Acta
Reviewer, Biochemistry
Reviewer, Journal of Applied Physiology

Rovetto
Grant Reviewer for the Italian Ministry for University and Research
Editorial Board, Circulation Research
Schadt
Grant Review
American Heart Association, National (Cardiovascular Regulation II Study Group)
American Osteopathic Association
U.S. Army (Coordinated through AIBS)

Smith
Ad hoc reviewer Medical Research Council of Canada
Ad hoc reviewer National Sciences Foundation
Ad hoc reviewer for Cystic Fibrosis Foundation of Canada
Ad hoc reviewer Thrasher Foundation
NIH Peer Review Oversight Group (PROG)

Terjung
Academic Promotion and Appointments Committee, Biomedical Sciences
Research Advisory Committee, Biomedical Sciences

Tsika
Reviewer, Journal of Biological Chemistry
Reviewer, Molecular Cardiology
Presentations and Lectures
Presentations and Lectures

Bowles
University of Missouri, Dept. of Biomedical Sciences; October, 2000.
APS Integrative Biology of Exercise Meeting, Portland, Maine; September, 2000.
Kansas State University, Dept. of Anatomy and Physiology, College of Vet. Medicine, March, 2000.

Chen

Clarke


Understanding intestinal ion transport using knockout mouse models. Specialized Center Of Research, Research Institute, Oakland Children’s Hospital, Oakland, CA. October


Dixon


Post-translational degradation of apoB, a physiologically important regulatory mechanism. Midwest Lipid Group, St. Louis, Missouri, April 15, 2000.


Severity of Atherosclerosis in Diabetic Yucatan Swine is Strongly Associated with Plasma Lipid-Enriched ApoB-Lipoproteins. University of Missouri, Pharmacology Seminar, October 9, 2000


Hale
Expression of Full-length, Active Cardiac Sodium-Calcium Exchanger Protein in Trichoplusia ni Larvae Membrane Vesicles, Cardiovascular Day, University of Missouri, Columbia, MO, February 2000.

A Novel Expression System for Membrane Proteins, Dept. of Pharmacology, University of Missouri School of Medicine, Columbia, MO, September 2000.

“A Novel Expression System for Membrane Proteins”, Department of Physiology and Biophysics; University of Texas Medical Branch at Galveston, Galveston, TX, July 2000.


**Hasser**
Control of the Sympathetic Nervous System after Cardiovascular Deconditioning. Department of Physiology and Pharmacology, St. Louis University. November, 2000

Effects of Simulated Weightlessness on Baroreflex Control of Sympathetic Nerve Activity in Rats. 2000 APS Conference, Baroreceptor and Cardiopulmonary Receptor Reflexes.

**Hay**

**Heesch**
Univ. of Nebraska Col. Med., Dept. Physiol. & Biophysics/ Omaha, NE. “Effects of Ovarian Hormones on Control of Sympathetic Outflow.”


Amer. Physiol. Soc. Conference/ Baroreceptor and Cardiopulmonary Receptor Reflexes/ Iowa City, IA/ “CNS Effects of Ovarian Hormones and Metabolites on Neural Control of Circulation”

**Huxley**
Chair and Speaker: EB2000 Symposium, San Diego, CA “Capillaries: How their Structure and Function Can Alter to Meet Tissue Demands”
Joint British Microcirculatory Society and Physiological Society Symposium on “The Response of the Endothelium to Pressure and Shear and the Cardiovascular Consequences”


Symposium on "Protein Losing Enteropathy", Children's Heart Fund, Buffalo, NY "Roles for serum proteins in the maintenance of cardiovascular barrier integrity"

Biomedical Engineering Society Meeting, Symposium on "Mechanical and Cytoskeletal Regulation of Microvascular Permeability"; Seattle, OR; Co-chair and Speaker

"Introduction: Intra/intercellular Endothelial Structures Mediating Microvascular Permeability"

Pennsylvania State University Biomedical Engineering Program "Adaptive Changes in Coronary Vascular Permeability to Proteins"

**Hwang**
Invited Speaker, Department of Physics, Wuhan University, China
Invited Speaker, Department of Physiology and Biophysics, University of Colorado

**Khanna**

Peritoneal Physiology - Case Studies. Amgen Nephrology Fellows Preceptorship Program.
University of MO, Columbia, MO. February 8, 2000.


