

CURRICULUM VITAE

Craig A. Emter, Ph.D.

I. PERSONAL DATA

Office Address: Department of Biomedical Sciences
University of Missouri- Columbia
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Citizenship: United States

II. EDUCATION:

2001-2006: Ph.D. Integrative Physiology (GPA 3.8), Department of Integrative Physiology, University of Colorado, Boulder, CO.
Mentor: Russell L. Moore, Ph.D.

1997-2000: M.S. Exercise Physiology (GPA 3.9, graduated with honors), Department of Kinesiology, Boise State University, Boise, ID.
Mentor: Ronald P. Pfeiffer, Ph.D.

1993-1997: B.S. Exercise Physiology (GPA 3.6, graduated with honors), Department of Kinesiology, University of Wyoming, Laramie, WY.

III. RESEARCH AND PROFESSIONAL EXPERIENCE

2016-to date: Associate Professor with tenure, Department of Biomedical Sciences, University of Missouri-Columbia, Columbia, MO.

2009-2016: Assistant Professor, Department of Biomedical Sciences, University of Missouri-Columbia, Columbia, MO.

2006-2009: Postdoctoral Fellow, Department of Biomedical Sciences.
University of Missouri-Columbia, Columbia, MO.
Mentor: Douglas K. Bowles, Ph.D.

IV. RESEARCH INTERESTS & GOALS:

The focus of my research is to understand the impact of novel pharmaceutical and exercise therapeutics on the myocardium and coronary arteries of the failing heart. Specifically, current research goals include elucidating new ways to treat both heart failure with preserved ejection fraction (HFpEF; a disease largely unresponsive to current standardized heart failure therapies) and heart failure with reduced ejection fraction (HFrEF) using translational large animal models developed in my laboratory. Existing projects are utilizing gene therapy and regenerative medicine strategies in a context of preexisting comorbidities (metabolic syndrome) using preclinical swine models (Ossabaw) of experimental heart failure (aortic banding, myocardial infarction).

A further goal of this research is to garner insight into better utilizing exercise as a therapeutic modality in a translational setting of heart failure. I believe that by determining the intensity and frequency of exercise that provides benefits to heart failure patients and the cellular mechanisms underlying those beneficial changes, the laboratory can generate translational windows into new therapeutic opportunities. My laboratory employs a multidisciplinary approach that integrates systemic physiologic measures with *in vitro* techniques to study the mechanisms and impact of pharmaceutical and exercise therapies in heart failure including catheter techniques and ultrasound (to measure cardiac and coronary vascular function *in vivo*), '-omics'-based analysis, cannulated vessel preparations, histology, biochemical assays, and patch clamping. Future goals include translation of our preclinical research models into medical practice with parallel clinical studies, and utilization of physiological inputs from the swine preclinical models to augment computational modeling of heart failure.

V. CURRENT PROJECTS:

1. Utilization of multiple translational models (swine) of heart failure with preserved ejection fraction and heart failure with reduced ejection fraction (HFpEF and HFrEF, respectively) for the identification of novel molecular mechanisms involved in the development of heart failure/cardiovascular disease and testing of novel therapeutic strategies in a clinically relevant large animal model. My laboratory has developed both Yucatan mini-pig and obese/diabetic Ossabaw swine models of HFpEF to address these research goals. Current projects include: 1) development of a transgenic Ossabaw swine model of smooth muscle cell BK_{Ca} β -subunit overexpression; and 2) development of an Ossabaw swine model of diabetic HFrEF.

2. Examination of coronary smooth muscle cell BK_{Ca} channels as a primary mechanism mediating impaired vascular/ventricular interactions in heart failure.
3. Examining the efficacy of a novel gene therapy (myocardial AAV transfection of non-endogenous p90 ribosomal S6 kinases [RSK3] binding domain protein) and mechanism (RSK3-muscle A-kinase anchoring protein [mAKAP] signalosome) for treating the development of heart failure with preserved ejection fraction.
4. Determining the efficacy of a bioabsorbable rhFSTL1*-containing collagen matrix (EpicaPatch), applied to the epicardium overlying the damaged myocardium in infarcted diabetic pigs.
5. Determination of the molecular mechanisms controlling myocardial fibrosis in a setting of heart failure, including examination of existing and novel imaging techniques in the diagnosis of heart failure and quantification of myocardial fibrosis.
6. Sex-based disparities in prevalence and development of the heart failure syndrome
7. Computational modeling of coronary blood flow and systemic vascular stiffness.
8. Determining the efficacy of DPP-IV and phosphodiesterase inhibition on cardiac remodeling and hypertrophy in heart failure.
9. Determining the role of increased advanced glycation end product accumulation on increased coronary vascular stiffness and related myocardial oxygen supply/demand imbalance in the development of heart failure with preserved ejection fraction.

