

CURRICULUM VITAE

Timothy I. Musch, Ph.D.

University Distinguished Professor

School of Health & Human Sciences and the Department of Anatomy and Physiology

CURRENT ADDRESS: Department of Anatomy and Physiology
College of Veterinary Medicine
128 Coles Hall
Kansas State University
Manhattan, KS 66506

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musch@vet.ksu.edu

EDUCATION: 1968-1972 University of California - Berkeley, California, B.A., (Physical Education)
1973-1974 University of California - Berkeley, California, M.A., (Physical Education)
1974-1981 University of Wisconsin - Madison, Wisconsin, Ph.D., (Exercise Physiology)
1981-1984 UTHSC - Southwestern Medical School, Dallas, Texas, Post-Doctoral Fellowship -
Division of Cardiology, (Cardiovascular Physiology)

EMPLOYMENT: 1984-1991, Pennsylvania State University; Assistant Professor of Medicine and Cellular & Molecular Physiology; Milton S. Hershey Medical Center, Hershey, PA, 17033.
1991-1993, Pennsylvania State University; Associate Professor of Medicine and Cellular & Molecular Physiology; Milton S. Hershey Medical Center, Hershey, PA, 17033.
1993-1996, Kansas State University; Associate Professor of Kinesiology, Anatomy & Physiology; Manhattan, KS 66506.
1996-2017, Kansas State University; Professor of Kinesiology, Anatomy & Physiology; Manhattan, KS 66506.
2013-2015, Kansas State University; Interim Associate Dean for Research & Scholarship; College of Health and Human Sciences; Manhattan, KS 66506.
2017-Pres, Kansas State University; University Distinguished Professor, Kinesiology; Manhattan, KS 66506

HONORS AND AWARDS:

Wheeler Scholar, University of California - Berkeley (Athletic and Academic Honors Scholarship), 1968-1972.
Graduate with Honors, University of California - Berkeley, 1972.
New Investigator Award (National), American College of Sports Medicine, 1986.
Award for Outstanding Contribution for 1986-87, American Heart Association, South Central Pennsylvania Chapter, 1987.
Kansas State University Presidential Award for Undergraduate Teaching, 1998.
Arthur C. Guyton Educator of the Year Award (National, highest teaching award given by the APS), American Physiological Society, 2013.
APS-Journal of Applied Physiology, Top Manuscript Reviewer, American Physiological Society. 2012, 2016.
Citation Award (National, 2nd highest award given by ACSM), American College of Sports Medicine, 2013.
Zoetis Award for Excellence in Research, College of Veterinary Medicine, Kansas State University, 2014.
Faculty Research Excellence Award, College of Health and Human Sciences, Kansas State University, 2017.
University Distinguished Professor, College of Health and Human Sciences, Kansas State University, 2017.
Nominated for Zoetis Distinguished Veterinary Teacher Award, College of Veterinary Medicine, Kansas State University, 2017, 2018.
APS-Environmental and Exercise Physiology Section Honor Award, American Physiological Society, 2018.
Selected Anatomy & Physiology Faculty Member of the Month Award by the College of Veterinary Medicine Class of 2019, 2020, 2022.
Nominated for President-Elect, American Physiological Society, 2020, 2021.
Nominated for Dr. Ron & Rae Iman Outstanding Faculty Award for Teaching, Kansas State University, 2019.
Dolph Simons Award in the Biomedical Sciences, Higuchi/Endowment Research Achievement Awards, The University of Kansas, 2023-2028.

PROFESSIONAL SOCIETIES:

Fellow, American College of Sports Medicine, 1985-present.

Fellow, American Physiological Society, 2016-present.

Member, American College of Sports Medicine, 1974-present.

Member, American Physiological Society, 1976-present.

Member, American Heart Association, 1984-present.

Member, Scientific Advisory Council for the American Federation for Aging Research, 1991-1998.

SERVICE TO NATIONAL SCIENTIFIC ORGANIZATIONS:

American Physiological Society:

Member of the Public Affairs Committee, 1998-2001, 2007-2010.

Member of the Committee on Committees, 2000-2004; Chair, 2020-2021.

Councilor for Environmental and Exercise Physiology (EEP) Section, 2000-2003.

Member of the National Exercise Models Planning Committee, 2002-2006.

Chair, Animal Care and Experimentation Committee, 2006-2009; Past Chair 2009-2012.

Member of the Education Committee, 2007-2010.

Member of FASEB Animals in Research and Education Subcommittee, FASEB, 2007-2021.

Chair, Environmental and Exercise Physiology Section, 2013-2016; Past Chair 2016-2019.

Member of the Section Advisory Committee, 2013-2016.

Member of the Fellows & Membership Committee, 2015-2019.

Member of the Strategic Planning Committee, 2017.

Councilor (member of the APS National Council), 2018-2021.

Member of the Task Force on Sexual Harassment, 2019-2020.

President-Elect, 2023, President, 2024, and Past-President, 2025.

Member of Code of Conduct Committee, 2023-2024.

Member of Strategic Planning Task Force, 2023 – 2024.

Chair, Working Group for Conference Management, 2023 -2024.

Member of Executive Committee, 2023 – Pres.

Member of Publications Committee, 2023 – Pres.

Member of Nominating Committee, 2023 – Pres.

Member of Finance Committee, 2023 – Pres.

Member of Summit Leadership Committee, 2023 – Pres.

Chair of Leadership Development Committee, 2025 – Pres.

Member of CEO Search Committee, 2025 – Pres.

American College of Sports Medicine:

Member of the Research Awards Committee, 1996-1998.

Chair, Research Awards Committee, 1998-2004.

Member of the Board of Trustees, 2005-2008.

Organizer of the Integrative Physiology of Exercise Meeting, Indianapolis, IN, 2006.

NASA:

Member of the Discipline Implementation Team/Exercise Countermeasures Project, NASA - Johnson Space Center, Houston, Texas, 1990.

NIH:

Chair, National Institute on Aging/National Institutes of Health Workshop. Sarcopenia and Physical Performance in Old Age, Dr. Chhanda Dutta, Program Director. Panel Presentation Part II. Muscle Fatigue. 1996.

