# THE 2018 ANNUAL REPORT CARDIOVASCULAR RESEARCH INSTITUTE OF VERMONT

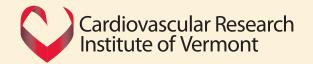
THE CARDIOVASCULAR RESEARCH INSTITUTE OF VERMONT is dedicated to reducing the incidence, morbidity, and mortality of heart and vascular diseases through improving prevention, diagnosis, and treatment.

By fostering collaborations among departments at The University of Vermont and The University of Vermont Medical Center, the Cardiovascular Research Institute of Vermont encourages the critical thinking that challenges assumptions and promotes excellence in clinical practice.

# CONTENTS

Cardiovascular Research News	R
Research Focus: Patient-Centered Research4	P
Researcher Support8	S
Scholarly Events	В
Connecting Our Scholars12	C
Research Funding: Highlights14	

	Research Publications: Highlights18
	Patent Activity23
	Scholarly Presentations24
)	Board of Directors & Leadership Council25
	Contact Information back cover



# **MESSAGE FROM THE DIRECTOR**

The Cardiovascular Research Institute of Vermont (CVRI) seeks to foster cardiovascular research. We accomplish this mission by promoting collaboration, highlighting research accomplishments in cardiovascular disease, and supporting career development. In the pages that follow you will see the mission of the CVRI brought to life as we highlight efforts designed to improve the care of patients with cardiovascular disease and highlight achievements that include grant funding, participation in clinical trials, and the publication of research findings.

In July 2017, the University of Vermont invested Benedek Erdos, M.D., Ph.D. as the inaugural Bloomfield Early Career Jim Ray, who was an avid cyclist who died of heart disease in Professor in Cardiovascular Research. Dr. Erdos was 1996. Early Career Investigators in cardiovascular research are the selected by the Board of Directors of the CVRI who felt beneficiaries because funds raised by this ride in 2017 were used that he was exceptionally well qualified for this prestigious to support attendance of early career scientists and physicians honor. Dr. Erdos has pioneered an innovative hypothesis at leading-edge conferences and educational forums. Additional that brain-derived neurotrophic factor may be a common support for early career investigators is provided by a gift from mediator of hypertension. His research uses novel genetic Paul Millman (also a member of the Cardiovascular Leadership tools that could change our ability to treat hypertension and Council) and his company, Chroma Technologies. This funding prevent cardiovascular events because hypertension is a supports summer research projects in cardiovascular disease by major cause of morbidity and mortality. The Board felt that first-year medical students. the support provided by this Professorship should enhance the likelihood of success for this talented junior investigator. The Early Career Advisory Committee of the CVRI actively Dr. Martin Bloomfield, an alumnus of the University of promoted cardiovascular research and enhanced collaboration Vermont and a member of the Cardiovascular Leadership through a series of events designed to encourage scientific Council, has chosen to give back to his alma mater in a exchange. This spring, the Early Career Advisory Committee meaningful manner by endowing this Professorship that is awarded small grants to junior investigators. The selection process designed to both recognize and support an extraordinary has been educational for both the applicants and the Early Career early career investigator in cardiovascular research. Advisory Committee, who were provided with a "grant review boot camp" by their Board advisor, Dr. Mary Cushman.

Mark Ray, another member of the Cardiovascular Leadership Council, raises money in support of research to treat and prevent heart disease through an annual event, the Jim Ray Memorial Heart Ride. Mark has raised nearly \$170,000 since the inaugural ride in 2000 in memory of his late father,



David J. Schneider, M.D., F.A.C.C., F.A.H.A.

Director Cardiovascular Research Institute of Vermont

Professor of Medicine The Robert Larner, M.D. College of Medicine at The University of Vermont

Director of Cardiovascular Services University of Vermont Health Network

We are proud of the accomplishments achieved in cardiovascular research at the University of Vermont. Thank you for taking the time to learn about these accomplishments in the pages that follow.

# **Cardiovascular Research News**

# CUSHMAN PRESENTS STUDY ON INCREASED TV VIEWING & BLOOD CLOT RISKS AT AHA



Mary Cushman, M.D., M.Sc.

**T** isk of blood clots increases with the  $\mathbf{\Gamma}$  amount of time spent watching television. even if people get the recommended amount of physical activity, according to preliminary research presented at the American Heart Association's Scientific Sessions 2017 in Anaheim, Calif., November 2017..

"Watching TV itself isn't likely bad, but we tend to snack and sit still for prolonged periods while watching," said Mary Cushman, M.D., M.Sc., co-author of the study and professor of medicine at the Larner College of Medicine at the University of Vermont and a CVRI Board of Directors member.

Prolonged TV viewing has already been associated with heart disease involving blocked arteries, but this is the first study in a western population to look at blood clots in veins of the legs, arms, pelvis, and lungs called venous thromboembolism or VTE.

Among 15,158 middle-aged (45-64 years) participants in the Atherosclerosis Risk in Communities Study, researchers found that the risk of developing a venous thromboembolism for the first time was:

• 1.7 times higher in those who reported they watch TV "very often" compared with those who watch TV "never or seldom":

• 1.8 times higher in participants who met recommended guidelines for physical activity and reported watching TV "very often" compared with those who reported watching TV "never or seldom";

• Increased with more TV viewing both for life-threatening clots in the extremities and those in the lungs; and while obesity was more common in people who watched more TV, in the study only about 25 percent of the increased risk could be explained by the presence of obesity. "Think about how you can make the best

use of your time to live a fuller and healthier life. You could put a treadmill or stationary bike in front of your TV and move while watching. Or you can delay watching TV by 30 minutes while you take a walk. If you must see your favorite show, tape it while you are out walking so you can watch it later, skipping the ads," said Cushman, who is also the director of the Thrombosis and Hemostasis Program at the University of Vermont Medical Center.

Each year, it is estimated that between 300,000 to 600,000 people in the U.S. develop venous thromboembolism. Besides avoiding prolonged TV watching, people can lower their risk by maintaining a healthy weight and staying physically active.

Other co-authors on the research presentation are Yasuhiko Kubota, M.D., and Aaron R. Folsom, M.D., M.P.H., of the University of Minnesota School of Public Health: Neil Zakai, M.D., M.Sc., of the UVM Larner College of Medicine; and Wayne D. Rosamond, Ph.D., M.S., of the University of North Carolina's Gillings School of Global Public Health.

The National Heart, Lung, and Blood Institute funded the study.

# ADES' CARDIAC REHAB EXPERTISE FEATURED IN CONSUMER REPORTS ARTICLE

hilip Ades, M.D., CVRI Distinguished Investigator and UVM Professor of Cardiovascular Medicine provided his cardiac rehabilitation expertise for a 2017 Consumer Reports Health article titled, "What's Missing from Your Heart-Attack Recovery Plan."

Part of the problem, as Ades explained, is the lack of geographically available options. "There are too few in many big cities, and in rural areas you could be a 3-hour drive from the nearest cardiac rehabilitation center," he says. "Physical activity improves fitness, and if fitness is improved it's easier to do daily activities. Even small improvements in physical function can greatly improve quality of life and self-esteem, and lead to overall better health."



Philip Ades, M.D.



Andrew Lombardo, UVM graduate student in molecular physiology and biophysics.

# 3D MODEL SYSTEM ILLUSTRATES HOW MOLECULAR MOTORS NAVIGATE

T n cells, cargo that contains tiny packages of critical biological materia L are transported by teams of minuscule myosin molecular "motors" along complex actin filament "highways." How these motors reach their destination when confronted with numerous intersections without GPS is a mystery. In a study published in the July 2017 issue of Nature Communications, University of Vermont researchers, including several associated with the CVRI, built three-dimensional (3D) actin highways with intersections as well as under- and over-passes within microfluidic chambers to emulate the complicated highways that myosin motors encounter in cells.

"We challenged motors to navigate their cargo along suspende filament tracks through intersections with the intention of understanding how teams of these motors work together when face with a directional dilemma," says **Andrew Lombardo**, a graduate student in molecular physiology and biophysics at the Larner College of Medicine at the University of Vermont.

He and colleagues in the lab of David Warshaw, Ph.D., chair of Molecular Physiology and Biophysics and a CVRI Board of Director member, used tiny, 3-micrometer-sized beads in these special chambers, as structural supports to spin a web of suspended actin filament highways between the beads.

"Similar to a tightrope artist carefully walking between two buildings, myosin motors bind to the suspended actin highways

al	while carrying their cargo and 'walking' along these tightropes,"
	said Lombardo. He and his colleagues observed that the motors
r	were surprisingly adept at moving their cargo through the complex
	physical and directional challenges presented by these 3D highways.
	"Actin filaments and intersections are numerous in the cell – for
	the motors, it's like navigating a city," says Lombardo. "However, you
	would never make it across town if you turned at every intersection."
:	In fact, myosin motors prefer to turn at intersections when such
	intersections are formed on flat surfaces. But when suspended 3D
	highways and intersections were created, teams of motors now carry
ed	their cargo in a relatively straight line through the intersections
	despite the option to turn or stop.
ed	"This simple model transport system provides a window into
	one of the most fundamental processes that occurs in every single
	cell within the human body," says Lombardo.
	In addition to Lombardo and Warshaw, co-authors on the study
	include UVM Molecular Physiology and Biophysicists Shane Nelson,
rs	Ph.D., Yusuf Ali, Ph.D., Research Engineer Guy Kennedy, and CVRI
	Distinguished Investigator Kathleen Trybus, Ph.D., as well as Sam
	Walcott of the Department of Mathematics, University of California,
	Davis. This work was funded by the National Institutes of Health,
	National Science Foundation, and the National Aeronautics and
	Space Administration.



# Cardiovascular **Research: Serving** the Patient

hysician scientists can find inspiration  $\mathbf{P}$  – and solutions – in every corner of an academic medical center: the clinic, the research arena, or while teaching. That's how Peter Spector, M.D., a University of Vermont professor of medicine and director of electrophysiology at The UVM Medical Center, came to co-develop — with Professor of Medicine and engineer Jason Bates, Ph.D. - a three-dimensional computational model of a human heart called Visible EP.

No matter the source of the inspiration, its ultimate focus remains the same: the development of new knowledge that can be put to use to offer better, more successful treatments and therapies to improve patients' lives.

The software technology that Spector and Bates built is as remarkable as their collaboration. Spector came to the table with the vision of the final product and a deep understanding of electrophysiology and how the heart works, but was unfamiliar with the programming process. Bates

possessed programming skills and expertise in computational models. Together, they produced a technology that very accurately models the electrical behavior of the human heart, to the smallest level of detail. Bates and Spector created Visible EP (which stands for "electrophysiology") as a means to gain a better understanding of how to cure the most common abnormal heart rhythm – atrial fibrillation (AF) – which afflicts more than five million people in the U.S. alone. Previous treatments had been less than adequate.

The result of their teamwork is a program that mimics the behavior of the heart from every aspect, as well as features the ability to provide unpredictable responses — a phenomenon called emergent behavior. While the parts of the heart and the rules of interaction have been programmed into the system, the computational heart model's reaction is entirely emergent, says Spector. "We've made, essentially, a living,

# **Research Focus**

breathing, interactive human heart," he says. "It will sit there and beat in what would be the equivalent of a normal rhythm; you can induce every sort of abnormal heart rhythm that you can imagine that a patient could have, and it's all happening on a computer screen."

