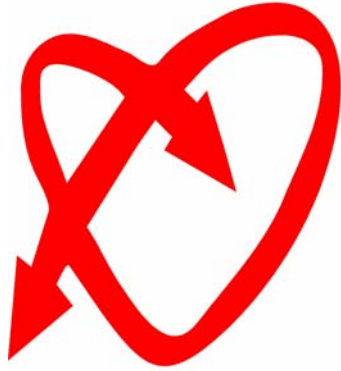


Dalton Cardiovascular Research Center



Annual Report
2002-2003

Summary of Accomplishments

Publications and Presentations

104 articles published
106 abstracts published
52 invited presentations

Awards and Peer Review

7 awards received
11 investigators served on editorial boards of 11 scientific journals
20 investigators review articles for 89 scientific journals
11 investigators review grant applications for 12 granting agencies

Education and Training

36 postdoctoral fellows
28 graduate students
16 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, medical pharmacology & physiology, 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 104 manuscripts in nationally recognized journals and books and gave over 50 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): Director of Dalton Cardiovascular Research Center, Professor of Medical Pharmacology & Physiology

Frank W. Booth, PhD: Professor of Biomedical Sciences

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

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

J. Thomas Cunningham, PhD: Assistant Professor of Medical Pharmacology & Physiology

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

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

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

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

Marc Hamilton, PhD: Assistant Professor of Biomedical Sciences

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

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

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

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

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

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

Allan W. Jones, PhD: Associate Director, Dalton Cardiovascular Research Center; Professor and Interim Chair of Medical Pharmacology & Physiology

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

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

Elmer M. Price, PhD: 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

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

Cystic Fibrosis

Investigators: Clarke, Hwang, Milanick, Price

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

Investigators: Booth, Bowles, Dixon, 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, Cunningham, Hasser, Heesch, Hay, Milanick, Price, Schadt, Sullivan

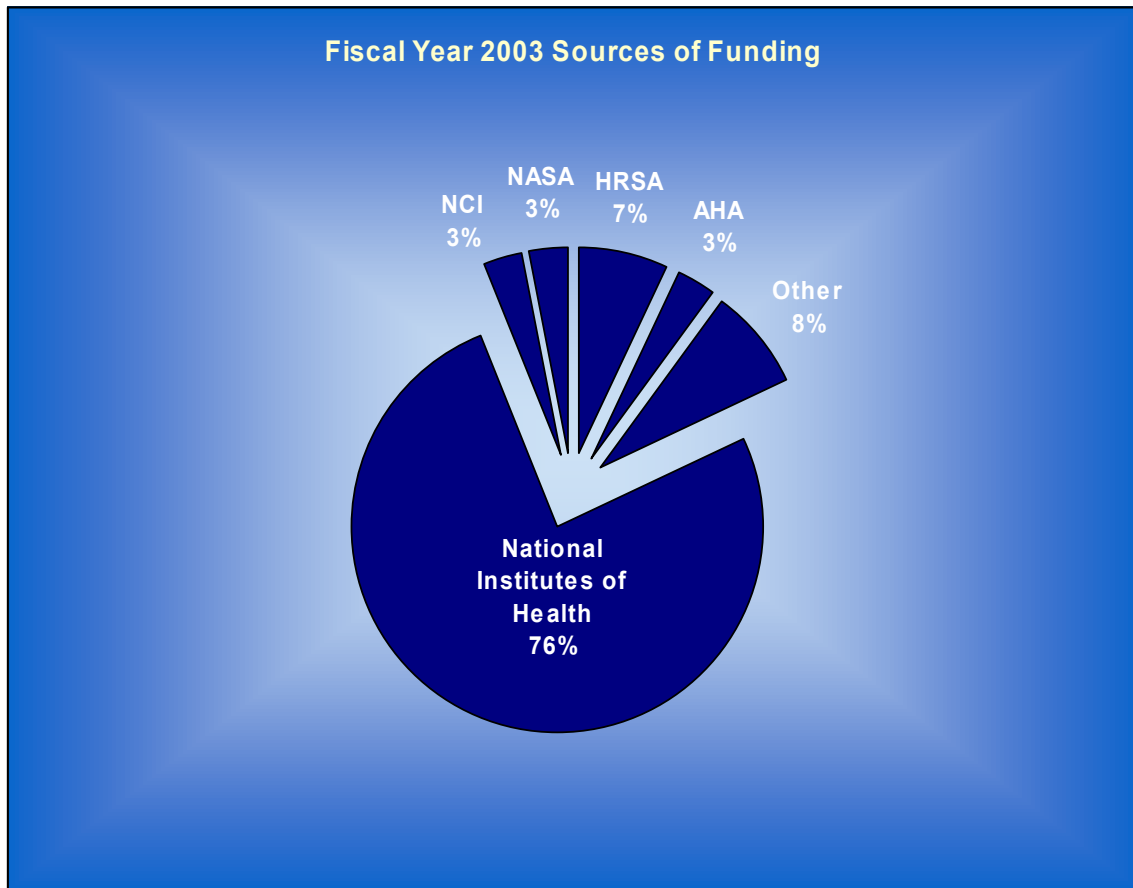
Tumor Angiogenesis

Investigators: Hyder

Funding

Fiscal Year 2003 Investigator Funding	
Grant Funds – Direct Costs	\$7,245,701
Grant Funds – Indirect Costs	\$2,343,649
Fellowships	\$340,813
Total Funding	\$9,930,163

Fiscal Year 2003 Funding Distribution	
Resident Investigators Direct Costs	\$4,175,458
Non-Resident Investigators Direct Costs	\$3,405,147
Total Direct Costs (excludes fellowships)	\$7,245,704



