Immune MATTERS

LA JOLLA INSTITUTE
FOR IMMUNOLOGY
FALL 2023

DELIVERING BETTER VACCINES

LA JOLLA INSTITUTE SCIENTISTS PUSH
FOR MORE EFFECTIVE, LONGER-LASTING VACCINES

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Immune MATTERS

Fall 2023

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OUR MISSION

The Institute will engage in a world-class biomedical research program with a focus on the immune system. It will conduct, share, and partner such that the results of its discovery program will make outsized contributions to the betterment of human health.

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The people behind vaccine research

Recent months have come with exciting developments at La Jolla Institute for Immunology (LJI). In this issue of *Immune Matters*, you'll meet our newest faculty member (and computational biologist extraordinaire), Assistant Professor Tal Einav, Ph.D. You'll also learn how LJI Professor Shane Crotty, Ph.D., will strengthen our mission in his new role as LJI Chief Scientific Officer. It's been a pleasure to welcome Dr. Einav to our Institute, and I'm looking forward to working with Dr. Crotty to build LJI's future.

Drs. Einav and Crotty are just two LJI faculty members leading cutting-edge vaccine research. In this issue's cover story, you'll learn how LJI experts, including Professors Sujan Shresta, Ph.D., Alessandro Sette, Dr.Biol.Sci., and Research Assistant Professor Daniela Weiskopf, Ph.D., are using new scientific tools to develop vaccines against deadly pathogens.

Immune system research affects all of us, but vaccine science feels especially personal. After all, LJI scientists don't just work in the San Diego community—we are the community. We want our kids and store clerks, our parents and Padres to receive the safest, most effective vaccines possible.

Community just means more since the start of the pandemic. My colleagues cheer for each other at softball games and graduation ceremonies. We run out for champagne when a new study is published. LJI folks will even brave summer heat for the sake of community! In July, LJI representatives marched in the San Diego Pride Parade and did the Institute proud in the Pride 5K Run + Walk.

It's also exciting to see our community of Institute supporters grow. I appreciate every chance to meet new visitors on campus and catch up with good friends at Institute events. Donor support has also helped us make new connections with the community we love. In the last few years, we've expanded our internship programs, organized LJI field trips for local students, and provided hands-on STEM activities at events such as the San Diego Festival of Science & Engineering.

We can't lose these human connections yet again. Vaccine research gives us hope—hope that we'll continue to find ways to come together.

Sincerely,

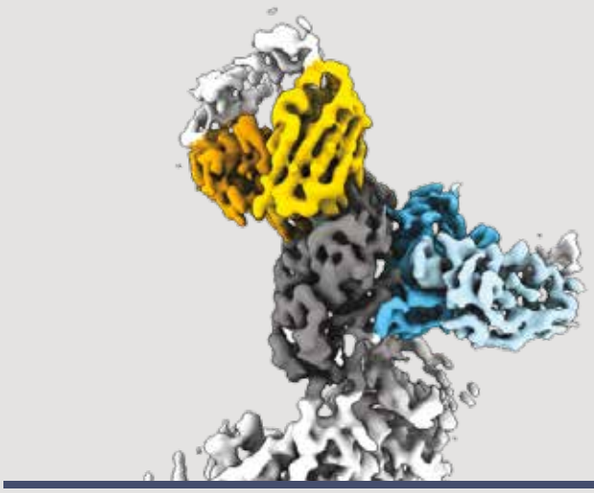
Erica Ollmann Saphire, Ph.D., MBA
Professor, President, and CEO
La Jolla Institute for Immunology

LJI scientists zero in on Omicron's weak points

In a recent *Cell Reports* investigation, LJI scientists showed how the original Moderna SARS-CoV-2 vaccine prompts patients to produce antibodies against the later Omicron variants of SARS-CoV-2. The researchers also captured highly detailed, 3D structures of three promising neutralizing antibodies bound to the virus' protective outer protein, called the Spike protein. This important work pinpoints exactly where Spike is vulnerable to human antibodies—and how future vaccines and antibody therapeutics might exploit these weaknesses.

> "To blunt the next pandemic and protect people from seasonal re-emergence of this one, we need antibodies of the broadest possible capacity."