Chair, National Institute on Aging/National Institutes of Health Workshop. Changes in Skeletal Muscle Blood Flow with Aging and Disease, Dr. Chhanda Dutta, Program Director. Panel Presentation Session III. Skeletal Muscle Blood Flow and Diseases Common to Old Age. 1998.

EDITORIAL AND MANUSCRIPT REVIEWING ACTIVITIES:

Cardiovascular Physiology Area Representative, National Meetings of the American College of Sports Medicine, 1987, 1991-1993.
Member Editorial Board, Medicine and Science in Sports and Exercise, 1989-2005.
Member Editorial Board, Journal of Applied Physiology, 1992-present.
Associate Editor, Medicine and Science in Sports and Exercise, 1992-2000.
Abstract Reviewer, National Meetings of the American College of Sports Medicine, 1994-1996, 2002-2010.
Abstract Reviewer, National Meetings of the American Heart Association, 1996-2002.
Member, Editorial Board, American Journal of Physiology: Heart and Circulatory Physiology, 2004-present
Associate Editor, Frontiers in Physiology, Exercise Physiology Section, 2009-2023.
Guest Associate Editor, American Journal of Physiology: Heart and Circulatory Physiology, 2017.

GRANT REVIEWING ACTIVITIES:

American Federation for Aging Research, Grant Review Conducted by Scientific Advisory Council, 1991-1998.
South Eastern Pennsylvania Heart Association Grant Review Committee, Dr. Nathan Rienchieck, Chair, 1989-1993.
AIBS/NASA Life and Biomedical Sciences and Applications Division-wide Peer Review. Study Section - Human Factors, Integrated Physiology (PHF) - Cardiopulmonary Physiology. Dr. Charles Turbyfill, Executive Secretary. Dr. Robert Van Citters, Chair. 1993-1995.
AIBS/NASA Life and Biomedical Sciences and Applications Division-wide Peer Review. Study Section - Human and Animal Biology (HAB) 1.5 - Cardiopulmonary Physiology. Dr. Charles Turbyfill, Executive Secretary. Dr. Robert Van Citters, Chair. 1995.
Allegheny-Singer Research Institute Intramural Project Review Panel 1996. Dr. Eric M. Cottingham, Senior Director, Research Support. 1996.
IDI-USRA/NASA Life and Biomedical Sciences and Applications Division-wide Peer Review. Study Section - Research Opportunities in Space Life Sciences - Cardiopulmonary Physiology. Dr. Francis Haddy, Executive Secretary. Dr. Michael L. Hess, Chairman. 1996-2001.
National Institutes of Health/National Heart, Lung, and Blood Institute. Reviewer for Study Section pertaining to RFA-HL-97-012 entitled "Heart Failure Research: New Approaches to Pathogenesis". Dr. Diane Reid, Scientific Review Administrator, 1998.
American Heart Association - Greater American Section - Heartland Consortium - Grant Review. Dr. Tony Waldrop, Scientific Review Administrator, 1999-2001, 2006-2009.
American Heart Association - Greater American Section - Heartland Consortium - Grant Review. Dr. Mark Chapleau, Scientific Review Administrator, 2001-2002.
AIBS/US Army Medical Research and Material Command (USAMRMC) Peer Review Panel. Study Section - Human Performance Optimization. Dr. Margaret E. Chamberlin, Senior Scientist/Program Manager. Dr. Michael Bonnet, Chair. 2006.
National Institutes of Health/National Heart, Lung, and Blood Institute. Reviewer for PPG application pertaining to PO1-HL62222-16 entitled "Neuro-Circulatory Function in Chronic Heart Failure. Dr. Kristin Goltry, Scientific Review Administrator, 2004, 2008, 2014.
National Institutes of Health/DE-INBRE, Delaware IDEa Network of Biomedical Research Excellence, INBRE Pilot Grant Awards. Dr. Robert E. Akins, Jr., Director, 2016.
The Dutch Research Council (NWO)OCENW research proposal OCENW.KLEIN.483. Dr. Loes van Bree Programme manager, Open Competition Domain Science – KLEIN. Dutch Research Council, Domain Science (ENW), PO Box 93460, 2509 AL The Hague, The Netherlands, 2020.

UNIVERSITY COMMITTEES:

1986-1993, Research Animal Utilization Committee; Ron Wilson, D.V.M., Chair, Pennsylvania State University College of Medicine.
1986-1993, Medical School Selection Committee; Mary K. Howett, Ph.D., Chair, 1986-1989; David Leaman, M.D., Chairman, 1991-1993, Pennsylvania State University College of Medicine.
1988-1993, Medical Student Research Committee; Tom Lloyd, Ph.D., Chair, Pennsylvania State University College of Medicine.
1989-1993, Human Use of Radioisotopes Subcommittee; Kenneth Miller, Ph.D., Chair, Pennsylvania State University College of Medicine.
1992-1993, Ciba-Geigy Beginning Investigator Award Review Committee; D. Eugene Rannels, Ph.D., Chair, Pennsylvania State University College of Medicine.
1993-1994, Kinesiology Head Search Committee; David A. Dzewaltowski, Ph.D., Chair, Kansas State University.

1993-1994, Kinesiology Exercise Physiology Search Committee; Timothy I. Musch, Ph.D., Chair, Kansas State University.

1994-1995, Kinesiology Exercise Physiology Search Committee; Timothy I. Musch, Ph.D., Chair, Kansas State University.

1993-1995, Kinesiology Spring Banquet Committee; Timothy I. Musch, Ph.D., Chair, Kansas State University.

1994-1995, University Institutional Review Board (IRB) or Committee on Research Involving Human Subjects; Dr. James Shanteau, Ph.D., Chair, Kansas State University.

1996-1998, Anatomy & Physiology Rudy Clarenburg Lectureship Committee; M. Roger Fedde, Chair, Kansas State University.

1998-2003, Anatomy & Physiology Rudy Clarenburg Lectureship Committee; Chair, Kansas State University.

1993-2006, Kinesiology Research Enhancement Committee; Chair, Kansas State University.

1994-pres, Kinesiology Tenure and Promotions Committee; Mary McElroy, Ph.D., Chair, Kansas State University.

