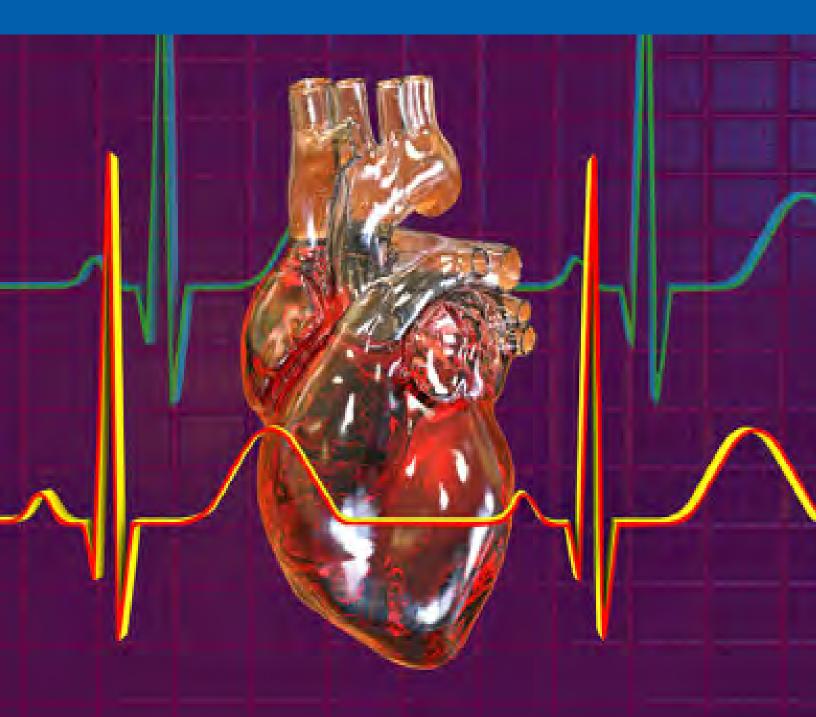
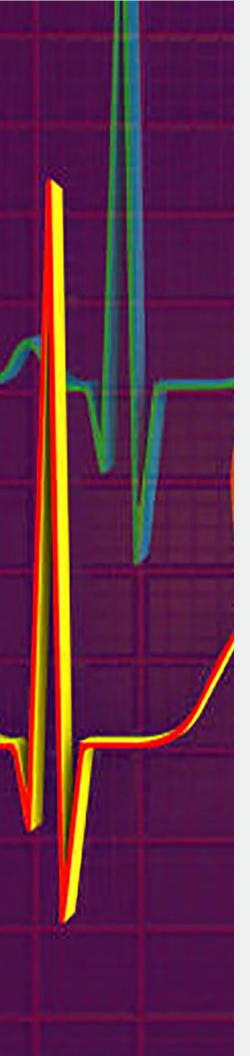


GILL QUARTERLY

PUBLISHED BY UK GILL HEART & VASCULAR INSTITUTE

Fall 2021







GILL QUARTERLY

FALL 2021

TABLE OF CONTENTS

Clinical Trials | Page 3

Fellows News/Accomplishments | Page 6

Affiliate News | Page 7

Research Features | Page 10

Fall Features | Page 16

Current Research Funding | Page 24

Publications | Page 28



FEATURED CLINICAL TRIAL

EMPACT-MI- A study to test whether empagliflozin can lower the risk of heart failure and death in people who had a heart attack (myocardial infarction)

PI: John Kotter, MD

This is a study in adults who had a heart attack (myocardial infarction). The purpose of this study is to find out whether a medicine called empagliflozin helps to lower the chances of having to go to the hospital for heart failure and whether it lowers the chances of dying from cardiovascular disease.

People who are in hospital may join the study soon after being treated for their heart attack. Participants are put into 2 groups by chance. One group takes 1 empagliflozin tablet a day. The other group takes 1 placebo tablet a day. Placebo tablets look like empagliflozin tablets but do not contain any medicine. All participants continue their standard treatment. Empagliflozin belongs to a class of medicines known as SGLT-2 inhibitors. Empagliflozin is a medicine that helps people with type 2 diabetes to lower their blood sugar. Researchers think that empagliflozin might also help people after heart attack who are at risk for heart failure, whether or not they have diabetes.

Participants are in the study for about 1 to 2 years. During this time, there are about 4 visits in person, 2 visits are done either by phone or by use of a mobile application. Results between the empagliflozin and placebo groups are compared. The doctors also regularly check the general health of the participants.

Primary Outcome Measures:

1. Composite of time to first heart failure hospitalisation or all-cause mortality [Time Frame: up to 24 months]

Secondary Outcome Measures:

1.Total number of HHF or all-cause mortality [Time Frame: up to 24 months]

2.Total number of non-elective Cardiovascular (CV) hospitalisations or all-cause mortality [Time Frame: up to 24 months]

3. Total number of non-elective all-cause hospitalisations or all-cause mortality [Time Frame: up to 24 months] 4. Total number of hospitalisations for MI or all-cause mortality [Time Frame: up to 24 months] 5. Time to CV mortality [Time Frame: up to 24 months]

For more information See:

https://clinicaltrials.gov/ct2/show/NCT04509674

Or Contact: Ben Rushing 859-323-5259

CURRENTLY ENROLLING CLINICAL TRIALS

BIO LIBRA - **AnaLysIs of Both Sex and Device** Specific FactoRs on Outcomes in PAtients with **Non-Ischemic Cardiomyopathy**

PI: Aaron Hesselson, MD

Coordinator: Ben Rushing 859-323-5259

Objective: This study is designed to evaluate the combined risk of all-cause mortality and treated ventricular tachycardia (VT) or ventricular fibrillation (VF) events by subject sex and by implanted device type. All-cause mortality, VT or VF alone, risk of cardiac death, and sudden cardiac death will be analyzed for the total cohort, as well as by subject sex and by the implanted device type

OPTIMIZER SMART POST - APPROVAL STUDY

PI: Aaron Hesselson, MD

Coordinator: Ben Rushing 859-323-5259

Objective: Post-approval study that evaluates data such as cardiac outcomes, quality of life, mortality, and functionality. Long-term data needed to assess complication rates and potential interactions with other implantable devices in the intended patient population. The post-approval study (PAS) protocol designed to address these concerns in a real-world setting.

BIO-AffectDX- Atrial Fibrillation associated with Heart Failure treated by BIOTRONIK's CRT-DX System

PI: Aaron Hesselson, MD

Coordinator: Ben Rushing 859-323-5259

Objective: To evaluate the percent of all subjects with improvement from baseline in heart failure patients with paroxysmal, persistent, and long-standing

persistent AF subtypes implanted with a two-lead BIOTRONIK CRT-DX system.

LEADLESS-II - A safety and effectiveness trial for a leadless pacemaker system

PI: Aaron Hesselson, MD

Coordinator: Jennifer Isaacs 859-323-4738

Objective: To confirm the safety and effectiveness of the Aveir device from implant through 6-weeks in a subject population indicated for a VVI(R) pacemaker.

