# Dalton Cardiovascular Research Center


## Annual Report 2003-2004

# Summary of Accomplishments

***Publications and Presentations***
76 articles published
77 abstracts published
26 invited presentations

***Funding and Peer Review***
$9,910,744 in total direct costs
12 investigators served on editorial boards of 11 scientific journals
21 investigators review articles for 84 scientific journals
9 investigators review grant applications for 13 granting agencies

***Education and Training***
18 postdoctoral fellows
30 graduate students
9 undergraduate students

# Overview

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 engineering, biological sciences, biomedical sciences, electrical engineering, medicine, physiology, pharmacology, and veterinary medicine and surgery 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, biomedical engineering, 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 investigators published over 76 manuscripts in nationally recognized journals and books and gave over 25 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.

# Dalton Investigators

**Edward H. Blaine, PhD, DSc(Hon)**: Professor of Medical Pharmacology & Physiology

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

**Douglas K. Bowles, PhD**: Associate Professor of Biomedical Sciences

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

**C. Michael Foley, DVM, PhD**: Research Assistant Professor, Dalton Cardiovascular Research Center

**Kevin D. Gillis, DSc**: Associate Professor of Biological Engineering

**Liqun (Andrew) Gu, PhD**: Assistant Professor of Biological Engineering

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

**Marc Hamilton, PhD**: Assistant Professor of Biomedical Sciences

**Eileen M. Hasser, PhD**: Professor of Biomedical Sciences

**Meredith Hay, PhD**: Professor of Biomedical Sciences; Director, Center for Gender Physiology and Environmental Adaptation, University of Missouri School of Medicine

**Cheryl M. Heesch, PhD**: Professor of Biomedical Sciences

**Virginia H. Huxley, PhD**: Professor of Medical Pharmacology & Physiology

**Tzyh-Chang Hwang, PhD**: Professor of Medical Pharmacology & Physiology

**Salman M. Hyder, PhD:** Associate Professor of Biomedical Sciences, Zalk Missouri Professor of Tumor Angiogenesis

**Allan W. Jones, PhD**: Professor of Medical Pharmacology & Physiology

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

**Ronald J. Korthuis, PhD**: Bolm Distinguished Professor and Chairman of Medical Pharmacology & Physiology

**M. Harold Laughlin, PhD**: Professor and Chair of Biomedical Sciences, Professor of Medical Pharmacology & Physiology

**Mark A. Milanick, PhD**: Professor of Medical Pharmacology & Physiology

**Patrick J. Mueller, PhD**: Research Assistant Professor, Dalton Cardiovascular Research Center

**Jaya Pamidimukkala, PhD**: Research Assistant Professor, Dalton Cardiovascular Research Center

**Jeffrey T. Potts, PhD**: Associate Professor of Biomedical Sciences

**Elmer M. Price, PhD**: Interim Director of the Dalton Cardiovascular Research Center, Associate Professor of Biomedical Sciences

**Michael J. Rovetto, PhD**: Professor of Medical Pharmacology & Physiology

**Leona Rubin, PhD**: Associate Professor of Biomedical Sciences

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

**James R. Sowers M.D., FACE, FACP, FAHA**: Director of the MU Diabetes and Cardiovascular Center, Associate Dean for Clinical Research Professor of Medicine, Physiology and Pharmacology

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

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

**Xiaoqin Zou, PhD**: Research Assistant Professor, Dalton Cardiovascular Research Center and Department of Biochemistry

# Research Areas

*Biomedical Engineering*
Investigators: Gillis, Huxley, Hwang, Jones, Milanick, Rubin, Zou, Gu

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

*Exercise/Inactivity Including Atherosclerosis, Muscle Biology, Obesity, Type II Diabetes, and Vascular Biology*
Investigators: Booth, Bowles, Hale, Hamilton, Hasser, Huxley, Jones, Laughlin, Price, Rubin, Terjung, Tsika

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

*Muscular Dystrophy*
Investigators: Kornegay

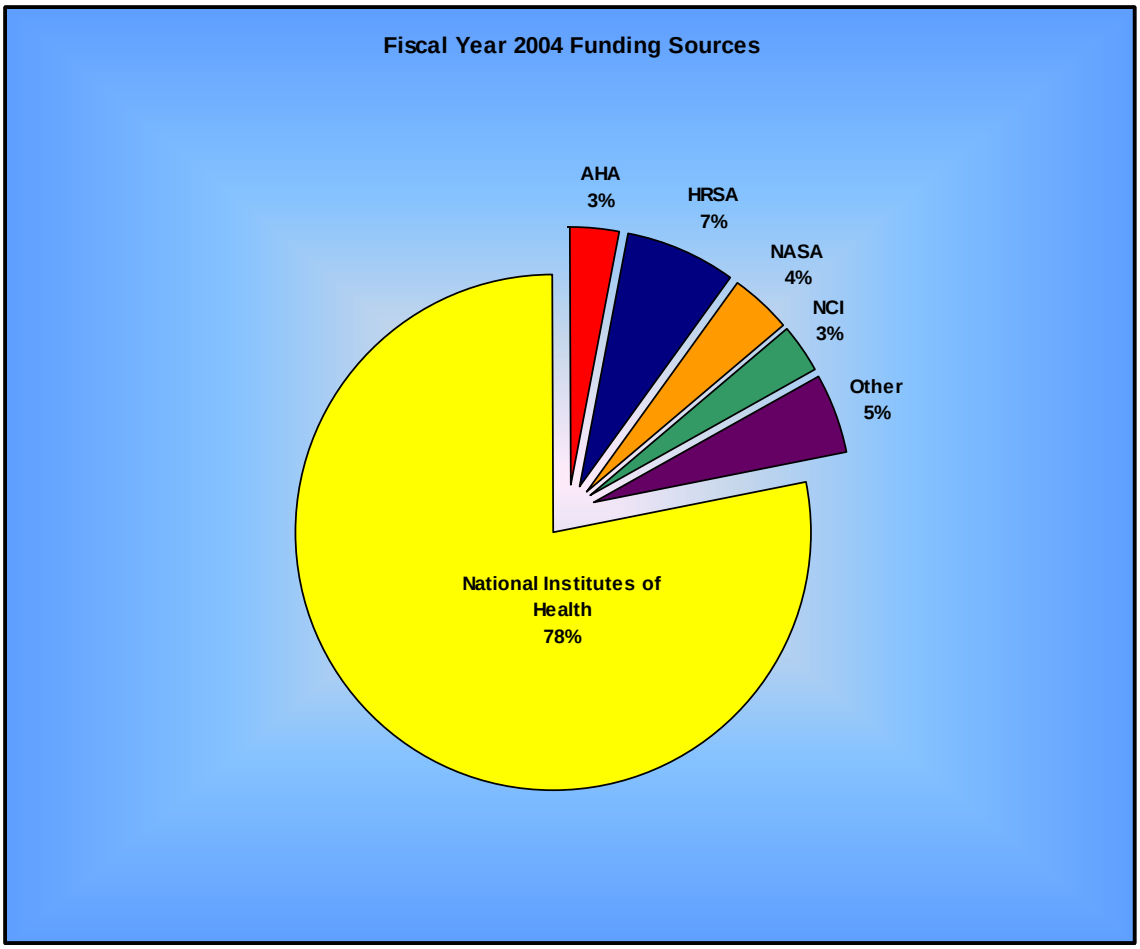
*Neurohumoral Control of the Circulation Including Hypertension, Heart Failure, and Salt and Water Homeostasis*
Investigators: Blaine, Hasser, Heesch, Hay, Milanick, Price, Schadt, Potts