Visible EP's emergent behavior feature makes it an attractive tool for medical education, as well as research applications. Because it can't be readily seen, electrophysiology has been regarded as a particularly difficult specialty to teach; the field was waiting for just such a teaching tool as Visible EP.

Spector uses the Visible EP technology in his arrhythmia research lab. Using this computer model, combined with studies of the real human heart, the group has proposed a new approach to analyzing an individual patient's electrical activity and to using this information to guide a new type of ablation. In addition, the team has developed a new catheter, signal processing



algorithms and a mapping approach for treatment of AF. This work was initially sponsored by a generous grant from the Evslin Foundation.

One patient who typifies the beneficial outcomes that come from cardiovascular research is Paula Desseau of Essex Junction, Vt. Desseau has lived life with atrial fibrillation — "afib," as she refers to it — for many years.

"Any exertion that I did, my heart would go into afib," says Desseau. "You would never know when it would go into afib," she says, and each occurrence would be a cause for major concern, and a trip to the emergency department.

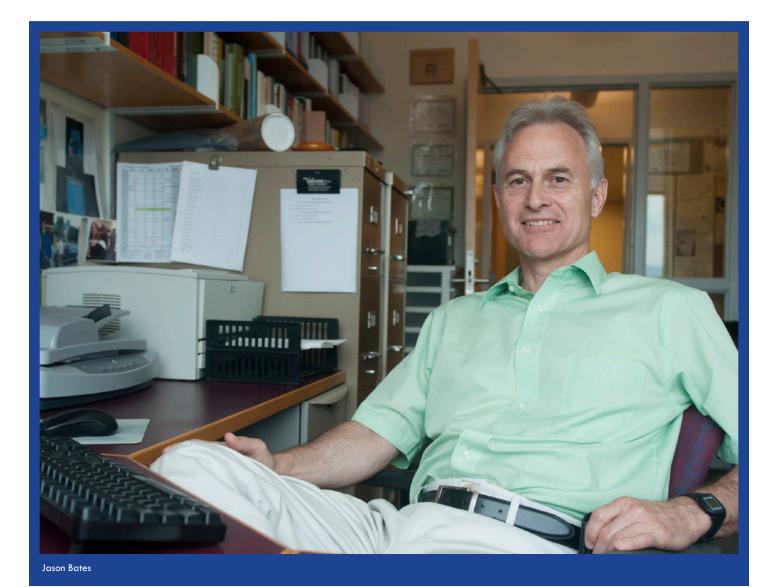
After Paula's third ablation treatment, Spector and his care team expected to find that with some of the ablations they'd created, the



Paula Desseau

scars had healed up.

"We discovered, much to our chagrin, that none of the scars has healed up," recalls Spector. "If you look it up in a textbook, there's no next move. We were stuck with pulling catheters out, waking Paula up, and telling her, 'I'm sorry, there's nothing we can do for you.' But we knew from the work that we're doing in the research lab that that's not true. We used our catheters in a way that's guided by the research work we'd done to tell us where we thought the fibrillation was coming from. We did a little bit more ablation than we had done already. That little bit made all the difference. Paula remained in normal rhythm for years after



that final procedure."

That research-based difference is something Paula Desseau thinks about every day.

"I don't know if I'd be here today if Dr. Spector had not done all he did for me," she says.



# Dr. Benedek Erdos Invested as Inaugural Bloomfield Professor

Benedek Erdos, M.D., Ph.D., an assistant professor in the Department of Pharmacology at the Robert Larner, M.D. College of Medicine at the University of Vermont, was invested in a formal ceremony on July 31, 2017 as the inaugural Martin E. Bloomfield '56, M.D.'60 and Judith S. Bloomfield '59 Early Career Professor in Cardiovascular Research.

The endowed professorship was established by Dr. Marty Bloomfield, a dualdegree UVM alumnus and retired cardiologist, and his wife Judy, a fellow Catamount and retired psychologist. Dr. Erdos is receiving funding for two years, with potential funding for a third year, to support his research project: "Brain-Derived Neurotrophic Factor, a Novel Hypothalamic Mediator in Hypertension."

Designed to significantly increase our understanding of the mechanisms of blood pressure regulation, the proposed studies in the Erdos Lab may help to identify novel therapeutic targets to treat hypertension.

This faculty position is particularly significant because it marks the first time ever at the University of Vermont that an earlycareer professorship has been endowed. As federal funding for research becomes more competitive, private philanthropy can help launch promising young careers with the potential to benefit not only the University of Vermont, but society at large.

The Bloomfields' decision to focus their philanthropic impact on an earlycareer professorship is based on personal experiences. At the time when Dr. Bloomfield was beginning his own career, research funding was not readily available. Years later, the Bloomfields' son Dan — also a cardiologist – benefited early in his career through research funding from an endowed assistant professorship that serves as the inspiration for their gift.

Following remarks from UVM Foundation President and CEO Shane Jacobson, UVM President Tom Sullivan and Larner College of Medicine Dean Rick Morin, Dr. Erdos was presented with a medallion in front of family, friends, colleagues and students in the Hoehl Gallery at the Larner College of Medicine on the UVM campus. After receiving his medallion, Dr. Erdos invited Dr. Bloomfield to the podium to present the donor with a matching medallion, which was followed by comments from Dr. Bloomfield.

Now a revered campus tradition, the formal investiture ceremony recognizes the importance of endowed positions and is one of the highest honors UVM can bestow on its faculty members and the generous donors who make it possible.

Dr. Erdos received his medical degree and Ph.D. from Semmelweis University in Budapest, the oldest medical school in Hungary. Following post-doctoral work at Wake Forest University, he held research positions at the University of Florida prior to arriving at UVM in 2014.

Dr. Erdos' research supports the mission of the CVRI, which leverages the worldclass research facilities as well as clinical capabilities of the Larner College of Medicine and the UVM Medical Center to reduce the incidence, morbidity and mortality of heart and vascular diseases. Dr. Bloomfield in 2017 joined the Cardiovascular Leadership Council, a group of community members who serve as ambassadors for the CVRI.

9

# **Scholarly Events**

The Cardiovascular Research Institute of Vermont (CVRI) brings outstanding scientists in cardiovascular medicine to The University of Vermont as Visiting Professors.

A gift from Martin Bloomfield, M.D.'60 enables CVRI to host the Burton E. Sobel Visiting Professor series, which honors Burton E. Sobel, MD, the Founding Director of CVRI. In addition to formal lectures, each Sobel Visiting Professor participates in meetings with early career investigators and a "Scholar's Tea," where selected early career investigators meet as a group with the Visiting Professor to discuss any topic and ask any question that may come to mind.

# **BURTON E. SOBEL VISITING PROFESSOR SEMINARS**

## May 31 - June 1, 2017

ROBERT A. HARRINGTON, M.D. Arthur L. Bloomfield Professor and Chair, Department of Medicine, Stanford University Chair, FDA Cardiovascular and Renal Drugs Advisory Committee and host of a regular podcast on theheart.org: The Bob

Harrington Show

- Seminar: Education and Research in an Era of Quality, Big Data, Precision Medicine, and Digital Health
- Interactive Discussion: Social Media in Medicine: How social media is being used to access and disseminate science to both scientists and the public

#### October 4 – 6, 2017

DAVID C. GOFF, JR., M.D., PH.D. Director, Division of Cardiovascular Sciences, National Heart, Lung, and Blood Institute • Medicine Grand Rounds: Eliminating Cardiovascular

Disparities through Community-Engaged Research: A thought exercise

• Interactive Discussion: Where's the Funding Going: NHLBI Strategic Vision implementation for the **Division of Cardiovascular Sciences** 

The Early Career Visiting Professorship was launched in 2017 by CVRI's Early Career Advisory Committee (ECAC). These professorships bring to campus a successful early career investigator for a series of events focusing on trainees and junior investigators.

# EARLY CAREER VISITING PROFESSOR SEMINAR

## October 29 - 31, 2017

BENJAMIN PROSSER, PH.D. Assistant Professor, Department of Physiology, Pennsylvania Muscle Institute, Perelman School of Medicine, University of Pennsylvania and The American Heart Association's 2017 "Outstanding Early Career Investigator"

- Research Seminar: Inotropy via Cytoskeletal Regulation
- Interactive Discussion: Establishing Independence: Lessons learned in starting a new lab



Nels Olson, Ph.D., assistant professor, Pathology and Laboratory Medicine and ECAC Chair (left) presents Benjamir Prosser, Ph.D., with the ECAC's "Rising Star Award" for impressive achievement early in his research career.



David C. Goff, Jr., M.D., Ph.D. delivers his Medicine Grand Rounds, "Eliminating Cardiovascular Disparities Through Community-Engaged Research: A thought exercise," on October 5, 2017 in the Davis Auditorium of the University of Vermont Medical Center. Dr. Goff's visit was supported by the Martin E. Bloomfield, M.D. '60

# Connecting **Our Scholars**

The Cardiovascular Research Institute of Vermont encompasses the full range of scholarship, from young scientists and physicians at the start of their careers to our Distinguished Investigators with decades of notable work to their credit. Through travel awards, research seminars, and an Early Career Advisory Committee available to them, junior investigators who are affiliated with the CVRI have plenty of rich opportunities to interact with and learn from their more experienced colleagues.

# **CVRI TRAVEL AWARDS**

# American Heart Association EPI/Lifestyle 2017 Scientific Sessions

Portland, OR – March 2017 Daniel Douce, M.D.

Fellow, Hematology and Oncology, Department of Medicine **POSTER PRESENTATION:** Association of sickle cell trait with common electrocardiographic abnormalities in the Reasons for Geographic and Racial Differences in Stroke (REGARDS) study

# American College of Cardiology 66th Annual **Scientific Sessions**

Washington, DC – March 2017 Mehdi Rambod, M.D.

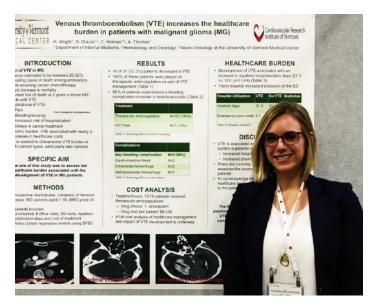
Fellow, Cardiovascular Division, Department of Medicine **POSTER PRESENTATION:** New-onset platypnea orthodeoxia and old patent foramen ovale: To close it or not to close it?

# Society for Reproductive Investigation 64th **Annual Scientific Meeting**

Orlando, FL – March 2017 Theresa Nga-Ling Ko, Ph.D.

Postdoctoral Associate, Department of Obstetrics, Gynecology and Reproductive Sciences

**ORAL PRESENTATION:** Venoarterial signaling (VAS) modulates shear stress-induced gestational uterine artery expansive remodeling



## Aaron Gelinne, B.S.

Medical Student, Larner College of Medicine Class of 2019s **POSTER PRESENTATION:** Remodeling and altered biomechanics of the mouse abdominal aorta during and after pregnancy

#### Carole McBride, Ph.D.

Research Specialist, Department of Obstetrics, Gynecology and Reproductive Sciences

**POSTER PRESENTATIONS (4):** Placental underperfusion and its clinical associations

Amyloid precursor protein products are associated with vessel stiffness and hypertension in subsequent pregnancy

Women with prior preterm preeclampsia have elevated inflammation and endothelial dysfunction compared to nulliparous women

Bone mineral density is decreased in women who develop preeclampsia

# International Society for Cerebral Blood Flow & Metabolism – Brain 2017

Berlin, Germany – April 2017 Siu-Lung (Kelvin) Chan, B.Sc., Ph.D.

