

Curriculum Vitae

Last updated 05/2023

PERSONAL DATA

D. Walter Wray, Ph.D.

Professor of Internal Medicine, Division of Geriatrics, University of Utah

Research Health Scientist, Geriatric Research, Education, and Clinical Center, George E. Wahlen VA Medical Center

Adjunct Professor, Department of Nutrition & Integrative Physiology, University of Utah

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EDUCATION

Years	Degree	Institution (Area of Study)
1991 - 1995	B.Sc.	Abilene Christian University (Biology)
1997 - 1999	M.Sc.	University of North Texas Health Science Center (Integrative Physiology)
2001 - 2003	Ph.D.	University of North Texas Health Science Center (Integrative Physiology)
2004 - 2007	Postdoctoral Fellow	University of California San Diego (Physiology)

PROFESSIONAL EXPERIENCE

Full Time Positions

1998	Laboratory Assistant, University of North Texas Health Science Center, Fort Worth, Texas
1999	Guest Research Associate, Copenhagen Muscle Research Center, Copenhagen, Denmark
2001 - 2003	Graduate Research Assistant, University of North Texas Health Science Center, Fort Worth, Texas
2002	Research Associate, Copenhagen Muscle Research Center, Copenhagen, Denmark
2006	Guest Research Associate, Institut de Myologie, Paris, France
2007 - 2008	Assistant Project Scientist, University of California San Diego Department of Medicine, La Jolla, CA
2008 - 2014	Research Assistant Professor, University of Utah Department of Medicine, SLC, UT
2009 - 2016	Adjunct Assistant Professor, University of Utah Department of Exercise & Sport Science, SLC, UT
2009 - Present	VA Investigator, VA Medical Center SLC GRECC, SLC, UT
2016 - 2022	Adjunct Associate Professor, University of Utah Department of Nutrition & Integrative Physiology, SLC, UT.
2016 - 2022	Adjunct Associate Professor, University of Utah Department of Health, Kinesiology, and Recreation, SLC, UT
2016 - 2022	Associate Professor with Tenure, University of Utah Department of Medicine, SLC, UT
2021 - Present	Interim Associate Director of Research, Salt Lake City GRECC
2021 - Present	Interim Director of Advanced Fellowship in Geriatrics, VA Geriatrics and Extended Care Service (GEC)
2022 - Present	Adjunct Professor, University of Utah Department of Nutrition & Integrative Physiology, SLC, UT.
2022 - Present	Adjunct Professor, University of Utah Department of Health, Kinesiology, and Recreation, SLC, UT
2022 - Present	Professor with Tenure, University of Utah Department of Medicine, SLC, UT

Editorial Experience

2009 - 2015 Editorial Board for Clinical Science (Advisory Panel)

2014 - 2022 Editorial Board for Journal of Applied Physiology

Journal Reviewer Experience

Ad-Hoc Reviewer for: Applied Physiology, Nutrition, and Metabolism, American Journal of Physiology Heart and Circulatory Physiology, Atherosclerosis, Circulation, Experimental Physiology, European Journal of Applied Physiology, Frontiers in Physiology, Hypertension, Journal of Applied Physiology, Journal of Physiology, Journal of the American College of Cardiology, Journal of Medicine & Science in Sports & Exercise, The Journals of Gerontology A: Biological Sciences.

Grant Reviewer Experience

Intramural

2009 - Present Ad-hoc Reviewer, University of Utah Seed Grant Committee

Extramural

- 2014 – Present Ad-hoc Reviewer, Department of Veterans Affairs Rehabilitation Research & Development, Musculoskeletal Medical Comorbidity Study Section (RRD2)
- 2014 – 2018 Ad-hoc Reviewer, Clinical and Integrative Cardiovascular Sciences (CICS) Study Section, National Heart, Lung, and Blood Institute, National Institutes of Health
- 2014 – Present Ad-hoc Reviewer, Vascular Endothelial Clinical Study Section, American Heart Association
- 2017 – Present Ad-hoc Reviewer, Department of Veterans Affairs Rehabilitation Research & Development Career Development Award Panel (RRD9)
- 2019 Ad-hoc Reviewer, Canada Foundation for Innovation
- 2020 – Present Ad-hoc Reviewer, K Award Standing Member Conflict SEP study section
- 2021 – Present Ad-hoc Reviewer, Department of Veterans Affairs Cardiovascular Science Research & Development Cardiovascular Studies-B (CARB) study section
- 2023 Ad-hoc Reviewer, Department of Veterans Affairs Middleton Award Review Panel
- 2023 – Present Ad-hoc Reviewer, Integrative Vascular Physiology and Pathology (IVPP) Study Section, National Heart, Lung, and Blood Institute, National Institutes of Health