*Tumor Angiogenesis*
Investigators: Hyder

# Funding

| Fiscal Year 2004 Investigator Funding | |
|---|---|
| Grant Funds - Direct Costs | 7,218,601 |
| Grant Funds - Indirect Costs | 2,437,861 |
| Fellowships | 254,283 |
| Total Funding | 9,910,744 |

| Fiscal Year 2004 Funding Distribution | |
|---|---|
| Resident Investigators Direct Costs | 3,721,776 |
| Non-Resident Investigators Direct Costs | 3,496,825 |
| Total Direct Costs (excluding fellowships) | 7,218,601 |



# Research Grants
Fiscal Year 2004 Total Costs

**American Heart Association**

"Central Autonomic Regulation Following Exercise" Patrick J. Mueller $60,500

"Energetics of Ligand-Protein Interactions and Structure-Based Drug Design against P. Aeruginosa Infections" Xiaoqin Zou $60,500

"Frequency Dependent Depression of Exocyosis in Baroreceptor Neurons and Role of Voltage-Gated Calcium Channels" Jayabala Pamidimukkala $39,000

"Pregnancy Induced Changes in GABAA Receptor Subunit Expression in a Brainstem" Charles M. Foley $60,500

**Association Francoise contre les Myopathies**

"Cellular Effects of Prednisone Treatment in Canine Dystrophy" Joe Kornegay $26,852

**Cystic Fibrosis Foundation**

"Alpha Defensins and Cystic Fibrosis" Lane L. Clarke $64,800

**Health Resources & Services Administration**

"Dalton Cardiovascular Research Center Construction/Renovation" Edward H. Blaine $665,735

**Microheart Inc.**

"Efficacy of PR11" Ronald Terjung $89,068

**Muscular Dystrophy Association**

"Cellular Effects of Prednisone Treatment in Canine Dystrophy" Joe Kornegay $38,963

**NASA**

"GABA Transmission in CV Function Following Simulated Microgravity in Male and Female Rats" Charles M. Foley $25,666

"Gender Differences in Hindlimb Unloaded Rats" Cheryl M. Heesch $317,680

"Genomics of Human Skeletal Muscle During Bedrest & Exercise" Marc Hamilton $31,409

"Signaling of Muscle Atrophy with Unloading" Frank W. Booth $17,938

**National Cancer Institute**

"Progestin Regulation of VEGF in Human Breast Cancer Cells" Salman M. Hyder $279,721

**National Institutes of Health**

"Adenosine Nucleotide Metabolism in Skeletal Muscle" Ronald Terjung $348,624

"Altered Mechanical Loads and Skeletal Muscle Phenotype" Richard Tsika 340,750

"Ca Sensing for Exocytosis" Kevin Gillis $181,250

"Ca Sensing for Exocytosis: Research Supplement for Underrepresented Minorities" Kevin Gillis $30,733

"Cardiovascular and Renal Physiology, Pharmacology and Biochemistry" Virginia Huxley $233,393

"Cardiovascular Regulation-Hindlimb Unweighted Animals" Eileen Hasser $253,750

"Central Cardiovascular Control During Blood Loss" James C. Schadt $253,750

"CFTR and Duodenal Anion Transport" Lane L. Clarke $217,500

"Circumventricular Organs: Gender & Hypertension" Meredith Hay $70,498

"Conversion of Shell Space -- Dalton Cardiovascular Research Center" Edward H. Blaine $302,167

"Cytosolic Modulation of Plasma Membrane Ion Transport" Mark Milanick $8,866

"Cytosolic Modulation of Plasma Membrane Ion Transport" Mark Milanick $359,190

"eNOS: Metabolism & Vascular Biology in Health & Disease" Harold Laughlin $546,619

"Exercise and Health: Integration from Molecule to Patient" Ronald Terjung $174,045

"Exercise Hypertrophy and Control of Myosin Induction" Richard Tsika $106,700

"Exercise Training and Peripheral Arterial Insufficiency" Ronald Terjung $362,500

"Exercise-Induced Growth of Skeletal Muscle" Frank W. Booth $170,375

"Failed Rescue of Old Skeletal Muscle from Atrophy" Frank W. Booth $290,000

"Gating of the CFTR C1 Channel by ATP Hydrolysis" Tzyh-Chang Hwang $253,750

"Metabotropic Glutamate Receptors and Baroreflex Function" Eileen Hasser $253,750