Research Grants

Fiscal Year 2003 Total Costs

American Heart Association

“Central Autonomic Regulation Following Exercise” Patrick Mueller \$60,500

“Energetics of Ligand-Protein Interactions and Structure-Based Drug Design Against *P. Aeruginosa* Infections” Xiaoqin Zou \$60,500

“Pregnancy Induced Changes in GABAA Receptor Subunit Expression in a Brainstem” Michael Foley \$30,250

“Role of Ubiquitin-Proteasome Pathway in Vascular Wall Metabolism and Atherosclerosis” Joseph Dixon \$19,988

Association Française contre les Myopathies

“Cellular Effects of Prednisone Treatment in Canine Dystrophy” Joe Kornegay \$35,802

Baylor College of Medicine

“Role of Growth Hormone Secretagogues and Exercise on Muscle Homeostasis under Microgravity” Frank Booth \$24,946

Chiron Corporation

“Collateral Blood Flow Increases with FGF-2: Study 2” Ronald Terjung \$41,617

Cystic Fibrosis Foundation

“Alpha Defensins and Cystic Fibrosis” Lane Clarke \$16,200

“CF Mouse Intestine: In Vivo Model for Pharmaceutical Testing” Lane Clarke \$15,270

“Intramolecular Regulation of CFTR” Elmer Price \$15,000

“Ion Transport Deregulations in the Murine Cystic Fibrosis Intestine, Study of Sodium Chloride Absorption” Lane Clarke \$9,400

Health Resources & Services Administration

“Dalton Cardiovascular Research Center Construction/Renovation” Edward Blaine \$665,735

Muscular Dystrophy Association

“Cellular Effects of Prednisone Treatment in Canine Dystrophy” Joe Kornegay \$76,202

NASA

“Gender Differences in Hindlimb Unloaded Rats” Cheryl Heesch \$61,875

“Genomics of Human Skeletal Muscle During Bedrest & Exercise” Marc Hamilton \$106,229

“Signaling of Muscle Atrophy with Unloading” Frank Booth \$97,313

National Cancer Institute

“Progestin Regulation of VEGF in Human Breast Cancer Cells” Salman Hyder \$280,096

National Institutes of Health

“Adenosine Nucleotide Metabolism in Skeletal Muscle” Ronald Terjung \$232,112

“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 \$11,794

“Cardiovascular and Renal Physiology, Pharmacology and Biochemistry” Virginia Huxley \$232,363

“Cardiovascular Regulation-Hindlimb Unweighted Animals” Eileen Hasser \$276,635

“Central Cardiovascular Control During Blood Loss” James Schadt \$253,750

“CFTR and Duodenal Anion Transport” Lane Clarke \$217,500

“Circumventricular Organs: Gender & Hypertension” Meredith Hay \$287,318

“Control of Sodium Intake in the Hindlimb Unweighted Rat” Thomas Cunningham \$184,875

“Conversion of Shell Space -- Dalton Cardiovascular Research Center” Edward Blaine \$302,167

“Cytosolic Modulation of Plasma Membrane Ion Transport” Mark Milanick \$106,389

“Exercise and Coronary Adenosine Activated K Currents” Douglas Bowles \$48,366

“Exercise Hypertrophy and Control of Myosin Induction” Richard Tsika \$126,688

“Exercise Training and Peripheral Arterial Insufficiency” Ronald Terjung \$362,500

“Exercise-Induced Growth of Skeletal Muscle” Frank Booth \$204,450

“Failed Rescue of Old Skeletal Muscle from Atrophy” Frank Booth \$287,750

“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 \$184,995

“Neural Regulation of Vasopressin Release” Thomas Cunningham \$181,250

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

“Ovarian Hormone Metabolites and Neural Circulatory Control” Cheryl Heesch \$83,532

“Proteomics: Inactivity-induced Muscle Insulin Resistance” Frank Booth \$72,500

“Quantitative Structure and Function of ABC Transporters” Xiaoqin Zou \$106,693

“Regulation of Baroreceptor Afferent Transmission” Meredith Hay \$91,166

“Regulation of Single Capillary Permeability Properties” Virginia Huxley
\$210,115

“Regulation of the Secretion of ApoB-Lipoproteins” Joseph Dixon \$253,660

“Satellite Stem Cell Biology” Frank Booth \$188,456

“Training: Muscle Blood Flow and Capillary Dynamics” Harold Laughlin
\$246,951

“Vascular Biology: Exercise Training and Coronary Disease” Harold Laughlin
\$1,580,971

National Science Foundation

“Cellular Electrophysiology on a Chip” Kevin Gillis \$202,595

Office of Naval Research

“Neural, Endocrine, and Local Mechanisms in the Effects of Environmental Stressors on the Cardiovascular Response to Blood Loss” James Schadt
\$163,607

Parent Project Muscular Dystrophy

“Investigative Therapeutics in a Canine Model of Duchenne Muscular Dystrophy” Joe Kornegay \$105,332

Proctor & Gamble

“VEGF-mediated Collateral Blood Flow” Ronald Terjung” \$32,145

Susan G. Komen Breast Cancer Foundation

“Progestin Regulation of VEGF in Breast Cancer Cells” Salman Hyder \$36,803

Fellowships

American Heart Association

“Role of Adenosine on Collagen Deposition and Its Significance in Myocardial Hypertrophy and Heart Failure” Arvinder Dhalla (Leona Rubin, sponsor) \$65,000

“Modulation of CFTR Gating by Membrane Cholesterol” Tomohiko Ai (Tzyh-Chang Hwang, sponsor) \$40,343

Cystic Fibrosis Foundation

“Molecular Biophysics of the CFTR Channel Pore” Zhen Zhou (Tzyh-Chang Hwang, sponsor) \$20,509

National Institutes of Health

“Adenosine Activation of Voltage-Dependent K⁺ Channels” Cristine Heaps (Douglas Bowles, sponsor) \$44,136