LJI PROFESSOR, PRESIDENT, AND CEO
ERICA OLLMANN SAPHIRE, PH.D., MBA

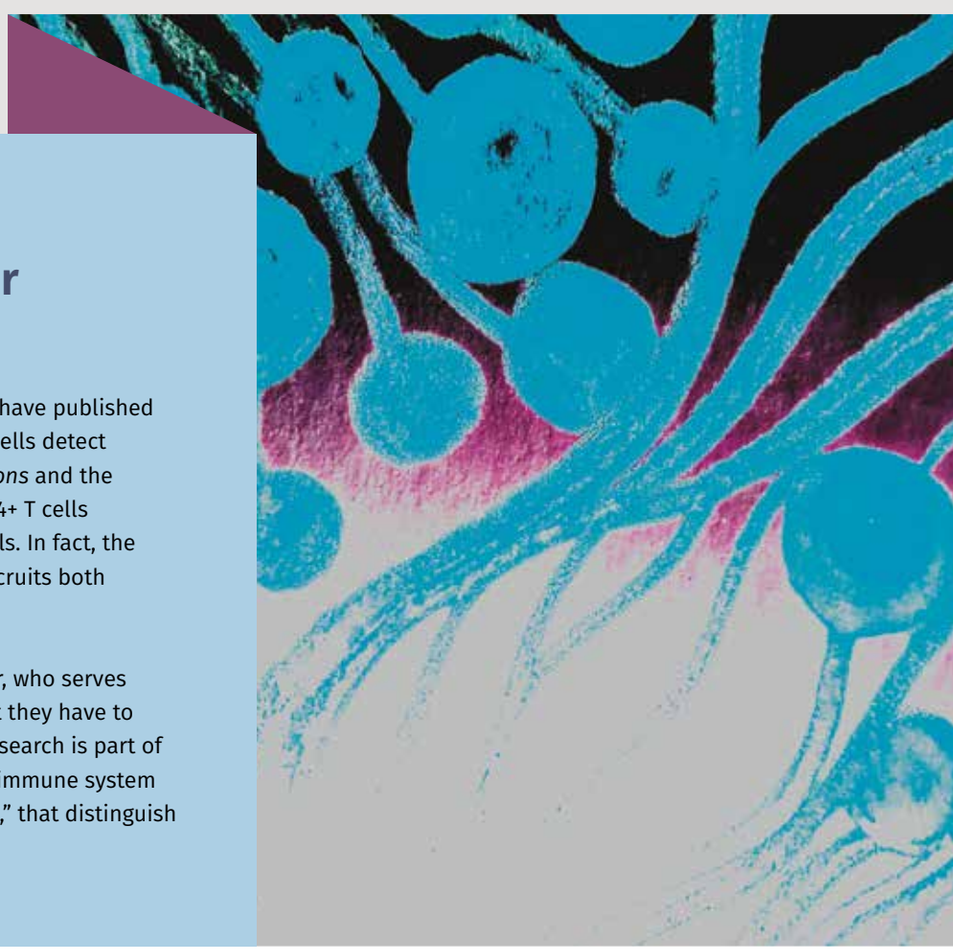


Antibody 2A10 (yellow shades) and antibody 1H2 (blue shades) were isolated from a vaccinated research volunteer. The LJI team found these two antibodies can neutralize many SARS-CoV-2 variants.

Anti-cancer vaccines must spur "helper" T cells into action

LJI Professor Stephen Schoenberger, Ph.D., and his colleagues have published new research into how the immune system's CD4+ "helper" T cells detect cancer cells. Their findings, published in *Nature Communications* and the *Journal of Clinical Investigation*, suggest we might harness CD4+ T cells while boosting the cancer-fighting power of CD8+ "killer" T cells. In fact, the researchers demonstrate a new kind of vaccine design that recruits both types of T cells to destroy large tumors.

"Therapeutic cancer vaccines can work," says Dr. Schoenberger, who serves as a member of the LJI Center for Cancer Immunotherapy. "But they have to leverage the natural synergy of CD4+ and CD8+ T cells." This research is part of ongoing work at LJI to advance our understanding of how the immune system can be trained to attack tell-tale markers, called "neoantigens," that distinguish tumor cells from healthy cells.



Investigating the rise of whooping cough

New LJI research suggests a shift in vaccine design may explain the steady rise of whooping cough cases. Beginning in 1948, patients in the United States received the whole-cell pertussis (wP) vaccine. The wP vaccine contained an inactivated version of the entire *Bordetella pertussis* bacterium. This potent vaccine sometimes caused short-term side effects, prompting the United States to adopt an acellular pertussis (aP) vaccine in 1996. This vaccine contains only four proteins from *B. pertussis*.

Both the wP and aP vaccines prompt immune cells to recognize and neutralize *B. pertussis,* but a rise in whooping cough cases in young people in the United States has some worried the aP vaccine doesn't work as well as the wP vaccine.

For the new study, scientists in the lab of LJI Professor Alessandro Sette, Dr.Biol.Sci., set out to map the landscape of T cell reactivity against *B. pertussis*. To do this, the researchers acquired blood samples from adults vaccinated with either wP or aP vaccines who had never been diagnosed with whooping cough.

The researchers found that T cell responses to aP and non-aP vaccine proteins were similar, regardless of which vaccine a person had received. Dr. Sette says the aP vaccine likely produces an immune response effective enough to prevent severe disease, but not very effective at preventing subclinical infections. This would lead to people unknowingly becoming carriers of *B. pertussis*, spreading the bacteria to those more vulnerable to the disease.

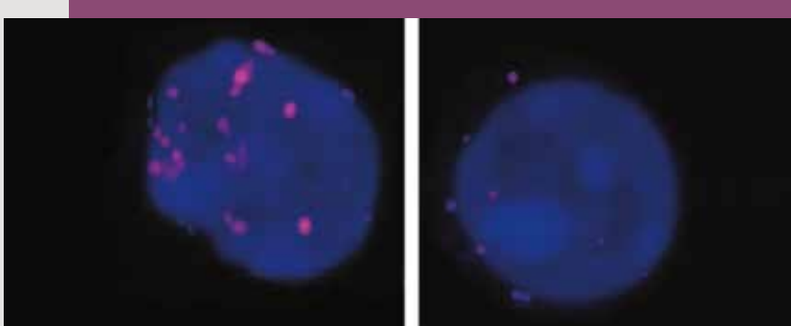
> "Our findings suggest that asymptomatic infection, not vaccination, is what drives the T cell response in adults who received the aP vaccine."
>
> LJI INSTRUCTOR
> RICARDO DA SILVA ANTUNES, PH.D.

Meet two new "flavors" of immune cells

LJI scientists have demystified an important group of immune cells, called mucosal-associated invariant T (MAIT) cells. Unlike conventional T cells, which circulate in our blood, MAIT cells are largely found in tissues where they protect us from a broad range of diseases. The human body makes a lot of these MAIT cells, yet much about their inner workings remained unknown until a recent LJI investigation.

In a *Nature Cell Biology* study, LJI Professor Mitchell Kronenberg, Ph.D., and LJI Instructor Tom Riffelmacher, Ph.D., showed how MAIT cells work—and where they get the energy to fight disease. Their research revealed two distinct "flavors" of MAIT cells: a virus-fighting subtype and a bacteria-fighting subtype. The researchers discovered these two subtypes get their energy from different sources: the antiviral subtype relies on sugar while the antibacterial subtype relies on fat. "I remember seeing this first batch of data and thinking, 'Wow, this is a huge difference—we need to look into this,'" says Dr. Riffelmacher, who also serves as the LJI Immunometabolism Core Director.

