



Main Line Health®

LANKENAU INSTITUTE FOR MEDICAL RESEARCH

# CATALYST

FALL 2018-WINTER 2019

## TAKING RESEARCH TO HEART

The Main Line Health clinical trials administered by LIMR offer patients access to potentially groundbreaking new devices and treatments for heart disease. | [Page 3](#)

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Mastering Innovation and Impactful Population Health Research

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LIMR Discovery: A Protein That Plays Nice — Until It Doesn't

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### About Lankenau Institute for Medical Research (LIMR)

LIMR is a nonprofit biomedical research institute located on the campus of Lankenau Medical Center and is part of Main Line Health. Founded in 1927, LIMR's mission is to improve human health and well-being. Faculty and staff are devoted to advancing innovative new approaches to formidable medical challenges, including cancer, cardiovascular disease, gastrointestinal disorders, autoimmune diseases, and regenerative medicine, as well as population health. LIMR's principal investigators conduct basic, preclinical and translational research, using their findings to explore ways to improve disease detection, diagnosis, treatment and prevention. They are committed to extending the boundaries of human health through technology transfer and training of the next generation of scientists and physicians. For more information, visit [limr.org](http://limr.org).



**George C. Prendergast, PhD**

*The Havens Chair for Biomedical Research*

*President and CEO*

*Lankenau Institute for Medical Research,  
Main Line Health*

## HEART OF THE MATTER

While we're enormously proud of the Lankenau Institute for Medical Research's 91-year history of breakthroughs in cancer research, it's important to note that our investigators are advancing discoveries in many other conditions, most notably in heart disease. Today, our basic science researchers are uncovering the causes of heart disease and developing novel treatments that can help improve patients' well-being and extend their lives.

That said, our work extends well beyond the laboratory. In fact, LIMR administers all of the cardiac clinical trials being conducted by the Lankenau Heart Institute of Main Line Health. During a clinical trial, researchers seek to determine, for example, how experimental medications, devices, and detection or diagnostic tools work in humans.

As you will read in our cover story beginning on page 3, Lankenau Medical Center has been leading and participating in many of the seminal heart disease-related clinical trials during the past four decades. In fact, the clinical research initiatives that led to the approval of almost all of the anti-arrhythmic medications and devices on the market today were either led by Lankenau clinicians or they participated in the research.

Over the years, Lankenau Medical Center has built an international reputation for its cardiac care, primarily in the treatment of structural heart diseases (SHD), conditions that typically involve the heart valves. And today, LIMR is administering numerous cardiovascular clinical trials, several of which seek to remedy SHD.

In this, our fifth edition of *Catalyst* magazine, you'll read about the cardiac clinical trials program that is providing patients with access to the latest devices and treatment options for SHD. And you'll learn more about the Structural Heart Team that, every day, is doing the vital work to improve the health of SHD patients and prolong their lives. I hope you will take a few moments to read about their work and the inspiring story of one of their patients.

In this issue, you also will read about LIMR's discovery of a gene that increases the severity of disease in multiple chronic inflammatory conditions, such as rheumatoid arthritis, lupus and cancer. And we'll take you behind the scenes to meet Robert Cox, PhD, LIMR's director of scientific administration, who discusses LIMR's infrastructure and equipment.

We hope you enjoy this issue of *Catalyst*. All of us at LIMR wish you and yours a Happy Holiday and a healthy and prosperous 2019.

## Mastering Innovation and Impactful Research

To thrive in a rapidly transforming environment one must not only change, but innovate. As Steve Jobs once said: “Innovation distinguishes between a leader and a follower.”

But effective transformations can be particularly challenging in industries like health care, with its multiple stakeholders, myriad regulations and long-established protocols. How does one even begin — and then successfully steer — the innovation process?

Evidence-based and collaborative population health research that focuses on certain patient groups can help. That’s why Main Line Health joined the Center for Health Organization Transformation (CHOT), an industry-university cooperative funded in part by the National Science Foundation. CHOT conducts research that supports management, clinical and information technology innovations in health care.