General Cardiology:

EMPACT-MI – A study to test whether empagliflozin can lower the risk of heart failure and death in people who had a heart attack (myocardial infarction)

PI: John Kotter, MD

Coordinator: Ben Rushing 859-323-5259

Objective: To demonstrate the superiority of empagliflozin 10 mg once daily versus placebo, in addition to standard of care, for the reduction of the composite endpoint of time to first heart failure hospitalization or all-cause mortality in high-risk patients hospitalized for acute MI.

RELIEVE-HF TRIAL: REducing Lung congestion symptoms using the v-wavE shunt in adVancEd Heart Failure

PI: John Gurley, MD

Coordinator: Stephanie Morris 859-323-5366

Objective: To provide reasonable assurance of safety and effectiveness of the V-Wave Interatrial Shunt System by improving meaningful clinical outcomes in

CLINICAL TRIALS CONTINUED

patients with NYHA functional class II, class III or ambulatory class IV heart failure, irrespective of left ventricular ejection fraction, who at baseline are treated with guideline-directed drug and device therapies.

MK-5475-007: A Phase 2/3, Multicenter, Randomized, Double-blind, Placebo-Controlled, Adaptive Design Study to Evaluate the Efficacy and Safety of MK-5475 in Adults with Pulmonary Arterial Hypertension

PI: David Booth. MD

Coordinator: Stephanie Morris 859-323-5366

Objective: Two cohorts to evaluate the effect of MK-5475: 1) versus placebo on the pulmonary vascular resistance (PVR) at Week 12, 2) versus placebo on 6-minute walk distance (6MWD) at Week 12.

Stephanie Morris, CCRP

Clinical Research Operations Manager Cardiovascular and Radiology Services Gill Heart & Vascular Institute Clinical Research

Phone: 859-323-5366

Stephanie.A.Morris@uky.edu

Research Coordinators

Ben Rushing, CCRC

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Clinical Research Team

John Kotter, MD

Director, Gill Heart & Vascular Institute Cardiology Research Center

Jennifer Isaacs, MS, MS, CCRP

Clinical Research Administrative Director Cardiovascular and Radiology Services Gill Heart & Vascular Institute Clinical Research 859-323-4738 Jennifer.isaacs@uky.edu

FELLOWS NEWS/ACCOMPLISHMENTS

WELCOME NEW FELLOWS



Trey Whiteside, MD Chief Fellow, PGY6



Evan Sheets, MD Junior Chief Fellow, PGY5 PGY6



Krystof Andress, MD



Daniel Krause, MD PGY6



Eric Kreps, MD PGY6



Tony Nguyen, MD PGY6



Raya Mannan, MD



Marc Paranzino, DO PGY6



Ranjan Banerjee, MD



Kevin Cao, MD PGY5



Ethan Fry, DO PGY5



PGY5



Benjamin Stoner, MD



Rocky Wool, DO



Jad Ballout, MD PGY4



Nakeya Dewaswala, MD PGY4



Awa Drame, MD PGY4



Sara Klinger, MD PGY4



Ahmed Noor, MD



Nicole Dexter, MD



Saima Shikari-Dossaji, DO, PGY4



Ashley Brunmeier, MD



Joshua Eason, DO ACI



Josue Villegas-Galaviz, MD, Advanced Heart Failure



Matthew Rafn, MD, MPH Interventional Cardiology



Matthew Sousa, MD



Hussam Hawamdeh, MD Interventional Cardiology Interventional Cardiology



SAVE THE DATE

Join us for the 8th annual UK Gill Affiliate Network Annual Meeting

Presented virtually through a series of live video sessions

Thursday, Nov. 4 - Friday, Nov. 5

Presentation times range from 8 a.m. EDT - 1 p.m. EDT

Formal invitation to follow.

MORE INFORMATION

For additional information, contact Rebecca Craft (rebecca.craft@uky.edu), or visit the conference website at https://www.cecentral.com/live/20849.





AFFILIATE NEWS GAN ANNUAL MEETING

The annual meeting of the Gill Heart & Vascular Institute Affiliate Network brings together hospitals throughout the Commonwealth that are interested in working together to enhance access to high-quality cardiovascular care. The meeting not only provides a glimpse into the future of cardiovascular medicine, but also offers strategies from leading national experts on how to position CV programs for success. This year's meeting features presentations focused on cardiovascular clinical care, quality, marketing, and management as well as sessions that examine trends in healthcare compliance and the current landscape of value-based purchasing.

MORE INFORMATION

For additional information, contact Rebecca Craft (rebecca.craft@uky.edu), or visit the conference website at https://www.cecentral.com/live/20849.

AFFILIATE NEWS

NEW LEADERSHIP LOOKS TO THE FUTURE

LEXINGTON, Ky. from UKNow (Aug. 3, 2021) – Dr. Rick Mc-Clure has deep roots in the University of Kentucky and UK HealthCare communities.

In 1983, he earned his medical degree from the UK College of Medicine, followed by both an internal medicine residency and cardiology fellowship at UK HealthCare. After about 12 years away, McClure returned to the University of Kentucky in 2004 to help establish a network of UK outreach clinics to improve heart health across the Commonwealth.

Cardiovascular disease is the leading cause of death in Kentucky and the state is among the top 10 in the country for cardiovascular mortality.

UK Gill Heart & Vascular Institute is at the forefront of the battle against heart disease and stroke. Its goal is to provide every patient with exceptionally compassionate care in the safest and most appropriate manner possible based on the best evidence and the latest technological advances.

When McClure returned to UK, he and his team spent the next 17 years building the robust and expanding network of UK-affiliated hospitals across the Commonwealth that he hoped would continue the UK Gill Heart & Vascular Institute's mission.

"We want to help Kentuckians lead healthier lifestyles and encourage their participation in cardiac screenings to reduce the negative impact of cardiovascular disease on the community," said McClure, who served as medical director of the UK Gill Affiliate Network.

Officially established in 2014, the UK Gill Affiliate Network now boasts 18 affiliate hospitals across the Commonwealth, from Pike County to McCracken County. The network allows the Gill Heart & Vascular Institute to work closely with regional hospitals to provide the highest quality of cardiovascular care. Through the network, specialists at the Gill Heart & Vascular Institute provide cardiovascular-specific education and training programs for network doctors, advanced practice practitioners, nurses and staff to ensure the most up-todate cardiovascular knowledge is available to them. Network members have remote access to cardiovascular educational opportunities and complimentary participation in cardiovascular

conferences as well as personalized and customized attention from the Gill Heart & Vascular-Institute to support the network hospitals' needs across the cardiovascular spectrum.

The UK Gill Affiliate Network also assists cardiovascular programs in achieving and maintaining subspecialty accreditations, provides clinical cardiology coverage and supports cardiac program growth and development. In addition, the network facilitates collaboration between local providers and Gill cardiologists, vascular surgeons and cardiothoracic surgeons. Developing these relationships allows for open communication and collaboration of care for patients.