“Angiogenic Growth Factors in Exercising Skeletal Muscle” Pamela Lloyd (Ronald Terjung, sponsor) \$40,196

“Lipids and Gene Regulation in Skeletal Muscle” Theodore Zderic (Marc Hamilton, sponsor) \$36,952

“Remodeling of Collateral Vessels After Femoral Occlusion” Barry Prior (Ronald Terjung, sponsor) \$51,392

“Molecular Biophysics of CFTR Chloride Channels” Silvia Bompadre (Tzyh-Chang Hwang, sponsor) \$20,062

“The Role of Leukemia Inhibitory Factor in Satellite Cell Proliferation and Skeletal Muscle Regrowth” Espen Spangenberg (Frank Booth, sponsor) \$16,390

United Negro College Fund

“Regulation of CFTR Gating by cAMP-Dependent Protein Kinase Phosphorylation” Allan C. Powe, Jr (Tzyh-Chang Hwang, sponsor) \$5,833

Postdoctoral Fellows

Student	Advisor
Tomohiko Ai Physiology	Dr. Tzyh-Chang Hwang
Layla Al-Nakkash Biomedical Sciences	Dr. Leona Rubin
Ranan Aktas Biological Sciences	Dr. Joseph Dixon
Lionel Bey Biomedical Sciences	Dr. Marc Hamilton
Silvia Bompadre Physiology	Dr. Tzyh-Chang Hwang
Julie Bossuyt Veterinary Biomedical Sciences	Dr. Calvin Hale
Casey Childers Veterinary Biomedical Sciences	Dr. Joe Kornegay
Zhiqiang Fan Biomedical Sciences	Dr. Frank Booth
Olga Glinskii Physiology	Dr. Virginia Huxley
Lara Gawenis Biomedical Sciences	Dr. Lane Clarke
Cristine Heaps Biomedical Sciences	Dr. Douglas Bowles
Kyle Henderson Biomedical Sciences	Dr. Harold Laughlin
Shengyou Huang Biological Sciences	Dr. Xiaoqin Zou
Lyudmyla Kvochina Biomedical Sciences	Dr. Cheryl Heesch
Hao-Yang Liu Dalton Cardiovascular Research Center	Dr. Xiaoqin Zou
Jocelyn Liu Biomedical Sciences	Dr. Joe Kornegay
Pam Lloyd Biomedical Sciences	Dr. Ronald Terjung

Shuichi Machida Biomedical Sciences	Dr. Frank Booth
Brad Noble Physical Medicine & Rehabilitation	Dr. Marc Hamilton
Carol Okamura Biomedical Sciences	Dr. Joe Kornegay
Jayabala Pamidimukkala Biomedical Sciences	Dr. Meredith Hay
Allan Powe Physiology	Dr. Joseph Dixon Dr. Tzyh-Chang Hwang
Barry Prior Biomedical Sciences	Dr. Ronald Terjung
Jie Ren Biomedical Sciences	Dr. Ronald Terjung
Espen Spangenburg Biomedical Sciences	Dr. Frank Booth
Xavier Stien Dalton Cardiovascular Research Center	Dr. Lane Clarke
Dharmesh Vyas Biomedical Sciences	Dr. Frank Booth
Christopher Woodman Biomedical Sciences	Dr. Elmer Price
Jianbo Wu Biomedical Sciences	Dr. Marc Hamilton
Bao Jian Xue Biomedical Science	Dr. Meredith Hay
Yan Yang Biomedical Sciences	Dr. Kevin Gillis
Theodore Zderic Biomedical Sciences	Dr. Marc Hamilton
Zhen Zhou Physiology	Dr. Tzyh-Chang Hwang

Graduate Students

Student	Advisor
Kirk Abraham Biomedical Sciences	Dr. Ronald Terjung
Kathryn Arns Biomedical Sciences	Dr. Lane Clarke
Jeffrey Brault Biomedical Sciences	Dr. Ronald Terjung
Peng Chen Electrical Engineering	Dr. Kevin Gillis
Xiaohui Chen Electrical Engineering	Dr. Kevin Gillis
Sathya Chinnadurai Veterinary student	Dr. James Schadt
Philip Fabrizio Physiology	Dr. Marc Hamilton
Chad Hancock Biomedical Sciences	Dr. Ronald Terjung
Bradley Harrison (Med student)	Dr. Thomas Cunningham
Meghana Honnatti Electrical Engineering	Dr. Kevin Gillis
Sonia Houston Physiology	Dr. Virginia Huxley
B. Matthew Howe Medicine	Dr. Thomas Cunningham
David Kump Physiology	Dr. Frank Booth
Mechele Lewis Medicine	Dr. Virginia Huxley
Kalyani Maddalli Physiology	Dr. Douglas Bowles
R. Tyler Morris Physiology	Dr. Frank Booth

Lee Ann Newman
Biomedical Sciences

Dr. Leona Rubin

Nicole Patino
Biological Engineering

Dr. Kevin Gillis

J. Scott Pattison
Physiology

Dr. Frank Booth

Chris Rathbone
Physiology

Dr. Frank Booth

Rei Sasaki
Physiology

Dr. Virginia Huxley

Heidi Shafford
Biomedical Sciences

Dr. James Schadt

Wonchul Shin
Biological Engineering

Dr. Kevin Gillis

Brian Steffen
Physiology

Dr. Frank Booth

Jay Taylor
Veterinary Medicine

Dr. Elmer Price

Mark A. Thompson
Medicine

Dr. Harold Laughlin

Sangeetha Udayasankar
Electrical Engineering

Dr. Kevin Gillis

Jianjie Wang
Physiology

Dr. Virginia Huxley
Dr. Leona Rubin

Undergraduate Students

Student	Advisor
Beth Bauman	Dr. Marc Hamilton
Christopher Bethel	Dr. Lane Clarke
Emily Bradford	Dr. Lane Clarke
Anthony Cova	Dr. Lane Clarke
Jessica Cox	Dr. Michael Rovetto
Tyler Foreman	Dr. Marc Hamilton
Alicia Haught	Dr. Eileen Hasser
Jamie Joshua	Dr. Mark Milanick
Michael Lawrence	Dr. Mark Milanick
Melissa Page	Dr. Marc Hamilton
Anamika Pandya	Dr. Lane Clarke
Justin Sponaugle	Dr. Kevin Gillis
Shengxin Sun	Dr. Virginia Huxley
Bonnie Taylor	Dr. Calvin Hale
Andrew Wheeler	Dr. Leona Rubin
Jennifer Wolf	Dr. Marc Hamilton