"Molecular Pathophysiology of Cystic Fibrosis" Tzyh-Chang Hwang $253,937

"Neural Circulatory Control: Pregnancy & Ovarian Hormones" Cheryl M. Heesch $120,404

"Neural Systems Regulating Vasopressin Release" Thomas Cunningham 5,625

"Proteomics: Inactivity-induced Muscle Insulin Resistance"Frank W. Booth $12,083

"Quantitative Structure and Function of ABC Transporters" Xiaoqin Zou $108,369

"Regulation of Barareceptor Afferent Transmission" Meredith Hay $37,986

"Regulation of Single Capillary Permeability Properties" Virginia Huxley $214,820

"Regulation of the Secretion of ApoB-Lipoproteins" Joseph Dixon $63,370

"Satellite Stem Cell Biology" Frank W. Booth $144,497

"Training: Muscle Blood Flow and Capillary Dynamics" Harold Laughlin $103,925

"Vascular Biology: Exercise Training and Coronary Disease" Harold Laughlin $1,634,861

**Office of Naval Research**

"Neural, Endocrine, and Local Mechanisms in the Effects of Environmental Stressors on the Cardiovascular Response to Blood Loss" James C. Schadt $94,387

**Parent Project/Muscular Dystrophy**

"Investigative Therapeutics in a Canine Model of Duchenne Muscular Dystrophy" Joe Kornegay $52,666

**Proctor & Gamble**

"VEGF-mediated Collateral Blood Flow" Ronald Terjung $8,036

**Susan G. Komen Breast Cancer Foundation**

"Progestin Regulation of VEGF in Breast Cancer Cells" Salman Hyder $12,268

**University of Pittsburgh/Muscular Dystrophy Association**

"Preclinical Gene Therapy in a Large Animal Model of DMD" Joe Kornegay $20,252

**University of Pittsburgh/National Institutes of Health**

"Preclinical Gene Therapy in a Large Animal Model of DMD" Joe Kornegay $49,567

**University of Rochester**

"Inflammatory Mechanisms in Arterioles and Venules" Virginia Huxley $82,868

# Fellowships

## American Heart Association

"Basis of Physical-Inactivity-Induced Insulin Resistance" David Kump (sponsor, Frank Booth) $21,000

"Angiotensin II dependent hypertension and the effects of gender: Baojian Xue (sponsor, Meredith Hay) $43,583

"Modulation of CFTR Gating by Membrane Cholesterol" Tomohiko Ai (sponsor, Tzyh-Chang Hwang) $19,450

## Cystic Fibrosis Foundation

"Molecular Biophysics of the CFTR Channel Pore" Zhen Zhou (Tzyh-Chang Hwang) $23,724

## National Institutes of Health

"Adenosine Activation of Voltage-Dependent K+ Channels" Christine Heaps (sponsor, Douglas Bowles) $24,074

"Lipids and Gene Regulation in Skeletal Muscle" Theodore Zderic (sponsor, Marc Hamilton) $38,140

"Molecular Biophysics of CFTR Chloride Channels" Silvia Bompadre (sponsor, Tzyh-Chang Hwang) $48,968

"Remodeling of Collateral Vessels After Femoral Occlusion" Barry Prior (sponsor, Ronald Terjung) $35,342

# Postdoctoral Fellows

| Student | Advisor |
|---|---|
| **Tomohiko Ai**<br>Physiology | Dr. Tzyh-Chang Hwang |
| **Layla Al Nakkash**<br>Biomedical Sciences | Dr. Leona J. Rubin |
| **Silvia Bompadre**<br>Physiology | Dr. Tzyh-Chang Hwang |
| **Olga Glinskii**<br>Physiology | Dr. Virginia H. Huxley |
| **Kyle Henderson**<br>Biomedical Sciences | Dr. Harold Laughlin |
| **Natalia Karasseva**<br>Molecular Biology | Dr. Richard Tsika |
| **Simon Lees**<br>Biomedical Sciences | Dr. Frank W. Booth |
| **Jocelyn Liu**<br>Biomedical Sciences | Dr. Joe Kornegay |
| **Shuichi Machida**<br>Biomedical Sciences | Dr. Frank W. Booth |
| **Marli Martins-Pinge**<br>Biomedical Sciences | Dr. Eileen M. Hasser |
| **Brad Noble**<br>Physical Medicine & Rehabilitation | Dr. Marc T. Hamilton |
| **Barry Prior**<br>Biomedical Sciences | Dr. Ronald Terjung |
| **Andrew Shanely**<br>Molecular Biology | Dr. Frank W. Booth |
| **Jianbo Wu**<br>Biomedical Sciences | Dr. Salman M. Hyder |
| **Baojian Xue**<br>Biomedical Sciences | Dr. Meredith Hay |
| **Theodore Zderic**<br>Biomedical Sciences | Dr. Marc T. Hamilton |

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| **Zhen Zhou**<br>Physiology | Dr. Tzyh-Chang Hwang |
| **Zhifang Zhu**<br>Biomedical Sciences | Dr. Marc T. Hamilton |

# Graduate Students

| Student | Advisor |
|---|---|
| **Kirk Abraham**<br>Biomedical Sciences | Dr. Ronald Terjung |
| **Nagabhavani Akunuri**<br>Computer Science | Dr. Marc T. Hamilton |
| **Kathyrn Arns**<br>Biomedical Sciences | Dr. Lane L. Clarke |
| **James Austgen**<br>Pharmacology & Physiology | Dr. Cheryl M. Heesch |
| **Jeffrey Brault**<br>Biomedical Sciences | Dr. Ronald Terjung |
| **Xiaohui Chen**<br>Biological Engineering | Dr. Kevin D. Gillis |
| **Jeong Han Cho**<br>Bioengineering | Dr. Tzyh-Chang Hwang |
| **Matt Dixon**<br>Veterinary Medicine | Leona J. Rubin |
| **Perminder Gulani**<br>Biomedical Sciences | Dr. Marc. T. Hamilton |
| **Chad Hancock**<br>Biomedical Sciences | Dr. Ronald Terjung |
| **Meghana Honnati**<br>Electrical Engineering | Dr. Kevin D. Gillis |
| **Kristen Hutchins**<br>Physiology | Dr. Marc. T. Hamilton |
| **David Kump**<br>Physiology | Dr. Frank W. Booth |
| **Catherine Lenox**<br>Veterinary Medicine | Dr. James C. Schadt |
| **Kalyani Maddali**<br>Physiology | Dr. Douglas K. Bowles |
| **Greg Miller**<br>Medicine | Dr. Mark Milanick |

