



Main Line Health®

LANKENAU INSTITUTE FOR MEDICAL RESEARCH

# CATALYST

FALL 2020



  
**Susan Gilmour, PhD**

  
**Laura Mandik-Nayak, PhD**

  
**Meghan Buckley, MS**

## WOMEN IN SCIENCE

Three of LIMR's many female researchers share their insights, advice for younger generations and the values that help organizations advance. | [Pages 3 & 4](#)

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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).

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## TRAINING TODAY'S CLINICIANS AND TOMORROW'S SCIENTISTS

For this ninth edition of *Catalyst* magazine, I want to take a moment to update our donors on the degree to which the Lankenau Institute for Medical Research (LIMR) enhances the work of our clinical colleagues at Main Line Health along with the larger research community. We do this not only by advancing biomedical research into new and exciting frontiers, but also by training present-day clinicians and future scientists. Following are just a few examples.

As part of their training, Main Line Health **medical and surgical residents** can perform one-month rotations in LIMR resident faculty groups, including those engaged in improving population health in our area, to help develop experimental treatments for cancer, cardiovascular and autoimmune diseases, gastrointestinal disorders, and non-scarring tissue regeneration. These rotations also can lead to more extended periods of research that help residents compete more effectively for coveted specialty fellowship positions.

Main Line Health **specialty fellows** — for instance, in cardiology, hematology/oncology or gastroenterology — perform three- to six-month research rotations at LIMR. This training empowers a wonderfully symbiotic relationship with the laboratory-based groups whereby the fellows assist the investigations that are progressing on clinical paths of development. At the same time, the fellows gain a broader and deeper understanding of the lab-based research that seeded nearly all of today's treatments and that generally drive the progress of future therapies.

Importantly, these research rotations help enable the continued accreditation of Main Line Health's graduate medical education programs, where research is a required

element for the fellowship programs in particular. In this way, LIMR is a key element in the ability of Main Line Health to educate, recruit and retain the best physicians offering the best care — which studies have shown occur at health systems where research is conducted.

Our educational initiatives at LIMR extend beyond clinical trainees to encompass **graduate and undergraduate students** from local biomedical science programs. Several LIMR labs are engaged in training graduate biomedical students who are in the thesis research stage for their doctoral degrees. Under LIMR's formal arrangement with Drexel University, more than 25 of the school's undergraduates have performed six-month research internships in LIMR labs over the past decade, a program supported in part by a grant from the Lankenau Women's Board. Additionally, LIMR has a summer undergraduate training program in the labs, also supported by the Lankenau Women's Board.

Under the tutelage of our principal investigators, these graduate and undergraduate students gain important laboratory skills they will need later while they pursue master's or doctoral degrees in biomedical science.

In these and many other ways, LIMR gives back to the health care and scientific communities by helping to train the next generation of clinicians and scientists.

As we prepare to close out a challenging but successful year at LIMR, I wish you and your loved one all the joys of the holiday season and a safe, healthy and prosperous 2021. ✨

### Fundraising Challenge Alert

As mentioned in the last issue of *Catalyst*, a group of LIMR Board Members — spearheaded by Chairman Peter Havens and his wife Louise, Jonathan Fox and Suzanne Markel-Fox, and Leila Gordon — have generously initiated a 1:1 fundraising challenge match to support LIMR's COVID-19 Research Fund. Together, they have pledged a gift of \$80,000 if an additional \$80,000 can be raised by the end of 2020. We are well on our way to meeting the challenge! You can accelerate this important coronavirus research by making a gift today. For more information on the LIMR COVID-19 Research Fund, see inside back cover.

## Update: LIMR Investigators Continue to Fight COVID-19

By now it's clear that the path out of the pandemic runs through the biomedical laboratory. As we noted in the summer edition of *Catalyst*, several LIMR investigators pivoted their research teams to battling COVID-19 and have been working hard to advance studies to better treat and prevent the virus. Several are working with federal agencies and research collaborators around the country. Following is an update on their progress.