VI. TEACHING ACTIVITIES:

Graduate and Professional

- 2019 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 9 lectures; 125 students)
 V_BSCI-8200 Multidisciplinary Approaches to Biomedical Research (lecturer; 1 lecture; 5 students)
 MPP 9430 Cardiovascular Physiology (lecturer; 1 lecture; 5 students)

- 2018 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 9 lectures; 125 students)
V_BSCI-8200 Multidisciplinary Approaches to Biomedical Research (lecturer; 1 lecture; 3 students)
MPP 9435 Molecular Exercise Biology (lecturer; 1 lecture; 8 students)
- 2017 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 9 lectures; 125 students)
V_BSCI-8200 Multidisciplinary Approaches to Biomedical Research (lecturer; 1 lecture; 2 students)
MPP 9430 Cardiovascular Physiology (lecturer; 1 lecture; 6 students)
- 2016 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 9 lectures; 125 students)
V_BSCI-8200 Multidisciplinary Approaches to Biomedical Research (lecturer; 1 lecture; 4 students)
- 2015 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 9 lectures; 125 students)
V_BSCI-8200 Multidisciplinary Approaches to Biomedical Research (lecturer; 1 lecture; 4 students)
MPP 9430 Cardiovascular Physiology (lecturer; 1 lecture; 9 students)
- 2015 (Spring): V_BSCI-8410 Seminar in Veterinary Biomedical Sciences (facilitator; 5 classes; 15 students)
BIO_SC 4952H Honors Research in Biological Sciences (mentor; 1 student)
- 2014 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 8 lectures; 125 students)
V_BSCI-8200 Multidisciplinary Approaches to Biomedical Research (lecturer; 1 lecture; 3 students)
V_BSCI-8410 Seminar in Veterinary Biomedical Sciences (facilitator; 6 classes; 16 students)
BIO_SC 4952H Honors Research in Biological Sciences (mentor; 1 student)
- 2014 (Spring): MPP 9431 Control of Energy Metabolism (lecturer; 1 lecture; 8 students)
V_BSCI-8410 Seminar in Veterinary Biomedical Sciences (facilitator; 5 classes; 14 students)

- 2013 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 8 lectures; 125 students)
V_BSCI-8085 Problems in Vet Biomedical Sciences (lecturer; 1 lecture; 5 students)
V_BSCI-8410 Seminar in Veterinary Biomedical Sciences (facilitator; 4 classes; 14 students)
MPP 9430 Cardiovascular Physiology (lecturer; 1 lecture; 5 students)
- 2013 (Spring): V_PBIO 5995 Foundations of Veterinary Research and Discovery (lecturer; 1 lecture; 35 students)
V_BSCI-8410 Seminar in Veterinary Biomedical Sciences (facilitator; 13 students)
- 2012 (Fall): V_BSCI-4333/5506/7333 Veterinary Cellular Biology (lecturer; 8 lectures; 121 students)
V_BSCI-8085 Problems in Vet Biomedical Sciences (lecturer; 1 lecture; 3 students)
- 2012 (Spring): MPP 9431 Control of Energy Metabolism (lecturer; 1 lecture; 10 students)
BIO_SC 4950H/4952H Honors Research in Biological Sciences (mentor; 1 student)
- 2011 (Fall): MPP 9430 Cardiovascular Physiology (lecturer; 1 lecture; 4 students)
V_BSCI-8085 Problems in Vet Biomedical Sciences (lecturer; 1 lecture; 5 students)
BIO_SC 4950H/4952H Honors Research in Biological Sciences (mentor; 1 student)

Trainees

Supervisor- High School

2019-to date: Emery Crockett, Christian Fellowship School, Columbia, MO.

Supervisor- Undergraduate

2011-2012: Brittany N. Muller, B.S. Biology (Honors; 2012)

2014-2015: Daniel Dozier, B.S. Biology (Honors; 2015)

2013-2016: Emily Dehn

2017: Emmanuel Duah

2017: Raine Ryerson

Supervisor- Veterinary Research Scholars Program

2013-14: Pamela Zgoda, VM1 student

2014-15: Noelany Cruz Rivera, VM1 student

2015: Whitney Davis, VM2 student

2015: Evan Hayes, VM2 student
2016: Tracy Swanson, VM1 student
2016: Madeleine Dionne, VM1 student
2017: Kelsey Duensing, VM1 student
2018: Sierra Crotty, VM1 student

Co-Mentor- Veterinary Research Scholars Program

2013-2014: Damian Peyton, VM2 student

Supervisor- Rotating Ph.D. Students

2012: Kurt D. Marshall, Ph.D. candidate, Biomedical Sciences

Ph.D. Dissertation Advisor

2012-2016: Jessica A. Hiemstra, Ph.D., Biomedical Sciences
Graduated - August 2016
Current Position – Medical Science Liaison, Mallinckrodt
Pharmaceuticals
2015-2019: Jenna Edwards, Ph.D. graduate student, Biomedical Sciences
2018-to date: Shannon Kelly, Ph.D. graduate student, Biomedical Sciences

Postdoctoral Advisor

2014-15: Brian Ferguson, Ph.D.
Current Position – Research Scientist, MyoKardia, San
Francisco, CA
2014-2018: T. Dylan Olver, Ph.D.
Current Position – Assistant Professor, University of
Saskatchewan, Saskatoon, Saskatchewan, Canada
2019-to date: Kleiton Silva, Ph.D.
Current Position –Postdoctoral Fellow, University of Missouri -
Columbia, Columbia, MO

Ph.D. Dissertation Committees

2017-2018: Adel Alturki, Ph.D. graduate student, Mechanical and Aerospace
Engineering
Advisor: Noah Manring, Ph.D.
2017-2018: Ghazwan Alwan, Ph.D. graduate student, Mechanical and
Aerospace Engineering
Advisor: Noah Manring, Ph.D.
2017-2019: Mouayed Al-Toki, Ph.D. graduate student, Mechanical and
Aerospace Engineering
Advisor: Noah Manring, Ph.D.
2015-2019: Adam Veteto, M.S. 2015, Ph.D. graduate student, Medical
Pharmacology & Physiology
Advisor: Kerry S. McDonald, Ph.D.
2016-2019: An Ouyang, Ph.D. graduate student, Pharmacology & Nutritional
Sciences, University of Kentucky

Advisor: Bradley S. Fleenor, Ph.D.