Seminar Series

“The Na, K-ATPase: from Cardiovascular Physiology to Molecular Biochemistry and Back”

Craig Gatto, Ph.D.

Department of Physiology & Biophysics
Illinois State University

Co-sponsored by the Department of Medical Pharmacology & Physiology

“Genotype/Phenotype Relationship of Ion Channel Mutations causing Long QT Syndrome”

Minoru Horie, M.D.

Department of Cardiovascular Medicine
Kyoto University School of Medicine

Co-sponsored by the Department of Medical Pharmacology & Physiology

“Central Causes of Varying Responsivity to Cocaine or Stress and the Relationship to Hypertension, Heart Disease, and Endotoxemia”

Mark Kneupfer, Ph.D.

Department of Pharmacological and Physiological Science
St. Louis University School of Medicine

Co-sponsored with the Department of Biomedical Sciences

“Purinergetic Transmission & Central Autonomic Regulation: The 100% Hypothesis Revisited”

Andrew M. Lawrence, Ph.D.

Department of Pharmacology
Monash University, Clayton, Australia

Co-sponsored with the Department of Biomedical Sciences

**“Neurotransmission of the Chemoreflex in the Nucleus Tractus Solitarii
of Awake Rats”**

Benedito Machado, Ph.D.

Department of Physiology

School of Medicine of Ribeirão Preto, University of São Paulo, Brazil

Co-sponsored with the Department of Biomedical Sciences

“Cardiac Phenotypes in MyBP-C Knock-out Mice”

Richard Moss, Ph.D.

Department of Physiology, University of Wisconsin Medical School

Director, University of Wisconsin Cardiovascular Research Center.

Co-sponsored with the Department of Medical Pharmacology & Physiology

**“The Na, K-ATPase: From Cardiovascular Physiology to Molecular
Biochemistry and Back”**

Glen Toney, Ph.D.

Department of Physiology

University of Texas Health Science Center, San Antonio

Co-sponsored with the Department of Medical Pharmacology & Physiology

Abstracts

Booth

- Chakravarthy, M.V., M.J. Joyner, and F.W. Booth. Reduction in Risk of Chronic Health Conditions: An Obligation for Physicians to Prescribe Physical Activity in the Practice of Medicine in the New Millennium. *Mayo Clinic Proceedings*. 77:165-73, 2002.
- Booth, F.W. and M.V. Chakravarthy. Cost and Consequences of Sedentary Living: New Battleground for an Old Enemy. *President's Council on Physical Fitness and Sports Research Digest*. 16(3):1-8, 2002.
- Chakravarthy, M.V. and F.W. Booth. The Epidemic of Sedentary Living. *American Journal of Medicine and Sports*. 4:11-12, 2002.
- Booth F.W., M.V. Chakravarthy, S.E. Gordon, and E.E. Spangenburg. Waging war against physical inactivity: Cellular/molecular mechanisms as weaponry. *Journal of Applied Physiology*. 93:3-30, 2002.
- Booth, F.W., M.V. Chakravarthy, and E.E. Spangenburg. Exercise and gene expression: Physiological Regulation of the Human Genome through Physical Activity. *J. Physiology (London)*. 543:399-41, 2002.
- Spangenburg EE, Chakravarthy MV, Booth FW. p27Kip1: a key regulator of skeletal muscle satellite cell proliferation. *Clin Orthop*. 2002 Oct;(403 Suppl):S221-S227.
- Chakravarthy MV, Booth FW. The epidemic of sedentary living. *Am. J. Med Sports* 4:11-12, 2002.

Bowles

- Rishel, M.E. and D.K. Bowles, J. Peterson and D.E. Korzick. Chronic exercise, gender and high fat diet exert distinct effects on PKC levels in porcine coronary arteries, *Circulation*, 2002.
- Bowles DK and L. Bey, M. Hamilton and M. Hay. Estrogen effects on myocardial gene expression, *FASEB J*, Vol. 16, pp. A883, 2002.
- Bowles DK. Hypercholesterolemia decreases coronary L-type Ca²⁺ current in macro-, not microrcirculation, *FASEB J*, Vol. 16, pp. A122, 2002.
- Heaps CL and DK Bowles. Hypercholesterolemia abolishes voltage-dependent K⁺ (KV) channel contribution to adenosine-mediated relaxation in coronary arterioles, *FASEB J*, Vol. 16, pp. A84, 2002.

Clarke

- N.M. Walker, L. Judd, B.A. Palmer G.E. Shull, and L.L. Clarke. Compromise of innate immunity in the intestine of cystic fibrosis (CF) mice. 103rd Annual Meeting of the American Gastroenterological Association, Digestive Disease Week, San Francisco, CA. May 19 - 22, 2002. Poster of distinction.
- L.R. Gawenis, B.A. Palmer, E.M. Bradford, G.E. Shull, and L.L. Clarke. Intestinal Na⁺ absorption and anion secretion are regulated in parallel. 103rd Annual Meeting of the American Gastroenterological Association, Digestive Disease Week, San Francisco, CA. May 19 - 22, 2002.