### Basic research

Professor **Scott Dessain, MD, PhD**, and colleagues used a LIMR-developed technology to identify and copy the most protective antibodies from 30 consenting Lankenau patients who recovered from COVID-19. Notably, LIMR was one of the first research centers to provide those much-needed antibodies to BARDA, the federal agency that responds to chemical, radiological and biological threats, for use as national standards for infection testing by other researchers. The agency expressed its gratitude for LIMR's expertise and quick response during the pandemic.

Professor **Ellen Heber-Katz, PhD**, is revisiting a generalized vaccine strategy she previously developed to assess possible use against any virus, including coronavirus. A peptide-lipid-liposome compound she developed was shown in animal studies to elicit a unique and powerful T-cell response that protected the animals from lethal doses of herpesvirus and rabies. Her team has since modified the concept, with the goal of incorporating a novel adjuvant to improve the response to her vaccine by elderly individuals, who are most at risk of COVID-19 mortality but often respond more weakly to vaccination compared with younger patients. At the personal encouragement of NIH's Dr. Anthony Fauci, Dr. Heber-Katz and collaborators at University of Colorado are advancing this important work.

**Melvin Reichman, PhD**, director of the LIMR Chemical Genomics Center, is part of a consortium funded by the Canadian Institutes of Health Research to discover novel combination-drug treatments for COVID-19. His role involves designing experiments to identify SARS-CoV-2 antiviral compounds that synergize with the drug remdesivir. Other project team members include experts in infectious disease research from U.S. and Canadian institutions.

Also, Dr. Reichman, in collaboration with Dynamis Pharmaceuticals, Jenkintown, Pa., received a grant from the Ben Franklin "Save Our Startups" program to study a treatment for dangerous immune reactions, known as "cytokine storms," in COVID-19 patients. The medication, meglumine, is being jointly developed by LIMR and Dynamis for treating diabetes complications such as kidney and liver dysfunction, known to be underlying conditions in COVID-19 fatalities.



Paul Gilman, MD, professor and director of the Clinical Research Center at LIMR.

Preclinical studies done by Professor **James Mullin, PhD**, and his team found that vitamins A and D can tighten lung tissue barrier functions as an innate defense against viral infection. Research examining the vitamins' ability to reduce lung inflammation are underway, as are studies of how COVID-19 defeats barrier functions in the lung tissue lining. The latter project is being conducted with collaborators at University of Pennsylvania and University of Texas. Overall, they seek to show how these vitamins may offer inexpensive and effective treatments to reduce mortality and improve patient outcomes.

Research Assistant Professor **Sunil Thomas, PhD**, is working on a COVID-19 structural vaccine and a simple diagnostic test. With collaborators at Kansas State University, he is using the new principles of structure-based design, which seeks to identify viral immunogens that can elicit the most protective antibody responses. The next step is to test the vaccine concept in animals.

### Clinical research

The Clinical Research Center at LIMR, under the direction of **Paul Gilman, MD**, is participating in a program to administer ruxolitinib, a medication that inhibits cytokine storms. As of early September, nine patients had been registered in this important program.

Main Line Health also is participating in a global observational study of COVID-19 patients admitted to intensive care units. The ECMOCARD study is collecting and describing myriad clinical aspects of the disease, such as severity of respiratory failure and risk factors. Patient data is anonymous to protect privacy. ✨



## Leading the Way Among Women in Science

From its earliest days, LIMR has benefited from the research breakthroughs of its female scientists. As just one example, embryologist Beatrice Mintz developed in the 1960s the first mammal composed of genetically different cell populations — a chimeric mouse — a stunning achievement that led to the creation of the first transgenic species now used globally in research and agriculture.

LIMR continues to lead in its career-advancing opportunities for women. Of the Institute's 85 employees who are researchers, 47 are women. LIMR's gender diversity is important, because extensive research has shown that diverse groups consistently outperform homogenous teams. In any field, but most especially STEM fields (science, technology, engineering and math), individuals from varied backgrounds often have personal experiences that can assist their conception of new and potentially groundbreaking solutions. That's why diversity in the ever-evolving culture of research has always been key to intellectual advancement.