SCHOLASTIC HONORS

- 2003 Young Investigator Travel Award, FASEB Cardiovascular Section
- 2007 Visiting Scholar Award, American College of Sports Medicine
- 2007 Research Career Enhancement Award, American Physiologic Society
- 2011 Hypertension Editorial Award, Top Original Paper in Population Science
- 2022 Hypertension Editorial Award, High Impact Paper in Clinical Science

ADMINISTRATIVE EXPERIENCE

Symposium/Meeting Chair/Coordinator

- 2012 Symposium Chair, “The Physiology of Exercise in Heart Failure”, American College of Sports Medicine Annual Meeting, San Francisco, CA.
- 2013 Symposium Chair, “Taming ‘The Sleeping Giant’: Control of the Peripheral Circulation during Exercise”, Experimental Biology Annual Meeting, Boston, MA.
- 2015 Symposium Chair, “The Two Faces of Heart Failure: Exercise Intolerance in HFrEF vs HFpEF patients”, American College of Sports Medicine Annual Meeting, San Diego, CA.
- 2017 Conference Co-Chair, “Getting to the Heart of Aging: An Interprofessional Approach to Cardiovascular Health”, Rocky Mountain Geriatrics Conference, Snowbird, UT.
- 2022 Symposium Chair “Vascular Dysfunction and Exercise Intolerance in HFpEF”, American College of Sports Medicine Annual Meeting, San Diego, CA.

UNIVERSITY COMMUNITY ACTIVITIES

University Level

- 2017 Faculty Presenter, Utah Cardiac Recovery Symposium, University of Utah
- 2017 Faculty Panelist, Utah Postdoctoral Association Lunch & Learn series

Health Sciences Level

- 2014 - Present Volunteer, Center for Clinical Translational Science, Reviewer for Center for Clinical Translational Science (CCTS) pre-submission peer review program.
- 2015 – Present Advisory Committee Member, Center for Clinical Translational Science (CCTS).
- 2018 – Present University of Utah School of Medicine Standardized Video Interview (SVI) Reviewer

Department Level

- 2012 – Present Advisory Board Member, Internal Medicine, Utah Vascular Research Laboratory Data Safety Monitoring Board (DSMB).
- 2013 Presenter, Metabolism Interest Group Lecture Series, Department of Medicine, University of Utah
- 2019 – Present Member & Reviewer, Internal Medicine Tenure Advisory Committee

Division Level

2008-Present Presenter, Geriatrics, Monthly Research Seminar Series
2009 Presenter, Geriatrics, 7th Annual Rocky Mountain Geriatrics Conference
2009 Presenter, University of Utah Center on Aging, Annual Spring Research Retreat
2010 Presenter, Geriatrics, 8th Annual Rocky Mountain Geriatrics Conference
2017 Co-Chair, Rocky Mountain Geriatrics Conference Planning Committee

VA SERVICE ACTIVITIES

2017 – Present Committee Member, VA Research & Development Committee (RDC)
2017 – Present Committee Member, VA Research & Development Subcommittee on Research Safety (SRS)
2017 – Present Committee Member, VA Research & Development Institutional Biosafety Committee (IBC)
2020 – Present Co-Director, GRECC/Geriatrics Translational Grand Rounds Series
2021 – Present Interim Associate Director of Research, Salt Lake City GRECC
2021 – Present Interim Director of Advanced Fellowship in Geriatrics, VA Geriatrics and Extended Care Service (GEC)

EXTERNAL SERVICE

2009 - 2012 Member, Department of Biology Visiting Committee, Abilene Christian University
2014 - 2017 Elected Committee Member, American Physiologic Society Awards Committee

SERVICE AT PREVIOUS INSTITUTIONS

2003-2008 Presenter, University of California San Diego, Physiology Division weekly seminar series

CURRENT MEMBERSHIPS IN PROFESSIONAL SOCIETIES

American College of Sports Medicine
American Physiology Society
American Heart Association
University of Utah Center on Aging

FUNDING

Active Grants

HL162856

National Institutes of Health NHLBI R01 (Wray, PI; Amann, Co-PI) 03/01/2023 - 02/28/2027

“Autonomic Dysfunction in Patients with HFpEF”

The overall goal of this project is to evaluate the regulation, transduction, and end organ expression of sympathetic overactivity in patients with HFpEF

Total Direct Costs: \$2,000,000

Role: Principal Investigator

CX002152

VA Clinical Science Research & Development Service Merit Award (Wray, PI) 10/01/2021 - 09/30/2028

“Novel Approaches for Improving Vascular Function in Veterans with HFpEF”

The overall goal of this project is to evaluate the efficacy of pharmacologic targeting of the nitric oxide pathway to improve vascular health in Veterans with heart failure with a preserved ejection fraction (HFpEF).