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| **R. Tyler Morris**<br>Physiology | Dr. Frank W. Booth |
| **Chris Rathbone**<br>Physiology | Dr. Frank W. Booth |
| **Nicole Patino**<br>Biological Engineering | Dr. Kevin D. Gillis |
| **J. Scott Pattison**<br>Physiology | Dr. Frank W. Booth |
| **Rie Sasaki**<br>Physiology | Dr. Virginia Huxley |
| **Heidi Shafford**<br>Biomedical Sciences | Dr. James C. Schadt |
| **Wonchul Shin**<br>Biological Engineering | Dr. Kevin D. Gillis |
| **Janet Simpson**<br>Biomedical Sciences | Dr. Lane. L. Clarke |
| **Brian Steffen**<br>Physiology | Dr. Frank W. Booth |
| **Darla L. Tharp**<br>Physiology | Dr. Douglas K. Bowles<br>Dr. Elmer Price |
| **Julie Throop**<br>Veterinary Pathobiology | Dr. Virginia H. Huxley |
| **Jianjie Wang**<br>Medical Pharmacology & Physiology | Dr. Virginia H. Huxley<br>Dr. Leona J. Rubin |
| **Aijing Zhang**<br>Biochemistry | Dr. Richard Tsika |
| **Terese Zidon**<br>Biomedical Sciences | Dr. Cheryl M. Heesch<br>Dr. Elmer Price |

# Undergraduate Students

| Student | Advisor |
|---|---|
| **Beth Baumann** | Dr. Marc T. Hamilton |
| **Jamie Custer** | Dr. Lane L. Clarke |
| **R. Boyd Field** | Dr. Patrick J. Mueller |
| **Divya Goddapudi** | Dr. Lane L. Clarke |
| **Alicia Haught** | Dr. Eileen M. Hasser |
| **Christine Hoeman** | Dr. Leona J. Rubin |
| **Ashley Mahon** | Dr. Elmer Price |
| **Shengxin (Sunni) Sun** | Dr. Virginia H. Huxley |
| **Lia Thornberry** | Dr. Richard Tsika |

# Abstracts

Bowles

Turk, J.R., D.K. Bowles, M.H. Laughlin and T.R. Thomas. Effect of endurance exercise training on aorta and coronary arteries of male pigs with diet-induced hyperlipidemia. Med Sci Sports Exer. In press, 2003.

Maddali, K.K., D.H. Korzick and D.K. Bowles. Glucocorticoid effects on coronary PKC isoform expression. FASEB J. 17(4): A508, 2003.

Heaps, C.L., E.M. Price and D.K. Bowles. Electrophysiological, pharmacological and molecular characterization of TEA-sensitive voltage-dependent $K^+$ channels in the coronary microcirculation. FASEB J. 17(4): A71, 2003.

Johnson, P.J., D.K. Bowles and N.T. Messer. Dexamethasone alters equine digital artery smooth muscle ion channel activity and contractility: Role in glucocorticoid-associated laminitis? J. Vet. Int. Med. 17 (3): 457-458, 2003.

Turk, J., J.A. Carroll, M.H. Laughlin, T.R. Thomas and D.K. Bowles. C-reactive protein correlates with coronary atherosclerosis in pigs fed a high fat and cholesterol diet. Presented at MU Cardiovascular Day, February 18, 2003, University of Missouri, Columbia, Missouri.

Turk, J., J.A. Carroll, M.H. Laughlin, T.R. Thomas and D.K. Bowles. C-reactive protein correlates with coronary atherosclerosis in pigs fed a high fat and cholesterol diet. Presented at MU Life Sciences Week, April, 2003, University of Missouri, Columbia, Missouri.

Tharp, D.L, B.R. Wamhoff and D.K. Bowles. NFAT upregulates calcium channel activity during VSMC differentiation. Presented at MU Life Sciences Week, April, 2003, University of Missouri, Columbia, Missouri.

Tharp, D.L, B.R. Wamhoff and D.K. Bowles. NFAT upregulates calcium channel activity during VSMC differentiation. Presented at MU Cardiovascular Day, February 18, 2003, University of Missouri, Columbia, Missouri.

Spangenburg, E.E., D.K. Bowles, S.J. Lee and F.W. Booth. Insulin-like growth factor induces skeletal alpha actin promoter activity in differentiating myoblasts through membrane localized voltage-gated Ca2+ channels. APS Summer Conference on Satelitte Cells, Scotsdale, AZ, July 26th, 2003.

Bowles, D.K., V.K. Ganjam, L.J. Rubin, K.K. Madalli, D.L. Tharp, R.A. Mester and C.L. Heaps. Endogenous testosterone stimulates expression and activity of L-type Ca2+ channels in coronary smooth muscle. FASEB J. 18(4) A271, 2004.

Tharp, D.L, B.R. Wamhoff and D.K. Bowles. Effects of cyclosporine A on vascular smooth muscle L-type calcium channel activity and gene expression. FASEB J. 18(4) A1238, 2004.

Korzick, D.H., C.L. Heaps, D.K. Bowles. Exaggerated coronary vasoreactivity to endothelin-1 in aged rats: Role of protein kinase C. FASEB J. 18(4) A271, 2004.