1998-2004, College of Arts and Science, Dean's Advisory Committee; Dean Peter J. Nicholls, Chair, Kansas State University.

2001-2004, Graduate Council; Dean Ronald Trewyn, Chair, Kansas State University.

2006-2013, University Institutional Animal Care and Use Committee (IACUC); Sally Olson, DVM, Chair, Kansas State University.

2006-2007, Kinesiology Exercise Physiology Search Committee; Timothy I. Musch, Ph.D., Chair, Kansas State University.

2011-2011, Anatomy & Physiology Interim Department Head Search Committee; Timothy I. Musch, Ph.D., Chair, Kansas State University.

2011-2013, Graduate Council; Dean Carol Shanklin, Chair, Kansas State University.

2012-2013, Anatomy & Physiology Department Head Search Committee; Timothy I. Musch, Ph.D., Kansas State University.

2013-2014, Department of Kinesiology Head Search; Timothy I. Musch, Chair, Kansas State University.

2013-2015, Associate Deans for Research Committee; Ron Trewyn, Chair, Kansas State University.

2016-2017, Department of Kinesiology Assistant/Associate Professor Search Committee.

2017-2018, University Distinguished Professors Nomination/Review Committee

2017-2018, College of Health and Human Sciences Dean's 5 Year Review Committee

2017-2018, College of Health and Human Sciences Physician Assistant Program Committee

2017-2018, College of Health and Human Sciences Director of Physician Assistant Program Search Committee

2017-pres, Department of Kinesiology Student Awards Committee

2019-pres, Department of Anatomy & Physiology Curriculum Committee

2022-2022, Department of Kinesiology Academic Advisor Search Committee

2022-pres, College of Health and Human Sciences College Awards Committee

2022-2024, University Distinguished Professors Task Force: President Richard Linton Team

2022-2024, University Distinguished Professors Task Force: Foundation President Greg Willems Team

TEACHING EXPERIENCE:

Pennsylvania State University College of Medicine

Appointed as an Associate Member of the Graduate Faculty of The Pennsylvania State University College of Medicine on July 22, 1988.

Graduate and Medical Student Courses Taught:

1. Medical (Human) Physiology 520 (710) - Medical physiology course taught to first year medical students.
2. Medical (Human) Physiology 523 (704) - Computer Simulated Cardiovascular Control Laboratory and Cardiovascular/Respiratory Physiology Animal Laboratory.
3. Medical Physiology 567 - Advanced Exercise Physiology.
4. Medical Physiology 797 - The Physiology and Biochemistry of Exercise.

Kansas State University College of Arts and Science & College of Human Ecology

Appointed as a Member of the Graduate Faculty of Kansas State University College of Arts and Science on November 19, 1993.

Undergraduate and Graduate Student Courses Taught:

1. Kinesiology 335 (Undergraduate course; Presently Course Coordinator) - Exercise Physiology.
Course focuses on basic biochemical and physiological responses to acute and chronic exercise.

2. Kinesiology 336 (Undergraduate course) - Exercise Physiology Laboratory Course. Course is the complementary laboratory course for Kinesiology 335 that focuses on basic biochemical and physiological responses to acute and chronic exercise
3. Kinesiology 796 (Graduate course) - Therapeutic Use of Exercise in the Treatment of Disease. Course focuses on the pathophysiology of various disease states, how the pathophysiology affects the physiological response to exercise and how exercise may or may not be used a therapeutic modality.
4. Kinesiology 800 (Graduate course) - Advanced Exercise Physiology. Course focuses on basic cardiovascular and skeletal muscle physiology and the responses to acute and chronic exercise.
5. Kinesiology 801 (Graduate course) – Physical Activity: Physiology to Public Health Impact. Course focuses on the study of physical activity and its impact on public health across levels of analysis from basic exercise physiology to social ecology.
6. Kinesiology 815 (Graduate course) - Research Methods. Course focuses the development of basic research methodology for graduate students in the area of exercise science.
7. Kinesiology 826 (Graduate course) – Advanced Cardiovascular Exercise Physiology & History of Scientific Discovery.
8. Anatomy & Physiology 737 (Graduate & Veterinary Medical Physiology course; Presently Course Coordinator) - Course focuses on systems physiology and is part of the first-year curriculum for veterinary medical students.
9. Anatomy & Physiology 747 (Graduate & Veterinary Medical Physiology course) – Course focuses on systems physiology and part of the first-year curriculum for veterinary medical students.

STUDENT ADVISING:

Pennsylvania State University College of Medicine

Medical Student Advisor:

Stephanie. A. Mackey; Academic Years: 1988 to 1992

Cuong T. Nguyen; Academic Years: 1990 to 1993

Medical Students Research (MSR) Projects:

The following students completed their MSR projects with Dr. Musch during their medical training:

James Ley - 1984

Anthony Bruno - 1984, 1985

Andrew Vayonis - 1985

Mark Leo - 1985

Mark Ghaul - 1986, 1987

Vincent Tranchitella - 1986

Stephen Bannar - 1987

Benjamin Warfel - 1988

John Terrell - 1988, 1989

Hoa Pham - 1990

Cuong Nguyen - 1990

Timothy Mazzola - 1991

Mark McKeague - 1991

Kevin Kearns - 1992

Postdoctoral Research Fellows

Hans Groth, M.D., 1988 - 1989

Joy Lehman, M.D., 1991 - 1992

Tadakazu Hirai, M.D., Ph.D., 1992 - 1993

Kansas State University College of Arts and Science & College of Health and Human Sciences

Master Student Advisor:

David Relling, 1993 – 1994

Aaron Aaker, 1993 – 1995

Jamie Bulf, 1993 – 1995

Robert Sweeney, 1993 – 1995

Craig Moseley, 1993 – 1995

Richard Petrisko, 1993 – 1996

Linjing Xu, 1994 – 1996

Rebecca Harder, 1994 – 1996

Barbara Wilson Anderson, 1994 – 1996
Gwen Appleberry, 1995 – 1996
Tonya Bunkers, 1995 – 1996
Carrienne Hornok, 1997 – 1998
Christian Larson, 1997 – 1998
Lisa Prather, 1997 – 1999
Winiata Shortland 1997 – 1999
Jamie Stark, 1998 – 1999
Sue Hageman, 1995 – 2000
Melinda Thein, 1999 – 2001
Toby Tinsley, 2000 – 2001
Amanda Durner, 2000 – 2002
Amy Harris, 2000 – 2002
Michael Koons, 2000 – 2002
Kevin Brighton, 2001 – 2003
Scott Schmidt, 2001 – 2003
Kevin Eklund, 2001 – 2003
Clay Greeson, 2001 – 2003
Ekaterina Foutopolou, 2001 – 2003
Jared Riehl, 2002 - 2004
Michael Durner, 2004 – 2005
Kimberly Lawson, 2004 – 2006
Scott Hahn, 2005 – 2007
Jeremiah Williams, 2004 – 2006
Steven Copp, 2006 – 2008
Kyle Herspring, 2006 – 2008
Lauren Hammel, 2006 – 2008
Colby Greer, 2007 – 2008
Daniel Debes, 2007 – 2008
Robert Davis, 2007 – 2009
Peter Schwagerl, 2008 – 2010
Scott Ferguson, 2010 – 2012
Gabrielle Sims, 2011 – 2013
Clark Holdsworth, 2010 – 2013
Anthony A. Garcia, 2012 – 2014
Angela Glean, 2013 – 2015
Trenton Colburn, 2014 – 2016
Dennis Jilka, 2016 – 2017
Kiana Schulze, 2019 – 2020
Nathan Kenney, 2024 – present

Kansas State University College of Veterinary Medicine & College of Health and Human Sciences

Doctoral Student Advisor:
John Paul Mattson, 1994 – 1997
Bryan Helwig, 1999 – 2003
Joslyn Hanson, 2002 – 2003
Kerry Quinn, 2008 – 2010
Steven Copp, 2008 – 2013
Clark Holdsworth, 2012 – 2016
Trenton Colburn, 2016 – 2021
Kiana Schulze, 2020 – 2025

Postdoctoral Research Fellows
Tadakazu Hirai, M.D., Ph.D., 1993 – 1995
Daniel Hirai, Ph.D., 2016 – 2018

GRANT FUNDING:

Pending:

College of Veterinary Medicine Intramural SMILE grant, "Effects of Exercise Training on Skeletal and Respiratory Muscle Function in Pulmonary Hypertensive Male and Female Rats", PI: Timothy I. Musch, Total Award = \$20,000

Active:

PHS/NIH-RO1-HL161160, "Signaling pathways regulating mechanoreflex sensitization in cardiovascular disease", 8/1/22-7/31/27, Lead PI: Steven W. Copp, Col: Timothy I. Musch, Total Award = \$2,717,795.

Completed:

PHS/NIH-RO1-HL142877, "Exercise Pressor Reflex Dysfunction in Heart Failure: Mechanisms and Treatment", 8/1/18-7/31/24 (No Cost Extension), PI: Steven W. Copp, Col: Timothy I. Musch, Total Award = \$1,195,327.

SMILE Award – Kansas State University, "Effects of Pulmonary Hypertension on Exercise (In)tolerance in Male and Female Rats", 9/1/2019-8/31/2023 (No Cost Extension), PI: Timothy I. Musch, Total Award = \$35,000.

Bayer AG, Effects of a soluble guanylate cyclase (sGC) activator and a sGC stimulator (separately and in combination) on skeletal muscle microcirculation and oxygen pressures in rats with heart failure. 6/1/2019-5/31/2023. PI: David C. Poole. Col: Timothy I. Musch, Total award = \$12,000.

PHS/NIH-R15-HL108328, "Heart Failure & Aging: Mechanistic bases of muscle vascular dysfunction", 8/1/15 - 7/31/19, PI: David C. Poole; CoPI: Timothy I. Musch, Total Award = \$375,000.

Johnson Cancer Research Center – Kansas State University, "Effects of dietary nitrate supplementation on tumor oxygenation and microcirculation". 11/1/2013 - 3/30/2016, PI: David C. Poole; Col: Timothy I. Musch, Total Award = \$9,500.

PHS/NIH-R15-HL103506, "Mechanisms of muscle microcirculatory dysfunction in heart failure", 4/1/11 - 3/31/14, PI: David C. Poole; CoPI: Timothy I. Musch, Total Award = \$365,546.

SMILE Award – Kansas State University, "Effects of Fish Oil Supplementation on Vascular Function in Rats with Chronic Heart Failure", 8/1/011 - 1/31/14, PI: Timothy I. Musch, Total Award = \$40,000.

American Heart Association - Heartland Consortium, "Role of nitric oxide synthase isoforms in microcirculatory dysfunction of heart failure", 7/1/10 - 12/31/12, PI: David C. Poole; CoPI: Timothy I. Musch, Total Award = \$143,000.

American Heart Association - Heartland Consortium, "Skeletal Muscle Microvascular Oxygen Delivery and Fatigue in Aging: Effects of Antioxidants", 7/1/07 - 12/31/09, PI: Timothy I. Musch, Total Award = \$143,000.

SMILE Award – Kansas State University, "Skeletal Muscle Microvascular Oxygen Delivery and Fatigue in Aging: Effects of Antioxidants", 9/1/06 - 8/31/09, PI: Timothy I. Musch, Total Award = \$33,367.

Cytokinetics Corporation, "Effects of Calcium Sensitizing Drugs on Oxygen Uptake and Exercise Performance", 11/1/07 – 3/31/09, PI: Timothy I. Musch, Total Award = \$89,171.

American Heart Association - Heartland Consortium, "Mechanisms of microcirculatory dysfunction in heart failure", 7/1/04 - 6/30/06, PI: David C. Poole, CoPI: Timothy I. Musch, Total Award = \$143,000.

PHS/NIH-1RO1-AG618770, "Senescence Alters Sympathetic Regulation to Heat Stress", 12/1/00 - 11/31/05, PI: Michael J. Kenney; Col: Timothy I. Musch, Total Award = \$1,159,500.

Proctor & Gamble Pharmaceuticals, "Effects of Rho-kinase inhibition on left ventricular function in rats with chronic heart failure induced by myocardial infarction ", 7/1/04 - 6/30/05, PI: Timothy I. Musch, Total Award = \$95,399.