Back to the Basics,- MOKP, Columbia, MO. Adequacy of Treatment HD & PD. Holiday Inn Executive Center, November 9, 2000.
“Peritoneal Dialysis Workshop”. Continuing Medical Education in Nephrology, Platinum Jubilee Celebrations. Seth GS Medical College & KEM Hospital. November 23, 2000

Kornegay
Phenotypic variation in a canine model of Duchenne muscular dystrophy. Neurology Grand Rounds. School of Medicine, University of Missouri (2000)
Breed-Specific Meningitis, Inflammatory Myopathies, Degenerative Myopathies, Feline Monoparesis/Paraparesis, Feline Tetraparesis, Feline Intracranial Syndromes, Management of the Paralyzed Dog, Western States Veterinary Conference, Las Vegas, NV (2000)

Laughlin
Laughlin MH: Non-uniform improvement of endothelial function in the coronary arterial tree after exercise training. The Peter Bohan Lecture, Department of Physiology, Lied Auditorium, Kansas University Medical Center, Kansas City, KS April 10, 2000.
Laughlin MH: Exercise training alters endothelial phenotype and function in the coronary arterial tree. Physiology Seminar, Department of Physiology, University of Texas Medical Center, San Antonio, TX April 24, 2000.
University of Missouri, Department of Biomedical Sciences. Seminar “Some Effects of Exercise Training on Endothelium and Vascular Smooth Muscle are Gender-Dependent”. October 2000.

Milanick
Comparing the extracellular properties of the Na/K pump and the PM Ca/H pump.
Cardiovascular Sciences Day, University of Missouri-Columbia

Dalton  Cardiovascular Research Center  

Pumping Ions: How and Why? Department of Physics, University of Missouri, St. Louis

Nolph
Introduction to Special Session on Ultrafiltration Management in Dialysis Patients, 20th Annual Dialysis Conference, San Francisco, California, February 27, 2000.
The Best Time to Start Dialysis in Chronic Renal Failure Patients, Invited Lecturer, Missouri State Medical Associations Sesquicentennial, Kansas City, MO, April 8, 2000.
Assessment of Adequacy and Prescription Tailoring (Creatinine Clearance, Kt/V, Correlation between the two, Which is better?) Invited Lecturer, National Kidney Foundation, Clinical Nephrology Meetings 2000, Atlanta, GA, April 16, 2000.
How to Deal with High Peritoneal Transporters, Invited Lecturer, Seventh International Course on Peritoneal Dialysis, Vincenza, Italy, May 26, 2000.
The Management of Chronic Renal Failure and the role of Protein Restriction. Medical Grand Rounds, Collins Visiting Professor, University of Colorado School of Medicine, Denver, Colorado. September 28, 2000.

Price
Structure Function Studies of CFTR, University of Texas, Galveston, TX. May, 15, 2000.
Rubin
“Alterations in Myocardial Cell Signaling and Calcium Homeostasis as a Mechanism of Myocardial Depression” Invited Symposium Speaker, 2000 Shock Society Meeting, Snowbird, Utah.

“The role of exercising on minimizing the effects of fat ingestion 2: porcine studies”. 2000, Nutrition and Exercise Sciences Seminar, University of Missouri.

Schadt
Mid-Missouri Health Information Management Association, “Cardiovascular Research at the University of Missouri-Columbia, Columbia, Missouri, June 9, 2000.

Terjung

Tsika

Twardowski


Zou
Xiaoqin Zou. A structural study of the interactions of potassium channels with their extracellular-entryway blockers. 8th Annual Cardiovascular Day. 2001.