We asked three women researchers at LIMR what compelled them to pursue scientific careers, what women bring to the table of a research organization, and what advice they have for younger women considering following in their footsteps. Meet the panelists:

- **Susan Gilmour, PhD**, professor and LIMR's deputy director, is a world-renowned cancer researcher who is defining how polyamines and thrombin support and accelerate malignancies.
- **Laura Mandik-Nayak, PhD**, associate professor, is developing a new therapeutic strategy to treat autoimmune disorders such as rheumatoid arthritis and lupus.
- **Meghan Buckley, MS**, LIMR's biostatistician, is an expert in developing valid study designs, data collection and analyses.

### What drew you to a career in STEM?

**Dr. Gilmour:** My family emphasized education. I'm the oldest of five girls, and we were all encouraged to study and have careers. My father was a researcher who worked during WWII on the Manhattan Project. After the war he developed textiles for DuPont. Science and math were emphasized by my father as being important, and that suited me, since I'm a detective at heart. For me, biology was so interesting. It's dynamic and fluid, with exciting interactions of the different biological systems.

**Dr. Mandik-Nayak:** I also came from a family that valued education. My mom was a science and math teacher, and my dad, an electrical engineer. As a kid I would search our yard for frogs and other small animals. I was always interested in biology, so a research career was a natural progression. As a college freshman, I had the opportunity to work in a biology lab. I've been in a lab ever since.

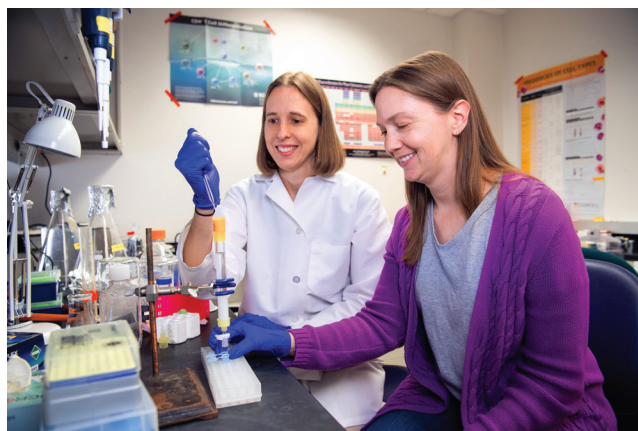
**Ms. Buckley:** I fell into science. I always liked math, but I didn't see myself pursuing a career in it. In my senior year of high school, I took a statistics course, and I saw how it could be applied to many fields. I then focused on biostatistics after internships in other industries during college.

### During your education, were you ever discouraged from pursuing a career in STEM, and if so, how did you respond?

**Dr. Mandik-Nayak:** I was never discouraged. I grew up just before STEM was getting defined. I was always interested in science. In retrospect, I guess I was either lucky or stubborn — probably a little of both.

**Ms. Buckley:** I always had someone in my corner, whether it was a teacher or someone in the field.

**Dr. Gilmour:** I don't discourage easily. Maybe that's a trait all scientists have or should have. My father always encouraged me to be a scientist, and my mother taught me how to write, which is an important skill to have in any scientific field. You must communicate what you discover.



Dr. Mandik-Nayak (right) consults with Lauren Merlo, PhD, research assistant professor.

#### Did you have a mentor then, and what salient advice did you carry from him or her into your career?

**Ms. Buckley:** I did a summer internship at Reading Hospital, near my childhood home. My boss was the director of nursing research. This was my first experience seeing a woman in a leadership role. She was not just doing research and pursuing her PhD in nursing, she also conducted herself in a professional manner and was a great leader. I was in awe. She showed me how I could see myself in the future. She remains a great friend.

**Dr. Mandik-Nayak:** In graduate school, there were many women graduate students, but few at the professor level. There were a couple, and they had strong, driven personalities and implied that women can have families or careers in science, but not both.

But my thesis advisor, who was successful and smart, also was married and had a baby. Her advice: Don't get discouraged. She showed me there are many ways to be a good scientist and that one could achieve a work-life balance, even though she herself was of the era when that was rare.