Research Analyst, Department of Neurological Sciences **POSTER PRESENTATION:** Increased infarction and hemorrhagic transformation in aged spontaneous hypertensive rats: Role of collateral CBF

# **Experimental Biology 2017** Chicago, IL – April 2017

Daniel M. Collier, Ph.D.

Research Assistant Professor, Department of Pharmacology **POSTER PRESENTATION:** Extracellular histones induce propagating Ca2+ influx, Ca2+ overload, and endothelial cell death in resistance-sized mouse mesenteric arteries

# Society for Cardiovascular Angiography and Interventions

New Orleans, LA – May 2017 Sreedivya Chava, M.D.

Fellow, Cardiovascular Division, Department of Medicine **POSTER PRESENTATION:** Coronary CT angiography to detect severe coronary artery disease prior to transcatheter aortic valve replacement

# International Society on Thrombosis and Haemostasis 26th Congress

Berlin, Germany – July 2017

## Laura M. Havnes, Ph.D.

Postdoctoral Associate, Department of Biochemistry **ORAL PRESENTATION:** Clot-bound thrombin characterization of plasma clots in a flow reactor

# Military Health System Research Symposium 2017

Kissimmee, FL – August 2017 Maria Cristina Bravo, Ph.D.

Faculty Scientist, Department of Biochemistry

**POSTER PRESENTATION:** Computational assessment that utilizes composition data from distinct patient cohorts to help determine procoagulant dynamics in burn patients over time

# American Society of Nuclear Cardiology, 22nd **Annual Scientific Session**

Kansas City, MO – September 2017 Sherri Khadanga, M.D.

Fellow, Cardiovascular Division, Department of Medicine **POSTER PRESENTATION:** Ratio of myocardial uptake to blood pool activity in dual-time-point 18F-FDG PET for the diagnosis of cardiac sarcoidosis

# TCT – Transcatheter Cardiovascular Therapeutics

Denver, CO – October 2017 Amir Azarbal, M.D.

Fellow, Cardiovascular Division, Department of Medicine **POSTER PRESENTATION:** Acute kidney recovery in patients undergoing transcatheter aortic valve replacement

**American Heart Association Annual Scientific** Sessions

Anaheim, CA – November 2017 Lakshmi Nambiar, M.D.

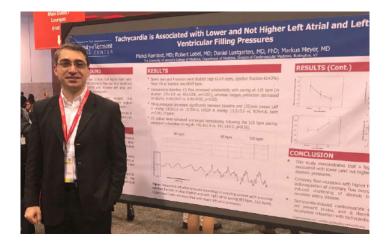
Fellow, Cardiovascular Division, Department of Medicine **POSTER PRESENTATION:** Left ventricular end-diastolic volume predicts exercise capacity in patients with a normal ejection fraction

## Mehdi Rambod, M.D.

Fellow, Cardiovascular Division, Department of Medicine **POSTER PRESENTATION:** Tachycardia is associated with lower and not higher left atrial and left ventricular filling pressures (shown below)

# **American Society of Hematology** Atlanta, GA – December 2017 Heather Wright, DO

Resident, Internal Medicine, Department of Medicine **POSTER PRESENTATION:** Venous thromboembolism (VTE) increases the healthcare burden in patients with malignant glioma (MG) (shown left)



# **Research Funding: 2017 Highlights**

Understanding the causes and consequences of cardiovascular disease, from the molecule to the patient to populations to policy, drives a robust research enterprise at the University of Vermont, and represents a significant portion of the \$85 million in funding received by the Larner College of Medicine in 2017. Grant funding comes from federal, state, corporate and non-profit sources; below is a sampling of current awards.

#### **Cardiac Muscle**

#### National Institutes of Health Funding

#### NIH 5R01 HL122744

Tachycardia-Induced Sarcolemmal Calcium Extrusion Defect in Patients with Diastolic Dysfunction PI: Markus Meyer, M.D. \$1,800,000

#### NHLBI U10 HL110342

Heart Failure Research Network -Vermont, New York and Ouebec Regional Clinical Center PI: Peter VanBuren, M.D. \$1,150,000

#### NHLBI R01 HL118524

Myofilament Based Mechanisms of Diastolic Dysfunction in HFpEF PI: Martin LeWinter, M.D. \$1,044,000

#### R01 HL126909-01

Cardiac Myosin-Binding Protein C: Molecular Modulation Actomyosin Function PI: David M. Warshaw, Ph.D. \$468.000

#### Ro1 AR067279

Skeletal Myosin-Bindina Protein C: Molecular Structure and Function PI: David M. Warshaw, Ph.D. \$192,500

#### RO1 GM078097

Mutational Studies of Processive Mvosin Motors PI: Kathleen Trybus, Ph.D. \$248,630

#### R01 GM094229

Mvosin Va Cargo Transport: In Vitro Model Systems PI: David M. Warshaw, Ph.D. \$346,500

#### R21 CA1911532

Alternative Exercise Modalities to Improve Skeletal Muscle Function in Cancer Survivors PI: Michael Toth, Ph.D. \$130,500

#### Ro1 HL078888

Genomics and Pharmacodynamics of Statin-Related Rhabdomvolvsis Subcontract PI: Russell Tracy, Ph.D. No cost extension

#### No1 HC95170

Jackson Heart Study - Specimen Repository Subcontract PI: Nancy Jenny, Ph.D. \$46,139

#### NIH/NIAMS R21 AR069199

Prevention of Skeletal Muscle Adaptations to Traumatic Knee Injury and Surgerv PI: Michael Toth, Ph.D. \$132,000

#### Ro1 AI132378

Structure and Function of the Plasmodium Myosin XIV-acting Glideosome PI: Kathleen Trybus, Ph.D. \$260,295

#### UO1 HL084904

Heart Failure Network Subcontract PI: Russell Tracy, Ph.D. \$375,883

#### NIH/NIAMS Ro1 AR065826

Skeletal Muscle atrophy and Dysfunction in Human Cancer PI: Michael Toth, Ph.D. \$271,172

#### NIH/NIA Ro1 AG050305

Skeletal Muscle Atrophy and Dysfunction Following Total Knee Arthroplastv PI: Michael Toth, Ph.D. \$294,306

#### NIH/NIA Ro1 AG04725

Sex-specific Adaptations to Different Resistance Exercise Programs in Older Adults Site PI: Michael Toth, Ph.D. \$377,039

# **Clinical Trials/Industry Support**

#### Medtronic

The Heart Rate 80bpm Study PI: Markus Meyer, M.D. \$50,000

CoreValve® Transcatheter Aortic Valve Replacement in Patients at Low Risk for Surgical Aortic Valve Replacement Site PI: Harold Dauerman, M.D. \$250.000

AdaptResponse Clinical Trial Local PI: Joseph F. Winget, M.D. \$67,550

Product Surveillance Registry 09-167 Registry Study: Patients who have received specific leads in the past 30 days, examining the longevity of the system/leads once implanted PI: Robert Lobel, M.D. \$250.000

#### Capricor. Inc.

Randomized, Double-Blind, Placebo-Controlled Phase I/II Study of the Safety and Efficacy of Intracoronary Delivery of Allogeneic Cardiosphere-derived Cells in Patients with an Anterior Myocardial Infarction and Ischemic Left Ventricular Dysfunction (ALLSTAR) Local PI: Matthew Watkins, M.D. \$326.000

#### St. Jude Medical

Quadripolar Pacing Post Approval Study PI: Daniel Lustgarten, M.D., Ph.D. \$17,250

#### Dauerman Research & Education Funding

Acute Kidney Recovery after TAVR: Northern New England Cardiovascular Disease Study Group PI: Richard Solomon, M.D. Acute Kidney Recovery after TAVR: 1 Year Follow Up Site PI: Harold Dauerman, M.D. Trainees: Amir Azarbal, M.D. (Fellow); Katherine Kurchena (medical student); Erika Mendoza (undergraduate student)

Acute Kidney Recover after TAVR vs. Surgical AVR PI: Harold Dauerman, M.D., Senior Investigator for the Northern New England Cardiovascular Disease Study Group Trainees: Rony Lahoud, M.D. (junior faculty)

Temporal Trends in Tricuspid Valve

Surgery and Outcomes: A Report of the Nationwide Inpatient Sample Senior Investigator: Harold Dauerman, M.D.

Trainees: Rony Lahoud, M.D. (junior faculty); Ashwini Sharma, M.D. (Fellow)

#### Edwards Lifesciences

Transcatheter Aortic Valve Replacement to UNload the Left Ventricle in Patients with ADvanced Heart Failure: A randomized trial (TAVR UNLOAD) Site PI: Harold Dauerman, M.D. \$250,000

#### **UVM REACH 17-0505**

Inflammatory BioMarkers in Heart Failure with Preserved Ejection Fraction PI: Johannes Steiner, M.D. \$10,000

#### Luitpold Pharmaceuticals

A Randomized, Double-Bllind, Placebo-Controlled Study to Investigate the Efficacy and Safety of Injectafer® (Ferric Carboxymaltose) at Treatment for Heart Failure with Iron Deficiency (HEART-FID) Site PI: Johannes Steiner, M.D.

#### Mass General Hospital

Voice Changes Predict Heart Failure (VOICE-HF) Site PI: Johannes Steiner, M.D.

# Vascular Biology /

**Thrombosis** 

#### National Institutes of Health Funding

R01 1HL121706

Regulation of Myoendothelial Function by Signaling Microdomains in Hypertension PI: Mark T. Nelson, Ph.D. \$325,981

#### T32 HL007594

Thrombosis and Hemostasis Program for Academic Trainees PI: Robert J. Kelm, Jr., Ph.D. NCE

#### R01 HL131181

K+ Sensing and Electrical Signaling by Kir Channels in Brain Vasculature PI: Mark T. Nelson, Ph.D. \$435,348

#### Ro1 NS093289-01

Targeting Parenchymal Arterioles in Acute Stroke Treatment PI: Marilyn J. Cipolla, Ph.D. \$1,653,665

#### NIH/NHLBI PO1 HL095488-01

Calcium Signaling in the Cerebrovascular Unit in Health and Disease PI: Mark T. Nelson, Ph.D. Project 1 and Administrative Core PI: Mark T. Nelson, Ph.D. \$7,831,664 Project 3: Cerebrovascular Function During Ischemia and Reperfusions PI: Marilyn J. Cipolla, Ph.D.