"By collaborating with local community hospitals and their providers through education, training and community out

"My vision is for the UK Gill Affiliate Network to be a model for the rest of the nation on how an academic medical center can collaborate with hospitals throughout the state to improve cardiovascular care and improve efficiency," Rajagopalan said.



Dr. Navin Rajagopalan (right) will take over for Dr. Rick McClure as the medical director of the UK Gill Affiliate Network. Pete Comparoni | UK Photo.

reach the residents of those communities benefit from access to state-of-the-art cardiovascular care near where they live," McClure said. "This also reduces the stress and cost that many will incur by having to travel to a large center such as UK."

McClure leaves his role as medical director of the UK Gill Affiliate Network to become the acting chair of the UK Department of Internal Medicine. UK cardiologist Dr. Navin Rajagopalan will step in as the new medical director of the UK Gill Affiliate Network.tinually work together to provide the best care possible for the patients we serve."

"We have accomplished so much over nearly two decades and yet there is still so much more to do," McClure said. "I look forward to seeing top-notch cardiovascular care continue to transform under Dr. Rajagopalan's leadership." Rajagopalan served as the director of heart failure and medical director of heart transplantation at UK HealthCare for nearly a decade before pursuing a leadership opportunity in New Jersey. He was recruited back to UK HealthCare in 2020 to serve as the associate director of the UK Gill Affiliate Network and the associate director of the Organ Failure and Transplant Network.

His clinical and research interests include systolic heart failure, peripartum cardiomyopathy and donor selection for heart transplantation.

"Dr. Rajagopalan is the perfect physician to take on this vitally important leadership position from Dr. McClure. They both excel in their ability to listen to the needs of our patients and their care providers across the state, and they are always searching for opportunities to improve in this excellence that has become standard with Gill Heart & Vascular Institute affiliations," said Dr. Vincent L. Sorrell, acting chief of the Division of Cardiology. "I have personally witnessed Navin's careful approach to his patients and his commitment to quality for more than a decade and therefore, I am certain that the Gill Affiliate Network is in good hands."

Rajagopalan plans to continue exploring ways to provide additional resources to affiliate hospitals and to help disseminate the most advanced technology throughout the Commonwealth.

"My vision is for the UK Gill Affiliate Network to be a model for the rest of the nation on how an academic medical center can collaborate with hospitals throughout the state to improve cardiovascular care and improve efficiency," Rajagopalan said.



ALLIANCE RESEARCH INITIATIVE

ONE-YEAR MILESTONES - SEPTEMBER 14, 2021

In August 2020, the College of Medicine officially launched 18 Alliance Initiative teams from each of the five research priority areas (substance use disorder; cardiovascular; diabetes and obesity; neuroscience; and cancer) and emerging areas of science. As the goals outline, these Alliance Initiative teams include members from 24 departments in the College of Medicine and nine colleges across the University.

There are four Cardiovascular Alliance teams: MYRA, TISA, TITAL and UK-AARC. The following pages are a summary report of their research efforts at the one-year funding mark. See: https://med.uky.edu/alliance to learn more and join a CV- Alliance.

TISA

Transdisciplinary Implementation Science Alliance

METRICS

PUBLICATIONS	GRANT	CLINICAL	NEW	# OF
	SUBMISSIONS	TRIALS	FUNDING	MENTEES
42	17	0	\$4,136,777	4

PRINCIPAL INVESTIGATORS

Jing Li, MD, MS Mahesh Kudrimoti, MD Gretchen Wells, MD, PhD

SUMMARY

Improvements in patient care depend on breakthroughs in research and translation of research findings into clinical care. But of all the discoveries in research to improve patient care, only a fraction are actually put into practice in clinics and hospitals. This gap between research and practice has fueled the expansion of implementation science research to support the optimal use of evidence-based practices in clinical and community systems of care. The Transdisciplinary Implementation Science Alliance (TISA) works to bring research successes into health care practice, especially across traditional fields. To reach its goal, TISA will practice team science, breaking down the silos that often prevent cooperation between disciplines (e.g., cardiology, oncology) and organizational structures (e.g., scientists, clinicians).



ALLIANCE MEMBERS

Amit Arbune, MD, Assistant Professor - Department of Internal Medicine

Ana Bastos de Carvalho, MD, PhD, Assistant Professor - Department of Ophthalmology and Visual Sciences

Erin Burke, MD, Assistant Professor - Department of Surgery

Roberto Cardarelli, DO, MHA, MPH, Professor, Department of Family and Community Medicine

Niraj Chavan, MD, MPH, Assistant Professor - Department of Obstetrics and Gynecology

Jessica Clouser, MPH, Research Director - Center for Health Services Research

Mark Dignan, PhD, Professor - Department of Internal Medicine

Mary Beth Fisher, DO, Fellow - Department of Internal Medicine

Rachel Graham, DrPH, Assistant Professor - College of Public Health

Alla Grigorian, MD, PhD, Associate Professor - Department of Internal Medicine

Vedant Gupta, MD, Assistant Professor - Department of Internal Medicine

Pam Hull, PhD, Associate Professor - Department of Behavioral Science

James Keck, MD, Assistant Professor - Department of Family and Community Medicine

Aaron Kruse-Diehr, PhD, Assistant Professor - College of Public Health

Mahesh Kudrimoti, MD, Professor - Department of Radiation Medicine

Mary "Beth" Lacy, PhD, Assistant Professor - College of Public Health

Jing Li, MD, DrPH, MS, Associate Professor - Department of Internal Medicine

Colleen McMullen, MA, MBA, Assistant Professor - Department of Physiology

Daniela Moga, MD, PhD, Associate Professor - College of Pharmacy

Kevin Pearce, MD, MPH, Professor, Department of Family and Community Medicine

Anne Ray, PhD, MeD, Assistant Professor - College of Public Health

Karen L. Roper, PhD, Assistant Professor - Department of Family & Community Medicine

Matthew Sirrine, Research Assistant - Center for Health Services Research

Ginny Sprang, PhD, Professor - Department of Psychiatry

Jerod Stapleton, PhD, Associate Professor - College of Public Health

Margaret Szabunio, MD, Professor - Department of Radiology

Jeff Talbert, PhD, Professor - Department of Internal Medicine

Kshitij Thakur, MD, Assistant Professor - Department of Internal Medicine

Gretchen Wells, MD, PhD, Professor - Department of Internal Medicine

Adrienne Whitt-Woosley, PhD, LCSW, Assistant Professor - Department of Psychiatry

Lovoria Williams, PhD, Associate Professor - College of Nursing

Mark V. Williams, MD, Professor - Department of Internal Medicine





MYRA

Myocardial Recovery Alliance

METRICS

PUBLICATIONS	GRANT	CLINICAL	NEW	# OF
	SUBMISSIONS	TRIALS	FUNDING	MENTEES
0	2	4	0	1

PRINCIPAL INVESTIGATORS

Ken Campbell, PhD Emma Birks, MD, PhD

SUMMARY

The Myocardial Recovery Alliance (MYRA) leverages existing clinical and scientific strengths at the institution to improve understanding of myocardial recovery. With support from bioengineers and geneticists, the translational research team will forge new collaborations to improve therapies for patients with heart failure. The MYRA alliance has already developed remarkable computer models of hearts that grow and evolve in response to pharmaceutical and genetic manipulation on the molecular level.