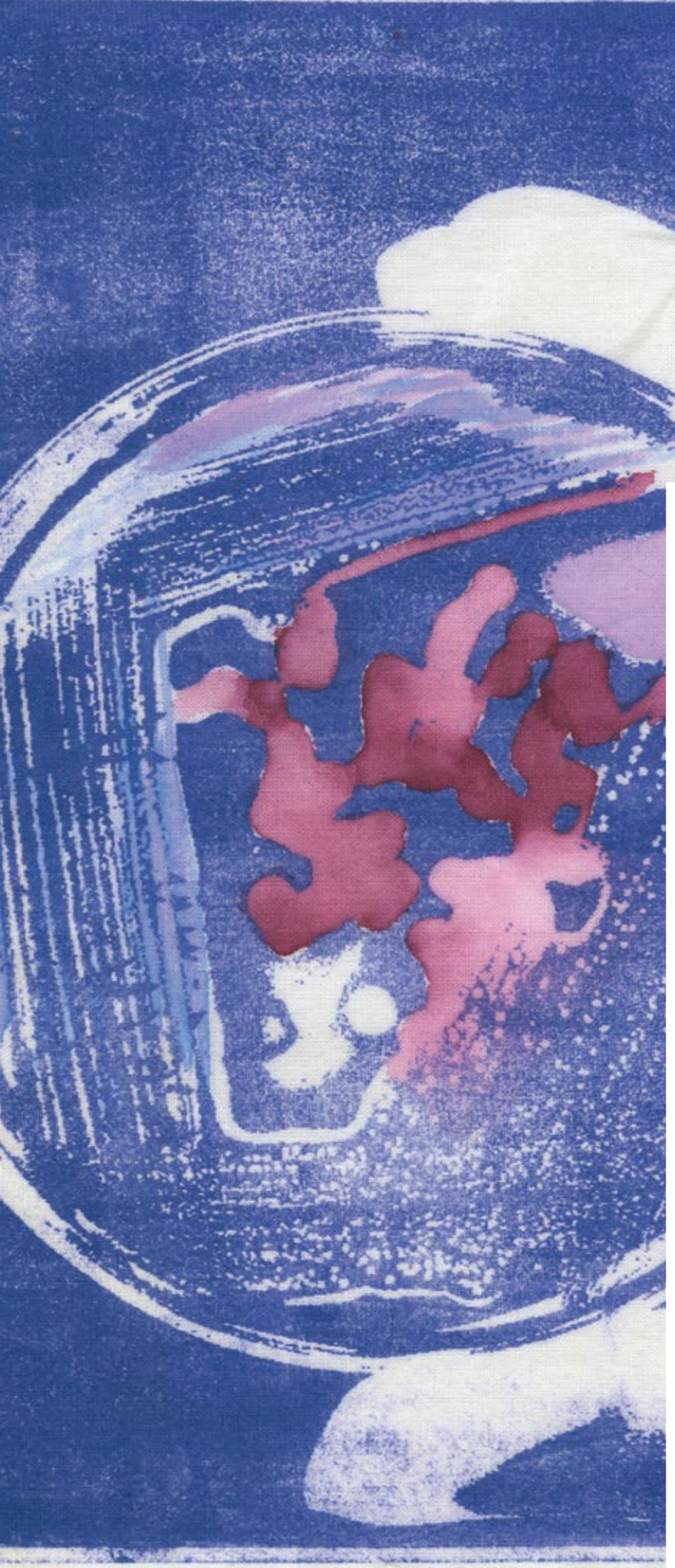
The scientists hope the new findings will guide the development of novel vaccines and cell therapies that shift the balance between these two cell groups to fight specific pathogens.



The purple spots in these images reveal a cell's nutrient-recycling machinery, which is much more active in fat-consuming MAIT cells (left).

DELIVERING BETTER VACCINES

LJI SCIENTISTS SHARE THEIR VISIONS FOR MORE EFFECTIVE, LONGER-LASTING VACCINES



“Vaccines are incredible,” says Shane Crotty, Ph.D., Professor and Chief Scientific Officer at La Jolla Institute for Immunology (LJI). “They are the only medicine recommended for every healthy person on the planet.”

Dr. Crotty and his colleagues recently launched the LJI Center for Vaccine Innovation. This center is home to researchers with the expertise to shape the future of vaccine design.

“LJI is one of the few places in the world that can measure all the different kinds of immune responses to a specific vaccine. We focus on the fundamental immunology of vaccines. Why does any vaccine work? And how can we get them to work better?” says Dr. Crotty. “The LJI Center for Vaccine Innovation will be the place that companies and other academic institutions come to understand their vaccine candidates.”

SPEED IS KEY

Just 19 years ago, Nepal had zero cases of dengue virus infection. Now the virus is endemic there. People in West Africa always thought they were safe from Ebola virus—until the virus began taking lives in Guinea in 2013.

Pathogens mutate. They travel the world. That’s why LJI scientists have developed tools to quickly assess immune cell responses and guide vaccine efforts against unexpected disease outbreaks.

In early 2020, Dr. Crotty and LJI Professor Alessandro Sette, Dr.Biol.Sci., published the very first study into how immune cells respond to COVID-19. They reported that human B cells and T cells could recognize and target SARS-CoV-2. This discovery gave scientists hope that a COVID-19 vaccine was possible. “We were able to rapidly hammer out some of the key questions,” says Dr. Sette.