- Y. You, L.L. Clarke, E. Richer, L. Hogue, T. Ferkol, and S.L. Brody. Differentiated primary culture of mouse airway epithelial cells from CFTR mutant mice demonstrate a CF phenotype. 16th Annual North American Cystic Fibrosis Conference, New Orleans, LA. October 3 - 6, 2002.
- K.T. Arns, N.M. Walker, L.R. Gawenis, B.A. Palmer, E.M. Bradford and L.L. Clarke. Cyclic nucleotide-gated cation channel (CNGC) currents are reduced in the intestine of CF mice. 16th Annual North American Cystic Fibrosis Conference, New Orleans, LA. October 3 - 6, 2002.
- L.R. Gawenis, B.A. Palmer, E.M. Bradford, M. Miller, G.E. Shull and L.L. Clarke. Parallel regulation of intestinal sodium absorption and CFTR-mediated anion secretion. 16th Annual North American Cystic Fibrosis Conference, New Orleans, LA. October 3 - 6, 2002.
- L.R. Gawenis and L.L. Clarke. CFTR mediated chloride secretion is regulated by lateral intercellular space volume. 16th Annual North American Cystic Fibrosis Conference, New Orleans, LA. October 3 - 6, 2002.
- N.M. Walker, L. Judd, L.R. Gawenis, B.A. Palmer, E.M. Bradford, G.E. Shull and L.L. Clarke. Compromise of antimicrobial peptide defense in the intestine of CF mice. 16th Annual North American Cystic Fibrosis Conference, New Orleans, LA. October 3 - 6, 2002.

Cunningham

- Bruno, S.B., Cornelius, J., Foley, C.M. Hasser E.M. & Cunningham, J.T. (2002) Increased Sodium Intake is Maintained in 2 Week Hindlimb Unloaded (HU) Rats. FASEB J.
- Sullivan, M.J., Hasser, E.M., Moffitt, J.A., Bruno, S.B. & Cunningham J.T. (2002). Changes in Salt Intake, Plasma Volume and Aldosterone during 24 Hindlimb Unloading in Male Rats. FASEB J.
- Penny, M., Higgs, K.A.N., Cornelius, J. and Cunningham, J.T. (2002). Fos B staining in rat supraoptic nucleus (SON) after hypertonic saline injection. FASEB J.
- Mueller, P.J., Cunningham, J.T., Grindstaff, R.R., Laughlin M.H., & Hasser, E.M. (2002) Hypotension-induced Fos in the hypothalamus of exercise trained rats. FASEB J.
- Mueller, P.J., Cunningham, J.T., Grindstaff, R.R., Zheng, H., Patel K.P., & Hasser, E.M. (2002) NADPH-diaphorase positive neurons in the hypothalamus of hindlimb unweighted rats. FASEB J.
- Cunningham, J.T., Bruno, S.B., Grindstaff, R.J., Grindstaff, R.R., Higgs, K.A.N., Mazzella, D. & Sullivan, M.J. (2002). Cardiovascular regulation of supratopic vasopressin neurons. Prog. Brain Res. 139, 257-273.
- Bruno, S.B., Cornelius, J., Hasser E.M. & Cunningham, J.T. (2003) Spironolactone blocks increased salt intake during 24-h hindlimb unloading in male rats. FASEB J.
- Hollenbeck A.C., Cunningham J.T., Higgs K.A.N., Bruno, S.B. & Cornelius J. (2003). Rat hindlimb unweighting increases Fos B expression in the nucleus of the solitary tract. FASEB J.
- Howe, B.M., Higgs K.A.N., Bruno S.B. & Cunningham J.T. (2003). Chronic Fos B expression in the hypothalamus after volume expansion in conscious rats. FASEB J.

- Penny, M., Higgs, K.A.N., Cornelius, J. and Cunningham, J.T. (2003). Effect of water restriction on Fos B staining in rat supraoptic nucleus (SON) after hypertonic saline injection. *FASEB J.*
- Austgen, J.R., Higgs K.A.N, Bruno S.B., Cornelius, J., & Cunningham, J.T., (2003) c-Fos expression in the paraventricular nucleus of the hypothalamus is influenced by murine leptin. *FASEB J.*
- Cunningham, J.T., Cornelius, J., Ghorbel, M. & Murphy D. (2003) Water deprivation suppresses Jun D staining in the supraoptic nucleus of the rat. *FASEB J.*
- Mueller, P.J. Cunningham, J.T., Patel, K.P. & Hasser E.M. (2003) Proposed role of the paraventricular nucleus in cardiovascular deconditioning. *Acta Physiol Scand*, 177, 27-35

Dixon

- Wysocka, E, Sturek, M., and Dixon, J.L. Coronary artery lipid accumulation in diabetic dyslipidemic pigs compared to normoglycemic high fat/cholesterol fed control pigs. *Arterioscler. Thromb. Vasc. Biol.* 22:878, a-38, 2002.
- Dixon, J.L., E. Wysocka, and M. Sturek. Coronary artery lipoprotein lipase and alpha smooth muscle actin expression in hyperlipidemic, diabetic dyslipidemic, and exercise trained diabetic dyslipidemic pigs. *Arterioscler. Thromb. Vasc. Biol.* (In press-2003).
- Peterson, A., Roberts, T.M., Sturek, M., Dixon, J.L. and Hardin, C.D. Bladder smooth muscle phenotype alterations in diabetic/dyslipidemic swine: a role for lipotoxicity? *FASEB J.* (in press-2003).