\$1,900,000

UM1 HL120877 Analysis and Characterization of Trauma-Induced Coagulopathy Project 1: Mechanism and Extent of Thrombin Generation in TIC PI: Kenneth Mann, Ph.D. Project 2: The Role of Factor Xla in TIC PI: Saulius Butenas, Ph.D. Project 6: The Coagulation and Fibrinolysis Interface PI: Kathleen Brummel-Ziedins, Ph.D. Project 12: Effects of Histones, Polyphosphates (polyp) and Thrombin on Native Endothelium in Trauma PI: Mark T. Nelson, Ph.D. Central Lab Director: Russell Tracy, Ph.D. \$23,769,600

#### RO1 NS045940-10 The Role of the Blood-brain Barrier in Seizure during Pregnancy and Preeclampsia

PI: Marilyn J. Cipolla, Ph.D. \$1,667,970

#### HHS N2682015000031

Multiethnic Study of Atherosclerosis (MESA) Task 1 and 3 Repository Maintenance Subcontract PI: Russell Tracy, Ph.D. \$94,418 Task 2 - Subcontract PI: Russell Tracy. Ph.D. \$276,379

#### U01 AG050499

Enabling Reduction of Low-grade Inflammation in Seniors (ENRGISE) Subcontract PI: Russell Tracy, Ph.D. \$131,412

#### R01 HL120854

T-cell Subsets as Risk Factors for CVD in CHS and Mesa Subcontract PI: Russell Tracy, Ph.D. \$178,556

#### R01 HL125032

Immune Function and the Risk of Cardiovascular Disease among HIV+ and Uninfected Veterans Subcontract PI: Russell Tracy, Ph.D. \$221,384

#### R01 HL126542

Targeting Hypercoagulation to Reduce Inflammation in Treated HIV Disease Subcontract PI: Russell Tracy, Ph.D. \$141.825

#### R01 HL126543

Role of Innate Immunity in HIV related Vascular Disease: Biomarkers and Mechanisms Subcontract PI: Russell Tracy, Ph.D. \$13,059

#### HHSN268201600006P

CHS Biorepository Support Services \$54,005

#### U01 HL130114

CHS Research Resources for the Cardiovascular Health of Older Adults Subcontract PI: Russell Tracy, Ph.D. \$13,290

#### R01 HL133860

Contemporary Venous Tissue Sodium, Inflammation and Blood Thromboembolism Treatment Pressure in MESA Subcontract PI: Neil Zakai, Ph.D. Subcontract PI: Margaret Doyle, Ph.D. \$108.263 \$104,199

#### R01 AG053325

Non-esterified Fatty Acids and Cardiometabolic Disease in Older Adults Subcontract PI: Russell Tracy, Ph.D. \$200,352

#### 1UH2NS100605

Microalial. Inflammatory and Omics Markers of Cerebral Small Vessel Disease in the CHARGE Consortium Subcontract PI: Russell Tracy, Ph.D. \$332,262

#### NINDS NS041588

Etiology of Geographic and Racial Differences in Stroke Mortality Subcontract PI: Mary Cushman, M.D., M.Sc. \$233,243

#### NHLBI HL59367

Epidemiology of Venous Thrombosis and Pulmonary Embolism Subcontract PI: Mary Cushman, M.D., M.Sc. \$223,963

R01 N5080850

Impact of Disordered Mineral Metabolism on Stroke and Cognitive Impairment Subcontract PI: Nancy Jenny, Ph.D.

\$6,904

#### R01 HL093009

Mediators of Atherosclerosis in So. Asians Living in America Subcontract PI: Nancy Jenny, Ph.D. \$24,682

#### R01 HL132264 NIH/NHLBI

Vascular Protection by HGF/IaG Protein Complexes that Activate RYK PI: Jeffrey Spees, Ph.D. \$1,619,373

#### **BARDA:** Biomedical Advanced Research and Development Authority

Establishment of a Minipiq Model of Ionizing Radiation-induced Thrombocytopenia, Coagulopathies and Measures of Associated Vascular and Organ Injury Subcontract PI: Kathleen Brummel-Ziedins, Ph.D. \$271.800

#### R01 HL131579

#### R01 HL136636

Capillary Control of Cerebral Blood Flow, and Its Disruption in Small Vessel Disease PI: Fabrice Dabertrand, Ph.D. \$1,250,000

#### R01 HL134371

Shear Stress-induced Maternal Uterine Vascular Remodeling During Pregnancy PI: George Osol, Ph.D. \$268,250

#### NIGMS CoBRE P-20

Project: Incentives Targeting Gestational Weight Gain in Overweight and Obese Low Income Women Project PI: Ira Bernstein, M.D.

#### R01 HL132947

Thrombosis Genetics in African Americans Co-I: Russell Tracy, Ph.D. \$311,641

#### Po1 HD03192116A1

National Longitudinal Study of Adolescent Health - Wave V Subcontract PI: Mary Cushman, M.D., M.Sc. \$405,472

#### R01 HD087061

Social Context, the Life Course, and Genetic Transcription in Add Health Subcontract PI: Mary Cushman, M.D., M.Sc. \$31,911

#### R01 AG023629

Exceptional Survival: Trajectories to Function Subcontract PI: Mary Cushman, M.D., M.Sc. \$14,895

#### K99 HL129045

Immune Activation and Immunosenescence Biomarkers and Cardiovascular Disease Risk PI: Nels Olson, Ph.D. \$111,512

#### **American Heart Association** Funding

#### Founders Affiliate Grant-in-Aid 16GRNT31160006

Role of PURB in Controlling the Phenotypic Plasticity of Vascular Smooth Muscle Cells PI: Robert J. Kelm, Jr., Ph.D. \$154,000

continued on next page

#### **Funding from Other Agencies**

#### Naval Health Research Center NHRC BAA 13-001

Complex Systems Approachs to Characterizing Trauma Induced Coagulopathy PI: Kathleen Brummel-Ziedins, Ph.D. \$2,613,270

#### European Union 666881 Horizon 2020

Small Vessel Disease in a Mechanistic Perspective: Targets for Intervention - Affected Pathways and Mechanistic Exploration for Prevention of Stroke and Dementia PI: Mark T. Nelson, Ph.D., for WP1; Co-PI for WP2, WP3, WP4, WP5 \$162,610

#### British Heart Foundation

Imaging Small Artery Endothelial Calcium Signals in Human Obesity: Does Damage to TRPV4 Channel Function Explain Endothelial Dysfunction? Clinical Research Training Fellowship at UVM for Majid Ahmed. Co-PIs: Adam S. Greenstein, Ph.D., and Mark T. Nelson, Ph.D. £164,006

#### Fondation Leducq

Pathogenesis of Small Vessel Disease of the Brain North American Coordinator: Mark T. Nelson, Ph.D. \$251,085

#### Totman Medical Research Trust Cerebrovascular Research

PI: Mark T. Nelson, Ph.D. \$150,000

#### **Clinical Trials/Industry Support**

#### Sanofi

Odyssey Outcomes Trial Local PI: Friederike Keating, M.D. \$56,000

#### Boston Scientific

EVOLVE SHORT DAPT: A National Registry of 3 Months Dual Antiplatelet Therapy in Conjunction with SYNERGY Bioresorbable Polymer Drug Eluting Stent for Patients at High Risk of Bleeding, National Steering Committee Site PI: Harold Dauerman, M.D. \$300,000

Quadripolar CRT-D on Currently Approved Lead SystemS (CROSS X4) Local PI: Joseph F. Winget, M.D. \$250,000

Evaluation of the WATCHMAN LAA Closure Device In Patients with Atrial Fibrillation Versus Long Term Warfarin Therapy (PREVAIL) Local PI: Daniel Lustgarten, M.D., Ph.D. \$168,613

Prospective Randomized Evaluation of the WATCHMAN LAA Closure Device In Patients with Atrial Fibrillation Versus Long Term Warfarin Therapy (PREVAIL) and Continued Access to PREVAIL (CAP2) Local PI: Daniel Lustgarten, M.D., Ph.D. \$250,000

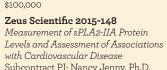
#### Janssen Pharmaceuticals, LLC

Novel Markers of Thrombotic Risk PI: David J. Schneider, M.D. \$372,000

#### Bayer Healthcare

GALILEO: A Randomized Trial of Antiplatelet versus Antithrombotic Strategy with Riviroxiban to Improve Outcomes after TAVR Site PI: Harold Dauerman, M.D. \$100,000

#### Measurement of sPLA2-IIA Protein Levels and Assessment of Associations with Cardiovascular Disease Subcontract PI: Nancy Jenny, Ph.D. \$115,912





With the start of each new academic year, the University of Vermont welcomes new medical students, trainees, and faculty to campus.

On August 30, CVRI's Early Career Advisory Committee hosted the first annual

# Welcome Soiree

The event, held in the Garden Atrium at UVMMC, provided an opportunity for newcomers to meet others interested in cardiovascular research and learn about the programs and funding available through CVRI.





Robert Harrington, M.D., Arthur L. Bloomfield Professor and Chair of the Department of Medicine at Stanford University and host of a regular podcast on theheart.org (The Bob Harrington Show), leads a discussion on social media in medicine in the Health Science Research Facility at the Larner College of Medicine during his visit to campus in May 2017.

# **Research Publications:** 2017 Highlights

Across our academic medical center campus, throughout the region, and around the world, teams of physicians and scientists are dedicated to reducing the incidence, morbidity, and mortality of heart and vascular diseases through improving prevention, diagnosis and treatment. We are pleased to present a sampling of publications and high-profile presentations from our University of Vermont colleagues engaged across a wide range of cardiovascular research.

#### **Cardiac Muscle**

AbouEzzeddine OF, McKie PM, Dunlay SM, Stevens SR, Felker GM, Borlaug BA, Chen HH, Tracy RP, Braunwald E and Redfield MM. Suppression of tumorigenicity 2 in heart failure with preserved ejection fraction. J Am Heart Assoc. 2017;6:doi 10.1161/ JAHA.116.004382.

Ahiawodzi PD, Kerber RA, Taylor KC, Groves FD, O'Brien E, Ix JH, Kizer JR, Djousse L, Tracy RP, Newman AB, Siscovick DS, Robbins J, Mukamal K. Sleep-disordered breathing is associated with higher carboxymethyllysine level in elderly women but not elderly men in the cardiovascular health study. Biomarkers. 2017:22:361-366.

Azarbal A, LeWinter MM, Pericardial effusion, Cardiol Clin, 2017;35:515-524.

Banerjee C, Hu Z, Huang Z, Warrington JA, Taylor DW, Trybus KM, Lowey S, Taylor KA. The structure of the actinsmooth muscle myosin motor domain complex in the rigor state. Journal of Structural biology. 2017;200:325-33.

Deeb GM, Chetcuti SJ, Reardon MJ, Patel HJ, Grossman M, Schreiber T, Forrest JK, Bajwa TK, O'Hair DP, Petrossian G. Robinson N. Katz S. Hartman, A. Dauerman HL, Schmoker J, Khabbaz K, Watson DR, Yakubov SJ, Oh JK, Li S, Kleiman NS, Adams DH, Popma JJ, for

the Corevalve Expanded Use Investigators. One-year results in patients undergoing transcatheter aortic valve replacement with failed surgical bioprostheses. JACC Cardiovasc Interv. 2017:10:1034-44.

Flyer JN, Zuckerman WA, Richmond ME, Anderson BR, Mendelsberg TG, McAllister JM, Liberman L, Addonizio LJ, Silver ES. Prospective study of adenosine on atrioventricular nodal conduction in pediatric and young patients after heart transplant. Circulation. 2017;135:2485-2493.