**Dr. Gilmour:** I was influenced by many people. During my postdoctoral training at the Wistar Institute, my advisor, Dr. Tom O'Brien, introduced me to the research field of polyamines, and I could see how broad its applications could be. That introduced me to a worldwide community with whom I've been interacting my whole career. It spans not just cancer research but every aspect of biomedical research.

I like the renaissance approach to life. My advisor taught me to look at things differently, to veer off the mainstream, find some new angle. That's the fun part of research. He also was a good writer, shared his grant applications for me to read, and then said, "Now write your own." Good sink-or-swim lesson.

#### Why is it important for organizations that focus on research to employ and fully engage women?

**Dr. Mandik-Nayak:** When I was a grad student, I would have answered that question differently than I do now. Then I would have said a person's gender shouldn't matter. But now I recognize that women tend to interact differently from men. You see it in meetings, in how they approach questions, and I think you need both types of approaches to have a healthy organization. That said, women do still tend to step back, especially when men talk over them. But good leaders know you shouldn't listen only to the loudest voice in a room but encourage the views of all.

**Dr. Gilmour:** I agree with you, Laura. In general, women approach problems differently from how men typically do. For me, I've learned to deal with the confidence issue. As a young woman, I didn't have enough confidence, and it was difficult for me to speak up. Then I realized you have to, because some people will monopolize a conversation, without having too much to back that up. Women offer another perspective that is often more team-oriented.

**Ms. Buckley:** I've been in my field for only five years, and I'm still finding my footing. At Main Line Health, I am the only one with this exact skill set of biostatistics. Still, some people want to compel me to work differently. My nature, like that of many women, is to please others, but sometimes I have to say no. It helps when I see someone like my boss, Professor Sharon Larson. From her I've learned to say, "I'm the expert. I'm happy to help, and we'll do the task the right way."

#### What advice would you offer a young woman considering a STEM career?

**Dr. Gilmour:** Challenge yourself. To me, it's important to feel as if I'm making a difference in the world. That will make you feel more fulfilled and happier in life than if you were just working for a paycheck.

**Ms. Buckley:** Network as early as possible. Reach out to those doing jobs you're interested in. Ask to shadow them or for an internship. The worst they can say is no.

**Dr. Mandik-Nayak:** During the holidays last year, I visited with family who have a daughter in middle school. Her mom proudly relayed that her daughter was doing well in science. The daughter was embarrassed and told her mom not to say that, I guess because boys were around. My reaction to her was: Don't be afraid to be smart! Use your talents.

**Dr. Gilmour:** I admit I was one of those kids, Laura. In my early career, after being awarded grant funding I would often tell people I got lucky. But I didn't just get lucky, I worked hard. ✨

## Helping Cancer Patients Thrive During Treatment



A treatment administered during a clinical trial has relieved the chemotherapy-induced nerve pain Clara Tracy Williams was experiencing.

Since its founding in 1927 as one of the first research centers in the nation devoted primarily to the study of cancer, LIMR has made significant discoveries that have informed therapeutic approaches to the disease. In recent years, witnessing the ongoing progress made in survival outcomes, LIMR investigators have broadened their focus to studies related to the challenges posed by therapeutic side effects.

"Researchers at LIMR and around the world continue the valiant work of developing potential cancer treatments," said Dr. George Prendergast. "But at LIMR we're special in that we're expanding our studies to help relieve the symptoms of cancer treatments and the long-term consequences of surviving cancer. This is important, so patients don't just survive their cancers but continue to thrive in life."

#### Potential treatment for chemotherapy-induced neuropathy

LIMR launched this year a randomized clinical trial that seeks to determine the effectiveness of a treatment for chemotherapy-induced peripheral neuropathy (CIPN), a common complication of cancer therapy. Neuropathy, a dysfunction of nerves, typically causes pain, numbness or weakness in the hands or feet. Therapeutic approaches to relieve CIPN so far have not been widely effective.