Masters Thesis Committees

- 2012-2013: Timothy D. Cornell, M.S. 2013, Medical Pharmacology & Physiology
Advisor: Kerry S. McDonald, Ph.D.
- 2015-2016: John Jones, M.S. 2016, Medical Pharmacology & Physiology
Advisor: Tim Domeier, Ph.D.
- 2015: Adam Veteto, M.S. 2015, Medical Pharmacology & Physiology
Advisor: Kerry S. McDonald, Ph.D.
- 2015-2016: Kelly Lum-Naihe, M.S. 2016, Medical Pharmacology & Physiology
Advisor: Lakshmi Pulakat, Ph.D.
- 2014-2018: Amy Zalzman, DVM, Veterinary Medicine & Surgery
Advisor: Lattimer/Duan

VII. SERVICE:

Department/Center

- 2012-to date: Director, Biomedical Sciences Histopathology Laboratory
- 2012-2015: Director, Biomedical Sciences Seminar Series
- 2013-to date: Biomedical Sciences Research Advisory Committee
- 2016-2018: Biomedical Sciences Graduate Program Advisory Committee
- 2018: Director of Graduate Studies, Biomedical Sciences Department
- 2014-to date: Chair, Biomedical Sciences Space Advisory Committee
- 2012-to date: Graduate Faculty Member
- 2012-to date: Doctoral Faculty Member
- 2012-2015: American Physiological Society Undergraduate Poster Session Recruitment, National Experimental Biology Meetings '12, '13, '14, '15.
- 2013-to date: Director, Biomedical Sciences Website
- 2016: Biomedical Sciences Senior Faculty Hire Search Committee
- 2017: Chair, Biomedical Sciences Faculty Hire Search Committee

Division/College

- 2016-to date: Non-Tenure Track Promotion Committee
- 2015-2018: Academic Research Advisory Board
- 2015-to date: Animal Resources Committee
- 2016-2018: Poster Judge, College of Veterinary Medicine Research Day
- 2014-2015: Oral Presentation Judge, Phi Zeta Research Day
- 2013: Poster Judge, Phi Zeta Research Day
- 2012: Grant Reviewer, University of Missouri Clinician Scientist Research Award

MU Campus

- 2018: Translational Biosciences Umbrella Program Development Committee
- 2016-2017: College of Engineering Biomedical Innovations Faculty Hire Search Committee
- 2016-to date: Dalton Cardiovascular Research Center Ultrasound Oversight Committee
- 2016: Grant Reviewer, University of Missouri Research Board
- 2012: Grant Reviewer, University of Missouri Research Board

UM System

- 2018-to date: Translational and Precision Medicine Emphasis Area - Vascular Working Group Committee member
- 2019-to date: Translational and Precision Medicine Imaging Sub-committee member
- 2013-2014: Chair, 21st Annual Cardiovascular Day Planning Committee
- 2012-2018: Poster Judge, 19th, 20th, 22nd, 23rd, 24th, & 26th Annual Cardiovascular Day

State/Regional/International

Professional Memberships

American Physiological Society
American Heart Association
Biophysical Society

Associate Editor

- 2019-to date: Journal of Applied Physiology
- 2017-to date: Journal of the American College of Cardiology: Basic to Translational Science (Guest Associate Editor)
- 2014-2015: Journal of Applied Physiology - Highlighted Research Topic - *"Exploring New Concepts in the Management of Heart Failure with Preserved Ejection Fraction: Is Exercise the Key for Improving Treatment?"* (Guest Editor)

Editorial Boards

- 2010-to date: Journal of Applied Physiology
- 2015-to date: Journal of the American College of Cardiology: Basic to Translational Science
- 2011-to date: Frontiers in Integrative Physiology

Journal Reviews

Journal of the American College of Cardiology
Journal of Physiology
American Journal of Physiology: Heart & Circulatory Physiology
Circulation: Heart Failure
Cardiovascular Research

Journal of Molecular and Cellular Cardiology
Medicine and Science in Sports and Exercise
Journal of the American Heart Association
Scientific Reports
Physiological Reports
PLOS ONE
Frontiers in Cardiovascular Medicine
Journal of Cardiac Failure
Journal of Vascular Research
European Journal of Applied Physiology
Experimental Physiology
Journal of Visualized Experiments
Applied Physiology, Nutrition, and Metabolism
American Journal of Cardiology
Experimental Biology and Medicine
British Journal of Sports Medicine
Journal of Cardiovascular Pharmacology
Journal of the Renin-Angiotensin-Aldosterone System
Cardiology
Beneficial Microbes
Cell Stress and Chaperones
Nutrition Research

