



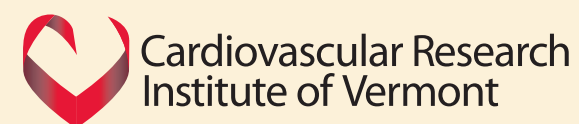
THE 2018 ANNUAL REPORT
CARDIOVASCULAR RESEARCH
INSTITUTE OF VERMONT

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.

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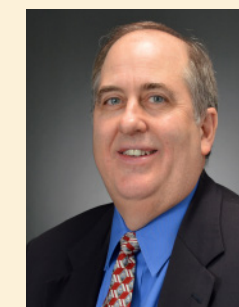


MESSAGE FROM THE DIRECTOR

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 Professor in Cardiovascular Research. Dr. Erdos was selected by the Board of Directors of the CVRI who felt that he was exceptionally well qualified for this prestigious honor. Dr. Erdos has pioneered an innovative hypothesis that brain-derived neurotrophic factor may be a common mediator of hypertension. His research uses novel genetic tools that could change our ability to treat hypertension and prevent cardiovascular events because hypertension is a major cause of morbidity and mortality. The Board felt that the support provided by this Professorship should enhance the likelihood of success for this talented junior investigator. Dr. Martin Bloomfield, an alumnus of the University of Vermont and a member of the Cardiovascular Leadership Council, has chosen to give back to his alma mater in a meaningful manner by endowing this Professorship that is designed to both recognize and support an extraordinary early career investigator in cardiovascular research.

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

Jim Ray, who was an avid cyclist who died of heart disease in 1996. Early Career Investigators in cardiovascular research are the beneficiaries because funds raised by this ride in 2017 were used to support attendance of early career scientists and physicians at leading-edge conferences and educational forums. Additional support for early career investigators is provided by a gift from Paul Millman (also a member of the Cardiovascular Leadership Council) and his company, Chroma Technologies. This funding supports summer research projects in cardiovascular disease by first-year medical students.

The Early Career Advisory Committee of the CVRI actively promoted cardiovascular research and enhanced collaboration through a series of events designed to encourage scientific exchange. This spring, the Early Career Advisory Committee awarded small grants to junior investigators. The selection process has been educational for both the applicants and the Early Career Advisory Committee, who were provided with a “grant review boot camp” by their Board advisor, Dr. Mary Cushman.

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.

Risk of blood clots increases with the 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

Philip 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

In cells, cargo that contains tiny packages of critical biological material 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 suspended filament tracks through intersections with the intention of understanding how teams of these motors work together when faced 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 Directors 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

while carrying their cargo and 'walking' along these tightropes," said Lombardo. He and his colleagues observed that the motors 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 their cargo in a relatively straight line through the intersections despite the option to turn or stop.

"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, 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

Physician scientists can find inspiration — 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,

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

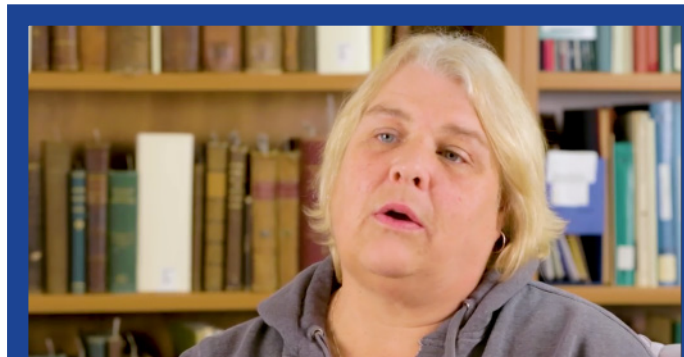


algorithms and a mapping approach for treatment of AF. This work was initially sponsored by a generous grant from the Evslin Foundation.

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.



Jason Bates



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 dual-degree 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 early-

career 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 early-career 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 world-class 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.

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**

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 Benjamin Prosser, Ph.D., with the ECAC's "Rising Star Award" for impressive achievement early in his research career.

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**



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 Endowed Visiting Professorship Fund.

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?

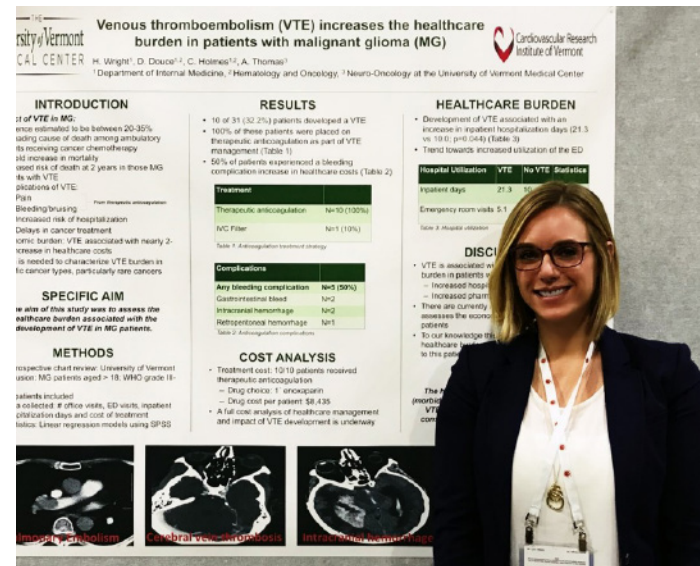
Society for Reproductive Investigation 64th Annual Scientific Meeting

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. Haynes, 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)

