RETURN ON INVESTMENTS IN RESEARCH

LIMR’s strategy: Fill the gap between discoveries made in the lab and treatments administered in the clinic | Page 3

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Advancing Cancer Care Through Clinical Research

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LIMR Scientists Uncover Potential New Therapy for Ulcerative Colitis

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A Donor Steps Up to Help Advance Scientific Breakthroughs

Page 8
A core theme running through this issue of Catalyst is LIMR’s relentless drive to create more effective medicines and improve patient care — that is, to keep moving forward, exploring and charting new territory.

As the research institute for Main Line Health, LIMR discovers new knowledge in the laboratory and through focusing on inventions discerns the best way to proactively advance those developments into the clinic. This focus on invention — the practical application of new knowledge — is part of LIMR’s operational DNA. Each article in this issue of Catalyst, our sixth edition of this newsletter, highlights a different angle of that continuing story.

In our cover story, you’ll read about just a few of LIMR’s patented and patent-pending new innovations in biopharmaceutical and medical device technologies. Some are already in use in the clinic or are in clinical trials, and others are at the proof-of-concept stage and ready for licensing out to biotechnology and pharmaceutical firms. Why is it crucial that LIMR invent? See “Return on Investments in Research,” starting on page 3, for the answer to that important question.

In this issue, you’ll also read about the cancer clinical studies that LIMR administers for Main Line Health. Clinical research advances medical knowledge and can give patients access to potential new treatments and therapeutic options before they are available to the general public. Indeed, institutions like Main Line Health that offer clinical studies are all about advancing “the new.” It signals that we remain ever questioning, testing, scrutinizing, developing new tools in our patient-care arsenal. For more on our oncology trials, see “New Frontiers: Advancing Cancer Care Through Clinical Research” on page 2.

Also in this issue, read about how LIMR investigators uncovered a potential new therapy for ulcerative colitis, a disease that affects almost 1 million Americans (see the story on page 7). And you’ll meet Becky Sassi, the new executive director of development for the Lankenau Medical Center Foundation, and read about her goals for LIMR (see page 5).

I hope you enjoy this issue, and if you would like to stay tuned to our updates, please bookmark our website at limr.org.

Until next time.
New Frontiers: Advancing Cancer Care Through Clinical Research

For Nina Cruice, participating in a LIMR clinical trial has been a way for her to focus on something positive after her cancer diagnosis and treatment.

Cruice is in the Breast Cancer Weight-Loss (or BWEL) study, which is for patients who’ve been diagnosed with early-stage breast cancer and are interested in losing weight. Researchers are trying to determine if losing weight and exercising more lowers the risk of cancer recurrence.

“The trial has been like a lifeline to me,” said the retired thrift and gift store manager of Riddle Hospital. “My daughter says the trial came along at just the right moment in my retirement. It’s time for me to pay attention to myself and my own health.”

The BWEL study is one of about 50 clinical trials being administered by the Clinical Research Center (CRC) at LIMR. Researchers are studying new drugs — including promising new immunotherapies — as well as diagnostic tests and treatment methods for cancer patients. This includes cancers of the breast, brain, gastrointestinal tract, prostate, blood, head and neck, and lung, as well as gynecologic cancers. Researchers also are studying nonclinical issues, such as health disparities and the financial health of cancer patients.

“Our goal with clinical research is to give Main Line Health’s oncology patients more tools in their arsenal to fight cancer,” said Paul Gilman, MD, director of CRC. “Many treatments that are now standards of care were first proven to be safe and effective in clinical trials.”

For patients, clinical trial participation may give them access to potential new treatments before they are widely available to the public. Their participation can also advance medical knowledge and help others who may develop cancer in the future. Perhaps most importantly, participants in clinical trials gain access to a high level of care and outcomes, ” said Dr. DeNittis. “Based on research findings, we’re able to offer patients at Main Line Health the very latest treatment options for their particular cancers.”

As part of the BWEL study, Nina Cruice checks in with her coach about once a month, keeps a food log to track calories, and wears a Fitbit to monitor her activity level. In the process she has lost weight and inches and says she feels great. Thankfully, her cancer has not returned.

“By participating in a clinical trial I’m giving back to the health care community and paying it forward to future cancer patients,” said Cruice. “Plus, it helps me focus on something other than my cancer, something positive that is having a beneficial outcome for me and could have for others, too.”

For more on Main Line Health’s cancer trials administered by LIMR, visit mainlinehealth.org/cancertrials.

You have the opportunity to 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.

LIMR’S STRATEGY: FILL THE GAP BETWEEN DISCOVERIES MADE IN THE LAB AND TREATMENTS ADMINISTERED IN THE CLINIC

Return on Investments in Research

“LIMR is unique among U.S. biomedical research institutes in that it focuses more on invention than the acquisition of new knowledge, unlike peer organizations that are mainly academically oriented,” said George Prendergast, PhD, president and CEO of LIMR. “The intellectual property we create is sublicensed to existing companies or spun out into new startup companies, as a mechanism to speed clinical and commercial development of our experimental medical therapies, tests and technologies.” Indeed, during the past decade, LIMR has incubated many companies as part of its culture of innovation.