Grant Review Study Sections

- 2018-2022: National Institutes of Health, Standing member, NHLBI
Hypertension and Microcirculation Study Section
- 2017: National Institutes of Health, Ad Hoc Study Section member, NHLBI
Cardiac Contractility, Hypertrophy, and Failure Review Committee -
2018/01 CCHF, Fall
- 2017: National Institutes of Health, Ad Hoc Study Section member, NHLBI
Hypertension and Microcirculation Review Committee – 2018/01
HM, Fall
- 2017: National Institutes of Health, Ad Hoc Study Section member, NHLBI
Hypertension and Microcirculation Special Emphasis Panel –
2018/01 ZRG1 HM-A (07) S
- 2017: National Institutes of Health, Ad Hoc Study Section member, NHLBI
Myocardial Ischemia and Metabolism (MIM) Members' Conflict
Special Emphasis Panel - ZRG1 CVRS-S (02) M, Summer
- 2017: National Institutes of Health, Ad Hoc Study Section member, NHLBI
Mentored Transition to Independence Review Committee - MTI
(MA) 1
- 2012-2016: American Heart Association, permanent Study Section member,
Cardiac Biology/Regulation- Basic Science 2 (BSci 2)
- 2014: Grant Review, Ad Hoc, Sir Henry Wellcome Trust

National Meetings

- 2018-2021: Joint Programming Committee Representative for the Cardiovascular Section of the American Physiological Society
- 2018-2021: Co-chair of the Cardiovascular Section Programming Committee of the American Physiological Society
- 2018-2021: Member of the Cardiovascular Section Steering Committee of the American Physiological Society
- 2017: Abstract reviewer, 2017 American Heart Association Basic Cardiovascular Sciences (BCVS) Scientific Sessions meeting.
- 2015-2016: Programming Committee for the 2016 American Physiological Society Integrative Biology of Exercise (IBE VII) meeting.

External Reviewer – Promotion & Tenure

- 2017: I was an external peer reviewer for Dr. Gary Van Guilder's application for tenure and promotion to the rank of Associate Professor in the Department of Health and Nutritional Sciences at South Dakota State University

VIII. AWARDS AND HONORS:

- 2018: Manuscript chosen for American Physiological Society *select* showcase – “Microvascular insulin resistance in skeletal muscle and brain occurs early in the development of juvenile obesity in pigs.” *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology*
- 2018: Induction into the Veterinary Medicine Honor Society, Phi Zeta, in recognition of promoting scholarship and research in matters pertaining to the welfare and diseases of animals.
- 2017: American Physiological Society Novel Disease Model Award – *Awarded to my trainee, T. Dylan Olver.*
- 2017: Fellow of the Cardiovascular Section of the American Physiological Society
- 2008: NIH Individual Postdoctoral National Research Service Award
- 2008: Selected for Oral Presentation- University of Missouri Cardiovascular Day
- 2006: Post-doctoral appointment: T-32 NIH Training Grant: *Exercise and Health; Integration from Molecule to Patient*
- 2004: University of Colorado UGGS Student Travel Grant
- 2001: Teaching/Research Assistantship, University of Colorado, Boulder
- 2000: Dean's List (4.0)- 3 semesters, Boise State Univ.
- 1999: Elected Graduate Student Representative, Boise State University
- 1997: Graduate Assistantship, Boise State University
- 1997: NSF/EPSCoR Research Fellowship, University of Wyoming
- 1997: Alpha Epsilon Delta, Health Sciences Honorary
- 1997: Golden Key Honor Society
- 1997: President's Honor Roll, 2 semesters (4.0 G.P.A.), University of Wyoming

1993: Presidential Honor's Scholarship, University of Wyoming
1993: Valedictorian, Riverton H.S., Riverton, WY.

IX. INVITED TALKS/SEMINARS

International/National/Regional Symposia

- 2019 APS National Experimental Biology Meeting - Cardiovascular Society Symposium: *Aging, Exercise, and Heart Failure: Looking for new targets.* Program Chair: Craig Emter (Columbia, MO).

- 2016 APS Integrative Biology of Exercise Meeting - Symposium: *Brains, Blood Vessels, and Hearts: Can Exercise Treat the Molecular Mechanisms Underlying Cardiovascular Disease?* Program Chair: Craig Emter (Columbia, MO).

- 2015 APS National Experimental Biology Meeting - Cardiovascular Society Symposium: *Treating Cardiovascular Disease with Exercise: Mechanistic Insight Translated from Animal Models.* Program Chairs: Craig Emter (Columbia, MO) and Joseph Libonati (Philadelphia, PA).

4/19: "Right Ventricular Hypertrophy is Associated with Increased MAPK8, Fibronectin, and Extracellular Matrix Regulatory Biomarker (MMP/TIMP) mRNA Levels in a Pre-Clinical Swine Model of HFpEF." Session Title – Cardiac ECM Niche in Health and Disease. National Experimental Biology Meeting, Orlando, FL. *Presented by my trainee, Shannon C. Kelly.*

4/19: "Chronic low-intensity exercise training prevents coronary artery stiffness via inhibition of perivascular adipose-secreted advanced glycation end products in aortic-banded mini-swine." Session Title - Aging, Exercise, and Heart Failure: Looking for new targets. National Experimental Biology Meeting, Orlando, FL. *Presented by my trainee, An Ouyang.*

4/19: "Vascular and Neuronal Features of Cardiogenic Dementia in Swine with Experimental Heart Failure: Isolating Mechanisms Using an Integrative Approach." Session Title – Interaction of Cardiovascular Disease and Neuro-Cognitive Impairment. National Experimental Biology Meeting, Orlando, FL. *Presented by my trainee, T. Dylan Olver.*

7/17: "Chasing Unicorns: Tales of a New HFpEF Swine Model." American Heart Association Basic Cardiovascular Sciences (BCVS) Scientific Sessions, Portland, OR.