The LJI team moved so quickly thanks in part to key infrastructure established at LJI back in 2003: the Immune Epitope Database (IEDB). This database, co-led by Dr. Sette and LJI Professor Bjoern Peters, Ph.D., includes tools to predict how human T cells can target pathogens.

The LJI Coronavirus Taskforce went on to publish important research into immune cell responses to COVID-19 infections, different COVID-19 vaccines, and the ever-growing list of COVID-19 variants of concern. Dr. Sette calls this series of SARS-CoV-2 breakthroughs the “poster child” that shows what LJI laboratories are capable of.

LJI scientists also formed new collaborations with laboratories around the world and shared data, computational tools, reagents, and laboratory supplies as they raced to beat COVID-19. “That was very powerful,” says LJI Research Assistant Professor Alba Grifoni, Ph.D., who co-led several pivotal COVID-19 studies. “We're still thinking along those same lines when we hear about a disease outbreak. How can we come together to do something about it?”

FIGHT EVERY VIRUS

In 2020, Drs. Crotty, Sette, Grifoni, and LJI Research Assistant Professor Daniela Weiskopf, Ph.D., reported that many people already had T cells that recognized SARS-CoV-2, even if they had never been exposed to the virus before. These individuals had caught common cold coronaviruses in the past, so they had T cells primed to “cross-react” to SARS-CoV-2.

Normally, individual T cells and B cells are good at hunting down specific threats. A T cell that fights a *Salmonella* infection is trying to target that pathogen and nothing else, for example. “Cross-reactive” immune cells are special because they recognize features that different, though closely related, pathogens have in common.

Drs. Sette and Grifoni are examining immune cell cross-reactivity as a way to develop new vaccines against a huge range of viruses with pandemic potential. Their laboratories are combining experimental findings with IEDB tools to predict how immune cells may react to viruses such as mpox, pertussis (whooping cough), Lassa virus, and SARS-CoV-2. Already, they've demonstrated that T cell cross reactivity gives the JYNNEOS mpox vaccine, which was developed to prevent smallpox, its fighting power.

> “If we can provide broad protection at the level of T cells against different members of a viral family, then we could be very much ahead of the game.” **Professor Alessandro Sette, Dr.Biol.Sci.**

"If we can provide broad protection at the level of T cells against different members of a viral family, then we could be very much ahead of the game," says Dr. Sette.

SAFE VACCINES FOR ALL

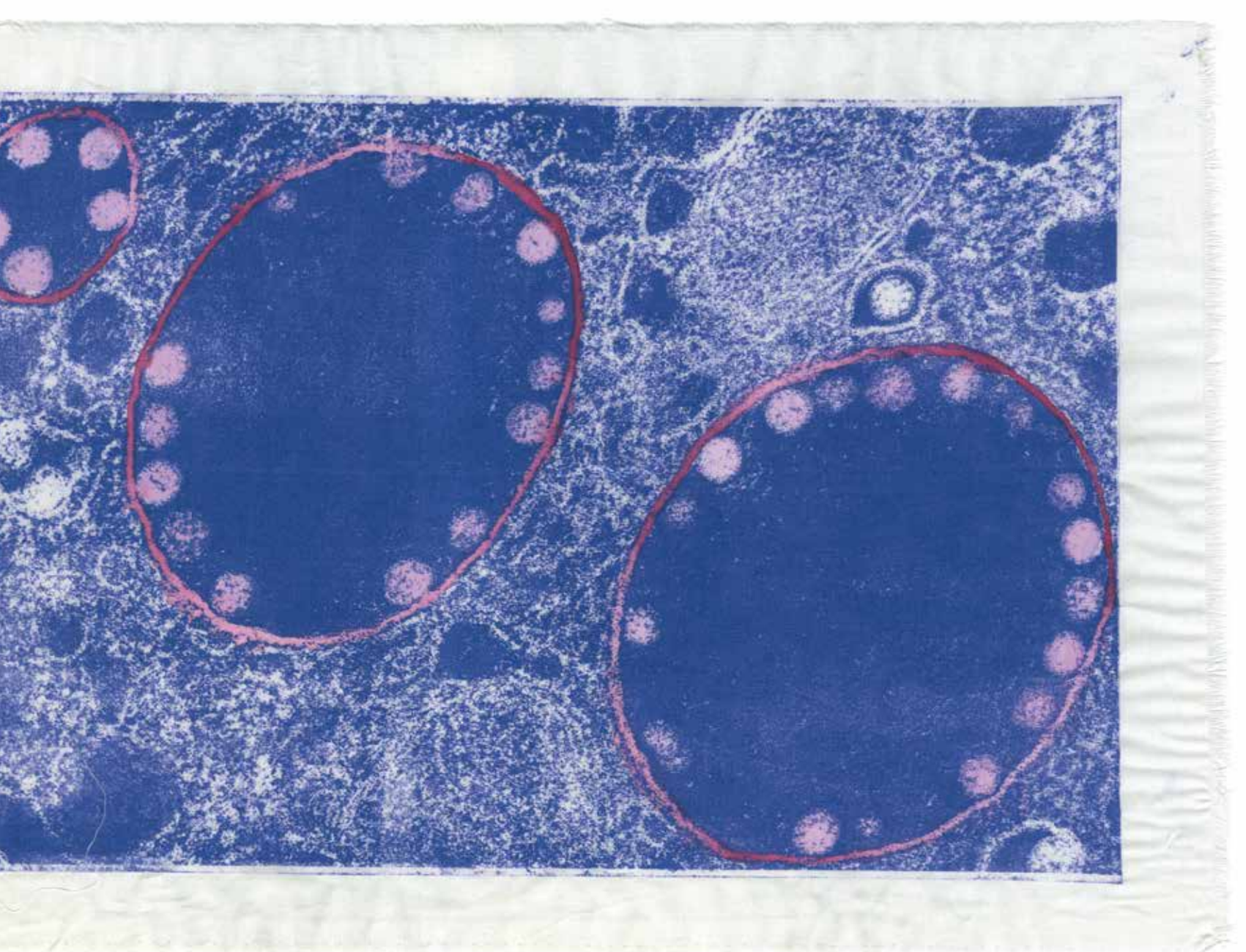
LJI Professor Sujan Shresta, Ph.D., is one of the world's leading experts on mouse models of viral infections. Her laboratory developed the first mouse models designed to help understand how T cells respond to flaviviruses such as dengue, Japanese encephalitis, Zika, West Nile, Powassan, and deer-tick. These viruses are carried by mosquitoes or ticks, and they are spreading rapidly around the globe, posing an ever-greater threat to human health, including in the continental United States.