Researchers are taking a novel approach to the challenge. They seek to determine if treatment with cannabidiol (CBD), a naturally occurring compound in the hemp cannabis plant, can reduce the severity and duration of CIPN symptoms.

While CBD is not FDA-regulated, it is commercially available for human consumption. The U.S. Farm Bill, signed into law in 2018, changed federal regulations relating to the

production and marketing of hemp, and the product was removed from the list of controlled substances. Hemp is not cannabis (marijuana) and is not intoxicating.

Marisa Weiss, MD, LIMR adjunct investigator and director of breast radiation oncology at Lankenau Medical Center, is the principal investigator of the Coala-T-CBD Study ongoing at Main Line Health. She and her team are studying if treatment with CBD can relieve CIPN in patients diagnosed with non-metastatic cancer of the breast, ovary, colon or endometria.

Clara Tracy Williams, a retirement benefits advisor from Lansdowne, Pa., who was diagnosed with breast cancer and is participating in the study, says her neuropathy decreased on the treatment. "I'm participating in the trial because I want to have access to the most treatment options for my cancer and be able to help the next patient," she said.

#### Blood test predicts delayed-onset nausea

Relieving treatment side effects is also the goal of MyNauseaRisk, a LIMR-developed blood test that can objectively and reliably predict which patients are most likely to experience delayed nausea after chemotherapy. Not all patients experience nausea equally. For some, it's almost non-existent, while for others it's debilitating. Being able to predict which patients are likely to suffer from nausea has been a challenge for physicians.

The blood test was developed by LIMR Assistant Professor U. Margaretha Wallon, PhD. "Patients who we've determined from the test are at a lower risk of delayed-onset nausea may be treated with a modified regimen of anti-nausea drugs, sparing them the ill effects of those medications," said Dr. Wallon, whose study was funded by The W.W. Smith Charitable Trust.

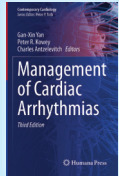
The MyNauseaRisk test detects in individuals a naturally occurring variation of glutathione recycling efficiency (GRE) in red blood cells, which the team discovered is correlated with the incidence of patient-reported, delayed, chemotherapy-induced nausea. The patented test they developed to detect GRE correctly classified almost 90 percent of patients with nausea sensitivity — a stunning and unprecedented finding.

Earlier this year, LIMR signed a licensing agreement with MYNARI Biomedical, a biotech startup that will commercialize MyNauseaRisk. Steve Davis, CEO of MYNARI Biomedical, said he plans to get the diagnostic test on the market as soon as possible.

Paul Gilman, MD, director of the Clinical Research Center at LIMR, noted: "Our goal with both the CBD clinical trial and MyNauseaRisk is to help Main Line Health's cancer patients not just endure their treatments but to continue to live active and full lives." ✨

## Updates from LIMR Researchers

Distinguished Professor Emeritus **Charles Antzelevitch, PhD**, and **Jose Di Diego, MD**, research professor, were awarded a grant from the National Institutes of Health for their proposal to develop a whole heart model of life-threatening J wave syndromes and novel therapeutic approaches for the cardiac arrhythmias caused by the disorders.



Professors **Gan-Xin Yan, MD, PhD**; **Peter Kowey, MD**; and **Dr. Antzelevitch** were the editors of the new textbook *Management of Cardiac Arrhythmias*, 3rd ed. (Springer 2020).

Two LIMR teams demonstrated in preclinical studies the positive impact of two different types of adjuvant therapy to improve the efficacy of widely used anti-PD-1 cancer immunotherapies. The teams were led by Deputy Director **Susan Gilmour, PhD**, and Associate Professor **Alex Muller, PhD**.

Associate Professor **Laura Mandik-Nayak, PhD**, and her team pointed the way to a precision medicine approach to rheumatoid arthritis (RA). They delivered in a highly targeted fashion a low-dose therapy for RA using a nanocarrier that inserted the treatment directly into B cells.

In preclinical studies, Professor **Ellen Heber-Katz, PhD**, and her team administered their specially designed therapeutic hydrogel at the onset of periodontitis and successfully promoted alveolar bone regeneration as preclinical proof of concept for this regenerative medicine.