10/16: "Connecting the Brain to the Heart: Cardiogenic Dementia and Exercise Therapy." Session Title - Brains, Blood Vessels, and Hearts: Can Exercise Treat the Molecular Mechanisms Underlying Cardiovascular

Disease? American Physiological Society Integrative Biology of Exercise Meeting, Phoenix, AZ. *Presented by my trainee, T. Dylan Olver.*

- 3/15: "Insights from a Large Animal Model of Heart Failure with Preserved Ejection Fraction: Is Exercise Our Best Treatment?" Cardiovascular Society: Treating Cardiovascular Disease with Exercise - Mechanistic Insight Translated from Animal Models. National Experimental Biology Meeting, Boston, MA.
- 8/14: "Saxagliptin Prevents Increased Coronary Arterial Stiffness and Advanced Glycation End Product Expression in a Miniature Swine Model of Heart Failure with Preserved Ejection Fraction." North American Artery Meeting, Chicago, IL.
- 11/13: "Chronic cyclosporine treatment preserves mitochondrial energetics but does not improve cardiomyocyte contractile function or calcium handling in a translational mini-swine model of heart failure with preserved ejection fraction." National American Heart Association Scientific Sessions, Dallas, TX. *Presented by my trainee, Jessica Hiemstra.*
- 4/13: "Chronic Interval Exercise Modifies the Myocardial Lipid Profile in a Miniature Swine Model of Heart Failure with Preserved Ejection Fraction." Featured Topic: Nutrients and Cardiovascular Health and Disease: Glucose, Fatty Acids and Beyond- Cardiovascular Section. National Experimental Biology Meeting, Boston, MA.
- 10/12: "Exercise Training for Heart Failure Patients: What do we REALLY know?" Central States American College of Sports Medicine Meeting, Columbia, MO.
- 4/12: "Utilizing Pressure-Volume Loops and Coronary Blood Flow to Assess Cardiac Efficiency in Miniature Swine with Compensated Heart Failure Following Low-Intensity Interval Exercise." National Experimental Biology Meeting, San Diego, CA.
- 2/12: "Utilizing Pressure and Heart Rate to Dissect Myocardial Oxygen Consumption and Contractile Reserve in a Mini-Swine Model of Disease and Exercise." Worldwide Webinar for Transonic/Scisense, Inc.

Invited Seminars (other institutions)

- 4/19: "Chasing Unicorns: Tales of a New HFpEF Swine Model." Eastern Virginia Medical School Seminar Series, Eastern Virginia Medical School, Norfolk, VA.

- 2/19: "Chasing Unicorns: Tales of a New HFpEF Swine Model." David Geffen School of Medicine Cardiovascular Seminar Series, University of California - Los Angeles (UCLA), Los Angeles, CA.
- 2/19: "Chasing Unicorns: Tales of a New HFpEF Swine Model." UC-Davis School of Medicine and School of Veterinary Medicine, Department of Pharmacology Seminar Series, University of California – Davis, Davis, CA.
- 10/18: "Chasing Unicorns: Tales of a New HFpEF Swine Model." Kirksville College of Osteopathic Medicine, Missouri School of Dentistry and Oral Health, A.T. Still University of Health Sciences, Kirksville, MO.
- 3/17: "Modeling Heart Failure with Preserved Ejection Fraction: A 'Large' Labor of Love". Amgen Inc., Thousand Oaks, CA
- 9/16: "Unlocking the Mechanisms Underlying the Increased Prevalence of Heart Failure with Preserved Ejection Fraction in Women - What do Ovariectomized & Aortic-Banded Female Mini-Pigs Tell Us?" Washington University School of Medicine & Center for Cardiovascular Research, St. Louis, MO.
- 11/15: "How in the heck are we supposed to treat heart failure with preserved ejection fraction? How about our old friend, exercise!" University of Minnesota Lillehei Heart Institute & Department of Integrative Biology and Physiology, Minneapolis, MN.
- 5/15: "Examining the cGMP-PKG Signaling Axis as a Therapeutic Target for Heart Failure with Preserved Ejection Fraction". University of Miami Miller School of Medicine & Interdisciplinary Stem Cell Institute, Miami, FL.
- 10/14: "Can you manipulate it and will it work? Examining cGMP as a therapeutic target for heart failure with preserved ejection fraction." Saint Louis University - Center for Cardiovascular Research, St. Louis, MO.
- 4/06: "Low-intensity Exercise Training Delays Onset of Decompensated Heart Failure in Spontaneously Hypertensive Heart Failure (SHHF) Rats." University of Colorado Health Sciences Center Division of Cardiology Research Conference, Denver, CO.
- 3/06: "Low-intensity Exercise Training Delays Onset of Decompensated Heart Failure in Spontaneously Hypertensive Heart Failure (SHHF) Rats." Department of Physiology and Biophysics. University of Illinois, Chicago, Chicago, IL.