Dr. Shresta’s ultimate goal is to develop pan-flavivirus vaccines—vaccines that protect against multiple flaviviruses at once. Different flaviviruses tend to co-circulate in the same geographic ranges and her work has already shown that flavivirus-cross-reactive T cells can protect against multiple diseases. Furthermore, Dr. Shestra’s mouse models make it easier to test how well flavivirus vaccines work and if they are safe. “You need an animal model to study what is really happening in the immune system following infection or vaccination, and our mouse models provide that much needed tool to flavivirus researchers,” says Dr. Shresta.

Safety is indeed a huge concern for pan-flavivirus vaccine efforts. Dr. Shresta's research was the first to show how flavivirus infections can trigger a phenomenon called “antibody-dependent enhancement,” where antibodies against one virus can leave the body vulnerable to other viruses. Fortunately, Dr. Shresta's research suggests we can save lives by designing flavivirus vaccines that trigger strong T cell responses, rather than relying on antibodies.

Dr. Shresta is working on a vaccine candidate that does just that. Over the last decade, her laboratory has honed a “self-amplifying” RNA platform for vaccine production. With this kind of vaccine platform, scientists can design a vaccine that tells a patient’s cells to start making small pieces of a viral molecule. T cells then encounter these molecules and learn to recognize their structure. “This could provide long-term protection,” says Dr. Shresta.

Dr. Weiskopf is also taking a close look at vaccine safety. She studies T cell responses to dengue virus, SARS-CoV-2, Chikungunya virus, and COVID-19 vaccines. For her dengue research, she's working with doctors in the Philippines to regularly collect blood samples from children who received a dengue vaccine several years ago. This vaccine, developed by a pharmaceutical company, was quickly shelved after scientists found it could lead to more severe dengue cases in some patients.



Dr. Weiskopf is trying to figure out why it failed. Could it be related to antibody-dependent enhancement? Or something else? Vaccines are known for being safe and effective. The dengue vaccine was an exception, and Dr. Weiskopf wants to make sure it stays that way.

LONGER-LASTING VACCINES

Dr. Weiskopf is also one of several LJI experts investigating exactly how long our immune cells "remember" past infections and vaccines. Vaccine durability is a big question in immunology right now, as health officials look to researchers for recommendations for how often a person should get COVID-19 vaccine "boosters."

"We test immune responses in the blood a year after a person gets a vaccine, but what about after two years, three years, five years?" says Dr. Weiskopf. "We have a lot to learn about how to maintain an effective vaccine response."

Dr. Crotty has uncovered new strategies to make vaccines work better and last longer. His laboratory focuses on B cells, which have the important job of churning out antibodies against specific pathogens. Dr. Crotty recently demonstrated that spreading out vaccine boosters can prompt B cells to make better and better antibodies to neutralize HIV, a virus notorious for evading human antibodies.

Vaccine ingredients make a difference, too. Most vaccines include a kind of adjuvant, a chemical that helps alert the immune system to danger and ramp up the immune response to the vaccine. For years, scientists have designed vaccines with an adjuvant called alum. Dr. Crotty's work suggests new types of adjuvants can actually improve vaccine responses.

About the artist:

Shannon Bodrogi is a mixed-media printmaker, originally from California, now living in Seattle, Wash. You can find their work at psiclopspress.com or follow them on instagram @psiclopspress.

CAPTURING VIRUSES IN ACTION

LJI Professor, President, and CEO Erica Ollmann Saphire, Ph.D., MBA, uses high-resolution imaging tools, such as cryo-electron microscopy, to map viral structures. Her team is one of the few in the world with the expertise to capture detailed, 3D images and videos showing how deadly viruses transform as they infect host cells.

Dr. Saphire's three-dimensional maps are critical for vaccine design. Ebola virus, for example, uses a "glycoprotein" shield of sugar molecules to hide from the immune system. But Dr. Saphire's team has shown there are fleeting moments in the Ebola virus life cycle where the glycoprotein structure shifts and human antibodies can swoop in to neutralize the virus.

These maps also show the areas where Ebola virus doesn't mutate—the "load-bearing" pieces of viral architecture that stay the same over time. Like with cross-reactive T cells, human antibodies can recognize these "conserved" regions across related viral species. This research brings scientists closer to developing a pan-filovirus vaccine, which could protect people from Ebola virus, Sudan virus, Marburg virus, and other related viral species.

A PLACE FOR VACCINE BREAKTHROUGHS

Vaccine research teaches us how immune cells work together and detect danger. This basic research is important for understanding how to better treat cancers, autoimmune diseases, heart disease, and much more. The LJI Center for Vaccine Innovation brings together the scientists who can make these connections. "We've got people who are really excited to collaborate," says Dr. Crotty.

Dr. Crotty and his colleagues work closely with LJI's world-class research cores. Experts in LJI's Clinical Studies Core, Department of Laboratory Animal Care, Flow Cytometry Core, Next Generation Sequencing Core, and many other research services support vaccine innovation at the Institute.