“Our membership in CHOT gives us access to transformative leadership with academic and business partners around the nation,” said Phillip D. Robinson, FACHE, president, Lankenau Medical Center. “We share the resources of all of the campuses involved with CHOT, so we can benefit from what’s being learned in all of those programs. Plus as a voting member, Main Line Health can prioritize the research projects CHOT undertakes.”

### Academic-industry collaborations

Here’s how it works: CHOT taps the knowledge and experience of health care industry leaders in order to guide university research — a distinct role reversal from traditional knowledge acquisition originating in academia and filtering “down to industry.”

**The 30 industry members of CHOT include not only Main Line Health and several health care systems in other parts of the country, but also technology companies, software providers, insurers and care-coordination ventures. They work with researchers at eight universities that are CHOT members, including Penn State, Texas A&M, and Georgia Tech.**

“For industry members like Main Line Health, CHOT offers a space to interact with their peers in health care delivery and to affect and direct academic research on topics that are important to them so that the findings are most relevant to their organization,” said Bitu Kash, PhD, MBA, CHOT center director.

Each year as a CHOT member Main Line Health gets assigned an academic researcher from a CHOT university site. Main Line Health joined the organization in 2015, and its first research project was led by a professor of health policy and management at Texas A&M. The project’s purpose was to identify factors associated with unplanned 30-day readmission rates at Main Line Health hospitals.

The researchers found the variables that can predict readmission include older age, Medicaid insurance, discharge destination, severity of illness and a diagnosis of chronic obstructive pulmonary disease (COPD). The results can help staff reduce readmissions by tailoring interventions in the most efficient and cost-effective manner.

A follow-up study in 2017 took a deeper dive into the research to help uncover the predictors of avoidable emergency department (ED) visits at Main Line Health’s hospitals and how to prevent unnecessary admissions from the ED. Previous research had shown ED visits increased since the enactment of the Affordable Care Act and Medicaid expansion, contributing to ED crowding in hospitals nationwide. There’s a continual concern that EDs are being used by some patients for non-urgent matters, which may hinder providing care to patients in truly urgent situations.

“We learned of several targeted interventions that could encourage or facilitate patients’ use of primary care services instead of the ED, especially for non-urgent and chronic conditions,” noted Sharon Larson, PhD, professor and executive director of the Main Line Health Center for Population Health Research at LIMR. “It was a valuable research report that offered actionable data to help improve our ED patient care.”

As Mr. Robinson added, “The research findings also helped to inform our design decisions for Lankenau’s new ED currently under construction. It helped us understand, for example, patient flow through the ED and how we can improve that.”

Main Line Health’s third CHOT research project will continue to focus, in part, on ED utilization. Said Mr. Robinson, “Our membership in CHOT shows our continued commitment to leadership in research and innovation, especially to expanding on our expertise in population health research.” ✨



Sharon Larson, PhD, professor and executive director of the Main Line Health Center for Population Health Research at LIMR, discusses recent CHOT findings with Phillip D. Robinson, FACHE, president of Lankenau Medical Center.



The Lankenau Heart Institute’s structural heart team is doing vital work to improve the health and prolong the lives of patients diagnosed with heart disease. *Left to right:* Sandra Abramson, MD; Roberto Rodriquez, MD; Paul Coady, MD; Scott Goldman, MD; Lisa Igidbashian, CRNP; Eric Gnall, DO. *Seated:* Kate Hawthorne, MD; and William Gray, MD. *Not pictured:* Andrea Beers, BSN, RN; Karen Klasic, RN; Bonnie O’Hara, CRNP; Samantha Roesch, CRNP; and clinical research nurses Susan Herring, RN, M.Ed.; and Jennifer Jordan, RN, MSN.

### OFFERING PATIENTS ACCESS TO GROUNDBREAKING CARDIAC CLINICAL TRIALS

## Taking Research to Heart

Robert Maloney had a leaky heart valve, known as mitral valve regurgitation. Affecting an estimated 4 million people in the United States, this common disorder can lead to declining heart function if left untreated. Maloney was told he needed surgery to fix it. Having previously undergone bypass surgery, he and his doctor sought a less invasive procedure this time.

“My doctor recommended I see Dr. Gray and Dr. Goldman at Lankenau Medical Center,” said Maloney, 79, a retired Philadelphia police officer now living in Dover, Delaware. “I had never met them before, but my doctor said they were very good.”