Wamhoff, BR, DK Bowles, S Sinha, AP Somlyo, AV Somlyo, GK Owens. $Ca_v1.2$ mediated expression of smooth muscle gene expression-novel roles for ROK and myocardin. *FASEB J*. 18(4) A1241, 2004.

Maddali, K. K., D.H. Korzick and D.K. Bowles. Testosterone effects on PKCδ and $Ca_v1.2$ expression in coronary arteries. FASEB J. 18(4) A1240, 2004.

Heaps, C.L., J. Parker and D.K. Bowles. Altered calcium sensitivity contributes to enhanced contractility of collateral-dependent coronary arteries. FASEB J. 18(4) A270, 2004.

Maddali, K. K., D.H. Korzick and D.K. Bowles. Testosterone effects on PKCδ and $Ca_v1.2$ expression in coronary arteries. Presented at MU Cardiovascular Day, Feb. 9th, 2004

Galle, C. and Bowles, D.K. Increased free cholesterol inhibits coronary smooth muscle Ca2+ current. Presented at MU Cardiovascular Day, Feb. 9th, 2004

Tharp, D.L, B.R. Wamhoff and D.K. Bowles. Effects of cyclosporine A on vascular smooth muscle L-type calcium channel activity and gene expression. Presented at MU Cardiovascular Day, Feb. 9th, 2004.

Clarke

K.T. Arns, N.M. Walker, L.R. Gawenis, E.M. Bradford and L.L. Clarke. Reduced cyclic nucleotide-gated cation channel activity in the large intestine of cystic fibrosis mice. FASEB J. 17:A917. Experimental Biology 2003, San Diego, CA. April 11-15, 2003.

L.R. Gawenis and L.L. Clarke. Collapse of the lateral intercellular space (LIS) limits anion secretion during acute cAMP stimulation of murine small intestine. Gastroenterology 124: P137. 104th Annual Meeting of the American Gastroenterological Association, Digestive Disease Week, Orlando, FL. May 18 - 21, 2003.

L.R. Gawenis, J.E. Simpson, E.M. Bradford, N.M. Walker and L.L. Clarke. Anion exchange activity of the duodenal villus epithelium in wild-type (WT) and cystic fibrosis (CF) mice. Gastroenterology 124: P186. 104th Annual Meeting of the American Gastroenterological Association, Digestive Disease Week, Orlando, FL. May 18 - 21, 2003.

J.E. Simpson, L.R. Gawenis, E.M. Bradford, K.T. Boyle, N.M. Walker, and L.L. Clarke. Sulfate permease anion exchangers in the duodenum of wild-type (WT) and cystic fibrosis (CF) mice. Pediatr. Pulmonol. Suppl. 25: 205, 2003. 17th Annual North American Cystic Fibrosis Conference, Anaheim, CA. October 16-19, 2003.

L.L. Clarke and N.M. Walker. LomucinTM (talniflumate) treatment increases survival in a CF mouse model of distal intestinal obstructive syndrome. Pediatr. Pulmonol. Suppl. 25: 250, 2003. 17th Annual North American Cystic Fibrosis Conference, Anaheim, CA. October 16-19, 2003.

L. Al-Nakkash, L.L. Clarke, and L.J. Rubin. Dietary genistein increases basal and cAMP-stimulated anion secretion across murine intestine. Pediatr. Pulmonol. Suppl. 25: 210, 2003. 17th Annual North American Cystic Fibrosis Conference, Anaheim, CA. October 16-19, 2003.

J.E. Simpson, L.R. Gawenis, N.M. Walker, K.T. Boyle, and L.L. Clarke. Reduced Cl-/base exchange activity in epithelial cells of duodenal villi from CF mice. Experimental Biology 2004, Washington, D.C. April 17 - 21, 2004.

Foley

Mueller PJ, Foley CM, and Hasser EM. 2003. Chemoreceptor activation in conscious rats following hindlimb unloading. FASEB J. 17 (4): A21.

Foley CM, Price EM, and Heesch CM. 2004. GABAA α1and α2 mRNA expression in nucleus tractus solitarius in nonpregnant and pregnant rats. FASEB J.

Haught AL, Foley CM, Mueller PJ, Friskey SA, Rossi NF, Heesch CM, and Hasser EM. 2004. Effects of cardiovascular deconditioning on the neurohumoral response to blood loss. FASEB J.

Heesch CM, Foley CM, Phaup GJ, and Hasser EM. 2004. Gender differences in autonomic determinants of the heart rate in cardiovascular deconditioning. FASEB J.

Kvochina L, Foley CM, Hasser EM, and Heesch CM. 2004. Tonic excitation and inhibition of the paraventricular nucleus in pregnant rats. FASEB J.

Foley AM, Foley CM, Hasser EM, Buff P, Ganjam V, Friskey SA,k Duckworth RA, and Brown M. 2004. Successful adaptations to the traditional hindlimb suspension model in the rat. FASEB J.

Martins-Pinge MD, Mueller PJ, Foley CM, Friskey SA, Heesch CM, and Hasser EM. 2004. Cardiovascular effects of nitric oxide and GABA in the paraventricular nucleus of the hypothalamus in conscious rats. FASEB J.

Hasser

Heesch CM, Foley CM, Phaup GJ, Hasser EM. Gender Differences in Autonomic Determinants of Heart Rate (HR) in Cardiovascular (CV) Deconditioning. FASEB J. 2004

Foley AM, Foley CM, Hasser EM, Buff P, Ganjam VK, Friskey SA, Duckworth RA, Brown M. Successful Adaptations to the Traditional Hindlimb Suspension Model in the Rat. FASEB J. 2004

Haught AL, Foley CM, Mueller PJ, Friskey SA, Rossi NF, Heesch CM, Hasser EM. Effects of Cardiovascular Deconditioning on the Neurohumoral Response to Blood Loss. FASEB J. 2004

Mueller PJ, Hasser, EM. Alterations in control of sympathetic nerve activity (SNA) by the nucleus tractus solitarius (NTS) in exercise trained (ExTr) rats. FASEB J. 2004

Kvochina L, Foley CM, Hasser EM, Heesch CM. Tonic Excitation and Inhibition of the Paraventricular Nucleus (PVN) in Pregnant Rats

Hay

Xue, B. and M. Hay. The role of testosterone in angiotensin II dependent hypertension. FASEB., 2004.