"We've made amazing accomplishments and we're excited to keep moving forward," says Dr. Crotty. "We're one of the best places in the world for solving problems in vaccine research."

LJI team earns national attention for vaccine research

LJI Professor Sujan Shresta, Ph.D., is working to mentor the next generation of vaccine researchers.

"People in my lab are really motivated to make a difference in countries where viruses such as dengue are causing major problems," she says.

This spring, members of her laboratory advanced past 1,000 initial competitors to win three top prizes in the Nucleate Activator competition. Their winning proposal outlined how the Shresta Lab's self-amplifying RNA vaccine platform could serve as the backbone of a future biotech start-up—and lead to new vaccines for dengue and Zika virus.

The LJI-led team won Nucleate's Alnylam Pharmaceuticals for Scientific Excellence Award; the Genentech Award for Justice, Diversity, Equity, and Inclusion; and the MilliporeSigma Award for Global Impact.

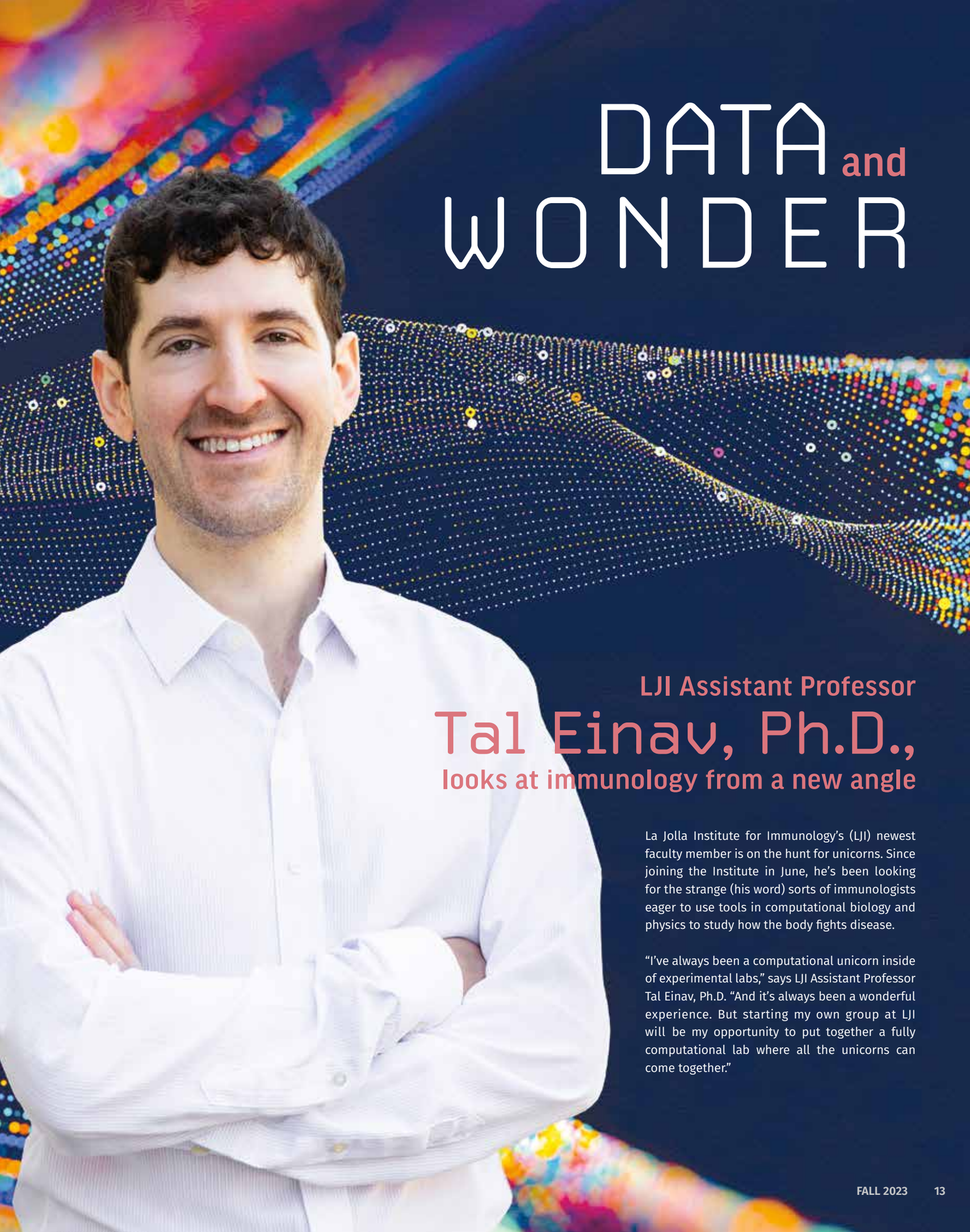
"We were humbled by the jury's reaction," says LJI Postdoctoral Fellow Rúbens Alves, Ph.D., who worked on the Nucleate pitch alongside LJI Instructor Annie Elong Ngono, Ph.D., and collaborators at UC San Diego. "Our project was recognized as having real potential, and our team has received support from people who really care."

Nucleate is a student-led, non-profit organization dedicated to empowering early-stage, life-science startups and emerging biotech leaders. The Nucleate Activator program connects early career researchers with MBA students and entrepreneurs interested in supporting potential biotech start ups.

LJI Postdoctoral Fellow Rúbens Alves, Ph.D., and LJI Instructor Annie Elong Ngono, Ph.D.

Now, thanks to Dr. Shresta's research and mentorship—and new connections with leading biotechs—Drs. Alves and Elong Ngono are poised to help develop life-saving vaccines at a low cost. "Working with Nucleate made it possible for people to understand our research and know how to help," says Dr. Elong Ngono.