Before examining the fruits of this strategy, a bit of background may be helpful. The field of biotechnology today sports an increased demand to yield health care return on investment — which is a solid and credible business expectation. The problem is that traditional academic research focuses almost exclusively on acquiring and validating new knowledge. End of story. The task of translating those findings into commercial products is left up to others, such as biotechnology and pharmaceutical firms.

This gap — between discoveries made at the lab bench and actual therapies for patient care — is what LIMR’s strategic initiative is meant to fill. And its growing pipeline of patented and patent-pending inventions, as well as its...
A new therapy developed by LIMR Deputy Director Susan Gilmour, PhD, and her team, including Kelsey Mariner, biomedical research assistant, kills tumor cells by blocking their ability to take up a crucial nutrient for their growth.

In the clinic, offer strong validation for this unique vision. Following are just a few of LIMR’s recent inventions and their development status.

**Cancer therapies**

- Researchers, including those at LIMR, discovered that the IDO1 enzyme drives about half of all human cancers, effectively shielding the growing tumor from the body’s immune attackers. LIMR researchers and NewLink Genetics Corp. developed indoximod, an immunotherapy drug that is in clinical trials. By blocking IDO1, indoximod restores the ability of the immune system to recognize cancer cells, including metastatic cells, and kills them. This approach offers the potential to fight many types of human cancer.

- LIMR’s Deputy Director Susan Gilmour, PhD, and a colleague from the University of Central Florida developed and patented a drug therapy that kills tumor cells by blocking the action of polyamines, a nutrient that is vital for cell growth and survival. Notably, solid tumors have an enormous appetite for polyamines.

**Autoimmune disease therapies**

- In the last issue of Catalyst, you read about LIMR’s discovery of the role the RhoG gene plays in promoting autoimmune diseases, such as rheumatoid arthritis (RA), diabetes and lupus, as well as diabetic retinopathy and macular degeneration. LIMR investigators were awarded a patent on their anti-RhoG antibody that shows therapeutic efficacy in preclinical studies.

- The enzyme IDO2, discovered at LIMR, has been identified as an essential promoter of autoimmune disease. In animal studies of RA, administration with an anti-IDO2 antibody developed at LIMR blocked disease development without affecting normal immune function. LIMR has been awarded two patents on this new therapeutic technique.

To help commercialize its inventions for clinical advancement, LIMR has contracted recently with L2C Partners LLC and with the technology transfer office at Thomas Jefferson University (TJU), the latter of which will serve as broker for LIMR’s most mature intellectual property. L2C Partners, a Wynnewood, Pa.-based company, specializes in commercialization services for nonprofit research centers and educational institutions. In their role, they will also help LIMR expand its invention culture into the arenas of clinical and population health research at Main Line Health. Both TJU and L2C will provide vital help to advance LIMR’s invention and discovery efforts.

**DEVELOPMENT**

**LANKENAU MEDICAL CENTER FOUNDATION’S NEW EXECUTIVE DIRECTOR OF DEVELOPMENT DISCUSSES HER ROLE IN CONNECTING DONORS AND RESEARCHERS**

Rebekah “Becky” Sassi, Executive Director of Development, Lankenau Medical Center Foundation

Q: How are you planning to advance philanthropic initiatives for research at Main Line Health?

Sassi: Much of fundraising is about listening and making connections: listening to our LIMR researchers share what they require to continually push the boundaries of discovery; listening to donors to learn what’s important in their lives and the lives of their family members. When those narratives intersect, connections can be made — and that’s what compels powerful and important work to happen.

Q: While meeting with LIMR’s scientific investigators these past few months, what has struck you as most salient for donors and others interested in research advancements to know?

Sassi: Since joining the Lankenau team, I have learned so much about LIMR that I did not know before. The incredibly rich history of scientific discovery that has happened here since its founding in 1927 serves as a strong springboard for the groundbreaking work taking place in LIMR’s labs today. Equally powerful to me is the fact that many of our researchers are also clinicians, or partner with clinicians, who see patients and are able to employ their scientific findings directly to bolster the extraordinary care provided daily at Main Line Health.

These are just a few of the biomedical innovations recently developed at LIMR. Others include an anti-NMDA receptor encephalitis (ANRE), a serious autoimmune disease depicted in the 2016 docudrama “Brain on Fire.” ANRE can lead to seizures, hallucinations, confusion, memory loss, uncontrollable body movements, and can even be fatal. ANRE can be cured if it’s identified early and appropriately treated, but identification cannot be performed in most clinical laboratories. Until now. (See the story on page 6.)
LIMR investigators create test for autoimmune encephalitis, isolate auto-antibodies

LIMR investigators created a simple diagnostic test for anti-NMDA receptor encephalitis (ANRE), an autoimmune disorder that can lead to serious psychiatric symptoms. The researchers also isolated and cloned auto-antibodies that may help elucidate the underlying mechanisms of the inflammatory brain condition that occurs when the body’s immune system attacks brain cells.