3/06: "Low-intensity Exercise Training Delays Onset of Decompensated Heart Failure in Spontaneously Hypertensive Heart Failure (SHHF) Rats." Department of Cell and Molecular Physiology. Loyola University, Chicago, Chicago, IL.

Seminars (local)

4/18: "Chasing Unicorns: Tales of a New HFpEF Swine Model." University of Missouri Department Comparative Medicine Program Seminar Series, Columbia, MO

5/17: "Modeling Heart Failure with Preserved Ejection Fraction: A 'Large' Labor of Love". University of Missouri Department of Medicine Research Seminar Series, Columbia, MO

2/17: "Exercise 'Dose' is important for Optimizing Health Benefits in a Mini-Swine Model of HFpEF". University of Missouri Cardiovascular Day, Columbia, MO.

2/17: "Female sex hormones are protective of vascular cognitive impairment in aortic banded mini- swine." University of Missouri Cardiovascular Day, Columbia, MO. *Presented by my trainee, T. Dylan Olver.*

11/12: "What to expect during years 1-6 of a tenure track job." University of Missouri Postdoctoral Association Career Development Series discussion panel, Columbia, MO.

9/11: "Exercise & Heart Failure: Uncovering the mechanisms underlying improved cardiovascular health." Department of Nutrition and Exercise Physiology Research Seminar Series. University of Missouri- Columbia, Columbia, MO.

2/10: "Exercise Training: An "Intense" Modulator of Cardiovascular Function and Remodeling in a Miniature Swine Model of Heart Failure." University of Missouri Cardiovascular Day, Columbia, MO.

2/10: "Intensity Matters: Mechanistic Insight into Exercise as a Therapeutic Intervention in Heart Failure." University of Missouri Clinical Correlation Conference- Exercise and Health: Integration from Molecule to Patient. University of Missouri- Columbia, Columbia, MO.

7/09: "Exercise Training: An "Intense" Modulator of Cardiovascular Function and Remodeling in a Miniature Swine Model of Heart Failure." Department of Biomedical Sciences. University of Missouri- Columbia, Columbia, MO.

- 2/08: "TRPC6 and Orai1 expression increase with mitogen augmented store-operated Ca²⁺ entry in rat aortic smooth muscle." University of Missouri Cardiovascular Day, Columbia, MO.
- 2/06: "Low-intensity Exercise Training Delays Onset of Decompensated Heart Failure in Spontaneously Hypertensive Heart Failure (SHHF) Rats." Department of Biomedical Sciences. University of Missouri- Columbia, Columbia, MO.

X. GRANTS AND CONTRACTS

Current

R01 HL112998 (Emter, PI; no cost extension through 2020) 5/1/14-4/30/2019
NIH/NHLBI

"Coronary Dysfunction, BK Channels, & Exercise in Heart Failure"

Major Goals: The goal of this project is to determine the role of the coronary vascular BK_{Ca} channel in the development of heart failure with preserved ejection fraction.

Role: PI

PR170699P1 (Emter/Kapiloff, MPI) 8/1/18-9/30/2023
Department of Defense (DOD) W81XWH-18-1-0179

"RSK3-mAKAP Targeting as a New Therapeutic Strategy for Heart Failure with Preserved Ejection Fraction in Women"

Major Goals: The goal of this project is to investigate novel gene therapies for treating HFpEF in women.

Role: PI

R44 HL140649 (Ruiz-Lozano, PI; Emter, PI on subcontract) 11/1/18-12/31/21
NIH/NHLBI

"IND-ENABLING EPICARDIAL BIOPHARMACEUTICAL IN THE DIABETIC HEART"

Major Goals: The goal of this project is to test the efficacy of a bioabsorbable rhFSTL1*-containing collagen matrix (EpicaPatch), applied to the epicardium overlying the damaged myocardium in infarcted diabetic pigs.

Role: PI on subcontract

Submitted/Pending/Under Review

R01 HL123706-01 (Emter, PI) Reviewed 2/2014
NIH/NHLBI (under revision for A1 resubmission)

"Diet, Exercise, and Lipid Mediated Mitochondrial Dysfunction in Heart Failure"

Major Goals: The goal of this project is to examine the effects of diet and exercise on Ca²⁺-independent phospholipase A₂ (iPLA₂), myocardial lipid

remodeling, and subsequent mitochondrial function in heart failure with preserved ejection fraction.

Role: PI

Completed

0035484 (Emter, PI) 1/1/2013-9/30/2015

Bristol Myers-Squibb/AstraZeneca \$1,355,199 direct costs

"Saxagliptin Attenuates Cardiac Hypertrophy and Remodeling Induced by Hypertrophic Stimuli"

Major Goals: The goal of this project is to determine the efficacy of saxagliptin and tadalafil for limiting cardiac remodeling heart failure with preserved ejection fraction.

Role: PI

W81XWH-14-1-0302 (Duan, PI) 9/10/14-8/29/2017

Department of Defense (DOD)

"A translational pathway towards a clinical trial using the second-generation AAV micro-dystrophin vector."

Major Goals: The goal of this project is to investigate novel gene therapies for treating muscular dystrophy.

Role: Co-Investigator (10%)

R01 HL57852-14 (McDonald, PI) 3/1/12-3/1/2017

NIH/NHLBI

"Regulation of Work Capacity in Cardiac Myocytes"

Major Goals: The goal of this project is to investigate the determinants of power output in myocardium.