Xue,B., Skala, K. Skala and M. Hay, Gender difference in the development of angiotensin II-induced hypertension in conscious mice. FASEB J.A825.3, 2003.

Pamidimukkala, J. and M. Hay. Frequency dependent depression of exocytosis and the role of protein kinases, FASEB J.577.7, 2003.

Pamidimukkala, J., C.J. Hoang and M. Hay, Role of presynaptic GABAB receptors in baroreceptor synaptic transmission. FASEB J. A 577.16, 21003.

Xue, B., and M. Hay. Sex differences in angiotensin II dependent hypertension, Soc. Neurosci., 2003.

Heesch

Heesch, C.M., C. M. Foley, G.J. Phaup, and E.M. Hasser. Gender differences in autonomic determinants of heart rate (HR) in cardiovascular (CV) deconditioning. In Press, FASEB Journal, 18.

Foley, C.M., E.M. Price and C.M. Heesch. GABAA Receptor α1 and α2 mRNA expression in nucleus tractus solitarius in nonpregnant and pregnant rats. In Press, FASEB Journal, 18 .

Kvochina L., C.M. Foley, E.M. Hasser, C.M. Heesch. Tonic excitation and inhibition of the paraventricular nucleus (PVN) in pregnant rats. In Press, FASEB Journal, 18.

Foley, C.M., P.J. Mueller, S.A. Friskey, N.F. Rossi, C.M. Heesch and E.M. Hasser. Effects of cardiovascular deconditioning on the neurohumoral response to blood loss. In Press, FASEB Journal, 18.

M. C. Martins-Pinge, P.J. Mueller, C.M. Foley, S.A. Friskey, C.M. Heesch and E.M. Hasser. Cardiovascular effects of nitric oxide and GABA in the paraventricular nucleus of the hypothalamus in conscious rats. In Press, FASEB Journal, 18.

Cunningham, R.L., J.A. Taylor, W.V. Welshons and C.M. Heesch. Methyl tert butyl ether extraction method for rodent estradiol radioimmunoassay. FASEB Journal, 17: A447, 2003.

Huxley

Zhang, R.V. and Huxley, V.H. 2003. Does Hetastarch Perform the Same as Albumin To Maintain Capillary Permeability Barrier as Measured by Capillary Hydraulic Conductivity (Lp)? 2003 ASA (American Society of Anesthesiology) October 11-15, Meeting Abstracts, San Francisco, CA. Anesthesiology 99:

Hyder

Liang, Y. Wu, J. and Hyder, S. M. (2003) Progestin regulation of VEGF in mammary cancer cells: A connection to tumor suppressor p53. AACR special conference on New Directions in Angiogenesis Research, Chicago, IL. Abstract A17.

Wu, J., Richer, J., Horwitz, K. B..and Hyder, S. M. (2003) Progestin dependent induction of VEGF in breast cancer cells: Role of progesterone receptor isoforms. AACR special conference on New Directions in Angiogenesis Research, Chicago, IL, Abstract A19. (J Wu: Recipient Travel Award).

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# Awards, Honors, Offices

Booth
Associate Editor, Journal of Applied Physiology, 1993B1994;
Editorial Board, American Journal of Physiology: Cell Physiology
Editorial Board, Medicine & Sports

Gillis
Elected Chair, Exocytosis and Endocytosis subgroup, Biophysical Society

Hamilton
Editorial Board: Journal of Applied Physiology

Hasser
Associate Editor, Am. J. Physiol. Heart Circ. Physiol.

Hay
Member, NASA- Human and Animal Research Policy Committee
Member, NIH-Hypertension & Microcirculation Study Section
Member, NIH-Experimental Cardiovascular Sciences Study Section
FASEB Science Policy Committee
Education Committee, American Physiological Society
Editorial Board, Am. Journal of Physiology, Heart and Circ.

Heesch
Editorial Board, American Journal of Physiology: Heart and Circulatory Physiology
Consulting Editor, American Journal of Physiology: Heart & Circulatory Physiology
Mentor, APS Career Mentoring Program in Physiology

Huxley
Associate Editor, Microcirculation
Editorial Board, American Journal of Physiology: Heart & Circulatory Physiology
Editorial Board, Journal of Vascular Research

Hwang
Gordon Research Conference, invited speaker
Molecular, Cellular and Developmental Neurosciences 3 Study Section, NIH, regular member
Editorial Board, Journal of General Physiology

Hyder
Invited to Expert Review Panel, Behavioral Health Concepts, Inc., Columbia, MO, 2003
Editorial Board Histology & Histopathology

Kornegay
Outstanding Alumnus Award College of Veterinary Medicine, Texas A&M University

Laughlin
Editorial Board, Journal of Applied Physiology
Associate Editor, Medicine & Science in Sports & Exercise

Milanick
Editorial Board: Journal of Membrane Biology

Rubin
Editorial Board, Shock

Schadt
Editorial Board, American Journal of Physiology: Heart and Circulatory Physiology
Editorial Board, Journal of Applied Physiology

Terjung
Chair, elected by Environmental and Exercise Physiology Section, American Physiological Society

# Books and Chapters

Booth

Spangenburg, EE, Booth, FW. Molecular regulation of individual skeletal muscle fiber types. Acta Physiol Scand. 178:413-424, 2003.

Chakravarthy MV, Booth FW. Inactivity and inaction: we can't afford either. Arch Pediatr Adolesc Med. 157:731-732, 2003.

Chakravarthy MV, Booth FW. Eating, exercise, and "thrifty" genotypes: connecting the dots toward an evolutionary understanding of modern chronic diseases. J Appl Physiol. 96:3-10, 2004.

Machida S, Booth FW. Regrowth of skeletal muscle atrophied from inactivity. Med Sci Sports Exerc. 36: 52-59, 2004.