Freiberg MS, Chang CH, Skanderson M, Patterson OV, DuVall SL, Brandt CA, So-Armah KA, Vasan RS, Oursler KA, Gottdiener J, Gottlieb S, Leaf D, Rodriguez-Barradas M, Tracy RP, Gibert CL, Rimland D, Bedimo RJ, Brown ST, Goetz MB, Warner A, Crothers K, Tindle HA, Alcorn C, Bachmann IM, Justice AC, Butt AA. Association between HIV infection and the risk of heart failure with reduced ejection fraction and preserved ejection fraction in the antiretroviral therapy era: Results from the Veterans Aging Cohort Study. JAMA Cardiol. 2017:2:536-46

Gupta DK, Daniels LB, Cheng S, deFilippi CR, Criqui MH, Maisel AS, Lima JA, Bahrami H, Greenland P, Cushman M, Tracy R, Siscovick D, Bertoni AG, Cannone V, Burnett JC, Carr JJ, Wang TJ. Differences in natriuretic peptide levels by race/ethnicity (from the Multi-Ethnic Study of Atherosclerosis). Am J Cardiol. 2017;120:1008-15.

Kim F, Biggs ML, Kizer JR, Brutsaert EF, de Filippi C, Newman AB, Kronmal RA, Tracy RP, Gottdiener JS, Djousse L, de Boer IH, Psaty BM, Siscovick DS, Mukamal KJ. Brain natriuretic peptide and insulin resistance in older adults. Diabet Med. 2017;34:235-8.

LeWinter MM. Pericardiectomy to treat heart failure with preserved ejection fraction: Unrestrained enthusiasm? Circ Heart Fail. 2017:10:e003971.

LeWinter MM, Taatjes D, Ashikaga T, Palmer B, Bishop N, VanBuren P, Bell S, Donaldson C, Meyer M, Margulies KB, Redfield M, Bull DA, Zile M. Abundance, localization and functional correlates of the advanced glycation endproduct carboxymethyl Lysine in Human Myocardium. Physiol Rep. 2017;5:e13462.

Lewis GD, Malhotra R, Hernandez AF, McNulty SE, Smith A, Felker GM, Tang WHW, LaRue SJ, Redfield MM, Semigran MJ, Givertz MM, Van Buren P, Whellan D, Anstrom KJ, Shah MR, Desvigne-Nickens P, Butler J, Braunwald E; NHLBI Heart Failure Clinical Research Network. Effect of oral iron repletion on exercise capacity in patients with heart failure with reduced ejection fraction and iron deficiency: The IRONOUT HF randomized clinical trial. JAMA. 2017;317:1958-66.

Lombardo AT, Nelson SR, Ali MY, Kennedy GG, Trybus KM, Walcott S, Warshaw DM. Myosin Va molecular motors manoeuvre liposome cargo through suspended actin filament intersections in vitro. Nat Commun. 2017;8:15692.

Meyer M, Rambod M, LeWinter M. Pharmacological heart rate lowering in patients with a preserved ejection fraction review of a failing concept. Heart Fail Rev. 2017;doi 10.1007/s10741-017-9660-1.

Murton OM, Hillman RE, Mehta DD, Semigran M, Daher M, Cunningham T, Verkouw K, Tabtabai S, Steiner J, Dec GW, Ausiello D. Acoustic speech analysis of patients with decompensated heart failure: A pilot study. J Acoust Soc Am. 2017;142:EL401. doi 10.1121/1.5007092.

Powell CJ, Jenkins ML, Parker ML, Ramaswamy R, Kelsen A, Warshaw DM, Ward GE, Burke JE, Boulanger MJ. Dissecting the molecular assembly of the Toxoplasma gondii MyoA motility complex. J Biol Chem. 2017;292:19469-19477.

Reardon MJ, Van Mieghem NM, Popma II, Kleiman NS, Søndergaard L, Mumtaz M, Adams DH, Deeb GM, Maini B, Gada H, Chetcuti S, Gleason T, Heiser J, Lange R, Merhi W, Oh JK, Olsen PS, Piazza N, Williams M, Windecker S, Yakubov SJ, Grube E, Makkar R, Lee JS, Conte J, Vang E, Nguyen H, Chang Y, Mugglin AS, Serruys PW, Kappetein AP; SURTAVI Investigators. Surgical or transcatheter aortic-valve replacement in intermediate-risk patients. N Engl I Med. 2017:376:1321-31.

Reddy YNV, Lewis GD, Shah SI, LeWinter M, Semigran M, Davila-Roman VG, Anstrom K, Hernandez A, Braunwald E, Redfield MM, Borlaug BA. INDIE-HFpEF (Inorganic nitrite delivery to improve exercise capacity in heart failure with preserved ejection fraction): Rationale and design. Circ Heart Fail. 2017;10:e003862.

Runte KE, Bell SP, Selby DE, Häußler TN, Ashikaga T, LeWinter MM, Palmer BM, Meyer M. Relaxation and the role of calcium in isolated contracting myocardium from patients with hypertensive heart disease and heart failure with preserved ejection fraction. Circ Heart Fail. 2017;10:pii: e004311.

Sayan M, Hopkins WE, Heimann R. Deep Inspiration Breath-hold (DIBH) technique to reduce cardiac radiation dose in the management of breast cancer. Current Cancer Therapy Reviews. 2016;12:1-13.

Straight CR, Ades PA, Toth MJ, Miller MS. Age-related reductions in single fiber calcium sensitivity is associated with decreased muscle power in men and women. Exp Gerontol. 2017;102:84-92.

Steiner J, LeWinter MM, Dauerman H. TAVR in patients with recued left ventricular ejection fraction. J Amer Coll Cardiol. 2017;70:3026-3041.

Steiner J, Rodes-Cabau J, Homes DR. LeWinter MM. Dauerman HL. Mechanical intervention for aortic valve stenosis in patients with heart failure and reduced ejection fraction. J Am Coll Cardiol. 2017;70:3026-41.

Steiner J, Wiafe S, Camuso J, Milley K, Wooster L, Bailey C, Thomas S, D'Alessandro D, Garcia J, Lewis GD. Predicting success: Left ventricular assist device explantation evaluation protocol utilizing comprehensive cardiopulmonary exercise testing. Circ Heart Fail. 2017;10:pii: e003694.

Vijayaraman P, Dandamudi G, Lustgarten D, Ellenbogen KA. Permanent his bundle pacing: Electrophysiological and echocardiographic observations from longterm follow-up. Pacing Clin Electrophysiol. 2017;doi 10.1111/pace.13130.

Whitelaw JA, Latorre-Barragan F, Gras S, Pall GS, Leung JM, Heaslip A, Egarter S, Andenmatten N, Nelson SR, Warshaw DM, Ward GE, Meissner M. Surface attachment, promoted by the actomyosin system of Toxoplasma gondii is important for efficient gliding motility and invasion. BMC Biol. 2017;15:1.

Yeshwant SC, Tsai MH, Jones BR, Hamlin MP, Bensimhon AD, Lustgarten DL. Iatrogenic type A aortic dissection during idiopathis ventricular tachycardia ablation. HeartRhythm Case Rep. 2017;3:396-9.

#### Vascular Biology/Thrombosis

Aaron KJ, Colantonio LD, Deng L, Judd SE, Locher JL, Safford MM, Cushman M, Kilgore ML, Becker DJ, Muntner P. Cardiovascular health and health care utilization and expenditures among medicare beneficiaries: The Reasons for Geographic and Racial Differences in Stroke (REGARDS) study. J am Heart Assoc. 2017;6:e005106.

Aaron CP, Schwartz IE, Hoffman EA, Angelini E, Austin JHM, Cushman M, Jacobs DR, Jr., Kaufman JD, Laine A,

Smith LJ, Yang J, Watson KE, Tracy RP, Barr RG. A longitudinal cohort study of aspirin use and progression of emphysemalike lung characteristics on CT imaging: The MESA lung study. Chest. 2017; S0012-3692:33210-5.

Ades PA. Effect of alirocumab dose increase on LDL-lowering and lipid goal attainment: is treatment to goal the way to go? Coron Artery Dis. 2017;28:186-7.

Ades PA, Keteyian SJ, Wright JS, Hamm LF, Lui K, Newlin K, Shepard DS, Thomas RJ. Increasing cardiac rehabilitation participation from 20% to 70%: A road map from the Million Hearts Cardiac Rehabilitation Collaborative. Mayo Clin Proc. 2017:92:234-42.

Ades PA, Savage PD. Obesity in coronary heart disease: An unaddressed behavioral risk factor. Prev Med. 2017;pii: S0091-7435(17)30133-0.

Angiolillo DJ, Rollini F, Storey RF, Bhatt DL, James S, Schneider DJ, Sibbing D, So DYF, Trenk D, Alexopoulos D, Gurbel PA, Hochholzer W, De Luca L, Bonello L, Aradi D, Cuisset T, Tantry US, Wang TY, Valgimigli M, Waksman R, Mehran R, Montalescot G, Franchi F, Price MJ. International expert consensus on switching platelet P2Y12 receptor-inhibiting therapies. Circulation. 2017;136:1955-1975.

Appiah D, Fashanu OE, Heckbert SR, Cushman M, Psaty BM, Folsom AR. Relation of coagulation factor XI with incident coronary heart disease and stroke: The Cardiovascular Health Study. Blood Coag Fibrinolysis. 2017;28:389-392.

Armstrong HF, Podolanczuk AJ, Barr RG, Oelsner EC, Kawut SM, Hoffman EA, Tracy R, Kaminski N, McClelland RL, Lederer DJ, Serum matrix metalloproteinase-7, respiratory symptoms, and mortality in communitydwelling adults: The Multi-Ethnic Study of Atherosclerosis. Am J Respir Crit Care Med. 2017:196:1311-17.

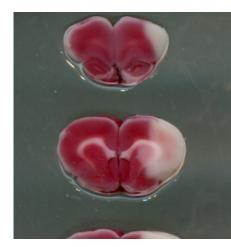
Arora P, Agarwal Z, Venkatraman A, Callas PW, Kissela B, Jenny N, Judd SE, Zakai NA, Cushman M, Galectin-3 and risk of ischemic stroke in the Reasons for Geographic and Racial Differences in Stroke (REGARDS) cohort. Eur J Neurol. 2017;24:1464-70.

Baylie R. Ahmed M. Boney AD, Hill-Eubanks DC, Heppner TJ, Nelson MT, Greenstein AS. Lack of direct effect of adiponectin on vascular smooth muscle cell BKCA channels or CA2+ signaling in the regulation of small artery pressure-induced constriction. Physiol Rep. 2017;5:e13337.

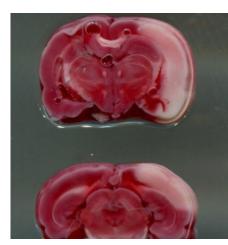
Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, de Ferranti SD, Floyd J, Fornage M, Gillespie C, Isasi CR, Jimenez MC, Jordan LC, Judd SE, Lackland D, Lichtman JH, Lisabeth L, Liu S, Longenecker CT, Mackey RH, Matsushita K, Mozaffarian D, Mussolino ME, Nasir K, Neumar RW, Palaniappan L, Pandey DK, Thiagarajan RR, Reeves MJ, Ritchey M, Rodriguez CJ, Roth GA, Rosamond WD, Sasson C, Towfighi A, Tsao CW, Turner MB, Virani SS, Voeks JH, Willey JZ, Wilkins JT, Wu JHY, Alger HM, Wong SS, Muntner P; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2017 update: a report from the American Heart Association. Circulation. 2017;135:e146-603.