Role: Co-Investigator (5%)

AHA Postdoctoral Fellowship (Olver, PI) 1/1/2016-12/31/2017

American Heart Association

"Mechanisms of sympathetic-mediated cerebrovascular vasoconstriction in heart failure with preserved ejection fraction"

Major goals: Salary support for research career development.

Role: Supervising PI

University of Missouri; Internal (Emter/Olver, Co-PI's) 1/1/18-12/31/18

College of Veterinary Medicine COR Faculty Research Program

"Role of endothelial NO on sympathetic-activated NPY-mediated pial artery vasoconstriction along the pial vascular tree"

Major goals: To elucidate the role of impaired NO signaling in facilitating sympathetic-activated NPY-Y1R-mediated vasoconstriction along the arterial tree to improve brain blood flow control in a setting of heart failure.

Role: PI

University of Missouri; Internal (Olver, PI) 1/22/16-12/31/18
MU Interdisciplinary Center on Aging - Research Enrichment and Dissemination
(READ) Small Grants Program
"Pathological Mechanisms of Sympathetic-mediated Cerebrovascular
Vasoconstriction as a Function of Menopause in Heart Failure with Preserved
Ejection Fraction"
Major goals: Pilot clinical and translational studies for examining sympathetic
nervous system contributions to developing heart failure in a mini-swine model of
HFpEF
Role: Supervising PI

University of Missouri; Internal (Emter/Olver, Co-PI's) 1/1/16-1/31/17
College of Veterinary Medicine COR Faculty Research Program
"Pathological mechanisms of sympathetic-mediated cerebrovascular
vasoconstriction in heart failure with preserved ejection fraction"
Major goals: Pilot clinical and translational studies for examining sympathetic
nervous system contributions to developing heart failure in a mini-swine model of
HFpEF
Role: PI

University of Missouri Research Board (Emter/Rector, PI's) 1/1/15-12/31/2016
"Translational swine model for the study of HFpEF"
Major goals: Pilot Clinical and Translational Studies for Developing an Obese
and Diabetic Ossabaw Swine Model of HFpEF
Role: Co-PI

F31 NRSA HL11882464 (Hiemstra, PI) 1/1/2016-9/1/2016
NIH/NHLBI
"Role of Cardiomyocyte Function & Sex in Developing Heart Failure with
Preserved Ejection Fraction"
Major goals: Salary support for research career development.
Role: Supervising PI

MU-iCATS Pilot Grant (PI: Emter) 1/1/2012-12/31/2013
University of Missouri- Columbia \$50,000 direct costs
"The Effects of Cyclophilin Inhibition on Cardiomyocyte Cell Death and
Ventricular Remodeling in Heart Failure"
Role: PI

P30 HL101332: Laughlin (PI) 9/1/09-8/31/12
NIH/NHLBI/ARRA \$1,222,750 direct costs
Cardiovascular Molecular/Cellular Biology.
Role: Co-Investigator (Tenure-Track Position and Start-up Award)

F32 NRSA HL093982-01 (Emter, PI) 6/1/08-11/15/09
NIH/NHLBI \$64,536 direct costs
The Effects of Exercise Training on Coronary Vascular Function in Heart Failure.
Role: PI

Unfunded

1R44 HL142334-01 (Emter/Li, Multi-PI) Reviewed 3/2018
"Anchoring Disruptor-Based Targeting of RSK3 in Heart Failure"
Major Goals: The goal of this project is to determine the efficacy of RSK3 as a treatment for pressure-overload hypertrophy.
Role: PI

National Science Foundation (Manring) Reviewed 3/2018
NSF
"Mechanical Solutions for Resistant Hypertension"
Major Goals: The goal of this project is to determine resistant hypertension can be controlled via alteration of the contraction kinematics of the left ventricle.
Role: Co-I (5%)

Washington University iCTS Pilot Grant (PI: Emter) Reviewed 11/2017
"Rsk3 Anchoring Disruptor Therapy for Heart Failure"
Major Goals: The goal of this project is to define the appropriate minimal dose of RBD to be used for efficacy testing and treatment of pressure-overload hypertrophy.
Role: PI

2R42 HL129524-02 (Emter/Kapiloff, Multi-PI) Reviewed 11/2016
NIH/NHLBI A1 resubmission (Impact Score - 27)
"RSK3 Anchoring Disruptor Therapy for Heart Failure"
Major Goals: The goal of this project is to determine the efficacy of RSK3 as a treatment for pressure-overload hypertrophy.
Role: PI

2R42 HL129524-02 (Emter/Kapiloff, Multi-PI) Reviewed 7/2016
NIH/NHLBI (Impact Score - 30)
"RSK3 Anchoring Disruptor Therapy for Heart Failure"
Major Goals: The goal of this project is to determine the efficacy of RSK3 as a treatment for pressure-overload hypertrophy.
Role: PI

NSF 16-1 (Emter/Manring/DelaFontaine, Multi-PI) Reviewed 2016
NSF
"EAGER: Heart-Contraction Synthesis for Controlling Resistant Hypertension"
Major Goals: The goal of this project is to determine if resistant hypertension can be controlled via alteration of the contraction kinematics of the left ventricle.