Maloney headed 78 miles north to Lankenau, where he met with William Gray, MD, system chief of the Division of Cardiovascular Disease at Lankenau Heart Institute, and Scott Goldman, MD, director of the structural heart program at Lankenau Heart Institute. Both physicians are also clinical professors at LIMR.

After their evaluations, the doctors determined Maloney was too high risk for conventional mitral valve surgery. But there was another option. Drs. Gray and Goldman told Maloney about a new research study that used a transcatheter approach to replace the mitral valve. The treatment was in an investigational stage, but Maloney opted to participate.

He was scheduled for further advanced cardiac imaging studies, which were performed by Sandra Abramson, MD, director, cardiovascular imaging, Lankenau Medical Center. With the proper imaging, his case was submitted to the clinical trial screening committee where it was determined

he was a good candidate for the device and could be included in the clinical trial.

Maloney had his mitral valve replaced using a transcatheter approach as part of the APOLLO clinical trial. In fact, he was the first patient in the Philadelphia region to enroll in the trial.

During this delicate procedure, Dr. Goldman made the incision to access the heart while Dr. Gray threaded the heart valve. Under the cardiac imaging direction of Dr. Abramson, the valve was placed and expanded within the mitral valve while his heart was beating. This helped to restore normal blood flow through his heart and to the rest of his body.

Today, Maloney says he is feeling great and has had no side effects or pain. “If you’re told you need a procedure, especially surgery, talk with your doctor about what’s available, and know all your options,” he said. “Someone has to be first, but you need to have faith in your doctors.”

Lankenau Medical Center was one of only 60 sites worldwide to participate in the APOLLO trial, further fulfilling its commitment to provide the Philadelphia region with the most advanced heart therapies available. “It’s exciting to have the prospect of new technology to arm physicians with when treating mitral valve regurgitation,” said Dr. Gray, who also serves as co-investigator of the trial.

For more than 30 years, Lankenau has been a major referral center for patients with structural heart and valve disease. Structural heart disease (SHD) is defined as a defect or abnormality of the heart not involving the coronary arteries.

Expanding access to treatment options for patients

Clinical trials, which are administered by LIMR's Center for Clinical Cardiology, are one of the critical treatment methods to which Main Line Health physicians have access. Currently LIMR offers numerous cardiac clinical trials, most of which are studying the safety and effectiveness of devices and treatments for SHD. (See sidebar for a list of some of these trials.)

Since the 1970s, Lankenau has been leading and participating in cardiac clinical research. "The clinical trials that have led to the approval of almost all of the antiarrhythmic drugs and devices being prescribed and implanted by physicians today were either led by Lankenau, or we actively recruited patients and were part of their seminal publication," said LIMR Professor Peter Kowey, MD, chairman emeritus of cardiology at Lankenau Heart Institute.

Conducting clinical research in SHD provides patients with access to the most up-to-date devices and treatment strategies, noted Dr. Gray who has led several clinical studies leading to FDA approval for new interventional cardiac and peripheral devices. "For some heart patients, research trials can offer an alternative solution to traditional treatments and in most cases, the use of a minimally invasive approach," he said.

"Patients across Main Line Health are receptive to clinical trial participation," said Dr. Goldman. "They know clinical trials offer access to devices and/or procedures that otherwise wouldn't be available to them. In some cases, there literally are no other alternatives to get the newest devices."

Dr. Gray added that, in many instances, Lankenau is the only site in the region where some trials are being conducted, which is why many patients travel great

CONTINUED ON NEXT PAGE

distances to participate. Moreover, Lankenau is the leading site for two national trials under the FDA's novel Early Feasibility Studies (EFS) program, and is participating in a third EFS trial. EFS provides a way for innovators to work directly with trial sponsors, FDA review teams and clinicians to increase the efficiency of cardiac device development. The EFS program typically involves only a small number of trial centers at any given time — three to five nationally — so the fact that Lankenau is currently involved in three of them speaks highly to the clinical research team's impressive track record.