Scan to learn more about the LJI team's Nucleate Activator awards.



DATA and WONDER

LJI Assistant Professor Tal Einav, Ph.D., looks at immunology from a new angle

La Jolla Institute for Immunology's (LJI) newest faculty member is on the hunt for unicorns. Since joining the Institute in June, he's been looking for the strange (his word) sorts of immunologists eager to use tools in computational biology and physics to study how the body fights disease.

"I've always been a computational unicorn inside of experimental labs," says LJI Assistant Professor Tal Einav, Ph.D. "And it's always been a wonderful experience. But starting my own group at LJI will be my opportunity to put together a fully computational lab where all the unicorns can come together."

It's a bit surprising that Dr. Einav even ended up in immunology. "My background was pretty weird from the get-go," says Dr. Einav. For example, after majoring in physics at Rice University, he had no idea which professors he wanted to work with during graduate school at Caltech. So he asked every professor for a 15-minute meeting to discuss their research.

"I let science take the backseat, and I primarily searched for the best possible fit in personality. Then I met this really cool professor, Rob Phillips, Ph.D., working in biophysics," says Dr. Einav. "He told me, 'Physics has some of the greatest tools, but biology has some of the greatest problems. Why don't you come work with me in this new area?' And so I did."

As a Ph.D. candidate in the Phillips Laboratory at Caltech, Dr. Einav discovered the power of computational biology—the idea of using data science to understand living things. He began by working with Dr. Phillips to study cell biology, namely, how bacteria read their genomes and make different proteins.

Dr. Einav loved his Ph.D. work. He loved the lab environment at Caltech. So, of course, he decided to do the unexpected thing. He left school for a year. "Most people take a break between undergrad and grad school, but I took a year off in between years of graduate school," he says. "For that year, I worked as a programmer in Champaign-Urbana, Illinois."

Champaign and Urbana are sister cities in central Illinois. The big draw is the University of Illinois, which Dr. Einav wasn't a part of. Though he did dive into one campus activity: dance. Dr. Einav had found a passion for swing dancing as a sophomore at Rice University. The push and pull of dancing with a partner made sense to the theoretical physicist in him. "As nerdy as it sounds, I interpreted the whole thing as applied classical mechanics," he says.

Dr. Einav started off taking classes in the more traditional East Coast swing style, and within a year he was dancing 10 hours a week. Three years later, he decided to dive into West Coast swing dancing without taking any classes. "It was a rough transition—just purely trial by fire," he says. "But West Coast is more free form, and I loved it."

Dr. Einav was eager to continue dancing in Champaign-Urbana when he happened to see a hip hop group perform at a campus fair. He asked if he could audition for the group. "They said, 'No problem. If you're a dancer, you belong with us,'" he says. "It was a blast." He kept dancing once he returned to complete his graduate studies at Caltech, where he ended up teaching weekly hip hop dance classes.

Meanwhile, Dr. Einav was exploring his second passion: immunology. By the end of graduate school, Dr. Einav was working with Caltech biochemist Pamela Bjorkman, Ph.D., to study how to design better antibodies against HIV.

"Not only could I make a difference on this deadly disease, but the research demanded the full range of my skills," says Dr. Einav. "It involved an intimate combination of biology, physics, math, and numerics." He felt that he had to stay in the immunology world after graduation—as the oddball lab member who manned a computer rather than a lab bench. With his doctorate in hand, Dr. Einav joined the laboratory of Jesse Bloom, Ph.D., at the Fred Hutch Cancer Center in Seattle.

Dr. Einav's work in computational biology comes at a fascinating time in history. Thanks to advances in genetic sequencing and new ways to zoom into single immune cells, researchers today are taking a closer look at human immune responses than ever before. "We have these tremendous datasets that we're just barely tapping into," says Dr. Einav.

> "Can we use big datasets to extract general principles about how we respond to vaccines, and then

Still, the world is vast, and even massive datasets cannot capture every detail. A pivotal moment in Dr. Einav's career came just as he finished giving a presentation on his work. A colleague came up and asked if he'd tried a computational method called "matrix completion."

Put very, very simply, this technique is a bit like assembling a jig-saw puzzle. Get enough pieces in place, and you can predict what the missing pieces will look like. "I listened to this explanation and thought, 'There is no way that something like this could exist,'" says Dr. Einav with a laugh. "But I sent him a dataset, and he showed me the magic."

Dr. Einav quickly realized the potential for using matrix completion to fill gaps in disease-related datasets. In a pivotal *Cell Systems* paper, Dr. Einav showed how the technique can help immunologists predict new viral behaviors. "I was really proud of that paper," says Dr. Einav. "That's how I first got into machine learning in immunology."

His research at Fred Hutch demonstrated the surprising ways computational biology can help us beat disease, and this work also won him a prestigious Damon Runyon Quantitative Biology Fellowship.

At LJI, Dr. Einav plans to initially study the immune response to the influenza virus. He hopes his laboratory can pave the way for a fundamentally new form of personalized medicine.

"Can we use big datasets to extract general principles about how we respond to vaccines, and then modify our current one-size-fits-all mode of vaccination to create personalized vaccines?" Dr. Einav asks. For example, by uncovering important patterns in the human immune response, he hopes to figure out what works best for specific patient groups—from the young to the elderly, from healthy people to individuals who are immunocompromised.

Dr. Einav is far from the only LJI "unicorn" making a space for computational biology in immune system research. Fellow faculty members Professor Bjoern Peters, Ph.D., and Associate Professor Ferhat Ay, Ph.D., specialize in data science and the development of computational tools. The Institute is also home to the Human Immunology Project Consortium (HIPC) Data Coordinating Center and to extremely valuable, open access databases such as the Immune Epitope Database (IEDB), led by Dr. Peters and LJI Professor Alessandro Sette, Dr.Biol.Sci., since 2003, and the Database of Immune Cell Epigenomes (DICE), led by LJI Associate Professor Pandurangan Vijayanand, M.D., Ph.D., since 2014.