Foley

- Foley CM, Ashmore RL, Price EM, Hasser EM, and Heesch CM. 2002. GABAA receptor α_1 and α_2 protein expression in rostral ventrolateral medulla in nonpregnant and pregnant Rats. *FASEB J.* 16(4): A500-A501.
- Heesch CM, Mueller PJ, Foley CM, and Hasser EM. 2002. Gender effects on autonomic responses to cardiovascular deconditioning. *FASEB J.* 16(5): A834.
- Bruno SB, Cornelius JN, Foley CM, Hasser EM, and Cunningham JT. 2002. Increased sodium intake is maintained in 2 week hindlimb unloaded (HU) rats. *FASEB J.* 16(5): A838.
- Foley CM, Mueller PJ, Zheng H, Price EM, Patel KP, Hasser EM, and Heesch CM. 2003. Pregnancy and cardiovascular deconditioning have opposite effects on neuronal nitric oxide synthase protein expression in the paraventricular nucleus of the hypothalamus. *FASEB J.*
- Mueller PJ, Foley CM, and Hasser EM. 2003. Chemoreceptor activation in conscious rats following hindlimb unloading. *FASEB J.*

Hale

- Bossuyt, J. Taylor, B.E., James-Kracke, M., and C.C. Hale, 2002, Cardiac Sodium-Calcium Exchange Interacts with Caveolin-3. *Biophys. J.* 82: 564a.
- Wong, T.C., Kamath, S., Quinn, T.P., Peletskaya, E.N., Bossuyt, J. and C.C. Hale, 2002, The solution structure of the cardiac exchange inhibitory peptide (XIP) by NMR spectroscopy. *Biophysical J.* 82: 653a.

Hamilton

- Bowles DK, Bey L, Hay M, Hamilton MT. Estrogen effect on myocardial gene expression. *The FASEB Journal*, April 2002.
- Hamilton, MT. The Exercise Training Dose-Response Relationship: An Integrative View From Molecular Biology, Physiology, And Epidemiology. *MSSE*, April Supplement, 2002.

Hasser

- Heesch, CM, Mueller PJ, Foley CM and Hasser EM . Gender Effects on Autonomic Responses to Cardiovascular Deconditioning. *FASEB J*. 2002
- Mueller, PJ, Cunningham JT, Grindstaff RR, Zheng H, Patel KP, Hasser EM. NADPH-Diaphorase Positive Neurons in the Hypothalamus of Hindlimb Unweighted Rats. *FASEB J*. 2002
- Mueller, PJ, Cunningham JT, Grindstaff RR, Laughlin MH, Hasser EM. Hypotension-Induced Fos Expression in the Hypothalamus of Endurance Trained Rats. *FASEB J*. 2002
- Mueller, PJ, Laughlin MH, Hasser EM. Baroreflex Mediated Vasopressin Release in Endurance Trained Rats. *ACSM* 2002
- Mueller PJ, Foley CM and Hasser EM. Chemoreceptor Activation in Conscious Rats Following Hindlimb Unloading. *FASEB J* 17: A21, 2003
- Mueller PJ and Hasser EM. Neurohumoral Response to Hypotension in Rats after Spontaneous Wheel Running. *FASEB J* 17: A1296, 2003
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Hay

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Heesch

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Hwang

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Laughlin

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Milanick

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Mueller

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Rubin

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Schadt

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Terjung

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Brault, J.J., K.A. Abraham, and R.L. TERJUNG. Creatine muscle uptake and creatine transporter expression in response to creatine supplementation and depletion. *J. Appl. Physiol.*: 94:000-000, 2003. (10.1152/jappphysiol.01171.2002)

Zou

Hao-Yang Liu, and Xiaoqin Zou. Pairwised GB/SA Scoring Function for Structure-based Drug Design. Submitted to *Journal of Physical Chemistry B*.

Hao-Yang Liu, Min Li, and Tzyh-Chang Hwang, Xiaoqin Zou. A Dimeric Structural Model of the Nucleotide Binding Domains of CFTR Based on the Crystal Structures of MalK and HisP. To be submitted to *Biochemistry*.

Ronald A. Siegel and Xiaoqin Zou. Membrane hysteresis of a simple Hill model system. To be submitted to *Journal of Chemical Physics*.

Xiaoqin Zou and Kent Gates et al. Sequence-dependent DNA alkylation by the antitumor agent leinamycin. In preparation.

Hao-Yang Liu, Xiaohui Wang, Peter Tipton, and Xiaoqin Zou. Structure-based Drug Design for PMM/PGM: An Enzyme Crucial for the Virulence of Bacterium *P. Aeruginosa*. *Biophysical Journal*, 84, 282a, 2003.

Patents

Price

U.S. Provisional Patent Application No. UVMO:024USP1 entitled " Method of Treatment of Endothelial Dysfunction and Engineered Proteins for Same", Elmer M. Price (Inventor), Miles Tanner, Harold Laughlin, Mike Sturek (Co-Inventors)

Awards, Honors and Offices

Booth

Associate Editor, Journal of Applied Physiology
Editorial Board, American Journal of Physiology: Cell Physiology

Foley

Caroline tum Suden/Frances A. Hellebrandt Professional Opportunity Award, American Physiological Society

Hasser

Inaugural Lecturer, University of Western Ontario
Golden Aesculapius Teaching Award
Associate Editor, Am. Journal of Physiology: Heart Circ. Physiology

Hay

Board Member, American Heart Association: Missouri Affiliate
Fellowship to attend Center for Creative Leadership – Leadership Development Program
Chair, Study-Section, CV-Reg.2, AHA National Center
FASEB Science Policy Committee

Heesch

Editorial Board, American Journal of Physiology: Heart and Circulatory Physiology
Consulting Editor, American Journal of Physiology: Heart and Circulatory Physiology
Guest Editor, Advances in Physiology Education