Total Direct Costs: \$1,200,000

Role: Principal Investigator

NCT05420012

Merck Investigator-Initiated Clinical Trial (Stehlik, PI) 10/01/2022-07/31/2025

“The Effect of Vericiguat on Peripheral Vascular Function, Patient Health Status and Inflammation in Patients with Heart Failure with Reduced Ejection Fraction”

The primary objectives of this clinical trial are to determine the impact of Vericiguat administration on vascular function, health-related quality of life and physical capacity, and biomarkers of inflammation in patients with HFpEF.

Total Direct Costs: \$450,000

Role: Co-Investigator

R01HL142603

National Institutes of Health NHLBI R01 (Trinity, PI)

07/01/2019 – 06/30/2024

“Targeting Oxidative Stress to Prevent Vascular and Skeletal Muscle Dysfunction during Disuse”

The overall goal of this project is to attenuate losses in vascular and skeletal muscle function during periods of inactivity (bedrest) by targeting mitochondrial function and the endogenous antioxidant pathway.

Total Direct Costs: \$1,903,235

Role: Co-Investigator

RX003343

VA Rehabilitation Research & Development Service Merit Award (Amann, PI)

10/01/2020 - 09/30/2024

“Efficacy of Exercise Training in Patients with HFpEF”

The goal of this project is to investigate the importance of skeletal muscle afferent nerve activity to exercise intolerance in Veterans with heart failure with a preserved ejection fraction (HFpEF).

Direct Costs: \$1,200,000

Role: Co-Investigator

1T32HL139451

National Institutes of Health Institutional National Research Service Award (Supiano, PI; Wray, Co-PI)

07/01/2018 – 06/30/2023

“Cardiovasomobility Research Training Program”

The overall goal of this Institutional NRSA is to provide research and clinical training in the areas of mobility and cardiovascular physiology.

Total Direct Costs: \$480,000

Role: Co-PI/Mentor

IK2RX003670

VA Rehabilitation Research & Development Career Development Award (Bunsawat, PI)

07/01/2022 – 06/30/2027

“Mechanisms of Impaired Skeletal Muscle Blood Flow and Exercise Intolerance in Veterans with Heart Failure with Preserved Ejection Fraction: Efficacy of Knee Extensor Training”

The overall goal of this career development award is to determine the impact of exercise training on autonomic and vascular dysfunction in Veterans with HFpEF

Total Direct Costs: \$1,100,000

Role: Mentor

Past Grants

R01HL116579

National Institutes of Health NHLBI R01 (Amann, PI)

03/01/2018 – 02/28/2022

“Role of Sensory Neurons in Cardiovascular Disease”

The goal of this project is to examine the mechanisms responsible for premature muscle fatigue during exercise in patients with hypertension.

Direct Costs: \$1,000,000

Role: Co-Investigator

VA Geriatrics and Extended Care Service Advanced Fellowship in Geriatrics (Francisco)

07/01/2020– 06/30/2022

Total Direct Costs: \$100,000

Role: Mentor

RX001311

VA Rehabilitation Research & Development Service Merit Award (Wray, PI)

07/01/2017 – 06/30/2021

“Overcoming Exercise Intolerance in Veterans with Heart Failure: The Role of NO”

The overall goal of this project is to determine whether interventions capable of improving nitric oxide (NO) bioavailability will lead to improved exercise tolerance in patients with systolic heart failure.

Total Direct Costs: \$1,080,500

Role: Principal Investigator

18POST33960192
American Heart Association Postdoctoral Fellowship (Bunsawat, PI) 01/01/2019 – 12/31/2021
“Autonomic and Vascular Dysfunction in Heart Failure with Preserved Ejection Fraction”
The goal of this fellowship is to provide postdoctoral training in autonomic and vascular physiology in the context of cardiovascular disease.
Total Direct Costs: \$80,000
Role: Sponsor/Mentor

HL118313
National Institutes of Health NHLBI R01 (Wray, PI) 02/01/2014 – 01/30/2019
“Peripheral Vasoconstriction in Heart Failure: Mechanisms & Modulatory Influences”
The overall goal of this project is to examine the role of sympathetic nervous system overactivity on chronic vasoconstriction in heart failure patients at rest and during aerobic exercise.
Total Direct Costs: \$1,250,000
Role: Principal Investigator

VA Office of Rural Health (Wray, PI) 10/01/2016 - 09/30/2019
“Remote Home-Based Delivery of Cardiac Rehabilitation”
The overall goal of this VA enterprise-wide initiative is to support implementation of a 12-week home-based Cardiac Rehabilitation program for Veterans living in rural areas.
Total Direct Costs: \$800,000
Role: Principal Investigator