PHS/NIH-1R21-AG19228, "Aging, Chronic Disease and Skeletal Muscle Perfusion ", 4/1/01 - 3/31/05, PI: Timothy I. Musch; CoPI: David C. Poole, Total Award = \$436,500.

PHS/NIH-1RO1-HL50306, "Muscle Capillary Geometry, Flow, and Oxygen Transfer", 7/1/98 - 6/30/04, PI: David C. Poole; CoPI: Timothy I. Musch, Total Award = \$1,156,557.

American Heart Association - Heartland Consortium, "Kinetics of muscle oxygen exchange in chronic heart failure", 7/1/00 - 6/30/02, PI: Timothy I. Musch, CoPI: David C. Poole, Total Award = \$80,000.

Proctor & Gamble Pharmaceuticals, "Cyclosporin A and Left Ventricular Remodeling and Dysfunction", 10/1/98 - 6/30/99, PI: Timothy I. Musch, Total Award = \$26,321.

American Heart Association - Kansas Affiliate, "Down-Regulation of Na⁺ Pumps in Skeletal Muscle of Rats with Chronic Heart Failure", 7/1/97 - 6/30/99, PI: Timothy I. Musch, Total Award = \$51,599.

American Heart Association - National, "Control of Sympathetic Nerve Discharge in Rats with Heart Failure Induced by Myocardial Infarction", 7/1/96 - 6/30/99, PI: Michael J. Kenney, Col: Timothy I. Musch, Total Award = \$123,200.

PHS/NIH-1RO1-AG11535, "Vascular Transport Capacity of Muscle in Heart Failure", 4/1/93 - 8/31/98, PI: Timothy I. Musch, Total Award = \$369,055.

Dean's Fund Research Grant – Kansas State University, "Effects of Endothelium-Derived Nitric Oxide Blockade on the Muscular Blood Flow Response to Treadmill Exercise in Male and Female Rats", 9/1/95 to 8/31/96, PI: Timothy I. Musch, Total Award = \$5,000.

Dean's Fund Research Grant – Kansas State University, "Biochemical and Histochemical Evaluation of Skeletal Muscle of Rats with Chronic Heart Failure (CHF) Induced by Myocardial Infarction", 9/1/94 to 8/31/95, PI: Timothy I. Musch, Total Award = \$5,000.

Syntex Corporation, "Effects of Ranolazine on Exercise Performance in Rats with Myocardial Infarction and Heart Failure", 2/1/94 - 1/31/95, PI: Timothy I. Musch, Total Award = \$20,638.

University Small Research Grant - Kansas State University, "Sympathetic Nerve Responses to NO Synthase Inhibition Produced by L-NAME in Rats", 11/1/93 to 6/31/94, PI: Timothy I. Musch, Total Award = \$1,800.

American Heart Association - Pennsylvania Chapter, "Vascular Transport Capacity of Muscle in Heart Failure", 7/1/92 - 6/30/94, PI: Timothy I. Musch, Total Award = \$67,893.

PHS/NIH-1RO1-HL44146, "Hypertension: Training-induced Increase in Work Capacity", 5/1/90 - 4/31/93, PI: Russell L. Moore, Col: Timothy I. Musch, Total Award = \$462,376.

Upjohn Company, "Effects of Ramipril on LV Morphology and Function in MI Rats", 12/1/91 - 11/30/92, PI: Timothy I. Musch, Total Award = \$22,000.

American Heart Association - Pennsylvania Chapter, "Long-term ACE Inhibition: Muscular Blood Flow Patterns in the Hindlimb of MI Rats During Exercise", 7/1/91 - 6/30/92, PI: Timothy I. Musch, Total Award = \$33,899.

American Heart Association - Pennsylvania Chapter, "Effects of Long-term ACE Inhibition on Ventricular Function", 7/1/90 - 6/30/91, PI: Timothy I. Musch, Total Award = \$23,047.

American Heart Association - Pennsylvania Chapter, "Effects of Endurance Training on the Regional Blood Flow Response to Exercise in Myocardial Infarcted Rats", PI: Timothy I. Musch, 7/1/89 - 6/30/90, Total Award = \$21,500.

American Heart Association - Pennsylvania Chapter, "Effects of High Intensity Training on Maximal Cardiac Output and Maximal Stroke Volume of Myocardial Infarcted Rats", 7/1/88 - 6/30/89, PI: Timothy I. Musch, Total Award = \$18,000.

American Heart Association - Pennsylvania Chapter, "Endurance Capacity of Infarcted Rats During Submaximal Work", 7/1/87 - 6/30/88, PI: Timothy I. Musch, Total Award = \$17,993.

PHS/NIH-R23-HL34510, "Heart Failure: Mechanisms to Enhance Work Capacity", 7/1/85 - 6/30/88, PI: Timothy I. Musch, Total Award = \$166,625.

American Heart Association - Pennsylvania Chapter, "Heart Failure: Tissue Glycogen Levels and Exercise Capacity", 7/1/85 - 6/30/86, PI: Timothy I. Musch, Total Award = \$17,995.

Research Initiation Grant - Pennsylvania State University, "Chronic Heart Failure: Tissue Glycogen Levels and Exercise Capacity", 7/1/85 - 6/30/86, PI: Timothy I. Musch, Total Award = \$4,979.