Huxley

National Organizing Committee for the 2005 meeting of IUPS
Hugh Stephenson Award: Research, American Heart Association-Heartland Affiliate
Associate Editor, Microcirculation
Editorial Board, American Journal of Physiology: Heart & Circulatory Physiology
Editorial Board, Microvascular Research
Editorial Board, Journal of Vascular Research

Hyder

Editorial Board, Histology & Histopathology

Laughlin

Sigma Xi Excellence in Graduate Research Mentoring Award, University of Missouri
Editorial Board, Journal of Applied Physiology
Associate Editor, Medicine & Science in Sports & Exercise

Milanick

Editorial Board, Journal of Membrane Biology

Rubin

Editorial Board, Shock

Honorary Member, Phi Zeta Veterinary Honor Society

Schadt

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

Editorial Board, Journal of Applied Physiology

Terjung

Editorial Board, Journal of Applied Physiology

Peer Review

Booth

Health & Science Policy Committee, American College of Sports Medicine
Planning committee of Normative Measures of Musculoskeletal Fitness, NIH Workshop
Member International Union of Physiological Sciences commission on Work and
Exercise Physiology

Bowles

Study section member, American Heart Association Peer Review Study Group,
Association/Professional Organization Service
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, Journal of General Physiology
Reviewer, American Journal of Respiratory Cell and Molecular Biology
Reviewer, American Journal of Veterinary Research
Grant Review, Missouri Research Board
Grant Review, Cystic Fibrosis Foundation - Research and Research Training Committee

Dixon

NIH Metabolism Study Section, Nutritional and Metabolic Sciences Integrated Review
Group. Special Reviewer, October, 2001 to present
Reviewer, Journal of Lipid Research
Reviewer, Journal of Biological Chemistry
Reviewer, Biochimica et Biophysica Acta
Reviewer, Atherosclerosis

Foley

Reviewer, Brain Research
Reviewer, American Journal of Physiology
Reviewer, Heart and Circulatory

Gillis

Reviewer, Nature
Reviewer, Reviewer, Science
Reviewer, Neuron
Reviewer, EMBO Journal
Reviewer, Biophysical Journal
Reviewer, Journal of Theoretical Biology
Reviewer, Journal of Neuroscience
Grant Review, NIH: ad hoc reviewer
Grant Review, National Science Foundation panel "Biochips"

Hale

Reviewer, National Science Foundation
Reviewer, American Heart Association – Great American Consortium
Reviewer, Biochimica et Biophysica Acta
Reviewer, Metabolism - Clinical and Experimental

Hamilton

Reviewer, Journal of Applied Physiology
Reviewer, Physiological Genomics
Reviewer, Biochemistry and Cell Biology
Reviewer, Medicine in Science and Sports and Exercise
Reviewer, Journal of Gravitational Physiology
Reviewer, European Journal of Lipid Science and Technology
Grant Review, NIH study section/NINDS
Grant Review, University of Missouri Research Board

Hasser

Reviewer, American Journal of Physiology, Heart and Circulation
Reviewer, American Journal of Physiology, Regulatory, Integrative
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, American Heart Association, Heartland Section

Hay

Reviewer, American Journal of Physiology, Heart and Circulation
Reviewer, American Journal of Physiology, Regulatory, Integrative
Reviewer, 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, ECS
Grant Review, AHA Study Section Chair, Cardiovascular Regulation II, American Heart Association, National (Dallas)

Heesch

Reviewer, Journal of Applied Physiology
Reviewer, American Journal of Physiology
Reviewer, Heart & Circulatory Physiology
Reviewer, Regulatory, Integrative, and Comparative

Reviewer, Medicine & Science in Sports & Exercise
Grant Review, NIH, Respiratory Physiology Study Section, Ad Hoc

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
Grant Review, NIH DDK Special Study Section

Hwang

Reviewer, American Journal of Physiology (cell physiology)
Reviewer, American Journal of Physiology (heart and circulation)
Reviewer, Journal of General Physiology
Reviewer, Neuron
Reviewer, Journal of Membrane Biology
Reviewer, Journal of Biological Chemistry
Reviewer, Journal of Pharmacology and Experimental Therapeutics
Reviewer, Journal of Molecular and Cellular Cardiology
Reviewer, Canadian Journal of Physiology and Pharmacology
Reviewer, Biophysical Journal
Reviewer, Journal of Physiology
Reviewer, Brain Research
Reviewer, American Journal of Physiology (Lung, Cell and Molecular)
Grant Review, Cystic Fibrosis Trust (United Kingdom)
Grant Review, Cystic Fibrosis Foundation
Grant Review, Cystic Fibrosis Research Inc.
Grant Review, MU Research Board
Grant Review, Veteran Affairs
Grant Review, NIH (CVA special reviewer, GMB ad hoc member, MCDN3 regular member)

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 and Cellular Biology
Reviewer, Molecular Human Reproduction
Reviewer, Pediatric Research
Reviewer, Tumor Biology
Grant Review, Susan G Komen Breast Cancer Foundation
Grant Review, Department of Defense Breast Cancer Program
Grant Review, University of Missouri Research Board

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

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, Heart and Circulatory Physiology
Reviewer, Journal Molecular and Cellular Cardiology
Reviewer, Journal Applied Physiology (1 in 2002)
Reviewer, Shock
Grant Review, University of Missouri Research Board
Grant Review, Tobacco Related Disease Research Program, State of California

Schadt

Reviewer, American Journal of Physiology: Regulatory, Integrative and Comparative Physiology
Reviewer, American Journal of Physiology: Physiological Genomics
Reviewer, Cardiovascular Research
Reviewer, European Journal of Pharmacology
Reviewer, Hypertension
Reviewer, Life Sciences
Reviewer, Medicine and Science in Sports and Exercise
Reviewer, Neuroendocrinology
Reviewer, Proceedings of the Society for Experimental Biology and Medicine
Reviewer, Regulatory Peptides
Reviewer, Shock
Grant Review, American Heart Association National (Cardiovascular Regulation II Study Group)
Grant Review, U.S. Army

Zou

Reviewer, Physical Review Letters.
Reviewer, Physical Review E.