ALLIANCE MEMBERS

Ahmed Abdel-Latif, MD, PhD, Associate Professor - Department of Internal Medicine Emma Birks, MD, PhD, Professor - Department of Internal Medicine Ken Campbell, PhD, Professor - Department of Physiology Vedant Gupta, MD, Assistant Professor - Department of Internal Medicine Candice Harvey Falls, PhD, Associate Professor - College of Nursing Andrew Kolodziej, MD, Assistant Professor - Department of Internal Medicine Sarah Kosta, Mentored Scientist - Department of Physiology John Kotter, MD, Assistant Professor - Department of Internal Medicine Steve Leung, MD, Associate Professor - Department of Internal Medicine Bryana Levitan, Echocardiology Technician - Department of Physiology Greg Milburn, Mentored Scientist, MD/PhD Student - Department of Physiology Neeti Reddy, MD, Assistant Professor - Department of Internal Medicine Vince Sorrell, MD, Professor - Department of Internal Medicine Gaurang Vaidya, MD, Assistant Professor - Department of Internal Medicine Jonathan Wenk, PhD, Associate Professor - College of Engineering



VITAL

Virus Induced Thrombosis Alliance

METRICS

PUBLICATIONS	GRANT	CLINICAL	NEW	# OF
	SUBMISSIONS	TRIALS	FUNDING	MENTEES
20	8	2	\$5,342,000	1

PRINCIPAL INVESTIGATORS

Beth A. Garvy, PhD Sidney W. Whiteheart, PhD

SUMMARY

The Virus Induced Thrombosis Alliance (VITAL) is investigating why infections cause an increased risk of cardiovascular disease. The combination of cardiology and virology is critical, especially now, as the effect of COVID-19 on clotting becomes clear. VITAL's initial focus on the thrombotic risks associated with HIV1+/AIDS has grown into a collaboration with the Bluegrass Care Clinic to examine coagulation dysfunction in COVID-19 patients. The team has already launched clinical studies of monocytes, platelets, and coagulation factors in HIV1+/AIDS patients and SARS-CoV-2/COVID-19 patients with varying severity of disease, and has begun a longitudinal study on changes in hemostasis occurring during SARS-CoV-2/COVID-19 disease and recovery from it.



ALLIANCE MEMBERS

Hammodah Alfar, Student - Department of Molecular and Cellular Biochemistry

Meenakshi Banerjee, PhD - University of Utah

Brittany Bissell, PharmD, Assistant Professor - Department of Internal Medicine

George Davis, PharmD, Professor - College of Pharmacy

Beth A. Garvy, PhD, Assoc. Dean for Biomedical Education - Department of Microbiology, Immunology and Molecular Genetics

Muhammad Gul, MD, Assistant Professor - Department of Internal Medicine

Melissa Hollifield, Scientist - Department of Microbiology, Immunology and Molecular Genetics

Xian Li, PhD, Scientist - Cardiovascular Research Center

Thein Myint, MD, Associate Professor - Department of Internal Medicine

Barbara Nikolajzyk, PhD, Professor - Department of Pharmacology and Nutritional Sciences

Chi Peng, PhD Candidate

Zach Porterfield, MD, PhD, Assistant Professor - Department of Microbiology, Immunology and Molecular Genetics

Martha Sim, Student - Department of Molecular and Cellular Biochemistry

Jamie Sturgill, PhD, Assistant Professor - Department of Internal Medicine

Alice Thornton, MD, Division Chief - Department of Internal Medicine

Sidney W. Whiteheart, PhD, Professor - Department of Molecular and Cellular Biochemistry

Jeremy P. Wood, PhD, Assistant Professor - Department of Internal Medicine

Jerold Woodward, PhD, Professor - Department of Microbiology, Immunology and Molecular Genetics

Congging Wu, PhD - Department of Physiology



UK-AARC

UK Aortopathy Alliance Research Center

METRICS

PUBLICATIONS	GRANT	CLINICAL	NEW	# OF
	SUBMISSIONS	TRIALS	FUNDING	MENTEES
15	5	2	\$835,000	3

PRINCIPAL INVESTIGATORS

Alan Daugherty, PhD Lisa A. Cassis, PhD

SUMMARY

The University of Kentucky Aortopathy Alliance Research Center (UK-AARC) works to use the existing strengths of basic science researchers to enhance the translation of their research to the clinical and population arena, speeding the bench to bedside process. UK-AARC is especially focused on research that will aid in the goal of developing effective pharmacological treatments as alternatives to surgery. The team's first collaboration is the development of an aortopathy-focused photoplethysmography, a device measuring blood flow, for use in clinical practice.



ALLIANCE MEMBERS

Yasir Alsiraj, PhD, Assistant Professor - Department of Pharmacology and Nutritional Sciences

Paula Anaya, MD, PhD, Associate Professor - Department of Internal Medicine

Joseph Bobadilla, MD, Professor - Department of Surgery

Michael Bounds, MD, Assistant Professor - Department of Surgery

Christoph Brehm, PhD, Assistant Professor - College of Engineering

Roberto Cardarelli, DO, Professor and Chair - Department of Family and Community Medicine

Lisa A. Cassis, PhD, Vice President for Research - University of Kentucky

Alan Daugherty, PhD, Chair and Professor - Department of Physiology

Eric Endean, MD, Professor - Department of Surgery

Fred de Beer, MD, Professor - Department of Internal Medicine

Ming Gong, MD, Professor - Department of Physiology

Zhenheng Guo, PhD, Professor - Department of Pharmacology and Nutritional Sciences

Dong Lee, MD, Assistant Professor - Department of Surgery

Hong S. Lu, MD, PhD, Assistant Professor - Department of Internal Medicine

David Minion, MD, Professor - Department of Surgery

Amanda Romesberg, DO, Assistant Professor - Department of Radiology

Hisashi Sawada, MD, PhD, Post-Doc - Department of Physiology

Mary Sheppard, MD, Assistant Professor - Department of Family and Community Medicine

Preetha Shridas, PhD, Research Faculty - Department of Internal Medicine

Vince Sorrell, MD, Professor - Department of Internal Medicine

Venkat Subramanian, PhD, Assistant Professor - Department of Internal Medicine

Lisa Tannock, MD, Professor - Department of Internal Medicine

Samuel Tyagi, MD, Assistant Professor - Department of Surgery

Nancy Webb, PhD, Professor - Department of Pharmacology and Nutritional Sciences

Jonathan Wenk, PhD, Associate Professor - College of Engineering

Eleftherios Xenos, MD, Professor - Department of Surgery



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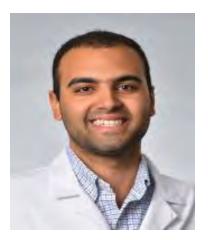


David Aguilar, MD Professor of Medicine

Fellowship: Cardiovascular Medicine (including Level III Adult Echocardiography and Level II Nuclear Cardiology training), Brigham and Women's Hospital

Internal Medicine Residency: Brigham and Women's Hospital Harvard Medical School

Research Interests: Dr. Aguilar's research predominantly focuses on cardiometabolic diseases, such as type 2 diabetes, obesity, and hypertension, and their adverse associations with cardiovascular outcomes, such as stroke and heart disease.