Professor **Sharon Larson, PhD**, executive director of the Main Line Health Center for Population Health Research at LIMR, moderated last spring a remote meeting of the statewide committee tasked with helping to develop the next Pennsylvania State Health Improvement Plan.

Clinical research from Professor **James Mullin, PhD**, and colleagues showing that zinc may be a chemopreventive for the disorder Barrett's esophagus was selected as the lead story in the summer edition of the National Cancer Institute's *Nutrition Frontiers* e-newsletter.

Immunome (IMNM), a company founded by LIMR Professor **Scott Dessain, MD, PhD**, and spun out of the LIMR biotech incubator, filed for a \$30+ million initial public offering (IPO).

## NEWS

### Renowned Clinician to Vocal Artists Brings His Research to LIMR



**R**obert Sataloff, MD, DMA, the preeminent physician for vocal artists around the world, brought to Main Line Health last year not only his thriving surgical practice but also his prodigious research initiatives. He serves as director of otolaryngology and communications sciences research at LIMR. Otolaryngology is a medical specialty focused on the ears, nose and throat.

Communications sciences involves the use of techniques and treatments to assist patients with communication impairments.

Dr. Sataloff has contributed to more than 1,000 papers and 68 books, and he is the editor in chief of a major journal for the field. "My research has resulted in many new approaches to diagnose and treat vocal artists," said Dr. Sataloff, who is recognized as one of the founders of the field of voice. He wrote the first modern comprehensive article on the care of singers and the first chapter and book on care of the professional voice. He has influenced the evolution of the field through his own efforts and through the Voice Foundation for nearly four decades.

Dr. Sataloff also trains the next generation of clinicians via the laryngology/care of the professional voice fellowship program at Lankenau Medical Center — a program he brought with him from Hahnemann University. Fellows work closely with Dr. Sataloff in both clinical activities and research.

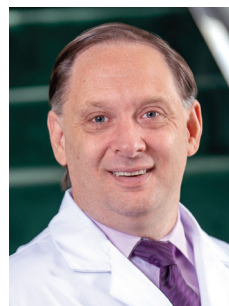
### Esteemed Cell Biologist Joins LIMR Faculty

**W**e welcomed to LIMR a new member of the resident faculty, Anthony Ashton, PhD.

Dr. Ashton studies RNA alternate splicing (AS), a cellular process for changing genomic instructions into functional proteins. AS plays an important role in the regulation of gene expression, protein diversity and ultimately, in species evolution. Indeed, it's changes in AS, not the size of the genome, that have driven the evolution and biological distinctiveness of homo sapiens.

Dr. Ashton seeks to understand the mechanisms of action for AS as they relate to cardiac disorders and cancer and to develop diagnostic tests that could determine clinical outcomes such as disease onset and progression.

Dr. Ashton previously served as the scientific director of the Division of Perinatal Research at the Kolling Institute of Medical Research, University of Sydney, Australia. He was awarded his PhD in vascular biology from the University of New South Wales in Australia, and completed his postdoctoral training in cardiology at Albert Einstein College of Medicine, New York City. ✨



## Q&A

### Behind the Scenes: Ensuring Safe and Efficient Research Operations



**Matt Finley, PhD, MBA**, director of LIMR research administration.

**W**hile LIMR's investigators bend over microscopes and computer screens in their labs, intent on finding solutions to our most pressing health concerns, including COVID-19, Matt Finley strives to ensure that those labs and all of their ancillary equipment continue to operate safely and effectively.

As director of research administration, Dr. Finley is responsible for the oversight of several LIMR departments,

including plant operations, the vivarium, and equipment maintenance, as well as programs that include technology transfer, and non-clinical research agreements.

Appointed to his position earlier this year, Dr. Finley has experience that ranges from academic and translational science to clinical and industrial roles. Prior to joining LIMR, he held positions of increasing responsibility in biotechnology companies. He earned his PhD in molecular biology and genetics from Temple University School of Medicine, followed by a cardiac immunology postdoctoral fellowship at Children's Hospital of Philadelphia. His MBA was awarded from the University of Maryland.