RX001697
VA Rehabilitation Research & Development Service Merit Award I01 (Richardson, PI) 07/01/2015 – 06/30/2019
“Passive Limb Movement: A Tool to Assess Vascular Health and Guide Rehabilitation”
The major goal of this project is to establish the passive limb movement (PLM) as an NO-dependent, reproducible, and clinically relevant tool to assess vascular health across the human lifespan.
Total Direct Costs: \$1,100,000
Role: Co-Investigator

CX001183
VA Clinical Science Research & Development Service Merit Award I01 (Frech, PI) 05/01/2015 – 04/30/2019
“Systemic Sclerosis Vasculopathy: Improved Clinical Monitoring and Treatment”
The goal of this project is to assess the role of endothelial nitric oxide synthase (eNOS) uncoupling on vascular dysfunction in patients with systemic scleroderma.
Direct Costs: \$649,986
Role: Co-Investigator

VA Geriatrics and Extended Care Service Advanced Fellowship in Geriatrics (Ratchford) 01/01/2016 – 12/31/2019
Total Direct Costs: \$160,000
Role: Mentor

VA Geriatrics and Extended Care Service Advanced Fellowship in Geriatrics (Clifton) 01/01/2014 – 12/31/2017
Total Direct Costs: \$160,000
Role: Mentor

University of Utah Center on Aging Pilot Grant (Wray, PI; Ryan, Co-PI) 12/01/2016 – 11/30/2017
“Inflammation and Vascular Function in HFpEF”
The overall goals of this project are to determine the degree of vascular dysfunction in heart failure patients with a preserved ejection fraction (HFpEF), and to evaluate the capacity of tetrahydrobiopterin (BH₄) administration to restore vascular function.
Total Direct Costs: \$20,000
Role: Principal Investigator

RX001418

VA Rehabilitation Research & Development Service
Small Projects in Rehabilitation Research (SPiRE) I21 (Wray, PI) 07/01/2014 – 06/30/2016
“Contribution of Endothelin-1 to Exercise Intolerance in HF”
The main goal of this project is to examine whether vascular endothelin-1 (ET-1) contributes to impaired skeletal muscle blood flow and associated exercise intolerance in heart failure patients.
Total Direct Costs: \$200,000
Role: Principal Investigator

VA Geriatrics and Extended Care Service Advanced Fellowship in Geriatrics (Lee) 01/01/2014 – 12/31/2016
Total Direct Costs: \$160,000
Role: Mentor

RX000182
VA Rehabilitation Research & Development Service Merit Award I01 (Richardson, PI) 07/01/2011 – 06/30/2015
“Oxidative Stress Links Aging, Activity, and Mobility Limitation”
The major goal of this project is to investigate the role of physical activity and oxidative stress on mobility in the elderly.
Total Direct Costs: \$1,100,000
Role: Co-Investigator

HL091830
NIH/NHLB Program Project (Wagner, PI) 12/01/2008 – 11/30/2014
“Mechanisms of Adaptation to Exercise in Health and COPD”
The major goal of this multidisciplinary program project grant is to understand key mechanisms of muscle adaptation to exercise in health and COPD.
Total Direct Costs: \$2,500,000
Role: Co-Investigator, Project 3

0835209N
American Heart Association Scientist Development Grant (Wray, PI) 07/01/2008 – 06/30/2013
"Non-adrenergic Regulation of Skeletal Muscle Blood Flow in the Elderly: A Multi-parametric Approach".
The major goal of this project is to evaluate age-related changes in Angiotensin-II- and Endothelin-1-mediated vasoconstriction at rest and during exercise.
Total Direct Costs: \$280,000
Role: Principal Investigator

American Federation of Aging Research Medical Student Training in Aging Research 06/01/2012 – 08/12/2012
“Overcoming Chronic Sympathetic Vasoconstriction in Heart Failure”
The goal of this training grant is to introduce medical students to aging-related research and geriatrics under the mentorship of top experts in the field.
Total Direct Costs: N/A
Role: Principal Investigator (Mentor, Amanda Berbert)

University of Utah Center on Aging Pilot Grant (Wray, PI) 07/01/2010 – 06/30/2011
“Efficacy of Antioxidants on Muscular and Vascular Function in the Elderly”
The major goal of this project is to examine the effects of acute and chronic antioxidant therapy on blood vessel and skeletal muscle health with advancing age.
Total Direct Costs: \$20,000
Role: Principal Investigator

American Federation of Aging Research Medical Student Training in Aging Research 07/07/2010 – 08/13/2010
“Angiotensin-II Effects on Sympathetic Vasoconstriction in the Elderly”
The major goal of this medical student training grant is to investigate the potentiating effect of ANG-II on sympathetic vasoconstriction in the elderly.
Total Direct Costs: N/A
Role: Principal Investigator (Mentor; award was declined by student applicant)

Association Francaise contre les Myopathies (Richardson, PI) 01/01/2008 – 12/31/2010

"MRI Assessment of Skeletal Muscle Perfusion and Metabolic Matching in Humans".