Presentations and Lectures

Bowles

ACSM Annual Meeting

Medical College of Georgia, Vascular Biology Center

Clarke

Acid-base transporters in the CFTR-null intestine. Department of Physiology. University of Southern Alabama, Mobile, AL.

Pathophysiology of intestinal obstruction in the CF mouse. Williamsburg Cystic Fibrosis Conference, Williamsburg, VA..

Intestinal obstructive syndrome in cystic fibrosis mice. Vertex Corp., San Diego, CA.

Dixon

Hepatic Free Cholesterol is Highly Correlated with Coronary Atheroma in Diabetic Dyslipidemic Pigs. University of Missouri, Cardiovascular Day IX, February 4, 2002

Swine models of Increased Atherosclerosis in Diabetes. Symposium: Mechanisms of Macrovascular Disease in Diabetes. Diabetes Endocrinology Research Center, University of Washington, Seattle, May 21, 2002

Gillis

The relationship between cAMP, Ca^{2+} , and transport of CFTR to the plasma membrane. Oregon Health Sciences University, Vollum Institute, Portland, OR, 02/2002

Amperometric detection of quantal catecholamine release on micromachined silicon chips. Drug Discovery for Ion Channels Satellite Symposium, Biophysical Society Annual Meeting, San Francisco, CA, 02/2002

The relationship between cAMP, Ca^{2+} , and transport of CFTR to the plasma membrane. Case Western Reserve University, Dept. of Physiology, Cleveland, OH, 03/2002

Single-cell assays of exocytosis. Axon Inc., Union City, CA, 11/2002

Protein kinase C enhances a highly Ca-sensitive mode of exocytosis in chromaffin cells. University of Southern California, Dept. of Physiology, Los Angeles, CA, 11/2002

Hale

Cardiac Sodium-Calcium Exchange: Large-Scale Expression and Possible Role in Transmembrane Signaling. Department of Physiology and Biophysics, Finch University of Health Sciences, The Chicago Medical School, Chicago, IL, January 2002.

Cardiac Sodium-Calcium Exchange and Caveolae. Department of Biochemistry and Molecular Biology, St. Louis University School of Medicine, St. Louis, MO December 2002.

Hamilton

Bey L, Wu JB, Zderic T, Hamilton D, Hamilton MT. Suppression of lipoprotein lipase in skeletal muscle during inactivity requires the transcription of a sedentary factor.

American College Sport of Medicine, Central States Symposium, October 2002, Kansas City.

Zderic T, Bey L, Akunuri N, Hamilton DG, Hamilton MT. Patterns of global gene expression in rat skeletal muscle during repeated intermittent inactivity. American College Sport of Medicine, Central States Symposium, October 2002, Kansas City.

Bowles DK, Bey L, Hay M, Hamilton MT. Estrogen effect on myocardial gene expression. FASEB, April 2002, New Orleans.

Hamilton, MT. Molecular and metabolic responses to exercise and inactivity. National Meeting of The American College of Sports Medicine St. Louis, MO. 05/02

Zderic TW, Bey L, Hamilton DG, Hamilton, MT. Gene expression profiles in rat skeletal muscle during unloading and low-intensity ambulatory activity. National Space Biomedical Research Symposium. Houston, TX. 01/02.

Hamilton, MT. Technical and theoretical advantages and limitations to microarray studies in assessing candidate genes for countermeasures. National Space Biomedical Research Symposium. Houston, TX. 01/02.

Hasser

Central Mechanisms of Cardiovascular Control after Cardiovascular Deconditioning. FASEB Summer Conference on Neural Control of the Circulation

Hay

Regulation of Baroreceptor Neurotransmission. University of Florida, Gainesville, FL, 2002.

Second Annual Missouri Symposium on Women's Health Research. Conference Chair University of Missouri, Columbia, MO., May 2002.

Measurements of Baroreceptor Synaptic Transmission. FASEB Summer Conference, Neurohumoral Control of the Circulation. Snowmass, CO, 2002.

Sex, Space and Environmental Adaptation: A National Workshop to Define Research Priorities Regarding Sex-Differences in Human Responses to Challenging Environments. Conference Chair. University of Missouri – Columbia., November, 2002.

Circumventricular Organs; Sex and Hypertension. Department of Physiology, Georgetown University , Washington, D.C., 2002.

Heesch

Experimental Biology 2002, New Orleans/ Symposium Organizer-- Amer. Physiol. Soc., Refresher Course in Neuroscience.

University of Missouri – Kansas City, School of Pharmacy/ Kansas City, MO. CNS Effects of Ovarian Hormones on Cardiovascular Regulation.

Federation of American Society of Experimental Biololgy Summer Research Conference: Neural Control of the Circulation. Snow Mass, Colorado

Huxley

Eli Lilly and Company, Cardiovascular Toxicology Division, Physiological Adaptation of Microvascular Permeability.

University of Rochester School of Medicine: Rochester, NY: Department of Pharmacology & Physiology, Despite what the Textbooks say Microvascular Barrier Properties Adapt to Changes in their Environment.
University of Rochester Matrix Journal Club. Adaptation of the Microvascular Glycocalyx: a Mechanism Participating in the Regulation of the Microvascular Barrier to Water and Solute.
American Heart Association, Chicago, IL. Co-chair session on Vasodilator Mechanisms in the Microcirculation

Hwang

Department of Physiology, University of California, Davis
Department of Physiology, Robert Wood Johnson Medical School
Institute of Human Gene Therapy, University of Pennsylvania
Department of Physiology, Johns Hopkins Medical School

Kornegay

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