**Q: What prompted you to bring your scientific and operational expertise to LIMR?**

**Dr. Finley:** Having worked in industry for the past decade, I wanted to challenge myself in a new environment. LIMR is unlike any other non-profit research institute in our area. Our investigators focus not only on determining the mechanisms of disease, they also advance solutions to the clinic to improve patients' health. I'm excited to be on a team where that's the focus.

**Q: While working with LIMR's scientific investigators, what has struck you as most noteworthy for donors and others interested in Main Line Health's research advancements to know?**

**Dr. Finley:** Ensuring that lab discoveries lead to improvements at the bedside means knowledge gained at LIMR can help Main Line Health patients directly. Also, the collaboration among LIMR investigators has proven to

accelerate progress. By combining experience, researchers devise unconventional approaches to diagnose and treat disease.

At the start of the COVID-19 pandemic, many LIMR faculty members — staying true to the bench-to-bedside philosophy — swiftly pivoted their research to battling the virus. It isn't easy for labs to switch gears with only a few weeks' notice. Considering the timeline, I'm impressed with my colleagues' achievements. While not working directly with patients during these difficult days, the LIMR faculty and their lab teams have been working hard in the background to empower our frontline heroes.

**Q: What are LIMR's greatest operational needs in the future, and how can donors help?**

**Dr. Finley:** We've been able to adapt to our current environment and keep our team safe, but we face challenges.

Some of the core systems that support research at LIMR — including COVID-19 research — are in need of upgrade and modernization for both efficient operation and long-term stability. These include our water-purification systems that deliver ultra-pure water needed for lab experiments; a cryogenic storage library where clinical samples and novel cells are archived; and scientific equipment, such as a mass spectrometer for measuring mass-to-charge ratios of molecules within samples — all critical equipment that's needed now.

Clinical Laboratory Improvement Amendments (CLIA) are U.S. federal regulatory standards that apply to all clinical lab testing performed on humans in the United States, except in clinical trials and basic research. A CLIA lab at LIMR could provide many future benefits, including performing diagnostic and other patient tests being developed by LIMR scientists.

We've learned many things during the current pandemic, including the critical importance of cross-functional support between researchers and clinicians to successfully tackle a disease like COVID-19. With a fully licensed CLIA lab at LIMR, testing could be shared between LIMR's and Main Line Health's clinical labs. As is the case with COVID-19, delayed testing results can make it difficult to stop disease spread. Having a CLIA lab set up, able to create novel diagnostic tests, and ready to respond could prove lifesaving in the event of a health emergency. And when not in emergency use, the lab could provide clinical trial results for new and ongoing studies at LIMR.

Lastly, it's become obvious in recent years that LIMR's limitations on space hinder our ability to grow beyond our current walls. Our labs are nearly filled to capacity, which makes it difficult to add new faculty and expand into new research programs. I share the vision of ensuring that LIMR remains a prominent research institute both in the region and the country. ✨

## Inspired by LIMR's Rapid Response to the Pandemic's Scientific Challenges



A special thank you to Suzanne Markel-Fox and Jonathan Fox who helped establish LIMR's COVID-19 Research Fundraising Challenge.

As a healthcare and biomedical research professional and longtime Narberth, Pa., resident, Jonathan Fox's nomination to the LIMR Board of Trustees in 2003 was a natural fit. Both Jonathan, a cardiologist by training, and his wife, Suzanne Markel-Fox, a psychologist/health information technology expert, used Lankenau for their medical care, despite working for another area health system. They experienced the high-quality, comprehensive, caring and professional environment for which Lankenau and Main Line Health are known. And their high regard for Lankenau, Main Line Health and LIMR continues, despite their move to San Francisco seven years ago.

Jonathan has worked in biomedical research for more than 40 years. From academia to large pharmaceutical and biotechnology companies, he has seen a broad spectrum of how research is done. First under former LIMR President Vince Cristofalo, and now under the current President and

CEO George Prendergast, Jonathan has witnessed LIMR evolve into an "acapreneurial" model — a mix of academic culture and invention-based entrepreneurialism.