Talal Alnabelsi , MD Assistant Professor of Medicine

Fellowships: Advanced Cardiovascular imaging fellow (CT/PET):

Houston Methodist Hospital

Cardiovascular Disease: University of Kentucky

Internal Medicine Residency: Einstein Medical Center, Philadelphia **Research Interests:** Dr. Alnabelsi's research includes PET Myocardial perfusion imaging, utilizing multi-modality imaging to streamline care, Infective Endocarditis, and troponin elevation in sepsis.

Outside Activities: Big foodie and a sports fanatic (basketball, NFL, football, tennis, basketball and formula 1).



Mary Beth Fisher, DO
Assistant Professor of Medicine
Fellowship: Cardiovascular Disease
University of Kentucky

Internal Medicine Residency: University of Kentucky

Clinical and Research Interests: Dr. Fisher's interests include women's heart health, cardio-obstetrics, and cardiovascular disease prevention.

Outside Interests: Dr Fisher along with her husband, two children and two dogs have settled into life in Lexington after completion of her training. Outside of clinical duties she enjoys spending her free time outside with her family including running, hiking, and gardening.



Amartya Ignaszewski, MD Assistant Professor of Medicine

Fellowship: Advanced Heart Failure/Transplant Cardiology Fellowship Northwestern Memorial Hospital, Chicago, Il Cardiovascular Disease Fellowship

Cooper University Hospital, Camden, NJ

Internal Medicine Residency: SUNY Upstate Medical University, Syracuse, NY

Research Interests: Dr. Ignaszewski's research includes adherence to guideline-based management of atrial fibrillation and sex-differences in medical therapy and oral anticoagulation for thromboembolic risk reduction in non-valvular atrial fibrillation.



Amartya Kundu, MD, FACC Assistant Professor of Medicine

Fellowship: Interventional Cardiology and Cardiovascular Disease, University of Massachusetts Medical School

Internal Medicine Residency: University of Massachusetts Medical School

Research Interests: Dr. Kundu's research focuses on outcomes following acute myocardial infarction, systematic reviews & meta-analyses evaluating the efficacy of different percutaneous interventions, and invasive management of cardiogenic shock.

Other Interests: Dr. Kundu is an avid traveler (has traveled to over 30 countries) who loves visiting new places and learning about different cultures. He also enjoys listening to music, trying different cuisines, and spending time with family and friends.



Denada S. Palm, MD Assistant Professor of Medicine

Fellowship: Structural Heart, Peripheral Vascular Interventions, and Interventional Cardiology- Brigham and Women's Hospital; Harvard Medical School; Boston, MA

Cardiovascular Medicine- Univ. of Illinois at Chicago; Chicago, IL **Internal Medicine Residency:** Univ. of Cincinnati; Cincinnati, OH **Research Interests:** Dr. Palm's research interests involve high risk percutaneous coronary interventions and contemporary management of cardiogenic shock.

Outside Interests: Involve spending time with my family, husband and three children. We just welcomed our youngest this summer!



AUGUST

GILL RECOGNITION AWARDS

The Gill Recognition Program seeks nominations of staff, faculty, trainee, or an entire area to recognize outstanding work based on one or more of the criteria below.

- Going the extra mile to help colleagues or patients
- Inspiring others
- Preventing a serious adverse event
- Embracing a spirit of constant improvement
- Creating a valuable learning opportunity or environment
- Developing an innovative approach or solution
- Outstanding commitment to a scholarly pursuit

Nominations should include the individual name or area and a brief description of the outstanding work.

The Gill Recognition Award will be awarded monthly. You may open the nomination form on your web browser by clicking the link below: Gill Recognition Program.

If the link above does not work, try copying the link below into your web browser: https://redcap.uky.edu/redcap/surveys/?s=-JFK4EPMJ83

See past winners here: https:// internalmedicine.med.uky.edu/ cvrc-gill-award

The Cardiac Cath Lab (pictured above) received the Gill Recognition Award for being recognized by a UK HealthCare patient. Here is what the patient

wrote on her patient survey to compliment the staff who provided care during her visit to the Cath Lab on 2/24. "I have dealt with a lot of medical staff in the past, but they really outdid themselves in the Cath Lab. I can not say enough about Cory. he was so genuine and nice and easy to ask any questions to. Steve, Clarissa and Faith were awesome in the procedure room as well. I also saw Peta for my echo and she was super gentle, which I needed after my procedure." She asks for the manager to review and recognize the staff for their great work.

"I have dealt with a lot of medical staff in the past, but they really outdid themselves in the Cath Lab. Jacob Stone was nominated by the entire Cardiac Rehab Staff (**See photo below**). This is what they wrote about Jacob: Jacob is a wonderful leader, always going the extra mile to improve patient care, by innovative approaches and constantly thinking about improvement of current procedures. In the past year Jacob has been able to adapt to the pandemic constraints while maintaining high quality care for the cardiac rehab patients. Cardiac Rehab closed its doors for only 8 weeks due to COVID19, while many programs across the state remained closed for well into the Summer months, very much in part to Jacob's efforts. During the closure Jacob initiated home exercise plans for current patients at time of closure and continued communication about reopening.

He created a reopening plan that

ultimately the national cardiac rehab organization released very similar info weeks later, he was ahead of the curve. During this time, he explored, and was able to initiate and implement a hybrid home based cardiac rehab program to serve those patients who were affected by their local cardiac rehab facility closures, that otherwise would not have been able to receive cardiac rehab services. In addition to these accomplishments, he is well on his way to approval of a cardiac rehab facility expansion adding much needed additional space for equipment and expanded dietary educational opportunities. He has also been an integral part of designing a cardiac rehab specific workflow in EPIC that is tailored to our facility. Jacob continually provides outreach education

about cardiac rehab to incoming residents and fellows and recently provided education to Cardinal Hill providers as well. He has participated in many community service events about hands only CPR, including teaching the UK Football team this life saving skill. Not only is Jacob the supervisor of cardiac rehab with all the manager duties, he also still provides patient care on a daily basis. His dedication and passion for the cardiac rehab program here at UK has been unwavering, and we, his staff, are so fortunate and blessed to have him as our fearless boss. We believe he is most deserving of this recognition.