Additional benefits of clinical research

While providing the most advanced care possible to patients will always be the number one priority, offering clinical trials has other benefits, too. "It builds our reputation, which helps facilitate the recruitment of top-notch physicians and

fellows," said Dr. Kowey. "And it enables us to publish articles, which enhances our leadership prowess and recognition in the academic realm."

Dr. Goldman adds, "Research programs also attract new patients to an institution, by being able to offer new technology that isn't available elsewhere."

When asked about the benefit to donors, Dr. Kowey said, "As a direct result of your philanthropy, you will see a significant impact on human life that can be both immediate and long-lasting." ✨

You have the opportunity to significantly advance current and future patient care with a gift to LIMR's clinical trials program. A limited number of naming opportunities for the Clinical Research Center are available, and gifts of all sizes are appreciated.

Structural heart disease clinical trials

With the goal of helping patients live healthier and longer lives, Main Line Health conducts clinical trials that involve participants who are willing to help advance medicine into new frontiers. This partnership between patients and researchers can lead to a better understanding of how to diagnose, treat, and prevent certain diseases or conditions. If you've been diagnosed with a heart condition, talk with a Main Line Health physician about your eligibility to enroll in a clinical trial. The following clinical studies to treat structural heart and valvular disease are currently enrolling patients.

- **PARTNER 3** is a national clinical trial providing continued access to the transcatheter heart valve replacement procedure for low-risk surgical patients with severe aortic stenosis.
- **Portico IDE** is a study for high-risk surgical patients diagnosed with aortic stenosis who are candidates for a transcatheter heart valve replacement. Researchers are evaluating the Portico™ aortic valve system that may allow the surgeon greater precision in positioning the valve during surgery.
- **EARLY TAVR** is a study assessing the safety and effectiveness of the Sapien 3 transcatheter aortic valve replacement (TAVR) in patients with severe aortic stenosis and who do not have symptoms. Patients are randomized to get either a TAVR or standard clinical surveillance.

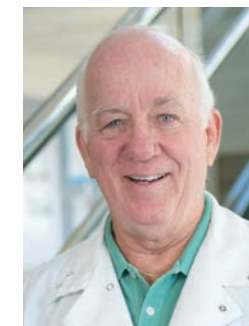
- **The APOLLO** trial is for patients diagnosed with a leakage of blood that moves backward through the heart's mitral valve each time the left heart ventricle contracts, a condition called mitral regurgitation. Researchers are evaluating a transcatheter mitral valve replacement system vs. conventional open heart mitral valve surgery. Lankenau Medical Center is one of only 60 sites worldwide to participate in this trial.
- **The ACTIVE** study will assess mitral valve repair with Edwards Cardioband™ System and guideline-directed medical therapy in patients diagnosed with mitral regurgitation and heart failure. Study enrollment to begin soon.
- **SITRAL** is a study evaluating the surgical implantation of a transcatheter valve in patients diagnosed with mitral valve disease resulting in stenosis and/or regurgitation.
- **Edwards Cardioband™ Tricuspid Valve\*** is evaluating patients with clinically significant, symptomatic functional tricuspid regurgitation. The study assesses the safety and performance of the Cardioband device for transcatheter tricuspid valve reconstruction.
- **ALT-FLOW\*** is evaluating a novel approach to treating patients with significant heart failure by decompressing the overloaded left heart by means of a shunt to the right heart. Study enrollment to begin soon.
- **Conformal CLASS\*** is for patients diagnosed with non-valvular atrial fibrillation at high risk for stroke. The study will evaluate the Conformal Left Atrial Appendage Seal Device, a permanently implanted device designed to occlude the left atrial appendage (LAA) to eliminate blood flow into, and clot passage from, the LAA.

For more on these and other cardiac clinical trials currently enrolling patients at Main Line Health, visit [mainlinehealth.org/cardiacclinicaltrials](http://mainlinehealth.org/cardiacclinicaltrials) or call 484.476.3030.

\* Early Feasibility Study (EFS)

TWO QUESTIONS

Mission: Safeguard Smooth, Efficient Research Operations



Robert Cox, PhD, Professor and Director of Scientific Administration at LIMR

When one thinks about biomedical research, white coats, test tubes and microscopes usually come to mind. But Robert Cox, PhD, goes well beyond those images. In his realm, biomedical

research encompasses everything from equipment like ultrasound machines and sub-zero freezers, to computer hardware and software, to facility needs and improvements. As director of scientific administration at LIMR, Dr. Cox spends his days in perpetual motion. He handles his daily routine with a calm and straightforward manner and a solid sense of humor.