PUBLICATONS: Google h-index 65, Citations >13,000

1. Weber, RE, KM Schulze, AG Horn, TE McCoach, ZJ White, KS Hageman, SE Hall, P Sandner, BJ Behnke, TI Musch, and DC Poole. Effect of soluble guanylyl cyclase stimulation on muscle oxygenation and exercise capacity in heart failure with mildly reduced ejection fraction. *Experimental Physiology*, In Press, 2025. doi: 10.1113/EP092756.
2. Schulze KM, DM Hirai, TD Colburn, JC Craig, TI Musch, and DC Poole. K_{ATP} channel inhibition-induce hyporexia in skeletal muscle: No evidence for pre-capillary sphincter action. *Microvascular Research* 160:104808, 2024. PMID: 40164381. doi: 10.1016/j.mvr.2025.104808.
3. Butenas, ALE, SK Parr, JS Flax, RJ Carrol, AM Baranczuk, CJ Ade, KS Hageman, TI Musch, and SW Copp. Protein Kinase C Epsilon Contributes to Chronic Mechanoreflex Sensitization in Rats with Heart Failure. *Journal of Physiology*, 603: 5071-5089, 2025. PMID: 39269684. doi: 10.1113/JP287020.
4. Schulze, KM, AG Horn, RE Weber, KS Hageman, BC Scheuermann, CJ Ade, BJ Behnke, DC Poole, and TI Musch. Bulk and regional diaphragm blood flow during chemical hyperpnea in pulmonary hypertensive rats. *Respiratory Physiology & Neurobiology* 335:104414, 2025. PMID: 39971146, doi: 10.1016/j.resp.2025.104414.
5. Weber, RE, KM Schulze, NJ Kenney, BC Scheuermann, ON Kunkel, CJ Ade, TI Musch, BJ Behnke, and DC Poole. Tumor bearing in untreated breast cancer decreases exercise tolerance without lowering maximal oxygen uptake in rats. *American Journal of Cancer Research* 15: 487-500, 2025. ISSN:2156-6976/ajcr0161424.
6. Schulze, KM, AG Horn, RE Weber, NJ Kenney, BC Scheuermann, CJ Ade, BJ Behnke, DC Poole, and TI Musch. Skeletal and respiratory muscle blood flow redistribution during submaximal exercise in pulmonary hypertensive rats. *Journal of Physiology* 603: 337-351, 2025. PMID: 39625445, doi: 10.1113/JP287549.
7. Schulze KM, Horn AG, Muller-Delp JM, White ZJ, Hall SE, Medarev SL, Weber RE, Poole DC, Musch TI, and Behnke BJ. Pulmonary hypertension impairs vasomotor function in rat diaphragm arterioles. *Microvascular Research* 154:104686, 2024. PMID: 38614154. PMCID: PMC11198381. doi: 10.1016/j.mvr.2024.104686.
8. Musch, TI, and DC Poole. Determining Peak Cardiac Output with Inert Gas Rebreathing: Methodological Considerations and Reporting. *Medicine & Science in Sports & Exercise* 56: 155-156, 2024. PMID: 37625168. doi:10.1249/MSS.0000000000003285.
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205. Musch, TI, CA Smith, NT Bateman, GS Mitchell, and JA Dempsey: Relative contributions of hypoxemia and alkalosis to brain metabolic acid production during acclimatization to hypoxia. *Federation Proceedings* 40: 427, 1981.
206. Musch, TI, NT Bateman, CA Smith, and JA Dempsey: Lactate production in rat brain during acclimatization to hypoxia. *Federation Proceedings* 39: 1092, 1980.
207. Bateman, NT, TI Musch, and IR Cameron: The control of intracellular pH in rat cardiac and skeletal muscle during prolonged hypoxic respiratory alkalosis. *Federation Proceedings* 38: 1144, 1979.
208. Smith, CA, TI Musch, and JA Dempsey: Ventilatory response of goats to exercise. *Federation Proceedings* 38: 1141, 1979.
209. Musch, TI, DA Pelligrino, and JA Dempsey: The effects of prolonged nitrous oxide and pentobarbital anesthesia on brain metabolites, intra- and extracellular fluid pH. *Federation Proceedings* 38: 975, 1979.
210. Pelligrino, DA, TI Musch, JA Dempsey, and FJ Nagle: Brain pH: Inter-regional differences, comparison of methods and effects of hypoxic hypocapnia. *Federation Proceedings* 37: 532, 1978.

INVITED SPEAKING ENGAGEMENTS:

- September 14, 2024 – “APS Governance Restructuring and How to Get Involved with the APS”. Presented at the Missouri Physiological Society, Kansas City, MO.
- October 20, 2018 – “Skeletal Muscle Oxygen Uptake and Utilization in Heart Failure”. Presented as the Keynote Speaker at the Nebraska Physiological Society Annual Meeting, Omaha, NE.
- September 12, 2018 – “Skeletal Muscle Oxygen Uptake and Utilization in Heart Failure”. Special seminar presented at the Penn State Heart and Vascular Institute, Pennsylvania State University College of Medicine, Hershey, PA. Also, outside reviewer of Progress Report for the Program Project Grant entitled

"Acute and Chronic Afferent Engagement: Sympathetic and End Organ Responses", Dr. Lawrence I. Sinoway, Program Director.