Bosetti F, Koenig JI, Ayata C, Back SA, Becker K, Broderick JP, Carmichael ST, Cho S, Cipolla MJ, Corbett D, Corriveau RA, Cramer SC, Ferguson AR, Finklestein SP, Ford BD, Furie KL, Hemmen TM, Iadecola C, Jakeman LB, Janis S, Jauch EC, Johnston KC, Kochanek PM, Kohn H, Lo EH, Lyden PD, Mallard C, McCullough LD, McGavern LM, Meschia JF, Moy CS, Perez-Pinzon MA, Ramadan I, Savitz SI, Schwamm LH, Steinberg GK, Stenzel-Poore MP, Tymianski M, Warach S, Wechsler LR, Zhang IH, Koroshetz W. Translational stroke research: Vision and opportunities. Stroke. 2017;48:2632-2637.

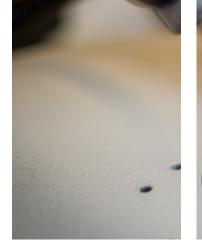
Brussé IA, van den Berg CB, Duvekot JJ, Cipolla MJ, Steegers EAP, Visser GH. Visual evoked potentials in women with and without preeclampsia during pregnancy and postpartum. J Hypertens. 2017. doi 10.1097/HIH.000000000001521.







continued on next page







Castagne R, Boulange CL, Karaman I, Campanella G, Santos Ferreira DL, Kaluarachchi MR, Lehne B, Moayyeri A, Lewis MR, Spagou K, Dona AC, Evangelou V, Tracy R, Greenland P, Lindon JC, Herrington D, Ebbels TMD, Elliott P, Tzoulaki J, Chadeau-Hyam M. Improving visualization and interpretation of metabolome-wide association studies (MWAS): An application in a populationbased cohort using untargeted 1H NMR metabolic profiling. J Proteome Res. 2017;16:3623-33

Chan SL, Cipolla MJ. Treatment with low dose fasudil for acute ischemic stroke in chronic hypertension. J Cereb Blood Flow Metab. 2017;37:3262-3270.

Chava S, Dauerman HL. Acute myocardial infarction. In: Critical Care Secrets, 6th edition (P. Parsons, R. Stapleton and Wiener-Kronish, Eds.), Elsevier, 2017.

Chava S, Gentchos G, Abernethy A, Leavitt B, Terrien E, Dauerman HL, Routine CT angiography to detect severe coronary artery disease prior to transcatheter aortic valve replacement. J Thromb Thrombolysis. 2017:44:154-160.

Cheung KL, Zakai NA, Folsom AR, Kurella Tamura M, Peralta CA, Judd SE, Callas PW, Cushman M. Measures of kidney disease and the risk of venous thromboembolism in the REGARDS (Reasons for Geographic and Racial Differences in Stroke) study. Am J Kidney Dis. 2017;70:182-90.

Cipolla MJ. Models of Focal Ischemia. In: Caplan LR, Biller J, Learv MC, Lo EH, Thomas AJ, Yenari M and Zhang JH, eds., Primer on Cerebrovascular Diseases, Second Edition. San Diego: Academic Press, 2017:299-303.

Cipolla MJ, Biller J. Persistent brain injury after preeclampsia. Neurology. 2017;88:1216-1217.

Cipolla MJ, Linfante I, Abuchowski A, Jubin R, Chan SL. Pharmacologically increasing collateral perfusion during acute stroke using a carboxyhemoglobin gas transfer agent (Sanguinate<sup>™</sup>) in spontaneously hypertensive rats. J Cereb Blood Flow Metab. 2017;271678X17705567. doi 10.1177/0271678X17705567.

Cipolla MJ, Sweet JG, Chan SL. Effect of hypertension and peroxynitrite decomposition with FeTMPyP on CBF and stroke outcome. J Cerebr Blood Flow Metab. 2017:37:1276-1285.

Cooper K, Bernstein IM, Skelly J, Heil S, Higgins S. The independent contribution of uterine blood flow to birth weight and body composition in smoking mothers. Am I Perinatol. 2017: doi 10.1055/s-0037-1608810

Cowan LT, Lutsey PL, Pankow JS, Cushman M, Folsom AR. Hospitalization with infection and incident venous thromboembolism: The ARIC study. Thromb Res. 2017;151:74-8.

Cruz MV, Luker JN, Carney BC, Brummel-Ziedins KE, Bravo MC, Orfeo T, Chen JH, Moffatt LT, Shupp JW. Reference ranges for rotational thromboelastometry in male Sprague Dawley rats. Thomb J. 2017:15:31.

Cushman M. Research and practice in thrombosis and haemostasis: The new ISTH journal. J Thromb Haemost. 2017:15:211.

Cushman M. Hello research and practice in thrombosis and haemostasis. Res Pract Thromb Haemost. 2017;1:5.

Cushman M, Brink E. Indexing for a new journal: Research and practice in thrombosis and haemostasis. Res Pract Thromb Haemost, 2017;1:148-9.

Dauerman HL. Bivalirudin across the Atlantic. JACC Cardiovasc Interv. 2017;10:1112-4.

Dauerman HL. The Sobel distinguished scholar in coronary artery disease. Coron Artery Dis. 2017;28:183-5.

Dauerman HL, Rambod M. Registries, reality and complete revascularization. Eurointervention. 2017;13:383-385.

Douce D, McClure LA, Lutsey P, Cushman M, Zakai NA. Outpatient treatment of deep vein thrombosis in the Unites States: the Reasons for Geographic and Racial Differences in Stroke Study. J Hosp Med. 2017:12:826-30.

Doyle MF, Tracy RP, Parikh MA, Hoffman EA, Shimbo D, Austin JH, Smith BM, Hueper K, Vogel-Claussen J, Lima J, Gomes A, Watson K, Kawut S, Barr RG. Endothelial progenitor cells in chronic obstructive pulmonary disease and emphysema. PLoS One. 2017:12:e0173446.

Duprez DA, Gross MD, Sanchez OA, Kizer JR, Ix JH, Lima J, Tracy RP, Jacobs DR, Jr. Collagen turnover markers in relation to future cardiovascular and noncardiovascular disease: The Multi-Ethnic Study of Atherosclerosis. Clin Chem. 2017:63:1237-47.

Engbers M, Blom JW, Cushman M, Rosendaal FR, van Hylckama Vlieg A. Functional impairment and risk of venous thrombosis in older people. J Am Geriatr Soc. 2017;65:2003-8.

Fashanu OE, Heckbert SR, Aguilar D, Jensen PN, Ballantyne CM, Basu S, Hoogeveen RC, deFilippi C, Cushman M, Folsom AR, Galectin-3 and venous thromboembolism incidence: The Atherosclerosis Risk in Communities (ARIC) study. Res Pract Thromb Haemost. 2017;1:223-30.

Fordvce CB, Al-Khalidi HR, Jollis JG, Roettig ML, Gu J, Bagai A, Berger PB, Corbett CC, Dauerman HL, Fox K, Garvey JL, Henry TD, Rokos IC, Sherwood MW, Wilson BH, Granger CB: STEMI Systems Accelerator Project. Association of rapid care process implementation on reperfusion times across multiple ST-segment elevation myocardial

infarction networks. Circ Cardiovasc Interv. 2017;10:pii: e004061.

Gaalema DE, Elliott RJ, Morford ZH, Higgins ST, Ades PA. Effect of socioeconomic status on propensity to change risk behaviors following myocardial infarction: Implications for healthy lifestyle medicine. Prog Cardiovasc Dis. 2017;pii: S0033-0620(17)30002-6.

Gaalema DE, Savage PD, Rengo JL, Cutler AY, Elliott RJ, Priest JS, Higgins ST, Ades PA. Patient characteristics predictive of cardiac rehabilitation adherence. J Cardiopulm Rehabil Prev. 2017;37:103-10.

Garg PK, Jorgensen NW, McClelland RL, Jenny NS, Criqui MH, Allison MA, Greenland P, Rosenson RS, Siscovick DS, Cushman M. Lipoprotein-associated phospholipase A2 and incident peripheral artery disease in a multi-ethnic cohort: The Multi-Ethnic Study of Atherosclerosis. Vasc Med. 2017:22:5-12.

Hanna DB, Lin J, Post WS, Hodis HN, Xue X, Anastos K, Cohen MH, Gange SJ, Haberlen SA, Heath SL, Lazar JM, Liu C, Mack WJ, Ofotokun I, Palella FJ, Tien PC, Witt MD, Landay AL, Kingsley LA, Tracy RP and Kaplan RC. Association of macrophage inflammation biomarkers with progression of subclinical carotid artery atherosclerosis in HIV-infected women and men. The Journal of Infectious Diseases. 2017;215:1352-61.

Harrington LB, Blondon M, Cushman M, Kaunitz AM, Rossouw JE, Allison MA, Martin LW, Johnson KC, Rosing I, Woods NF, LaCroix AZ, Heckbert SR, McKnight B, Smith NL. The crosssectional association between vasomotor symptoms and hemostatic parameter levels in postmenopausal women. Menopause. 2017:24:360-70.

Hawkins VE, Takakura AC, Trinh A, Malteiros-Lima MR, Cleary CM, Wenker IC, Dubreuil T, Rodriguez EM, Nelson MT, Moreira TS, Mulkey DK. Purinergic regulation of vascular tone in the retrotrapezoid nucleus is specialized to support the drive to breather eLife. 2017:6:e25232.

Haynes LM, Orfeo T, Mann KG, Everse SJ, Brummel-Ziedins KE. Probing the dynamics of clot-bound thrombin at venous shear rates. Biophys J. 2017;112:1634-4.

Heppner TJ, Hennig GW, Nelson MT, Vizzard MA. Rhythmic calcium events in the lamina propria network of the urinary bladder of rat pups. Front Syst Neurosci. 2017;11:87.

Howard G, Kleindorfer D, Cushman M, Long DL, Jasne A, Judd SE, Higginbotham JC, Howard VJ, Contributors to the excess stroke mortality in rural areas in the United States. Stroke. 2017;48:1773-8.

Howard G, Safford MM, Mov CS, Howard VJ, Kleindorfer DO, Unverzagt FW, Soliman EZ, Flaherty ML, McClure LA, Lackland DT, Wadley VG, Pulley LV, Cushman M. Racial differences in the incidence of cardiovascular risk factors in older black and white adults. J Am Geriatr Soc. 2017:65:83-90.

Howe L, Badger G, Bernstein IM. Effect of pregnancy interval on second pregnancy blood pressure following prior preeclampsia. Reprod Sci. 2017;doi 10.1177/1933719117725815.

Houghton D, Moll S, Key N, Laux J, Shea T, Zakai N. Analysis of anticoagulation strategies for venous thromboembolism during severe thrombocyropenia in patients with hematologic malignancies: A retrospective cohort. Leukemia and Lymphoma. 2017;58:2573-2581.

Hu S, Zhu Y, Zhang Y, Dai J, Li L, Dauerman H, Soeda T, Wang Z, Lee H, Wang C, Zhe C, Wang Y, Zheng G, Zhang S. Jia H. Yu B. Jang IK. Management and outcome of patients with acute coronary syndrome caused by plaque rupture versus plaque erosion: An intravascular optical coherence tomography study. J Am Heart Assoc. 2017;6;pii: e004730.