Prior to joining LIMR in 2000, Dr. Cox served as director of the Bockus Research Institute at Graduate Hospital. He was on the faculty of the University of Pennsylvania School of Medicine where he taught Physiology 100, a course taken by all first-year medical students. Thus, he has contributed to the training of thousands of future physicians.

Q: How would you define your role here at LIMR?

**Dr. Cox:** My job is to ensure continual operation of our research initiatives. I make sure that LIMR scientists have top-of-the-line equipment in the most modern labs and that everything is in perfect working order. Staying on top of infrastructure needs takes me into every nook and cranny of

our facility — from labs to the loading dock to the glass-wash facility, and everywhere in between. I try to anticipate needs and stay up to date with research protocols.

Q: What are LIMR's greatest operational needs?

**Dr. Cox:** To stay in the forefront of medical research, we must replace scientific equipment on an ongoing basis. For example, we will soon need to replace several -80° freezers, and we need new biosafety cabinets and centrifuges. We have one shaking incubator and could really use another.

To identify and characterize the chemical structures of molecules, we would like our LIMR researchers to have a new mass spectrometer, which costs about \$60,000. A relatively immediate need is an ultrasound machine for the animal facility, which costs about \$120,000. The machine we currently have will eventually be phased out, which means no spare parts currently are available.

This past year we replaced the X-ray cesium irradiator and were able to use federal funds for about half the cost. We also purchased a new imaging flow cytometer that gives terrific insights into complex biological phenomena in cells. The image quality is first-rate and extremely helpful to the researchers and their work.

That said, our immediate needs are in the range of \$250,000 worth of scientific equipment. ✨

Your donation can help purchase scientific equipment so that LIMR's investigators can continue to advance biomedical research and improve patient health and well-being.

## Updates From LIMR Researchers

Main Line Health Center for Population Health Research (CPHR) at LIMR produced a scientific review of supervised consumption facilities (SCFs) as a means to help combat the opioid epidemic. The study was produced by CPHR at the request of The Office of the Health Commissioner, Philadelphia Department of Public Health. SCFs are medical interventions in which essential services are provided to reduce substance use, the harms associated with substance abuse, and fatal overdoses. **Sharon Larson, PhD**, executive director of CPHR, was invited to give several talks around the city this year on her team's research findings.

Professor **Jim Mullin, PhD**, and a colleague from the University of Pennsylvania were awarded a grant from the National Institutes of Health (NIH) to study the effects of Ebola virus on the gastrointestinal tract.

Professor **Charles Antzelevitch, PhD**, and his team were awarded an NIH grant to study novel treatment approaches for the management of life-threatening cardiac arrhythmias.

LIMR researchers created a simple diagnostic test for an autoimmune disorder that can lead to serious psychiatric symptoms. They isolated and cloned auto-antibodies that may help elucidate the underlying cellular mechanisms of anti-NMDA receptor encephalitis, a type of brain inflammation. **Scott Dessain, MD, PhD**, the Joseph and Ray Gordon Chair in Clinical Oncology and Research, was the lead researcher on this groundbreaking study.

Associate Professor **Laura Mandik-Nayak, PhD**, was named to the Department of Defense's Study Section for its new Lupus Research Program, part of the Congressionally Directed Medical Research Program.

LIMR President and CEO **George Prendergast, PhD**, gave the talk "Cancer and the Microbiome" at the 2018 Imagine Solutions Conference held in Naples, Florida, in February. He was invited by the American Cancer Society to give his talk, which was part of the conference's National Cancer Summit.

Professor **Ellen Heber-Katz, PhD**, a world-renowned expert in regenerative medicine, was an invited guest of the director general of Science Foundation Ireland (SFI) to attend SFI's St. Patrick's Day Science Medal Awards and St. Patrick's Day Global Ireland event in Washington, D.C., in March. The event was hosted by Dan Mulhall, Ireland's ambassador to the U.S. In attendance was Ireland's Prime Minister Leo Varadkar and Dr. France Cordova, director of U.S. National Science Foundation.