The major goal of this project is to develop NMR sequences for the simultaneous assessment of muscle perfusion and metabolism.

Total Direct Costs: \$250,000

Role: Co-Investigator

Parker B. Francis Fellowship Program (Wray, PI)

07/01/2007 – 06/30/2010

"Statins, Exercise, and Oxidative Stress: an Integrative Approach for Improved Skeletal Muscle Function in Chronic Obstructive Pulmonary Disease"

The major goal of this project is to study the potential of statin therapy, antioxidant administration, and exercise training to improve skeletal muscle dysfunction in COPD.

Total Direct Costs: \$250,000

Role: Principal Investigator/Recipient

Tobacco-Related Disease Research Program (Richardson, PI)

07/01/2006 – 06/30/2009

"Oxidative Stress and Skeletal Muscle Dysfunction in Chronic Obstructive Pulmonary Disease".

The major goal of this project is to study the contribution of oxidative stress to skeletal muscle dysfunction in COPD.

Total Direct Costs: \$510,000

Role: Co-Investigator

HL007212

National Institutes of Health National Research Service Award (Wagner, PI)

03/01/2004 – 02/28/2007

"Physiology Basis of Pulmonary Disease"

The major goal of this institutional training grant was to provide postdoctoral training in pulmonary physiology.

Total Direct Costs: N/A

Role: Trainee

General Clinical Research Center CReFF award, UC San Diego (Wray, PI)

01/01/2006 – 12/31/2006

"The role of Endothelin-1- and Angiotensin-II-mediated vasoconstriction in regulation of skeletal muscle blood flow with advancing age".

The major goal of this pilot project was to gather preliminary data concerning age-related changes in skeletal muscle blood flow during administration of ET-1 and ANG-II.

Total Direct Costs: \$20,000

Role: Principal Investigator

Pending Grants

HL170007

National Institutes of Health NHLBI R01 (Amann, PI; Wray, Co-PI)

Dates Pending

"Cardiovascular and Neuromuscular Issues in Chronic Pain

Total Direct Costs: \$2,000,000

Role: Co-Principal Investigator

Status: Scored (Impact Score 40, 32nd percentile)

TEACHING RESPONSIBILITIES/ASSIGNMENTS

Course Lectures

2011 - Present

Primary Instructor, ESS 6970(4): Thesis Research: MS, 3 SCH, 1 student, University of Utah, Exercise and Sport Science

2017 – Present

Instructor, NUIP 7305: Advanced Cardiovascular Physiology

2022 – Present

Instructor, NUIP 7405: Cardiovasomobility

Clinical Teaching

2002 - 2003

Adjunct Instructor, Tarrant County JC NE, Fort Worth, Texas

Laboratory Teaching

2007 - 2008 Laboratory Instructor, Organ Physiology, Pulmonary section, USCD SOM

Small Group Teaching

2006 - 2008 Study Group Leader, Organ Physiology Respiratory Conferences (SOMC 206). UCSD SOM
2010 - Present Study Group Leader, Danish Cardiovascular Research Academy, Integrative Human Cardiovascular Control Ph.D. Course

Trainee Supervision

Masters

2009 - 2012 Advisor/Mentor, Zachary Barrett-O'Keefe, University of Utah.
2121 - Present Advisor/Mentor, Jarred Iacovelli, University of Utah.

Doctoral

2012 - 2015 Advisor/Mentor, Zachary Barrett-O'Keefe, University of Utah.
2017 - Present Advisor/Mentor, Jeremy Alpenglow, University of Utah.

Post-Doctoral

2011 - 2015 Co-Mentor, Melissa Hayman, University of Utah/SLC VAMC.
2011 - 2013 Co-Mentor, Stephen Ives, University of Utah/SLC VAMC.
2013 - 2015 Mentor, Joshua Lee, Ph.D., University of Utah/SLC VAMC.
2014 - 2018 Mentor, Heather Clifton, Ph.D., University of Utah, SLC VAMC.
2016 - 2019 Mentor, Steve Ratchford, Ph.D., University of Utah, SLC VAMC.
2017 - 2021 Mentor, Kanokwan Bunsawat, Ph.D., University of Utah, SLC VAMC.
2020 - 2022 Mentor, Michael Francisco, Ph.D., University of Utah, SLC VAMC.