Ix JH, Katz R, Bansal N, Foster M, Weiner DE, Tracy R, Jotwani V, Hughes-Austin J, McKay D, Gabbai F, Hsu CY, Bostom A, Levey AS, Shlipak MG. Urine fibrosis markers and risk of allograft failure in kidney transplant recipients: A case-cohort ancillary study of the FAVORIT trial. Am J Kidney Dis. 2017;69:410-9.

Johnson AC, Cipolla MJ. Altered hippocampal arteriole structure and function in a rat model of preeclampsia: Potential role in impaired seizure-induced hyperemia. J Cereb Blood Flow Metab. 2017;37:2857-2869.



Kent ST, Rosenson RS, Avery CL, Chen YI, Correa A, Cummings SR, Cupples LA, Cushman M, Evans DS, Gudnason V, Harris TB, Howard G, Irvin MR, Judd SE, Jukema JW, Lange L, Levitan EB, Li X, Liu Y, Post WS, Postmus I, Psaty BM, Rotter JI, Safford MM, Sitlani CM, Smith AV, Steward JD, Trompet S, Sun F, Vasan RS, Woolley JM, Whitsel EA, Wiggins KL, Wilson JG, Muntner P. PCSK9 loss-offunction variants, low density lipoprotein cholesterol, and risk of coronary heart disease and stroke: data from 9 studies of blacks and whites. Circ Cardiovasc Genet. 2017;10:e001632.

Koide M, Moshkforoush A, Tsoukias NM, Hill-Eubanks DC, Wellman GC, Nelson MT, Dabertrand F. The vin and yang of Ky channels in cerebral small vessel pathologies. Microcirculation. 2017;25: doi 10.1111/micc.12436.

Landry KK, Alexander KS, Zakai NA, Judd SE, Kleindorfer DO, Howard VI, Howard G, Cushman M, Association of stroke risk biomarkers with stroke symptoms: the Reasons for Geographic and Racial Differences in Stroke (REGARDS) cohort. I Thromb Haemost, 2017:15:21-7.

Levy JH, Moore KT, Neal MD, Schneider D, Marcsisin VS, Ariyawansa J, Weitz JI. Rivaroxaban reversal with prothrombin complex concentrate or tranexamic acid in healthy volunteers. I Thromb Haemost. 2017;doi 10.1111/jth.13894.

Liu Z, Chang AN, Grinnell F, Trybus KM, Milewicz DM, Stull JT, Kamm KE. Vascular disease-causing mutation, smooth muscle alpha-actin R258C, dominantly suppresses functions of alpha-actin in human patient fibroblasts. Proc Natl Acad Sci U S A. 2017;114:E5569-E78.

Liu Y, Reynolds LM, Ding J, Hou L, Lohman K, Young T, Cui W, Huang Z, Grenier C, Wan M, Stunnenberg HG, Siscovick D, Hou L, Psaty BM, Rich SS, Rotter JI, Kaufman JD, Burke GL, Murphy S, Jacobs DR, Jr., Post W, Hoeschele I, Bell DA, Herrington D, Parks JS, Tracy RP, McCall CE, Stein JH. Blood monocyte transcriptome and epigenome analyses reveal loci associated with human atherosclerosis. Nat Commun. 2017:8:393.

Longden TA\*, Dabertand F\*, Koide M, Gonzales AL, Tykocki NR, Brayden JE, Hill-Eubanks DC, Nelson MT. Capillary K+-sensing initiates retrograde hyperpolarization to increase local blood flow. Nat Neurosci. 2017;20:717-726. \*denotes equal contribution

Mahmoodi BK, Cushman M, Naess IA, Allison MA, Bos WJ, Braekkan SK, Cannegieter SC, Gansevoort RT, Gona PN, Hammerstrom J, Hansen JB, Heckbert S, Holst AG, Lutsey PL, Manson JE, Martin LW, Matsushita K, Meijer K, Lakoski SG, Overvad K, Prescott E, Puurunen M, Rossouw JE, Sang Y, Severinsen MT, ten Berg J, Folsom AR, Zakai NA. Association of traditional cardiovascular risk factors with venous thromboembolism: An individual-level data meta-analysis of prospective studies. Circulation. 2017:135:7-16.

Manini TM, Anton SD, Beavers DP, Cauley IA, Espeland MA, Fielding RA, Kritchevsky SB, Leeuwenburgh C, Lewis KH, Liu C, McDermott MM, Miller ME, Tracy RP, Walston ID, Radziszewska B, Lu J, Stowe C, Wu S, Newman AB, Ambrosius WT, Pahor M, investigators EPs. Enabling reduction of low-grade inflammation in seniors pilot study: concept, rationale, and design. J Am Geriatr Soc. 2017;65:1961-8.

McDermott MM, Tian L, Wunderink RG, Kalhan R, Kibbe MR, Greenland P, Tracy R, Zhao L, Liu K, Huffman M, Wilkins JT, Liao Y, Shah S, Lloyd Jones D, Green D. Pulmonary hospitalizations and ischemic heart disease events in patients with peripheral artery disease. Vasc Med. 2017:22:218-24.

McMahon SR, Ades PA, Thompson PD. The role of cardiac rehabilitation in patients with heart disease. Trends Cardiovasc Med. 2017;pii:S1050-1738(17)30017-8.

McMahon SR, Schneider DJ. Use of platelet function testing to guide the timing of coronary artery bypass surgery. Coron Artery Dis. 2017;28:454-456.

Milewicz DM, Trybus KM, Guo DC, Sweeney HL, Regalado E, Kamm K, Stull JT. Altered smooth muscle cell force generation as a driver of thoracic aortic aneurysms and dissections. Arterioscler Thromb Vasc Biol. 2017:37:26-34.

continued on next page

# **Research Publications: A Sampling (continued)**

Naik RP, Irvin MR, Judd S, Gutierrez OM, Zakai NA, Derebail VK, Peralta C, Lewis MR, Zhi D, Arnett D, McClellan W, Wilson JG, Reiner AP, Kopp JB, Winkler CA, Cushman M. Sickle cell trait and the risk of ESRD in blacks. J Am Soc Nephrol. 2017;28:2180-7.

Ng M, Graff M, Lu Y, Justice A, Mudgal P, Liu CT, Young K, Yanek LR, Feitosa MF, Wojczynski MK, Rank K, Brody JA, Cade BÉ, Dimitrov L, Duan Q, Guo X, Lange LA, Nalls MA, Okut H, Tajuddin SM, Tayo BO, Vedantam S, Bradfield JP, Chen G, Chen WM, Chesi A, Irvin MR, Padhukasahasram B, Smith JA, Zheng W, Allison MA, Ambrosone CB, Bandera EV, Bartz TM, Berndt SI, Bernstein L, Blot WJ, Bottinger EP, Carpten J, Chanock SJ, Chen YI, Conti DV, Cooper RS, Fornage M, Freedman BI, Garcia M, Goodman PJ, Hsu YH, Hu J, Huff CD, Ingls SA, John EM, Kittles R, Klein E, Li J, McKnight B, Nayak U, Nemesure B, Ogunniyi A, Olshan A, Press MF, Rohde R, Rybicki BA, Salako B, Sanderson M, Shao Y, Siscovick DS, Stanford JL, Stevens VL, Stream A, Strom SS, Vaidya D, Witte JS, Yao J, Zhu X, Ziegler RG, Zonderman AB, Adeyemo A, Ambs S, Cushman M, Faul JD, Hakonarson H, Levin AM, Nathanson KL, Ware EB, Weir DR, Zhao W, Zhi D, Odden MC. Factors associated with ischemic stroke survival and recovery in older adults. Stroke. 2017;48:1818-26.

Olson NC, Cushman M, Judd SE, Kissela BM, Safford MM, Howard G, Zakai NA. Associations of coagulation factors IX and XI levels with incident coronary heart disease and ischemic stroke: The REGARDS study. J Thromb Haemost. 2017:15:1086-94.

Pankow JS, Tang W, Pankratz N, Guan W, Weng LC, Cushman M, Boerwinkle E, Folsom AR. Identification of genetic variants linking protein C and lipoprotein metabolism: The Atherosclerosis Risk in Communities Study (ARIC). Arterioscler Thromb Vasc Biol. 2017;37:589-97.

Park M, Katz R, Shlipak MG, Weiner D, Tracy R, Jotwani V, Hughes-Austin I, Gabbai F, Hsu CY, Pfeffer M, Bansal N, Bostom A, Gutierrez O, Sarnak M, Levev A and Ix IH. Urinary markers of fibrosis and risk of cardiovascular events and death in kidney transplant recipients: The FAVORIT trial. Am J Transplant. 2017;17:2640-49.

Phillips JK, McBride CA, Morris EA, Crocker AM, Bernstein IM, Adiposity, but not obesity, is associated with arterial stiffness in young nulliparous women. Reprod Sci. 2017; doi 10.1177/1933719117728797.

Pike MM, Larson NB, Wassel CL, Cohoon KP, Tsai MY, Pankow JS, Hanson NQ, Decker PA, Berardi C, Alexander KS, Cushman M, Zakai NA, Bielinski SJ. ABO blood group is associated with peripheral arterial disease in African-Americans: The Multi-Ethnic Study of Atherosclerosis (MESA), Thromb Res. 2017:153:1-6.

Polonsky TS, Ning H, Daviglus ML, Liu K, Burke GL, Cushman M, Eng J, Folsom AR, Lutsey PL, Nettleton JA, Post WS, Sacco RL, Szklo M, Lloyd-Jones DM. Association of cardiovascular health with subclinical disease and incident events: The Multi-Ethnic Study of Atherosclerosis. J Am Heart Assoc. 2017;6:e004894.

Raffield LM, Zakai NA, Duan Q, Laurie C, Smith JD, Irvin MR, Doyle MF, Naik RP, Song C, Manichaikul AW, Liu Y, Durda P, Rotter JI, Jenny NS, Rich SS, Wilson JG, Johnson AD, Correa A, Li Y, Nickerson DA, Rice K, Lange EM, Cushman M, Lange LA, Reiner AP; NHLBI Trans-Omics for Precision Medicine (TOPMed) Consortium, Hematology & Hemostasis TOPMed Working Group. D-dimer in African Americans: Whole genome sequence analysis and relationship to cardiovascular disease risk in the Jackson heart study. Arterioscler Thromb Vasc Biol. 2017:37:2220-7.

Rambod M, Terrien E, Dauerman HL. White line sign of impending coronary occlusion in transcatheter aortic valve replacement. Circ Cardiovasc Interv. 2017;10:pii: e005011.

Rengo JL, Savage PD, Shaw JC, Ades PA. Directly measured physical function in cardiac rehabilitation. J Cardiopulm Rehabil Prev. 2017;37:175-181.

Robinson-Cohen C, Zelnick LR, Hoofnagle AN, Lutsey PL, Burke G, Michos ED, Shea SJC, Tracy R, Siscovick DS, Psaty B, Kestenbaum B and de Boer IH. Associations of vitamin D-binding globulin and bioavailable vitamin D concentrations with coronary heart disease Events: The Multi-Ethnic Study of Atherosclerosis (MESA). J Clin Endocrinol Metab. 2017:102:3075-84.