AUGUST

GILL RECOGNITION AWARDS CONT.

Mindy Thompson nomindated Ken Campbell, PhD of Physiology. Mindy said: Dr. Campbell meets most, if not all, of the criteria for this award. A few years after his arrival at the University of Kentucky, Dr. Campbell developed an innovative approach with one of the cardiologist to startup a cardiac biobank using limited resources available to his lab. Dr. Campbell serves as the Director of Graduate Studies and teaches several courses to include MD826. He takes pride in making course material exciting, easily accessible and comprehendible. While most professors might dread receiving class reviews at the end of the semester, Dr. Campbell welcomes the

the opportunity for improvement. He frequently seeks ways to improve both professionally and personally. Dr. Campbell has an inspiring personality that allows him to encourage others and has allowed him to build an unbelievable internal and external network. The support he offers his colleagues and mentees is unsurpassed. This, I was able to witness when he had a lab reunion Zoom. Several of his previous students or post docs joined a Zoom reunion to catch up. All five of them had nothing but positive things to say about Dr. Campbell but most importantly, the work culture they

described is the same, if not better, today. A positive work culture can be challenging to create let alone maintain, and improve, over the course of 17 years which speaks volumes to his character and leadership!

"Dr. Campbell has an inspiring personality that allows him to encourage others".

SEMINARS AND JOURNAL CLUBS

* Check website for details.

Cardiovascular Seminar Series

Fridays at 8:00 am

This forum brings to campus prominent external speakers and provides presentations by UK faculty to ensure their research expertise is widely known.

https://cvrc.med.uky.edu/cvrc-current-seminar-schedule

Cardiovascular Journal Club

Tuesdays at 8:00 am

Presenters in this forum discuss specific citations including basis for this publication's selection, strengths and weaknesses, from the perspective as if he/she were the original reviewer. For more information contact: Greg Graf, Ph.D. or Ryan Temel, Ph.D.

https://cvrc.med.uky.edu/cvrc-current-journal-club-schedule

Blood Cell Journal Club

4th Friday of each month at 4:00 pm

The journal club was started a number of years ago in an effort to provide a focal point for the hemostasis community at UK. The focus is usually on platelets but they also discuss papers on Coagulation and Immune responses. https://cvrc.med.ukv.edu/cvrc-blood-cell-journal-club-2018

Cardiovascular Seminar Series for Today's Clinician-Scientists

TODD 170

Noon- 12:50 PM and Zoom

Speakers will discuss late-breaking research, critical review of the guidelines, and other relevant cardiovascular topics. These presentations are expected to deliver knowledge and strategies that directly result in changes in practice that can improve patient outcomes.

Thursday 1/27/2022

Thursday 2/24/2022 - Speaker: Anna Hemnes, MD, Vanderbilt University Medical System

Thursday 3/24/2022

Thursday 4/28/2022 - Speaker: Hakan Oral, MD, Frankel Cardiovascular Center, University of Michigan Health

Thursday 5/26/2022 Thursday 9/29/2022

Thursday 10/27/2022



SEPTEMBER

CVRC RESEARCH DAY

LEXINGTON, Ky. By Mallory Olson, in UKNOW (Sept. 14, 2021)

What if there were a way to cure hypertension associated with obesity? University of Kentucky researcher Frédérique Yiannikouris, Ph.D., an assistant professor in the University of Kentucky College of Medicine's Department of Pharmacology and Nutritional Sciences, may be on track to find it.

Specializing in obesity, diabetes and cardiovascular disease research, Yiannikouris' most recent research project is focused on a novel molecule, found in the fat, liver and kidney, that might help to cure hypertension associated with obesity.

Hypertension is another name for high blood pressure. It is normal for blood pressure to fluctuate during the day, but if it consistently stays high, you are considered hypertensive. High blood pressure means that blood is pushing too hard against artery walls. The force of this blood can damage the heart and the delicate inner lining of the artery walls. This damage can lead to many health problems.

Kentucky is one of the top five states in the nation for high adult obesity rates, with 36.6% of the population considered obese. The accumulation of fat is just one aspect of the incredibly complex disease. The metabolic changes that occur with obesity result in an increase in cardiovascular risk

factors, like hypertension, poor bone quality and insulin resistance. "If you can keep your blood pressure below 120 mmHg, the risk of cardiovascular disease drops dramatically," Yiannikouris said. "In this context, identifying novel molecules and/or receptors involved in the control of blood pressure will allow us to better understand the link between obesity and hypertension and find novel therapeutic treatments for these highly prevalent diseases."

Yiannikouris' study focuses on the unique receptor, called the prorenin receptor (PRR), which she and her team believe could represent a potential therapeutic target in the treatment of cardiovascular disease. More specifically, they are studying the role of PRR in fat mass growth,

in the accumulation of lipid in the liver and in the regulation of blood pressure, with a special emphasis on the difference between men and women.

"We recently found a new paradigm of crosstalk between adipose tissue and the liver, involving cholesterol, triglyceride and PRR," she said. "Interestingly, we found that PRR contributes to lipid stability and that PRR can also be separated into a soluble form, called sPRR. This soluble form can induce an increase in blood pressure during the development of obesity."

Both hyperlipidemia and hypertension are risk factors in cardiovascular disease. Even with antihypertensive treatment, the mortality rate is higher in patients who are hypertensive taking anti-hypertensive drugs than in a population of people with normal blood pressure. Yiannikouris said despite a wide range of available treatments, a significant number of patients have resistant hypertension.

"Understanding the mechanism by which PRR contributes to dyslipiedemia and hypertension will provide critical insights to develop new drugs targeting PRR and/ or its soluble form," Yiannikouris said. "This can, in turn, result in manageable blood pressure, when combined with sustainable lifestyle changes." Yiannikouris' research program is just one example of the type of research projects presented during the 2021 Cardiovascular Research Day, held in conjunction with the Fredrickson Lipid Research Conference. The multiday event celebrates innovative research in cardiovascular health. It is hosted by the University of Kentucky Saha Cardiovascular Research Center and the UK Gill Heart & Vascular Institute. The conference was the first in-person scientific conference in the field of lipid and lipoprotein metabolism and cardiovascular disease in nearly two years.

With 250 attendees from UK and nearly 40 other universities, the event showcased a wide variety of research activity from scientists and researchers, from trainees to prominent senior scientists.

After opening remarks by Alan Daugherty, Ph.D., director of the UK Saha Cardiovascular Research Center, several distinguished speakers presented their research. Steven Steinhubl, M.D., the director of Digital Medicine and an associate professor of genomic research for Scripps Research Translational Institute, presented "Healthcare Transformation and the Need for More Unreasonable Clinician-Researchers."

Elizabeth McNally, M.D., Ph.D., the director of the Center for Genetic Medicine at Northwestern University Feinberg School of Medicine, was honored with the UK Gill Heart & Vascular Institute Outstanding Contributions to Cardiovascular Research award.