Role: Co-PI

U01 AG055126-01 (Bowles/Laughlin, PI) Reviewed 7/2016
NIH Common Fund - Molecular Transducers of Physical Activity in Humans
"MU Swine Preclinical Exercise Core"

Major Goals: The goal of this project is to utilize the pig as the most similar animal model for humans to define the molecular transducers and downstream mechanisms induced by exercise which produce adaptation and ultimately ameliorate chronic disease.

Role: Co-Investigator (5%)

R01 HL12179494 (Manring, PI) Reviewed 10/2016
NIH/NHLBI

"Mathematical Modeling and In-Vitro Experiments for Treating Resistant Hypertension Using a Compliant Graft"

Major Goals: The goal of this project is to investigate a novel treatment for resistant hypertension by demonstrating mathematically that hypertension and the pressure-rise-rate (dP/dt) within the aorta may be controlled by using a compliant graft to absorb pressure spikes.

Role: Co-Investigator (15%)

R01 HL132955 (Emter/Kapiloff, Multi-PI) Reviewed 2/2016
NIH/NHLBI

"Mechanisms of Concentric Remodeling in Swine Models of Health and Disease"

Major Goals: The goal of this project is to determine the role of RSK3 in both pathological and physiological hypertrophy.

Role: Co-PI (25%)

Harrington Scholar-Innovator Grant (Kapiloff & Emter, Co-PI's)
Reviewed 2015

The Harrington Project for Discovery and Development - Harrington Discovery Institute

"RSK3-Targeted Gene Therapy for Heart Failure"

Major Goals: The goal of this project is to validate the efficacy of RSK3 as a novel gene therapy for heart failure with preserved ejection fraction.

Role: Co-PI

Supplement to R01 HL112998 (Emter, PI) Reviewed 5/2015
NIH/NHLBI

PA-15-034: Administrative Supplements for Research on Sex/Gender
"Role of Coronary Function & Sex in Developing Heart Failure "

Major Goals: The goal of this project is to determine the role of the coronary vascular BK_{Ca} channel in the development of Heart Failure with Preserved Ejection Fraction

Role: PI

AHA Predoctoral Fellowship (Hiemstra, PI) Reviewed 5/2015
American Heart Association
"Role of Cardiomyocyte Function & Sex in Developing Heart Failure with Preserved Ejection Fraction"
Major goals: Salary support for research career development.
Role: Supervising PI

14-14NSBRI2-0022 (Laughlin, PI) Reviewed 5/2015
National Aeronautics and Space Administration (NASA)
"Exploring Alternative VIIP Etiologies (EAVE); NSBRI Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions."
Major Goals: The goal of this project is to develop a swine model of elevated intracranial pressure.
Role: Co-Investigator

BRP-PPG (Lardo & Lima, PI's) Reviewed 7/2013
NIH/NHLBI
Computed Tomography of Myocardial and Coronary Artery Disease
Major Goals: Develop and validate CT methods for quantifying myocardial extracellular volume fraction and improve image reconstruction and post-image processing of delayed enhanced CT infarct imaging.
Role: Co-Investigator- Aim 1 (10%)

U01 (Chatterjee & Bluemke, PI's) Reviewed 2/2013
NIH/NHLBI Clinical Center
PAR-13-029, "Opportunities for Collaborative Research at the NIH Clinical Center" "Glycosphingolipids and Glycosyltransferase in Cardiac Hypertrophy"
Major Goals: Determine the efficacy of D-PDMP in preventing left ventricular hypertrophy (LVH) in Yucatan pigs.
Role: Co-Investigator- Aim 1 (10%)

XI. BIBLIOGRAPHY

Peer-Reviewed Articles

1. An Ouyang, T. Dylan Olver, **Craig A. Emter**, and Bradley S. Fleenor. Chronic exercise training prevents coronary artery stiffening in aortic-banded miniswine: Role of perivascular adipose-derived advanced glycation end products. *Journal of Applied Physiology*, 2019 Jul 11.
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- *American Physiological Society Press Release*: <https://www.the-aps.org/detail/news/2019/07/30/exercise-helps-reduce-coronary-artery-stiffening-in-heart-failure?SSO=Y>
2. T. Dylan Olver, Jenna C. Edwards, Thomas J. Jurrissen, Adam B. Veteto, John L. Jones, Chen Gao, Christoph Rau, Chad M. Warren, Paula J. Klutho, Linda Alex, Stephanie C. Ferreira-Nichols, Jan R. Ivey, Pamela K. Thorne, Kerry S. McDonald, Maike Krenz, Christopher P. Baines, R. John Solaro, Yibin Wang, David A. Ford, Timothy L. Domeier, Jaume Padilla, R. Scott Recto, and **Craig A. Emter**. Western Diet-fed, Aortic-Banded Ossabaw Swine: A Pre-Clinical Model of Cardio-Metabolic Heart Failure. *Journal of the American College of Cardiology – Basic to Translational Science*, 2019 June;4(3):404-421. doi: 10.1016/j.jacbts.2019.02.004
 - *Editorial Comment*: Thomas E. Sharp III, David J. Lefer and Steven R. Houser. Cardiometabolic Heart Failure and HFpEF: Still Chasing Unicorns. *Journal of the American College of Cardiology – Basic to Translational Science*, 2019 June;4(3):422-424. doi: 10.1016/j.jacbts.2019.05.003
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