This environment, he strongly believes, empowers what he calls the "highly skilled, insightful and industrious" faculty of LIMR to pursue innovative research without much of the usual administrative and academic obstacles found in other settings. Jonathan shared: "A tight focus, lean administrative model, and strong support by the Main Line Health community pulling together toward shared goals sustains and grows LIMR as a small but very effective research institute."

More recently, Jonathan and Suzanne were particularly impressed with LIMR's response to the pandemic's challenges. "LIMR transformed itself almost overnight from a group of talented investigators focused on chronic diseases of aging into a strike force focused on ways we can better diagnose, track and treat victims of this terrible pandemic," said Jonathan. "The researchers' particular focus on supporting Main Line Health's frontline health care workers who put themselves at risk every day to serve the critical needs of our patient community and their families is nothing short of remarkable."

Jonathan was so energized and inspired by LIMR's rapid pivot to COVID-focused research — which he described as embodying a spirit of urgency, dedication to scientific rigor, and commitment to making a difference — that he and Suzanne decided immediately to join a group of LIMR Board Members, spearheaded by Board Chair Peter Havens, and establish the **LIMR COVID-19 Research Fundraising Challenge**. New gifts to support LIMR's COVID-19 research received through the end of 2020 will be matched dollar for dollar up to \$80,000.

Jonathan and Suzanne are thrilled to personally support this important work and want to make every effort to raise further funds for it from the community, while removing barriers to progress and productivity on the part of the LIMR faculty.

Jonathan described LIMR as "a very special place for research embedded in a very special place for top-quality health care in a community-based, patient-friendly institution." He noted: "We should all strive, as members of that community, to support and help further evolve LIMR into the vision that Dr. Prendergast and Peter Havens continue to refine. Whether participating in a clinical trial, attending educational events when they become available again, spreading the word to your neighbors, or making a philanthropic donation, we can all contribute to the extent that we are able. LIMR is truly an important research institute making incredibly vital contributions at a critical time for our community, our society and the world. Please consider helping in any way you can." ✨

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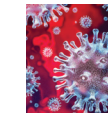
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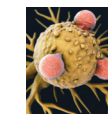
## Your Investments in Research at LIMR Can Have a Significant Impact

You can designate one of the following funds to direct your contributions and support research that is important to you.



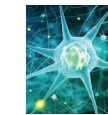
### COVID-19 Research Fund

Your gift will support several biomedical scientists at LIMR who have pivoted their research toward battling the coronavirus. They are advancing studies to better diagnose, treat and prevent COVID-19 infection. Several LIMR Board Members have joined together to initiate a Challenge Match to help raise additional funds to support LIMR's COVID-19 research. For the remainder of 2020, they will match dollar-for-dollar all contributions to this fund up to \$80,000, thereby doubling your donation to this important research.



### 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 attack 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.



### 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

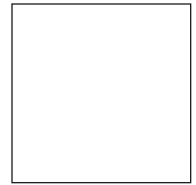
Unrestricted gifts to LIMR enable opportunities to target your gift where our doctors and scientists believe it can have the greatest impact.

To make a donation, please use the reply envelope inserted in this publication, or donate online at [limr.org](http://limr.org) (click on Supporters). Or call Amy Manskya of the Lankenau Medical Center Foundation at 484.476.8070, or email [manskya@mlhs.org](mailto:manskya@mlhs.org).



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**Main Line Health®**

**ABOUT MAIN LINE HEALTH**

Main Line Health® is an integrated health system serving the Philadelphia region, with more than 2,000 physicians, one quaternary and three tertiary care hospitals, a wide network of patient care locations and community health centers, specialized facilities for rehabilitative medicine and drug and alcohol recovery, a home health service, and a biomedical research institute. Collectively, Main Line Health's physicians, care teams, health care facilities, and researchers provide patients with primary through highly specialized care as well as access to clinical trials.