## NEWS

### Dr. Susan Gilmour Named Deputy Director of LIMR



Susan Gilmour, PhD, a professor on the resident faculty at LIMR, has been named LIMR's new deputy director. Dr. Gilmour, who has been at LIMR since 1990, is a cancer researcher well known for her work on polyamines, a class of nutrients for which all cancers have a voracious appetite. Throughout her career, her overarching goal has been to

translate her basic research findings into therapies that can contribute to increased survival in cancer patients.

Dr. Gilmour earned a bachelor's degree in biology at the University of Virginia, her PhD in toxicology and pharmacology from Rutgers University/University of Medicine and Dentistry, followed by a postdoctoral fellowship in molecular carcinogenesis at The Wistar Institute in Philadelphia. For more than 26 years, her research has been supported by funding from the National Institutes of Health. She also has received multiple additional grants including those from the U.S. Department of Defense, Boehringer Ingelheim, W.W. Smith Charitable Trust, and Sharpe-Strumia Research Foundation. ★

### LIMR Launches New Website



LIMR's website, [limr.org](http://limr.org), underwent a complete redesign earlier this year. The new site offers:

- Descriptions of the more than 50 clinical trials ongoing at Main Line Health
- Answers to frequently asked questions about clinical studies
- Complete profiles of LIMR's 18 resident faculty
- LIMR's long and storied history and accomplishments through the past 91 years
- Our technologies invented, licensed or available for licensing
- Helpful information for those who would like to contribute to LIMR's research advances, including profiles of four prominent contributors

Even complete past issues of this magazine, *Catalyst*, are available. Bookmark it today: [limr.org](http://limr.org). ★

## BASIC RESEARCH

### Discovery: A Protein That Plays Nice — Until It Doesn't

Researchers at LIMR uncovered a gene that increases the severity of disease in chronic inflammatory conditions, including rheumatoid arthritis, lupus, macular degeneration and cancer. Specifically, their studies showed the gene RhoB helps cells respond to certain stresses and will actually promote disease if those stresses are unresolved and thus become chronic in nature.

Think of RhoB like the quiet kid in the playground who typically helps maintain the peace with other children. But when continually provoked, that same child turns hostile and wreaks havoc on the group's stability. You're left wondering: "Wow, I didn't realize how influential this child could be."

"RhoB is not a crucial player in healthful states, but when stresses accumulate we've shown it's very important in promoting a pathogenic immune response; that is, it's capable of increasing the severity of diseases," said Lisa Laury-Kleintop, PhD, LIMR associate professor. "RhoB acts as a stress-response mediator that influences the severity of inflammatory signals. It doesn't seem to be involved usually in normal immunity. But in chronic immune states such as autoimmune disease it is critical for autoantibody production and inflammation. These features make RhoB a good subject to block as a general treatment for many autoimmune diseases and age-associated inflammatory diseases."

#### A key player in autoimmune disorders

Autoimmune disorders and other chronic inflammatory diseases are skyrocketing in incidence globally. At LIMR, researchers seek to identify molecules that modify inflammatory severity in such diseases. In one important line of work, Dr. Laury-Kleintop has led preclinical studies demonstrating that blocking the RhoB protein can strongly blunt development of rheumatoid arthritis (RA), a debilitating joint disorder, and lupus, a disease caused when the immune system turns on the body and attacks its own tissues.

As published last year, LIMR researchers showed that laboratory mice bred to be without the RhoB gene had a markedly decreased incidence of arthritis and disease-causing autoantibodies. And when other mice develop arthritis and are given an anti-RhoB-targeted treatment, the disease subsides to a large extent. Interestingly, the treatment doesn't appear to affect a normally functioning immune system — a stark contrast to all other treatments for autoimmune disease, which greatly increase risks of infection and other undesirable side effects.