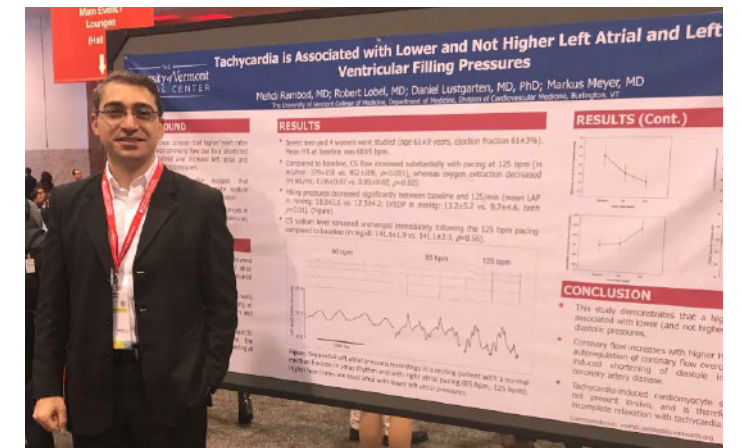
American Society of Hematology

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)



Funding from Other Agencies

Naval Health Research Center NHRC BAA 13-001

Complex Systems Approaches 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

Zeus Scientific 2015-148

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 UVMC, 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, Dunlap 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 actin-smooth 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.

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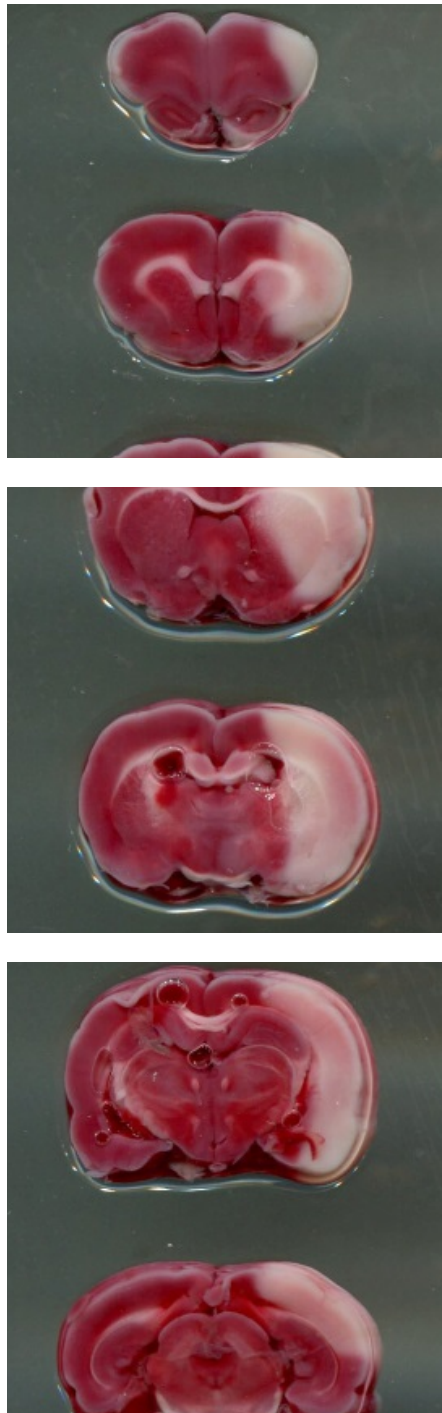
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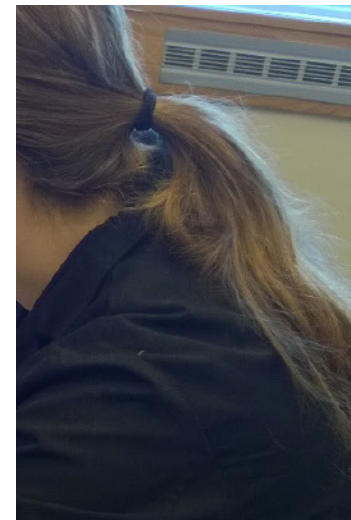
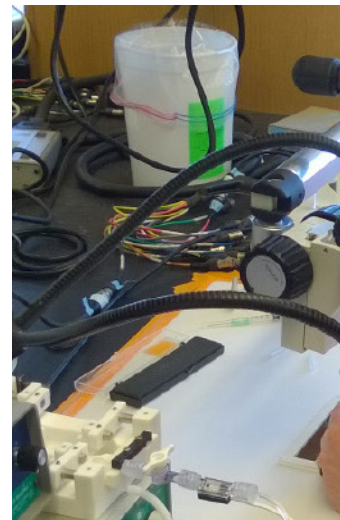
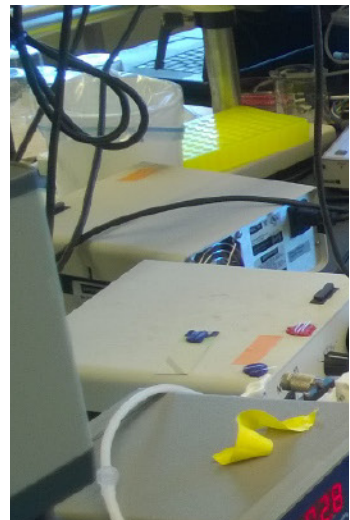
Patent Activity

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™ 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 Eye 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

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Regulation of Vascular Resistance in the Brain: Physiology and Pathophysiology

Alliance Sante Quebec

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

Marilyn 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, Warsaw, Nelson, Bernstein and Cushman.

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