She presented "The Genetic Landscape of Heart Failure."

Katherine Gallagher, M.D., an associate professor of surgery, Section of Vascular Surgery, and Microbiology and Immunology at the University of Michigan, was awarded the UK Gill Heart & Vascular Institute Early Career Award. She presented "Epigenetics in Vascular Disease."

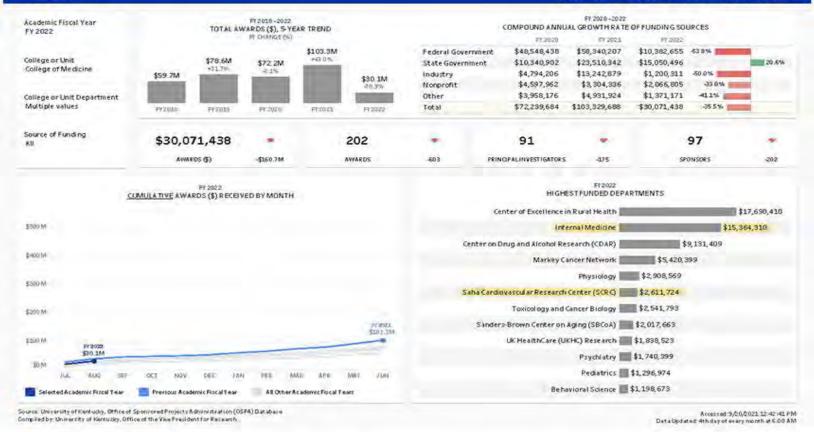
Judged poster sessions concluded with an awards ceremony recognizing the best presentations.

The event was made possible by support from the UK Saha Cardiovascular Research Center, the UK Office of the Vice President for Research, the UK Cardiovascular Research Priority Area and the Gill and Saha foundations.

"In this context, identifying novel molecules and/or receptors involved in the control of blood pressure will allow us to better understand the link between obesity and hypertension and find novel therapeutic treatments for these highly prevalent diseases." - Dr. Yiannikouris.

For more informationabout the programs mentioned please see the following web pages:

UK Saha CVRC
Uk Office of the VPR
UK CV-RPA
Gill Foundation
Saha Foundation



Doug Andres

RIT1-Mediated Protection Following Traumatic Brain Injury
National Institute of Neurological
Disorders & Stroke
02/15/2018-01/31/23

An Innovative Therapeutic Approach to Treat Cardiomyopathy Army Medical Research and Materiel Command 07/01/20-06/30/23

Ken Campbell

Multiscale Modeling of Inherited Cardiomyopathies and Therapeutic Interventions National Heart Lung and Blood Institute 08/03/17-07/31/22

Length-Dependent Activation in Human Myocardium National Heart Lung and Blood Institute 09/15/20- 07/31/24

Dual Filament Control of Myocardial Power and Hemodynamics University of Missouri 08/25/20- 07/31/24 Computer Modeling of Myosin Binding Protein C and its Effect on Cardiac Contraction Case Western Reserve 04/01/19-03/31/23

Thick-Filament Regulation In Human Heart Failure Washington State University 07/01/19-06/30/22

CRCNS: Multi-Scale Models of Proprioceptive Encoding for Sensorimotor Control Emory University 09/16/16-05/31/2022

Awards for members of Gill Heart & Vascular Institute total over \$33 Mil per year!

Lisa Cassis

Center of Research in Obesity and Cardiovascular Disease COBRE Core A: Admin Core National Institute of General Medical Sciences 09/08/08-07/31/23

EPSCoR Administrative KY Economic Development Cab 02/01/19-06/30/22 Supplemental Environmental Project Compliance Assistance Tools and Services
KY Department of Environmental Protection
07/01/07-12/31/21

Healthy Kentucky Research Building Fit-up for Vascular Research Office of the Director 09/23/19-10/31/21

Sex Differences in Angiotensin-Induced Vascular Diseases
National Heart Lung and Blood
Institute
03/21/12-05/31/22

Alan Daugherty

University of Kentucky- Baylor College of Medicine Aortopathy Research Center American Heart Association 04/01/18-03/31/22

A Mechanistic Study to Elucidate the Role of Protein S in Elevating the Risk of Thrombosis in Obese, Pre-menopausal Women Louisiana State University Health Sciences Center- New Orleans 01/15/21-12/31/24

RESEARCH FUNDING CONTINUED

Determinants of Aorta Heterogeneity National Heart Lung and Blood Institute

06/01/21-05/31/28

Macrophage Migration Inhibitory Factor and Urinary Pain Lexington Biomedical Research Institute 07/01/19-06/30/23

Brian Delisle

Transcriptional Regulation of KCNH2 National Heart Lung and Blood Institute 03/08/19-02/28/23

Circadian Clock Regulation of Myocardial Ion Channel Expression and Function
University of Florida
09/01/20- 05/31/22

Toward Early Diagnosis of Long QT Syndrome Using Machine Learning and Molecular Dynamics Simulation of KCNH2 Loyola University 01/01/21- 12/31/21

Internal Medicine is currently the highest funded division in the College of Medicine..

Florin Despa

Role of Systemic Amylin Dyshomeostasis in Alzheimer's Disease National Institute on Aging 09/15/16- 05/31/22 The Amylin Dyshomeostasis Hypothesis of Vascular Contributions to Cognitive Impairment and Dementia (VCID)

National Institute of Neurological Disorders & Stroke 04/01/20-03/31/25

Ming Gong

Targeting Timing of Food Intake as a Novel Strategy against Disruption of Blood Pressure Circadian Rhythm in Diabetes National Heart Lung and Blood Institute 01/15/19-10/31/22

A Novel Mechanism by which Smooth Muscle BMAL1 Regulates IL-6 and Sexual Dimorphism of Abdominal Aortic Aneurysm National Heart Lung and Blood Institute 08/20/18-07/31/22

Scott Gordon

The Role of High Density Lipoprotein Associated Protease Inhibitor Activity in Protection Against Atherosclerosis.