ANRE can lead to seizures, hallucinations, confusion, and uncontrollable body movements, and can even be fatal. About 30 percent of patients are children and teens, and females are affected more often than males. ANRE can be cured if it’s identified early and appropriately treated, but the only currently available diagnostic test cannot be performed in most clinical laboratories.

To address this, LIMR Professor Scott Dessain, PhD (above right), and his team created a simple ANRE assay that can be adapted for use with common laboratory techniques. “Our discovery will help doctors to more easily identify patients who have this treatable neurological and psychiatric disease,” said Dr. Dessain, the Joseph and Ray Gordon Chair in Clinical Oncology and Research.

In a companion study, the Dessain team, including biomedical research assistant Chandana Kattala (above left), isolated and cloned NDMA receptor auto-antibodies from a patient. The auto-antibodies provide standards for the diagnostic test the researchers described. These studies were supported by a grant from the National Institutes of Health.

George Prendergast, PhD (right), and LIMR Professor Janet Sawicki, PhD, took calls during an all-day TV broadcast at NBC10 about cancer and cancer research last November. The American Association for Cancer Research, which sponsored the event, had invited Drs. Prendergast and Sawicki to be on the panel of cancer experts answering viewers’ questions. During this exciting day, Dr. Prendergast also was interviewed on camera about the latest advances in cancer research.

LIMR Scientists Uncover Potential New Therapy for Ulcerative Colitis

Ulcerative colitis (UC), a disease that affects nearly 1 million Americans, can significantly impact quality of life by causing abdominal pain, weight loss, fatigue and frequent diarrhea, among other symptoms. It has been blamed partly on the typical Western diet, which in some individuals can promote a low-grade chronic inflammation of the gut. Whatever the causes, it’s clear that patients with UC are at an increased risk of colorectal cancer.

Those diagnosed with UC currently are prescribed anti-inflammatory drugs and immune suppressors whose unpleasant side effects, such as opportunistic infections, and lack of efficacy in certain individuals, limit treatment quality.

LIMR researchers and their colleagues set out to determine a way to prevent and perhaps better treat UC. They studied experimental mice that had been treated to develop UC and administered to them an antibody to Bin1, a protein that LIMR researchers had previously identified may be involved in cancer and UC.

“The animals treated with the Bin1 antibody had no signs of UC, while those in the other group did show signs of UC,” said James Mullin, PhD, LIMR professor and one of the study’s authors. “We found that our Bin1 antibody appeared to decrease the expression of several inflammatory agents in the colon.”

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The study’s findings were built on years of basic research on the Bin1 gene at LIMR, suggesting a radically different approach to reduce or eliminate UC severity by decreasing the expression of several inflammatory agents in the colon.

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You can fund this type of research. Please see the inside back cover for ways to contribute to LIMR’s work.

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Helping to Advance Scientific Breakthroughs at LIMR

Linda Waddell of Narberth, Pa., has been connected with Lankenau Medical Center for many years, as a donor, volunteer and currently an officer of the Lankenau Women’s Board and its Hamper Shop Auxiliary. However, it wasn’t until early 2018 that this former senior marketing executive of Verizon Corp. had the opportunity to attend a John D. Lankenau Society event and hear LIMR scientists speak in detail about their work.

She was incredibly impressed with the research underway, and in particular, fascinated by LIMR’s immunotherapy and stem cell research programs. Waddell said, “While I don’t have millions of dollars to donate to either of these fields, I was happy to find a place where my donation can make a difference by helping with necessary funding for these research initiatives.”

To that end, Waddell made a first-time gift to LIMR in 2018 of more than $30,000 to support the work of LIMR President and CEO George Prendergast, PhD, a world-renowned cancer research scientist.

Noted Dr. Prendergast, “LIMR has been the fortunate recipient of research grants to support our work over the years, but it’s even more meaningful to us when someone like Linda, who is so devoted to her community and uses her time and energy to better local organizations, understands the importance of the work we are doing and then acts on it to make an investment to further it.”

Waddell’s gift is a significant boon to LIMR. Philanthropic donations—of any size—support necessary research expenses, such as equipment and technology, supplies, and scientists’ and research assistants’ time.

“I hope my story will inspire others in our community to consider a gift to LIMR and, in so doing, have the opportunity to participate meaningfully in its vital research program, especially in an age of decreasing public funding for such programs,” she said. “It’s inspiring to me to have the ability to help advance scientific research in my own backyard that has the potential for impact on a global level.”

— Linda Waddell

George Prendergast, PhD, welcomed donor Linda Waddell into his lab recently to demonstrate the research that her generous contributions helped to fund.

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— Linda Waddell

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 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, 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 limr.org, and click on Supporters. Or call Rebekah Sassir, executive director of the Lankenau Medical Center Foundation, at 484.476.8067 or email sassir@mlhs.org.
THE POWER OF GIVING
Charitable giving does not require great wealth, only generosity of spirit and a desire to share what one has for the benefit of others.

A gift to Main Line Health’s Lankenau Institute for Medical Research (LIMR) has the potential to do great good. LIMR’s ultimate mission is to prevent disease and reduce suffering. Your support makes this possible.

To learn more, visit mainlinehealth.org/lmcgiving or call 484.476.8070.

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.