Graduate Student Committees

2009 - 2011 Member, Stephen Ives, University of Utah, PhD/Doctorate Committee.
2009 - 2011 Member, Melissa Hayman, University of Utah, PhD/Doctorate Committee.
2010 - 2015 Member, Matt Rossman, University of Utah, PhD/Doctorate Committee.
2010 - 2013 Member, Garrett Morgan, University of Utah, PhD/Doctorate Committee.
2012 - 2015 Member, Jon Groot, University of Utah, PhD/Doctorate Committee.
2012 - 2016 Member, Jayson Gifford, University of Utah, PhD/Doctorate Committee.
2012 - 2015 Member, Song Young Park, University of Utah, PhD/Doctorate Committee.
2014 - 2015 Member, Cory Etheredge, University of Utah, PhD/Doctorate Committee.
2013 - 2016 Member, Corey Hart, University of Utah, PhD/Doctorate Committee.
2013 - 2017 Member, Grant Henson, University of Utah, PhD/Doctorate Committee.
2016 - 2022 Member, Taylor Thurston, University of Utah, PhD/Doctorate Committee.
2017 - 2020 Member, Jay Hydren, University of Utah, PhD/Doctorate Committee.
2017 - Present Member and Chair, Jeremy Alpenglow University of Utah, PhD/Doctorate Committee.
2018 - 2023 Member, Vincent Georgescu, University of Utah, PhD/Doctorate Committee.
2021 - Present Member and Chair, Jarred Iacovelli, University of Utah, PhD/Doctorate Committee.

Educational Lectures

Didactic Lectures

2006 - 2007 Guest Lecturer, USCD Department of Biology, BIPN 108 Integrative Biology of Exercise.
2009 - Present Guest lecturer, University of Utah Department of Exercise & Sports Science, ESS 6384 Cardiovascular Physiology.
2010 - Present Guest lecturer, University of Utah Department of Rehabilitation, RHSCI 7200 Neuromuscular Performance and Adaptation to Rehabilitation.
2010 - 2015 Lecturer, Danish Cardiovascular Research Academy, Integrative Human Cardiovascular Control Ph.D. Course.