Rennie MJ, Wackenhage, H, Spangenburg EE and Booth FW. Control of the size of the human muscle mass. Ann. Rev. Physiol. 66:799-828, 2004.

Huxley

Rumbaut, R.E. and V.H. Huxley, 2004 "Regulation of Microvascular Hydraulic Conductivity: In: Encyclopedia of Microcirculation, D. Neil Granger, ed., In press

Kornegay

Lorenz MD, JN Kornegay: Handbook of Veterinary Neurology, 4th Ed, WB Saunders Co, Philadelphia, 2004.

Terjung

TERJUNG, R.L. (Section Editor). I. Muscular System, II. Cardiovascular System, and III. Metabolic System. In. Advanced Textbook of Exercise Physiology. C.M. Tipton (Ed), Lippincott, Williams & Wilkins. Baltimore, 2004.

# Peer Review

Bowles
Reviewer, Journal of Physiology
Reviewer, Cardiovascular Research
Reviewer, Medicine & Science in Sports & Exercise
Grant Reviewer, Research Board Grants, University of Missouri System
Grant Reviewer, Regular Member, American Heart Association CV Regulation II Peer Review Study Group
Grant Reviewer, Ad Hoc Member, NIH Skeletal Muscle Biology Study Section

Clarke
Reviewer, American Journal of Physiology: Gastrointestinal and Liver Physiology
Reviewer, American Journal of Physiology: Cell Physiology
Reviewer, Gastroenterology
Reviewer, American Journal of Veterinary Research
Reviewer, British Journal of Pharmacology
Grant Reviewer, Missouri Research Board
Grant Reviewer, Cystic Fibrosis Foundation - Research and Research Training
Grant Reviewer, Committee Cystic Fibrosis Foundation - Functional Genomics RFA Committee
Grant Reviewer, National Institutes of Health - Renal Transport/Function Study Sections (Ad Hoc)
Grant Reviewer, Broad Medical Research Foundation (Ad Hoc)

Foley
Reviewer, American Journal of Physiology, Heart and Circulatory
Reviewer, Brain Research
Reviewer, Medicine and Science in Sport and Exercise

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

Hale
Reviewer, Biochimica et Biophysica Acta (Amsterdam, The Netherlands) manuscript review

Hamilton
Reviewer, Physiological Genomics, American Journal of Physiology (Cell)
Reviewer, American Journal of Physiology (Endo and Metab)
Reviewer, Journal of Applied Physiology
Reviewer, Medicine & Science in Sports & Exercise
Reviewer, Journal of Molecular and Cellular Cardiology
Reviewer, Biochimica et Biophysica Acta, J. of Gravitational Physiology
Reviewer, International J of Spts Med
Reviewer, International J of Spts Nutrition

Reviewer, European J of Lipid Science and Tech
Reviewer, Microvascular Research
Reviewer, Biochemistry and Cell Biology

Hasser
Reviewer, American Journal of Physiology (Heart Circ. Physiol.)
Reviewer, American Journal of Physiology (Reg. Integ. Physiol.)
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
Reviewer, Neuroscience
Grant Review, LA Board of Regents Research Competitiveness Program

Hay
Reviewer, American Journal of Physiology, Heart and Circulation
Reviewer, American Journal of Physiology, Regulatory, Integrative Hypertension
Reviewer, Journal of Neurophysiology
Reviewer, Journal of Physiology, London
Reviewer, Brain Research
Reviewer, Journal of Autonomic Nervous System
Reviewer, Journal of Applied Physiology
Grant Review, NIH Study Section, HM, chartered member

Heesch
Reviewer, Journal of Applied Physiology, guest reviewer
Reviewer, American Journal of Physiology: Heart & Circulatory Physiology
Reviewer, American Journal of Physiology: Regulatory, Integrative, and Comparative
Reviewer, Medicine & Science in Sports & Exercise

Huxley
Reviewer, American Journal of Physiology (Heart & Circulation; Cell; Regulatory, Integrative & Comparative; Endocrine & Metabolism)
Reviewer, Circulation Research
Reviewer, Biorheology
Reviewer, Biophys. Biochem. Acta
Reviewer, Journal of Applied Physiology
Reviewer, Journal of Physiology (London)
Reviewer, Annals of Biomedical Engineering
Reviewer, Hypertension

Hwang
Reviewer, Proceedings of National Academy of Sciences, USA
Reviewer, Nature
Reviewer, FEBS Lett.
Grant Review, NIH (MCDN3, regular member), Philip Morris External Research Program

Hyder
Reviewer, Breast Cancer Research
Reviewer, Br. J. Pharmacology
Reviewer, Cancer Research
Reviewer, Clinical Cancer Research
Reviewer, Clinical Chemistry
Reviewer, Endocrine
Reviewer, Endocrinology
Reviewer, Fertility and Sterility
Reviewer, Histology and Histopathology
Reviewer, Hormone Research
Reviewer, Human Reproduction
Reviewer, J. Pharmacol. Expt. Therapeutics
Reviewer, J. REPRODUCTION and fertility
Reviewer, Life Sciences
Reviewer, Molecular Carcinogenesis
Reviewer, Molecular and Cellular Biology
Reviewer, Molecular Human Reproduction
Reviewer, Pediatric Research
Reviewer, Tumor Biology
Grant review, University of Missouri-Columbia, College of Veterinary Medicine, Committee on Research Grants
Grant review, Susan G Komen Breast Cancer Foundation (2002-2005), (Peer-Review Process Recognized by NCI)
Grant review, Department of Defense Breast Cancer Program (2003 pgm)

Kornegay
Reviewer, Journal of the American Veterinary Medical Association
Reviewer, Journal of the American Animal Hospital Association
Reviewer, Journal of Neurological Sciences
Reviewer, Neuromuscular Disorders
Reviewer, Journal of Veterinary Internal Medicine