Roetker NS, Armasu SM, Pankow JS, Lutsey PL, Tang W, Rosenberg MA, Palmer TM, MacLehose RF, Heckbert SR, Cushman M, de Andrade M, Folsom AR. Taller height as a risk factor for venous thromboembolism: A Mendelian randomization meta-analysis. J Thromb Haemost, 2017;15:1334-43.

Rubin LJ, Hopkins WE. Diagnostic evaluation of pulmonary hypertension in adults. In: UpToDate; Rose BD (Ed); UpToDate, Waltham, MA; 2017.









Rubin LJ, Hopkins WE. Overview of pulmonary hypertension. In: UpToDate; Rose BD (Ed); UpToDate, Waltham, MA; 2017

Rubin LJ, Hopkins WE. Pathogenesis of pulmonary hypertension. In: UpToDate; Rose BD (Ed); UpToDate, Waltham, MA; 2017

Rubin, LJ, Hopkins, WE. Treatment of Pulmonary Hypertension. In: UpToDate, Rose, BD (ed), UpToDate, Waltham, MA 2017.

Salimi, PN, Niggel, JB, Keating FK. How to achieve patient-centered testing: Role of the protocol nurse. J Nucl Cardiol. 2017;doi 10.1007/s12350-017-0911-2.

Sammut A, Shea S, Blumenthal RS, Szklo M, Bathon JM, Polak JF, Tracy R, Giles JT. Albuminuria in rheumatoid arthritis: Associations with RA characteristics and subclinical atherosclerosis. Arthritis Care Res (Hoboken). 2017;69:1799-1808.

Schechter ME, Andrade BB, He T, Richter GH, Tosh KW, Policicchio BB, Singh A, Raehtz KD, Sheikh V, Ma D, Brocca-Cofano E, Apetrei C, Tracy R, Ribeiro RM, Sher A, Francischetti IMB, Pandrea I, Sereti I. Inflammatory monocytes expressing tissue factor drive SIV and HIV coagulopathy. Sci Transl Med. 2017; 9:doi 10.1126/scitranslmed.aam5441.

Sites CK, Wilson D, Barsky M, Bernson D Bernstein IM, Boulet S, Zhang Y, Embryo cryopreservation and preeclampsia risk. Fertil Steril. 2017:108:784-790.

Solomon R, HL Dauerman. Acute kidney injury: Cures, culprits and consequences. Circ Cardiovasc Interv. 2017;10:e004742.

Stillman CM, Lopez OL, Becker JT, Kuller LH, Mehta PD, Tracy RP, Erickson KI. Physical activity predicts reduced plasma beta amyloid in the Cardiovascular Health Study. Ann Clin Transl Neurol. 2017;4:284-91.

Tykocki NR, Bonev AD, Longden TA, Heppner TI, Nelson MT. Inhibition of vascular smooth muscle inward-rectifier K+ channels restores myogenic tone in mouse urinary bladder arterioles. Am J Physiol Renal Physiol. 2017;312:F836-F847.

Winovich DT, Longstreth WT Jr, Arnold AM, Varadhan R, Zeki Al Hazzouri A, Cushman M, Newman AB, Vella CA, Allison MA, Cushman M, Jenny NS, Miles MP, Larsen B, Lakoski SG, Michos ED, Blaha MJ. Physical activity and adiposityrelated inflammation: The MESA. Med Sci Sports Exerc. 2017;49:915-921.

Winters J, Morris CS, Holmes C, Lewis P, Bhave AD, Najarian KE, Shields JT, Charash W, Cushman M. A Multidisciplinary quality improvement program increases the inferior vena cava filter retrieval rate. Vasc Med. 2017;22:51-6.

Wong ND, Zhao Y, Quek RGW, Blumenthal RS, Budoff MJ, Cushman M, Garg P. Sandfort V. Tsai M. Lopez IAG. Residual atherosclerotic cardiovascular disease risk in statin-treated adults: The Multi-Ethnic Study of Atherosclerosis, J Clin Lipidol. 2017;11:1223-33.

Xing L., Higuma T, Wang Z, Aguirre AD, Mizuno K, Takano M, Dauerman HL, Park SJ, Jang Y, Kim CJ, Kim SJ, Choi SY, Itoh T, Uemura S, Lowe H, Walters DL, Barlis P, Lee S, Lerman A, Toma C, Tan JWC, Yamamoto E, Bryniarski K, Dai J, Zanchin T, Zhang S, Yu B, Lee H, Fujimoto J, Fuster V, Jang IK. Clinical significance of lipid-rich plaque detected by optical coherence tomography: A 4-year follow-up study. J Am Coll Cardiol. 2017;69:2502-13

Zakai NA, McClure LA, Judd SE, Kissela B, Howard G, Safford MM, Cushman M. D-dimer and risk of stroke and coronary heart disease: The Reasons for Geographic and Racial Differences in Stroke (REGARDS). Thromb Haemost. 2017;117:618-24.

Zakai NA, Olson NC, Judd SE, Kleindorfer DO, Kissela BM, Howard G, Cushman M. Haemostasis biomarkers and risk of intracerebral haemorrhage in the REasons for Geographic and Racial Differences in Stroke Study. Thromb Haemost. 2017;117:1808-15.

# **Patent Activity**

Researchers associated with the CVRI have pursued innovations in a wide range of patentable areas concerning cardiovascular health, from devices and systems to new methods and research aids.

Patent Application 2017/0121407 Oxidized LDL as a biomarker for neurological complications of pregnancy Marilyn J. Cipolla, Ph.D.

U.S. Patent 9,706,935 Peter Spector, M.D. CATHETER SYSTEMS AND RELATED METHODS FOR MAPPING, MINIMIZING, AND TREATING CARDIAC FIBRILLATION

U.S. Patent 9,693,699 Peter Spector, M.D. Jason Bates, Ph.D. METHODS AND SYSTEMS FOR MAPPING CARDIAC FIBRILLATION

# Scholarly **Presentations**

A sampling of CVRI researchers invited to speak at national and international meetings.

# American Heart Association International Stroke Conference

Houston, TX – February 2017 Marilyn Cipolla, Ph.D.

Sanguinate<sup>™</sup> Opens Collaterals, Improves Reperfusion and Decreases Infarction in Spontaneously Hypertensive Rats

# **Japanese Circulation Society**

Kanazawa, Japan – March 2017 Mary Cushman, M.D., M.Sc. Current Use of Antiplatelet Agents for Acute Coronary Syndromes in the United States

# **Trans-NIH Workshop on Chronic Inflammation Biomarkers in Disease Development and Prevention**

Rockville, MD – May 2017 Russell Tracy, Ph.D. Development of Chronic Disease Biomarkers Based on Inflammation and Adaptive Immunity

# International Society for Advancement of Cytometry 32nd Congress

Boston, MA – June 2017

Margaret Doyle, Ph.D.

Cellular Biomarker Discovery: Assay Validation and Quality Control in High-Throughput Population Studies with an Eve Towards Clinical Utilization

# International United Leukodystrophy Foundation Meeting

Minneapolis, MN – July 2017

## Fabrice Dabertrand, Ph.D.

Capillary Control of Cerebral Blood Flow, and Its Disruption in Small Vessel Disease

# International Society on Thrombosis and Haemostasis 2017 Congress

Berlin, Germany – July 2017 Nels Olson, Ph.D.

A Basal-State Monocyte Gene Transcription Profile is Associated with Circulating Levels of Th1 Cells: the Multi-Ethnic Study of Atherosclerosis (MESA)

# International Symposium on Resistance Arteries

Manchester, UK – September 2017 Mark Nelson, Ph.D. Keynote Speaker: Capillaries as Decoders of Neural Rhythm in the Brain: Translating thought into blood flow

# International Symposium on Resistance Arteries

Manchester, UK – September 2017 Marilyn Cipolla, Ph.D. Regulation of Vascular Resistance in the Brain: Physiology and Pathophysiology

Alliance Sante Ouebec Quebec, Canada – October 2017 Russell Tracy, Ph.D. The Research University of the Future

# International Symposium on Collaterals to the Brain

Los Angeles, CA – November 2017 Marilvn Cipolla, Ph.D. Impact of Hypertension on Pial Collateral Function

# **American Heart Association Annual Scientific** Sessions

Anaheim, CA – November 2017

## Neil Zakai. Ph.D.

Curbing the Atherothrombotic Risk in Patients with Diabetes Mellitus Frontiers in Medicine: Risk Stratification and Management of Acute Pulmonary Embolism

# American Society of Hematology 59th Annual Meeting

Atlanta, GA – December 2017

#### Neil Zakai. Ph.D.

Recurrent Cerebral Sinus Thrombosis: Why was anticoagulation not enough?



From left: Drs. Schneider, Dauerman, Cipolla, Warshaw, Nelson, Bernstein and Cushman.

# **Board of Directors**

## David J. Schneider, M.D., F.A.C.C., F.A.H.A., Director

Professor of Medicine, UVM Larner College of Medicine; Director of Cardiovascular Services, UVM Health Network; Director, Cardiovascular Research Institute of Vermont

## Ira Bernstein, M.D.

Professor and John Van Sicklen Maeck Chair of Obstetrics, Gynecology & Reproductive Sciences, UVM Larner College of Medicine; Medical Director of Women's Services, University of Vermont Medical Center

Marilyn J. Cipolla, Ph.D., F.A.H.A. Professor of Neurological Sciences, UVM Larner College of Medicine

# Mary Cushman, M.D., M.Sc., F.A.H.A.

Professor of Medicine, Division of Hematology/Oncology, UVM Larner College of Medicine; Director, Thrombosis and Hemostasis Program, University of Vermont Medical Center

# Harold L. Dauerman, M.D., F.A.C.C.

Professor of Medicine, Division of Cardiovascular Medicine, UVM Larner College of Medicine; Network Director of Interventional Cardiology, UVM Health Network; Cardiologist, University of Vermont Medical Center

# Mark T. Nelson, Ph.D., F.A.H.A.

University Distinguished Professor and Chair of Pharmacology, UVM Larner College of Medicine

## David M. Warshaw, Ph.D., F.A.H.A.

Professor and Chair of Molecular Physiology & Biophysics, UVM Larner College of Medicine

# Leadership Council

Members of the Cardiovascular Leadership Council serve as ambassadors for the Cardiovascular Research Institute of Vermont (CVRI), its Board of Directors, investigators and faculty, in the overall effort to educate and engage Vermonters and the broader community in support of cardiovascular medicine.

Marty Bloomfield, M.D. New York, N.Y.

Lauren Currv Westford, Vt.

Mary Evslin Stowe, Vt.

Peter Gibbs Shelburne, Vt.

Nicole LaBrecaue South Burlington, Vt.

Todd R. Lockwood South Burlington, Vt.

Paul Millman Westminster, Vt.

Mark Rav Shelburne, Vt.

**Patrick Robins Burlington**, Vt.

**Glen Wright** Shelburne, Vt.



Cardiovascular Research Institute of Vermont UVM Larner College of Medicine Colchester Research Facility 360 South Park Drive Colchester, Vermont 05446

802-656-8955

www.med.uvm.edu/cvri

University of Vermont MEDICAL CENTER