"Our observations using two preclinical autoimmune models, RA and lupus, suggest a function for RhoB in specifically altering the production of autoantibodies that contribute to autoimmune disease," said Laura Mandik-Nayak, associate professor at LIMR and lead author of the study. "When we targeted RhoB with an antibody, we reduced the



Lisa Laury-Kleintop, PhD, LIMR associate professor (center), discusses the implications of the latest discoveries in her laboratory with her biomedical research assistants Summer Sedano (left) and Kaylend Manley.

development of autoantibodies in both models. This was a surprising result, and we're excited about its potential therapeutic implications."

#### Blocking blood vessel formation

In addition to work on RhoB and autoimmune disorders, research has shown the benefit of blocking RhoB's actions on other disorders, such as diabetic retinopathy and macular degeneration. "Our antibody against RhoB that arrests autoimmune disease also appears to inhibit the growth of abnormal blood vessels seen in the retinal disease 'wet' macular degeneration, which occurs often in the elderly," explained Dr. Laury-Kleintop.

This line of work dovetails with studies of RhoB in cancer, pioneered in part at LIMR, where it was shown that RhoB is needed to drive formation of blood vessels that tumors need in order to grow. Furthering the connection between RhoB and disease, Dr. Laury-Kleintop noted that levels of RhoB have been reported to rise naturally during aging and that high levels of RhoB are found in other inflammatory diseases, such as chronic kidney disease where it appears in the urine of patients, perhaps useful as a biomarker.

In keeping with a focus on translating findings in the lab into the clinic, LIMR developed and patented antibodies that interact with RhoB and limit its function in preclinical models of disease. "We're working with a New England-based biotech company that we hope will license the technology and bring it to clinical trials," noted Dr. Prendergast. "Through such a partnership, we seek to test the anti-RhoB therapy in autoimmune diseases like RA and lupus, or perhaps also in cancer or ocular disorders of the retina. We believe this unique agent to treat inflammatory diseases in a specific manner, leaving the normal immune system intact, has significant potential to improve patients' lives and well-being." ★

Your donation can help advance the development of this therapy that has already demonstrated great potential and has the capacity to improve patients' lives in the future.

## The Long-term Value of Investing in Research

In medicine, hope springs from research. At the Lankenau Institute for Medical Research (LIMR), this is our core precept. We know that nearly every life-saving medication, medical device and health care procedure used today by a clinician to help a patient started from a researcher's experiment. Someone at some point had a new thought, "I wonder if *this* might work." That's the first step in improving medical practice — or as biomedical scientists say, in moving from bench to bedside.

Research requires not just time, creativity and great diligence. It also requires financial support. Your investments in research at LIMR can have a significant impact on health care. Our scientists are expanding the frontiers of human health, blending knowledge-based academic culture with invention-based entrepreneurialism — our unique "acapreneurial" culture.

- **In cancer research**, our faculty focus on disease modifier genes and experimental drugs that influence inflammation and immunity. These drugs empower new types of immunotherapy with the capability to eradicate metastatic disease. Our scientists are globally recognized for their expertise in tumor metabolism and immune modulation in the tumor microenvironment, putting LIMR at the forefront of the immunotherapy revolution in cancer. Our clinical researchers study the latest experimental therapies developed by pharmaceutical groups and the National Cancer Institute, including molecular targeted therapies that attack the specific genes in a patient's specific tumor (also known as personalized medicine).
- **In cardiovascular research**, our faculty focus on new drugs and devices to correct abnormal heartbeat (arrhythmia), treat and prevent heart attacks and strokes, and avert heart failure. They also conduct bioengineering studies aimed at growing new hearts from a patient's own cells. Our world-renowned clinical researchers conduct their studies at the Lankenau Heart Institute, one of the top-performing cardiovascular medicine and surgery centers in the country.
- In other areas, LIMR investigators use the knowledge they have created to devise new experimental treatments for **arthritis, diabetes, lupus, infectious disease, neurological disorders** and **gastrointestinal disease**. We also have international leaders in **regenerative medicine** and **population health** as part of our vision to create patient solutions of the future.

Every day our researchers seek to not only advance scientific discoveries in ways that can most rapidly impact patient care today, but to also train the next generation of scientists so that biomedical innovations can benefit the health of future generations of patients.