PEER-REVIEWED JOURNAL ARTICLES

1. Shi, X., **D.W. Wray**, K.J. Formes, H.W. Wang, P.M. Hayes, A.H. O-Yurvati, M.S. Weiss, and I.P. Reese. Orthostatic hypotension in aging humans. *Am J Physiol Heart Circ Physiol* 2000 Oct;279(4):H1548-54. PMID:11009440.
2. **Wray, D.W.**, K.J. Formes, M.S. Weiss, A.H. O-Yurvati, P.B. Raven, R. Zhang, and X. Shi. Vagal cardiac function and arterial blood pressure stability. *Am J Physiol Heart Circ Physiol* 2001 Nov;281(5):H1870-80.
3. Fadel, P.J., M. Strömstad, **D.W. Wray**, S.A. Smith, P.B. Raven, and N.H. Secher. New insights into differential baroreflex control of heart rate in humans. *Am J Physiol Heart Circ Physiol* 2003 Feb;284(2):H735-43. PMID:12388288.
4. Keller, D.M., W.L. Wasmund, **D.W. Wray**, S. Ogoh, P.J. Fadel, M.L. Smith, and P.B. Raven. Carotid baroreflex control of leg vascular conductance at rest and during exercise. *J Appl Physiol* 94:542-48, 2003. PMID:12391067.
5. Ogoh, S., S. Volianitis, P. Nissen, **D.W. Wray**, N.H. Secher, and P.B. Raven. Carotid baroreflex responsiveness to head-up tilt-induced central hypovolaemia: effect of aerobic fitness. *J Physiol* 2003 Sep 1;551(Pt 2):601-8. PMID:12813144.
6. **Wray, D.W.**, P.J. Fadel, P.B. Raven, M.L. Smith, and M. Sander. Inhibition of alpha-adrenergic vasoconstriction in exercising human thigh muscles. *J Physiol* 2004 Mar 1;555(Pt 2):545-63. PMID:14694145.
7. **Wray, D.W.**, P.J. Fadel, D.M. Keller, S. Ogoh, M. Sander, P.B. Raven, and M.L. Smith. Dynamic carotid baroreflex control of the peripheral circulation during exercise. *J Physiol* 2004 Sep;559:675-684. PMID:15235090.
8. **Wray, D.W.**, M. Uberoi, L. Lawrenson, and R.S. Richardson. Heterogeneous limb vascular responsiveness to shear stimuli during dynamic exercise in humans. *J Appl Physiol* 2005 Jul;99(1):81-6. PMID:15718401.
9. Formes, K., **D.W. Wray**, A.H. O-Yurvati, M. S. Weiss, and X. Shi. Sympathetic cardiac influence and arterial blood pressure instability. *Auton Neurosci* 2005 Mar 31;118(1-2):116-24. PMID:15795185.
10. **Wray, D.W.**, A.J. Donato, A. Uberoi, J.P. Merlone, and R.S. Richardson. Onset exercise hyperemia in humans: partitioning the contributors. *J Physiol* 2005 Jun 15;565(Pt 3):1053-60. PMID:15860535.
11. Carter, R. III, S.N. Chevront, **D.W. Wray**, M.A. Kolka, L.A. Stephenson, M.N. Sawka. *J Therm Biol* 30 (2005) 495-502.
12. A.J. Donato, **D.W. Wray**, A. Uberoi, J.P. Merlone, and R.S. Richardson. Differential effects of aging on limb blood flow in humans. *Am J Physiol Heart Circ Physiol*, 2006 Jan;290(1):H272-8. PMID:16183733.
13. **Wray, D.W.**, A. Uberoi, L. Lawrenson, and R.S. Richardson. Evidence of preserved endothelial function and vascular plasticity with age. *Am J Physiol Heart Circ Physiol* 2006 Mar;290(3):H1271-7. PMID:16272199.
14. Richardson, R.S., S. Dutiell, C. Wary, **D.W. Wray**, J. Hoff, and P.G. Carlier. Human skeletal muscle intracellular oxygenation: the impact of ambient oxygen availability. *J Physiol* 2006 Mar 1;571(Pt 2):415-24. PMID:16396926.
15. Brothers, R.M., M.L. Haslund, **D.W. Wray**, P.B. Raven, and M. Sander. Exercise-induced inhibition of angiotensin-II-vasoconstriction in human thigh muscle. *J Physiol* 2006 Dec 1;577(Pt 2):727-37. PMID:16973706.
16. **Wray, D.W.**, A.J. Donato, S.K. Nishiyama, and R.S. Richardson. Acute sympathetic vasoconstriction at rest and during dynamic exercise in cyclists and sedentary adults. *J Appl Physiol* 2007 Feb;102(2):704-12. PMID:17082367.
17. Richardson, R.S., A.J. Donato, **D.W. Wray**, A. Uberoi, L. Lawrenson, and D.M. Bailey. Exercise-induced brachial artery vasodilation: the role of free radicals. *Am J Physiol Heart Circ Physiol* 2007 Mar;292(3):H1516-22. PMID:17114239.
18. Jonk, A.M., I.P. van den Berg, I.M. Olfert, **D.W. Wray**, T. Arai, S.R. Hopkins, and P.D. Wagner. Effect of acetazolamide on pulmonary and muscle gas exchange during normoxic and hypoxic exercise. *J Physiol* 2007 Mar 15;579(Pt 3):909-21. PMID:17218362.
19. Barden, J., L. Lawrenson, J. Poole, D.M. Bailey, J. Kim, **D.W. Wray**, and R.S. Richardson. Limitations to vasodilatory capacity and $\text{VO}_{2\text{max}}$ in trained human skeletal muscle. *Am J Physiol Heart Circ Physiol*, 2007 May;292(5):H2491-7. PMID:17259436.
20. Nishiyama, S., **D.W. Wray**, K. Berkstresser, K. Ramaswamy, and R.S. Richardson. Limb-specific differences in flow-mediated dilation: The role of shear rate. *J Appl Physiol*, 2007 Sep;103(3):843-51. PMID:17556495.
21. **Wray, D.W.**, S.K. Nishiyama, A.J. Donato, M. Sander, P.D. Wagner, and R.S. Richardson. Endothelin-1-mediated vasoconstriction at rest and during dynamic exercise in healthy humans. *Am J Physiol Heart Circ Physiol*, 2007 Oct;293(4):H2550-6. PMID:17693542.
22. **Wray, D.W.**, P.B. Raven, and M. Sander. Diminished baroreflex-induced vasoconstriction following alpha-2 adrenergic receptor blockade in humans. *Auton Neurosci* 2008 Feb 29;138(1-2):114-7. PMID:18054844.
23. **Wray, D.W.**, S.K. Nishiyama, R.A. Harris, and R.S. Richardson. Angiotensin-II in the elderly: impact of AT1 receptor sensitivity on peripheral hemodynamics. *Hyper* 2008 Jun;51(6):1611-6. PMID:18413487.
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REVIEW ARTICLES

1. **Wray D.W.**, S.K. Nishiyama, A.J. Donato, P. Carlier, D.M. Bailey, A. Uberoi, and R.S. Richardson. (Invited Review) The paradox of oxidative stress and exercise with advancing age. *Exerc Sport Sci Rev* 2011 Apr;39(2):68-76. PMID:21206280.
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CONFERENCE PROCEEDINGS

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2. **Wray, D.W.** and Richardson, R.S. (Commentary) In FMD, NO is actually the “middle man”. *J Appl Physiol* 2005 Oct;99(4):1624. PMID:16160027.