- May 31, 2017 – "Exercise Limitations in Heart Failure". Presented at the national meeting of the American College of Sports Medicine, Denver, CO. Chairperson: Timothy I. Musch. Highlighted Symposium.
- January 12, 2017 – "Skeletal Muscle Oxygen Uptake and Utilization in Heart Failure". Presented at the national Utah Cardiac Recovery Symposium, January 12-13, University of Utah School of Medicine, Salt Lake City, UT. Chairpersons: Lillian L. Khor & Adriana Torres. Part of a symposium defining the role of periphery in heart failure & recovery.
- May 28, 2015 – *"Is there a disconnect between human and animal fatigue models? What do we need to do?"*. Presented at the national meeting of the American College of Sports Medicine, San Diego, CA. Part of a symposium entitled "No Muscle is an Island".
- June 1, 2012 – "Dynamic Heterogeneity of Exercising Muscle Blood Flow and Microvascular Oxygen Exchange in Animal Muscles". Presented at the national meeting of the American College of Sports Medicine, San Francisco, CA. Part of a symposium entitled "Dynamic Heterogeneity of Exercising Muscle O₂ Exchange".
- May 30, 2012 – "Diet Impacts Blood Flow Control and Matching Muscle O₂ Delivery-to-Utilization". Presented at the national meeting of the American College of Sports Medicine, San Francisco, CA. Part of a symposium entitled "Changing the Oxygen Cost of Exercise: New Discoveries, Novel Implications (In Memory of Brian Whipp)".
- May 28, 2008 – "Blood Flow Distribution in Aging and Disease". Presented at the national meeting of the American College of Sports Medicine, Indianapolis, IN. Part of a symposium entitled "VO_{2max} in Aging and Disease: Role of Skeletal Muscle".
- May 14, 2007 - "Animal Welfare: Environmental Stress and Humane Endpoints". Seminar presented at the Scientists Center for Animal Welfare (SCAW), ILAR Headquarters, Keck Center of the National Academy of Sciences, 500 Fifth Street NW, Washington, D.C.
- May 4, 2006 – "Muscle microcirculatory oxygen exchange in chronic heart failure". Seminar presented at the Department of Biomedical Sciences, College of Veterinary Medicine, University of Missouri, Columbia, MO.
- January 9, 2006 – "Muscle microcirculatory oxygen exchange in chronic heart failure". Seminar presented at the Department of Physiology, University of Kansas Medical Center, Kansas City, KS.
- December 2, 2005 – "Capillary hemodynamics and oxygen pressures in the aging microcirculation". Seminar presented at the Noll Research Laboratory, Pennsylvania State University, University Park, PA. Noll Physiology Seminar Series.
- December 1, 2005 – "Muscle microcirculatory oxygen exchange in chronic heart failure". Seminar presented at Pennsylvania State University Heart and Vascular Institute, Hershey, PA. General Clinical Research Center Lecture Series.
- January 14, 2003 – "Rat model of myocardial infarction and congestive heart failure". Seminar presented at Procter & Gamble Pharmaceuticals, Mason, OH.
- March 8, 2002 – "Down regulation of the Na/K pump in skeletal muscle of rats with heart failure. Seminar presented to the Department of Integrated Physiology, North Texas Health Science Center, Ft Worth, TX.
- November 14, 2001 – "Rat model of myocardial infarction and congestive heart failure: Tricks of the trade". Seminar presented at Collateral Therapeutics, Inc., San Diego, CA.
- March 22, 2001 - "Exercise dysfunction in CHF: new insights". Seminar presented to the Department of Integrated Biology, University of California, Davis, CA.
- March 24, 2000 - "Perturbations in skeletal muscle blood flow in rats with congestive heart failure induced by myocardial infarction". Seminar presented to the Department of Animal Science, Rutgers University, New Brunswick, NJ.
- April 20, 1999 - "Skeletal muscle function in congestive heart failure". Presented at the Symposium on Skeletal Muscle Function in Different Cardiovascular Disease States, Experimental Biology, Washington, DC.

- October 23, 1998 - "Skeletal muscle blood flow response to exercise in rats with chronic heart failure induced by myocardial infarction". Presented at the Central States Chapter of the American College of Sports Medicine, Kansas City, MO.
- September 25, 1998 - "Skeletal muscle abnormalities and their contribution to exercise intolerance in chronic heart failure". Seminar presented to the Division of Cardiovascular Medicine, Department of Medicine, University of California, Davis, CA.
- November 21, 1997 - "Endothelial dysfunction in the regulation of skeletal muscle blood flow during exercise in rats with chronic heart failure". Seminar presented at a Procter & Gamble Health Care Research Center, Mason, OH.
- July 17, 1997 - "Skeletal muscle microcirculatory dysfunction in chronic heart failure." Seminar presented to Division of Cardiology, Department of Medicine, Milton S. Hershey Medical Center, Pennsylvania State University College of Medicine, Hershey, PA.
- May 31, 1997 - "Skeletal muscle abnormalities in animal models of heart failure: metabolism, blood flow and exercise." Presented at the national meeting of the American College of Sports Medicine, Denver, Colorado. Part of a symposium entitled "Heart failure-induced adaptations in cardiac and skeletal muscle: insights from transgenic to human models."
- January 31, 1997 - "Skeletal muscle blood flow abnormalities in the rat model of congestive heart failure." Seminar presented at the Center for Cardiovascular Magnetic Resonance and Imaging. Cardiovascular Division, Department of Internal Medicine, Barnes-Jewish Hospital at Washington University School of Medicine, St. Louis, MO.
- January 21, 1997 - "The role of nitric oxide in the regulation of skeletal muscle blood flow during exercise in rats with chronic heart failure." Seminar presented to Center on Aging, Department of Medicine, Kansas University Medical Center, Kansas City, KS.
- November 15, 1996 - "Skeletal muscle blood flow abnormalities in heart failure." Seminar presented to the Department of Kinesiology, University of Colorado, Boulder, CO.
- May 30, 1995 - "Effects of nitric oxide synthase inhibition on the muscle blood flow response to exercise in rats with chronic heart failure." Presentation was part of the "William Reddan Symposium". Department of Preventive Medicine, University of Wisconsin, Madison, WI.
- April 6, 1995 - "The rat model of chronic heart failure induced by myocardial infarction: Reductions in exercise capacity associated with skeletal muscle blood flow abnormalities." Seminar presented to the Department of Kinesiology and Health Sciences, Texas A&M University, College Station, TX.
- February 24, 1995 - "The rat model of chronic heart failure induced by myocardial infarction: Blood flow abnormalities associated with EDRF dysfunction." Seminar presented to the Department of Physiology and Biophysics, University of Nebraska Medical School, Omaha, NE.
- June 2, 1994 - "Importance of the endothelium in control of skeletal muscle blood flow during acute exercise." Presentation was part of the symposium entitled "Endothelial-mediated control of coronary and skeletal muscle blood flow during exercise" that was presented at the national meeting of the American College of Sports Medicine, Indianapolis, IN.
- January 13, 1994 - "Skeletal muscle blood flow abnormalities in rats with chronic heart failure: changes in vascular flow capacity and the role of nitric oxide synthesis and release." Department of Veterinary Biomedical Sciences Seminars. Seminar presented to the Department of Anatomy and Physiology, University of Missouri, Columbia, MO.
- July 14, 1993 - "Pathophysiology of congestive heart failure in the rat." Division of Cardiovascular Pharmacological Research, Syntex Corporation, Palo Alto, CA.
- November 13, 1992 - "Effects of chronic ACE inhibition on the skeletal muscle blood flow response to exercise in rats with chronic heart failure." Cardiology Research Seminars. Seminar presented to the Division of Cardiovascular Medicine, Department of Medicine, University of California, Davis, CA.
- November 12, 1992 - "Effects of chronic ACE inhibition on the skeletal muscle blood flow response to exercise in rats with chronic heart failure." Cardiology Research Seminars. Seminar presented to the Division of Cardiology, Department of Medicine, University of California, San Francisco, CA.
- November 11, 1992 - "Elevated diaphragmatic blood flow during exercise in rats with chronic heart failure." Seminar presented to the Department of Physical Education, The University of California, Berkeley, CA.