Peter H. Havens, Chairman, Board of Trustees, Lankenau Institute for Medical Research, part of Main Line Health

### Today's investment, tomorrow's cures

The challenge we face is that the mechanisms that fund research activities in this country have changed dramatically. For decades most biomedical research funding came from the public sector, most notably the National Institutes of Health (NIH), an agency within the U.S. Department of Health and Human Services. Beginning around the turn of this century, the percentage of NIH applicants awarded grant funding has declined in real terms, as other pressures on federal entitlements and needs have increased.

To put our struggle into perspective, one important grant-funding mechanism from the NIH on which many biomedical investigators depend has significantly decreased over the past 20 years. *Today, fewer than one-fifth of the scientists who apply for this support actually receive it.*

As a result, biomedical researchers must secure funding alternatives in the private sector or abandon their research altogether. Who knows what future cures, medical devices and new standards of care will be left undeveloped simply due to lack of funding?

Through the ages, our nation has prided itself on its spirit of innovation and risk-taking, driven by the boundless energy and optimism of its people. In the biomedical arena, U.S. researchers account for over 75% of medical innovation worldwide. But this leadership is under great fiscal pressure. If, like me, you believe in the inherent value of the foundational attributes of research needed to drive innovation, I encourage you to invest in the people with the smartest and most promising ideas by donating to LIMR.

Your support of LIMR's continual drive to advance medicine will not only benefit us today, but our children and grandchildren tomorrow.

Thank you. ✨

### CORRECTION



In our Spring-Summer 2018 edition of Catalyst magazine, we published a story about the Gordon Family who has been instrumental to LIMR and Main Line Health. The photo caption should have read as follows: *The Gordon Family (from left): Scott, Ray, Joseph, Leila and Hunter. We apologize for inadvertently swapping the names of Scott and Hunter Gordon.*

### LIMR BOARD OF TRUSTEES

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## Your Investments in Research at LIMR Can Have a Significant Impact

You can designate one of the Lankenau Institute for Medical Research's special funds to help precisely target your contributions to health care research that matters to you.



### Immunotherapy Pioneer Fund

Immunotherapy entails the prevention or treatment of disease with substances that manage the immune system's capabilities to clear disease, rather than attacking the disease itself. LIMR has spearheaded unique studies of disease modifier pathways that impact immunity and cancer progression, developing new drugs to target them. Your generous contributions to this fund will help us to continue to advance these innovative directions.



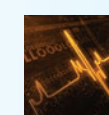
### Regenerative Medicine Vision Fund

Regenerative medicine deals with new processes of replacing, engineering or regenerating human tissues to restore or establish normal function. LIMR is privileged to have one of the pioneers in regenerative medicine, Professor Ellen Heber-Katz, PhD, who has discovered an experimental drug approach that may eliminate a need for stem cell transfer. Your contributions to the Regenerative Medicine Vision Fund will help further her research, enabling her and her team to continue groundbreaking work on this approach that holds enormous promise for the future of health care.



### Biotechnology Innovation Fund

This fund supports work on biological molecules engineered by LIMR scientists that can enhance the diagnosis, prognosis and treatment of disease. Your generous contributions to this fund can help advance the work of our researchers, including, for example, our studies on targeted nano-carrier therapeutics as experimental treatments for cancer, and our work on cloned human antibodies as treatments for infectious disease, cancer and neurological illnesses.



### Cardiovascular Breakthrough Fund

Cardiovascular disease accounts for nearly 800,000 deaths in the United States every year, or about one of every three deaths. Additionally, about 92 million American adults are living with some form of heart disease or the after-effects of stroke. LIMR is home to world-renowned cardiovascular researchers. Your gift to this fund will further research that could benefit the lives of millions of heart disease and stroke patients.

### LIMR Unrestricted Fund

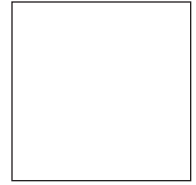
Unrestricted gifts to LIMR are important in enabling opportunities to target your gift where our doctors and scientists believe it could have the greatest impact.

To donate to LIMR, please use the reply envelope inserted in this publication. You also can donate online at [www.limr.org](http://www.limr.org), and click on Supporters. Or call Rebekah Sassi, executive director of the Lankenau Medical Center Foundation, at 484.476.8067 or email [sassir@mlhs.org](mailto:sassir@mlhs.org).



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