National Heart Lung and Blood Institute
08/20/18-07/31/22

Protease Activity in Atherosclerotic Plaque Formation and Protection by Novel HDL-targeting Protease Inhibitors Medical Foundation 12/01/18-11/30/21 High Density Lipoprotein Targeting Protease Inhibitors for Preservation of Lung Function Alpha One Foundation Incorporated 07/01/21-06/30/23

Identifying Pharmacokinetic Markers to Predict Altered Lipoprotein Kinetics in the Vascepa to Accelerate Lipoprotein Uptake and Elimination (VALUE) Study Amarin Pharma Incorporated 07/30/21-07/30/22

Gregory Graf

Contributions of hepatic and intestinal pathways to cholesterol excretion
National Institute Diabetes & Digestive & Kidney
09/13/17-07/31/22

The Don S. Fredrickson Lipid Research Conference National Heart Lung and Blood Institute 09/01/20-08/31/21

Brian Jackson

Graduate Research Fellowship Program
National Science Foundation
08/01/18-07/31/23

Jing Li

Project MISSION: Developing a multicomponent, Multilevel Implementation Strategy for Syncope OptImal-Care thrOugh eNgagement
National Heart Lung and Blood
Institute
08/01/2017-07/31/21

RESEARCH FUNDING

CONTINUED

Xiangan Li

Relative Adrenal Insufficiency is a Risk Factor and an Endotype for Sepsis

National Institute of General Medical Sciences

05/01/21-04/30/26

Mechanism of Adrenal Insufficiency as A Risk Factor for Sepsis National Institute of General Medical Sciences 09/01/17-08/31/22

Synthetic HDL a Potential Sepsis Therapy National Institute of General Medical Sciences 11/01/15-11/30/21

Zhenyu Li

Inflammasome Activation Triggers Systemic Coagulation in Sepsis National Heart Lung and Blood Institute 05/15/19-04/30/23

A Novel Mechanism of Immunosuppression in Sepsis: Depletion of Monocytes and Macrophages National Institute of General Medical Sciences 09/20/19-06/30/23

Heart-Platelet Crosstalk: JNK, AFib, and Thrombogenesis Rush University Medical Center 05/15/19-02/28/23

Analia Loria

Effect of Early Life Stress on Obesity-Induced Hypertension in Mice National Heart Lung and Blood Institute 12/01/17-11/30/22 Fat Nerve Recording in Mice American Physiological Society 10/01/19-07/31/21

Hong Lu

Atherosclerosis Mechanisms: Angiotensin II Production and Action National Heart Lung and Blood Institute 05/01/18-03/31/22

Debra Moser

Rural Intervention for Caregivers' Heart Health (RICHH) National Institute of Nursing Research 09/26/16-06/30/22

Online Cognitive Behavioral Therapy for Depressive Symptoms in Rural Coronary Heart Disease Patients Patient Centered Outcomes Re-

search Institute 10/01/2020 to 09/30/2024

Gia Mudd-Martin

Corazón de la Familia (Heart of the Family) National Institute of Nursing Research 03/02/17-01/31/22

Heart of the Family: A Cardiovascular Disease and Type 2 Diabetes Risk Reduction Intervention in High-Risk Rural Families National Institute of Nursing Research 09/07/20-06/30/25

Timothy Mullett

Using Biomarkers and Imaging in Fungal Regions to Improve Lung Cancer Diagnosis Vanderbilt University 04/01/19-03/31/22

Kentucky Lung Cancer Survivorship Program Bristol Myers Squibb Foundation Incorporated 09/01/14-12/31/21

Addressing Comprehensive Lung Cancer Biomarker Testing Through Project ECHO American Cancer Society 05/01/21-03/01/22

Mariana Nikolova-Karakashian Ceramide and Acute Phase Proteins Elevation During Aging National Institute on Aging 08/01/02-05/31/23

Jonathan Satin

Monomeric G-Proteins and Cardioprotection from Heart Failure National Heart Lung and Blood Institute 09/01/17- 08/31/21

An Innovative Therapeutic Approach to Treat Cardiomyopathy Army Medical Research and Materiel Command 07/01/20-6/30/23

Nancy Schoenberg

Community to Clinic Navigation to Improve Diabetes Outcomes National Institute Diabetes & Digestive & Kidney 08/01/17-07/31/22

RESEARCH FUNDING

CONTINUED

Implementing an Evidence-Based mHealth Diet and Activity Intervention: Make Better Choices 2 for Rural Appalachians
National Heart Lung and Blood Institute
08/01/20-04/30/25

Venkateswaran Subramanian Calpains and Abdominal Aortic Aneurysms

National Heart Lung and Blood Institute 08/10/17-07/31/22

08/10/1/-0//31/22

Ryan Temel

TRAF6 Nanoimmunotherapy to Resolve Plaque Inflammation Mount Sinai 08/15/18-06/30/22

Targeting MicroRNA-33 To Reduce Intracranial Atherosclerosis and Other Neurovascular Hallmarks of Vascular Cognitive Impairment and Dementia National Institute of Neurological Disorders & Stroke 04/01/19-03/31/22

Therapeutic Targeting of Metabolic microRNAs as a New Treatment Paradigm for NASH Aalborg University 01/01/19-12/31/24

Dongfang Wang

SBIR: Development of a TransApical to Aorta Double Lumen Cannula for a Neonate LVAD W-Z Biotech LLC 04/01/19-07/31/22 Development of a Paracorporeal Pump-Integrated Artificial Lung for Transport of Warfighters with Acute Respiratory Distress Syndrome (ARDS) Army Medical Research and Materiel Command

08/15/19 -08/14/22

Christopher Mark Waters

Biophysical Mechanisms of Hyperoxia-Induced Lung injury National Heart Lung and Blood Institute 04/15/20-03/31/24

ASK1 and Ventilator-Induced Lung Injury National Heart Lung and Blood Institute 12/15/16-11/30/21

Regulation and Function of IL33 During Neonatal RSV Infection Louisiana State University 05/05/18-07/31/21

Nancy Webb

Serum Amyloid A, Inflammasome Activation, and Abdominal Aortic Aneurysms National Heart Lung and Blood Institute 01/01/17-12/31/21

NRSA T32: Pharmacology and Nutritional Sciences: National Institute Diabetes & Digestive & Kidney 08/15/00-07/31/21

Jonathan Wenk

Force Validated Heart Valve Surgical Planning Tool University of Arkansas 09/01/19-08/31/22

Sidney Whiteheart

Platelet Exocytosis and Endocytosis in Thrombosis and Immunity National Heart Lung and Blood Institute 04/01/20-03/31/28

Regulatory Mechanisms of Glycoprotein Sialylation
Case Western Reserve
01/01/21-11/30/24

Jeremy Wood

Protein S Anticoagulant Activity: Biochemical Mechanisms and Structural Studies National Heart Lung and Blood Institute 09/15/15-09/31/21

Coordination of the TFPI/Protein S and APC/Protein S Anticoagulant Systems Pfizer Inc 06/22/21-05/31/23

PUBLICATIONS JULY-SEPTEMBER

Ad N, Luc JGY, Nguyen TC; COVID-19 North American Cardiac Surgery Survey Working Group (**Sekela, ME**). Cardiac surgery in North America and coronavirus disease 2019 (COVID-19): Regional variability in burden and impact. *J Thorac Cardiovasc Surg*. 2021 Sep;162(3):893-903.e4. doi: 10.1016/j.jtcvs.2020.06.077.

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Backer CL. Commentary: Does atrioventricular septal defect atrial fenestration treat the child ... or the surgeon? *J Thorac Cardiovasc Surg.* 2021 Jul 28:S0022-5223(21)01141-7. doi: 10.1016/j. jtcvs.2021.07.042.

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