November 5, 1992 - "Elevated diaphragmatic blood flow during exercise in rats with chronic heart failure." Pulmonary Biology and Medicine Seminars. Seminar presented to the Department of Cellular and Molecular Physiology and the Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

October 20, 1992 - "The effects of exercise training on maximal stroke volume generation in MI rats with chronic heart failure." Seminar presented to the School of Health, Physical Education and Recreation. University of Wyoming, Laramie, WY.

February 20, 1992 - "Skeletal muscle blood flow abnormalities in heart failure." Cardiology Research Seminars. Seminar presented to the Division of Cardiology, Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

January 21, 1992 - "The use of exercise training in the treatment of chronic heart failure." Seminar presented to the Pacing Technology Research Division of the Medtronic Corporation, Minneapolis, MN.

September 30, 1991 - "Skeletal muscle blood flow abnormalities in heart failure." Cardiology Grandrounds. Seminar presented to the Division of Cardiology, Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

February 19, 1991 - "Skeletal muscle and respiratory muscle blood flow abnormalities during exercise in rats with a chronic myocardial infarction and heart failure." Seminar presented to the Department of Biomedical Sciences, College of Veterinary Medicine, University of Missouri, Columbia, MO.

August 28, 1990 - Faculty presentation of an overview of academic life for students in medical school at The Pennsylvania State University College of Medicine. Faculty advisor for the beginning first year medical students. Workshop sponsored by the Big Brother/Big Sister Medical Student Program.

April 26, 1990 - "The effects of exercise training on rats with a chronic myocardial infarction and heart failure." Seminar presented to the School of Health, Physical Education, and Recreation, Kent State University, Kent, OH.

March 1, 1990 - "The early onset of fatigue during submaximal exercise in rats with a chronic myocardial infarction and heart failure." Seminar presented to the Department of Physical Education, University of California, Berkeley, CA.

November 17, 1989 - "Exercise training studies in rats with chronic heart failure induced by myocardial infarction." Seminar presented to the Department of Physical Education, University of California, Berkeley, CA.

May 12, 1989 - "Exercise training in the myocardial infarcted rat." Seminar presented to the Department of Kinesiology, University of Waterloo, Waterloo, Canada.

April 26, 1989 - "Dynamic exercise training studies using the rat model of myocardial infarction and chronic heart failure." Seminar presented to the Division of Pulmonary Medicine Research Conference, The Milton S. Hershey Medical Center, Hershey, PA.

March 31, 1989 - "Dynamic exercise training studies using the rat model of myocardial infarction and chronic heart failure. An overview". Seminar presented to the Biodynamics Research Laboratory, University of Wisconsin, Madison, WI.

April 14, 1989 - The effects of high intensity sprint training on central cardiac function and peripheral blood flow in rats". Medicine Research Conference. Seminar presented to the Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

November 7, 1988 - "The cardiovascular response to exercise and exercise training in patients with limited cardiac output capabilities". Cardiology Grand Rounds. Seminar presented to the Division of Cardiology, Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

September 7, 1988 - Faculty presentation of an overview of academic life for students in medical school at The Pennsylvania State University College of Medicine. Faculty advisor for the beginning first year medical students. Workshop sponsored by the Big Brother/Big Sister Medical Student Program.

May 6, 1988 - "Exercise studies in myocardial infarcted rats with chronic heart failure". Seminar presented to the Division of Cardiology, Department of Medicine, University of California, Davis, CA.

August 19, 1987 - "Myocardial infarction and endurance capacity." Seminar presented to the Division of Cardiology, Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

June 26, 1987 - Faculty representative of the Medical Selection Committee's Annual Counseling Program. Faculty advising to individuals concerning the admission and selection criteria for entrance in the medical school program at The Pennsylvania State University College of Medicine.

June 2, 1987 - "Use of the rat model of myocardial infarction in exercise studies." Seminar presented to the Department of Physical Education, University of California, Berkeley, CA.

November 13, 1986 - "Exercise studies in rats with myocardial infarction." Seminar presented to the Department of Physiology, Knoll Research Laboratory, The Pennsylvania State University, University Park, PA.

November 10, 1986 - "Exercise training studies in myocardial infarcted rats." Seminar presented to the Department of Physiology, The Milton S. Hershey Medical Center, Hershey, PA.

October 31, 1986 - "The rat model of chronic heart failure induced by myocardial infarction." Seminar presented to the Department of Radiation Research, Uniformed Services, Bethesda, MD.

October 20, 1986 - "Arterial blood gases and acid-base status in dogs during graded dynamic exercise." Seminar presented to the Division of Pulmonary Medicine, Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

September 5, 1986 - Faculty presentation of an overview of academic life for students in medical school at The Pennsylvania State University College of Medicine. Faculty advisor for the beginning first year medical students. Workshop sponsored by the Big Brother/Big Sister Medical Student Program.

April 11, 1986 - "Glycogen depletion patterns in rats with chronic heart failure." Seminar presented to the Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.

September 23, 1985 - "The effects of dynamic exercise training on the regional blood flow response to maximal exercise in the purebred foxhound." Seminar presented to the Department of Physiology and Biophysics, The University of Oklahoma Health Science Center, Oklahoma City, OK.

March 4, 1985 - "The purebred foxhound as a model for dynamic exercise training." Seminar presented to the Department of Cellular and Molecular Physiology, The Milton S. Hershey Medical Center, Hershey, PA.

October 18, 1984 - "The effects of dynamic exercise training on purebred foxhounds." Seminar presented to the Cardiovascular Section, Department of Medicine, University of Pennsylvania, Philadelphia, PA.

September 12, 1984 - "Role of central chemoreceptors in ventilatory acclimatization of chronic hypoxia." Seminar presented to the Division of Pulmonary Medicine, Department of Medicine, The Milton S. Hershey Medical Center, Hershey, PA.