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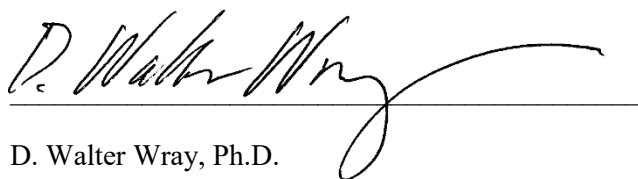
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ORAL PRESENTATIONS

- 2005 "Vascular Responses to Exercise and Shear Stress in the Arms and Legs", American College of Sports Medicine Annual Meeting, Nashville, TN.
- 2007 "Mechanisms and Consequences of Lactate Production During Exercise", American College of Sports Medicine (Southwest Chapter) Annual Meeting, San Diego, CA.
- 2008 "Investigating Human Vascular Control by Pharmacologic Means and its Application to Aging", American College of Sports Medicine Annual Meeting, Indianapolis, IN.
- 2008 "Regulation of skeletal muscle blood flow in the elderly", Canadian Federation of Biological Sciences Annual Meeting, Winnipeg, Canada (withdrawn).

- 2009 “Exercise and Aging”, 7th Annual Rocky Mountain Geriatrics Conference, Midway, UT.
- 2010 “Regulation of the Skeletal Muscle Vasculature with Age”, 8th Annual Rocky Mountain Geriatrics Conference, Park City, UT.
- 2010 “Vascular Regulation and Age”, American College of Sports Medicine (Southwest Chapter) Annual Meeting, San Diego, CA.
- 2010 “Pharmacologic Manipulation of the Autonomic Nervous System”. The Danish Cardiovascular Research Academy and Faculty of Health Sciences, University of Copenhagen, Denmark.
- 2011 “Efficacy of Antioxidants on Muscular and Vascular Function in the Elderly”. University of Utah Center on Aging Retreat, Salt Lake City, UT.
- 2012 “The Physiology of Exercise in Heart Failure”. American College of Sports Medicine Annual Meeting, San Francisco, CA.
- 2012 “The Exercise Pressor Reflex”, The Danish Cardiovascular Research Academy and Faculty of Health Sciences, University of Copenhagen, Denmark.
- 2012 “Control of Vascular Resistance During Exercise: Protocol Design in Cardiovascular Studies”, The Danish Cardiovascular Research Academy and Faculty of Health Sciences, University of Copenhagen, Denmark.
- 2013 “Regulation of Skeletal Muscle Blood Flow with Advancing Age”, Metabolism Interest Group Lecture Series, Division of Endocrinology, Department of Medicine, University of Utah.
- 2013 “Non-adrenergic regulation of the peripheral circulation during exercise.” Experimental Biology Annual Meeting, Boston, MA.
- 2014 “Control of Skeletal Muscle Blood Flow during Exercise in Heart Failure with Preserved Ejection Fraction (HFpEF)”, Geriatric Research, Education, and Clinical Center (GRECC) Symposium, Gerontological Society of America Annual Meeting, Washington, D.C.
- 2015 "Taming 'The Sleeping Giant': New Insights Into the Regulation of Skeletal Muscle Blood Flow During Exercise". Department of Physiology seminar series, University of Oregon, Eugene, OR.
- 2015 "Exercise Hyperemia in Health & Disease". Department of Health & Exercise Science seminar series, Colorado State University, Fort Collins, CO.
- 2016 "Adrenergic versus Non-adrenergic Regulation of Blood Flow during Exercise" University of Utah Vascular Research Laboratory Colloquium Series, Division of Geriatrics, Salt Lake City, UT.
- 2017 "Peripheral Vascular Function in Heart Failure and Recovery", Utah Cardiac Recovery Symposium, University of Utah, Salt Lake City, UT
- 2017 “Cardiovascular Aging Physiology”, 15th Annual Rocky Mountain Geriatrics Conference, Snowbird, UT.
- 2019 “Autonomic and Vascular Function in Heart Failure”. Division of Geriatrics /GRECC Grand Rounds, University of Utah, Salt Lake City, UT
- 2019 “Oxidative Stress, Inflammation, and Vascular Control in Health & Disease” University of Texas Clinical Translational Research Forum, Arlington, TX
- 2019 “Unraveling the Complexities of Blood Flow Regulation during Exercise” Department of Physiology Seminar Series, University of Arizona College of Medicine, Tucson, AZ
- 2021 “Vascular Function and Blood Flow Regulation in Patients with Heart Failure” Italian Physiology Society Annual Meeting, Milan, Italy.
- 2022 “Exercise Intolerance in Heart Failure with a Preserved Ejection Fraction (HFpEF): Causes, Consequences, and the Journey Towards a Cure” American College of Sports Medicine Annual Meeting, San Diego, CA
- 2023 “Protagonists, Antagonists, and Mimetics: Who are the Stars and Supporting Characters in the Regulation of Exercising Muscle Blood Flow?” American College of Sports Medicine Annual Meeting, Denver, CO

Signature:



D. Walter Wray, Ph.D.

Date: 05/22/2023