Laughlin
Reviewer, Avia. Space Environ. Med
Reviewer, J. Applied Physiol
Reviewer, Med. Sci. Sports Exercise
Reviewer, Am. J. Physiol.
Reviewer, Hypertension
Reviewer, Blood Vessels

Reviewer, Microvascular Research
Reviewer, Circulation
Reviewer, Circulation Research
Reviewer, Microcirculation
Grant Review, National Institutes of Health Study Section: National Institute of Child Health and Human Development: Pediatrics Subcommittee

Milanick
Reviewer, American Journal of Physiology:Cell Physiology
Reviewer, Biochimica Biophysica Acta: 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

Mueller
Reviewer, American Journal of Physiology: Heart and Circulatory Physiology
Reviewer, Journal of Applied Physiology
Reviewer, Medicine and Science in Sports and Exercise

Price
Reviewer, Molecular Pharmacology
Reviewer, Biochimica et Biophysica Acta
Reviewer, Biochemistry
Reviewer, Journal of Applied Physiology

Rubin
Reviewer, American Journal of Physiology
Reviewer, British Journal of Pharmacology
Reviewer, Shock
Grant Review, Tobacco Related Disease Research Program, State of California

Schadt
Reviewer, American Journal of Physiology: Regulatory, Integrative and Comparative Physiology
Reviewer, Hypertension
Grant Review, American Heart Association, National (Cardiovascular Regulation II Study Group)
Grant Review, National Institutes of Health/U.S. Army
Grant Review, NHLBI-Special Emphasis Panel-184

Sohma
Reviewer, Journal of General Physiology

Tsika
Reviewer, Journal of Biological Chemistry
Reviewer, Molecular and Cellular Biology
Reviewer, Journal of Applied Physiology
Reviewer, American Journal of Physiology (Cell Physiology)
Grant Review, National Institutes of Health

# Invited Presentations and Lectures

Clarke

Lomucin™ (talniflumate) treatment increases survival in a CF mouse model of distal intestinal obstructive syndrome. 17th Annual North American Cystic Fibrosis Conference, Anaheim, CA. October 16, 2003.

Anion exchange activity of the duodenal villus epithelium in wild-type (WT) and cystic fibrosis (CF) mice. Williamsburg Cystic Fibrosis Conference, Williamsburg, VA, May 30-June, 3. 2003.

Hale

"A Vision of Science - What Biology Departments Must Do". Department of Biological Sciences, Hampton University, Hampton, VA, March 2003.

Hay

NASA Sex/Gender Inclusion Workshop, Washington D.C.

Thought Leaders Workshop on Sex Based Biology Society for Women's Health Research, Washington, D.C.

"Sex, Space and Environmental Adaptation" Presentation to the Office of Science and Technology Policy, Office of the President of the United States, White House Conference Center, Washington, D.C.

"Sex, Aging and Angiotensin II" Workshop, Georgetown University

"Sex and Hypertension", St. Louis University

Huxley

International Symposium & Workshops on Advanced Experimental Physiology: Excitable Cells, Pancreatic Beta Cells, and Endothelial Cells, Bangkok, Thailand, "The Role of Gender in the Adaptation of Coronary Microvascular Permeability to Exercise: Lessons Learned from Pigs"

Pennsylvania State University: Noll Physiological Research Laboratory Colloquium, "Is sex a variable worth considering in studies of physiological adaptation to exercise?"

Department of Medical Pharmacology & Physiology, University of Missouri School of Medicine: "So, ya thought you knew all about albumin?"

NIH RFA Symposium on Arteriole and Venular Function, Bethesda, MD

I H Sarelius and VH Huxley, "Inflammatory mechanisms in arterioles and venules

Dalton Cardiovascular Research Center Investigators Series: "Control of the interface between blood and tissue."

Hwang

Department of Biological Engineering, University of Missouri-Columbia

Department of Physics, University of Missouri-Columbia

Gordon Conference

Hyder

85th Annual Endocrine Society Meeting, Philadelphia

16th Intl. Symposium of the Journal of Steroid Biochemistry and Molecular Biology, Tyrol, Austria, (Steroids and Cancer)

Kornegay

Cerebellar diseases of dogs and cats. Recent Advances in Animal Health and Production (26th Annual Meeting). Faculty of Veterinary Medicine, University Putra Malaysia. Serdang, MALAYSIA, 2003.

Laughlin

Laughlin MH: "Nitric oxide: role in combating disease." Symposium, American College of Sports Medicine meetings, San Francisco, CA, May 28-31, 2003.

Laughlin MH: "Physical Activity in Prevention and Treatment of Coronary Disease: The Battle Line is in Exercise Vascular Cell Biology." The Joseph B. Wolffe Lecture of the American College of Sports Medicine meetings, San Francisco, CA, May 28-31, 2003.

Laughlin MH: "Physical Activity: Mechanisms of Vascular Adaptation in Skeletal Muscle." The Gollnick Tutorial Lecture of the American College of Sports Medicine meetings, Indianapolis, Indiana, June 2-5, 2004

Milanick

Moving Molecules Through Membranes - Up, Down, and Around the Corner
Mount Holyoke College

Mueller

"Effects of Exercise on Neurohumoral Control of the Cardiovascular System"
Dept. of Biomedical Sciences, University of Missouri-Columbia

Rubin

"Basic Research Focused on Women's Health". 2003. Moving Research into Practice: Chronic Disease and Missouri Women. Workshop: UMC and Office of Women's Health, State of Missouri.

Terjung

Role of Exercise, Angiogenic Growth Factors & Nitric Oxide in Vascular Remodeling.
In: Canadian Society for Exercise Physiology Annual Meeting, Niagara at the Falls, Ontario, Canada. October 1-5, 2003.

Tsika

October 2003: TEF-1 interactions at A/T-rich and MEF2 like cis-elements: Functional implications for skeletal and cardiac muscle hypertrophy. Children's Hospital Medical Center. Molecular Cardiovascular Biology, Cincinnati, OH.

Zou

Department of Chemistry, University of Missouri-Columbia