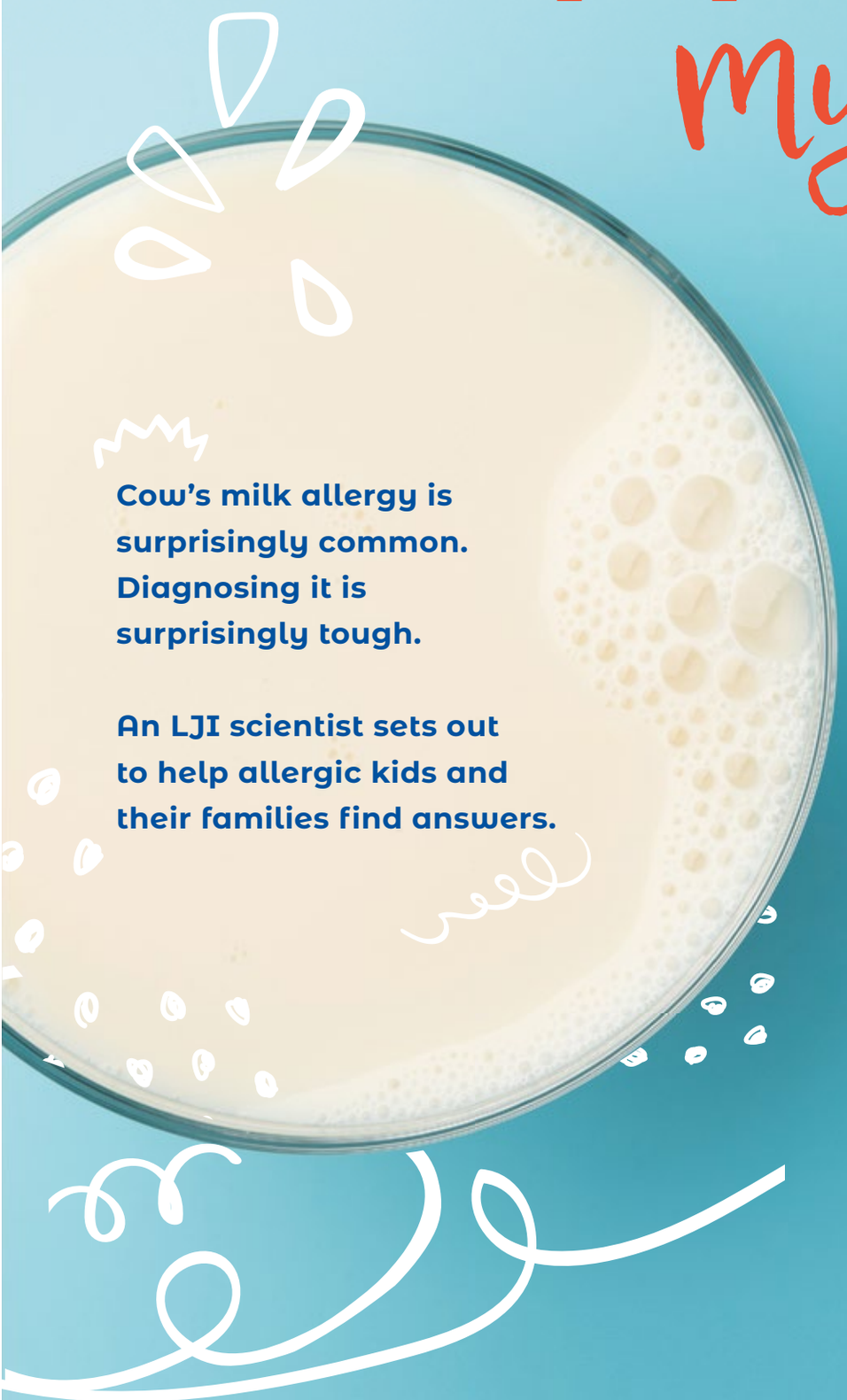
All of these efforts mean that a tremendous amount of data flows through LJI, providing ample opportunities for computational biologists like Dr. Einav to collaborate and extend the impact of their work.

Dr. Einav is also keen to work with researchers from the Saphire Laboratory and the Shresta Laboratory to study Ebola virus, dengue virus, and other pathogens. He says he knew early on that LJI would be a good home for his unique brand of science.

"I deeply resonated with the spirit of the faculty and the flavor of research being done at LJI. The big questions they're asking are the same questions I've been going after," says Dr. Einav. "When you find that fit, it's incredibly invaluable."•

modify our current one-size-fits-all mode of vaccination to create **personalized vaccines**?"

milk mysteries



Cow's milk allergy is surprisingly common. Diagnosing it is surprisingly tough.

An LJI scientist sets out to help allergic kids and their families find answers.

Cow's milk allergy is the most common type of food allergy in children—it's also the weirdest.

In all allergies, a person gets sick when immune cells overreact to normally harmless molecules, such as milk proteins, peanut proteins, or cat dander. Immune cells think the offending molecules are dangerous pathogens, and they launch a counterattack. The immune cells churn out inflammatory molecules, and a person begins to get very, very ill.

Most food allergies last a lifetime. Cow's milk allergy is strange because kids usually "outgrow" it. In fact, around 80 percent of children with a cow's milk allergy see the allergy disappear by adulthood.

At La Jolla Institute for Immunology (LJI), scientists are taking a closer look at how immune cells drive allergic reactions. Their research may guide the development of better diagnostics and therapies for cow's milk and other food allergies.

LJI Postdoctoral Fellow Sloan Lewis, Ph.D., is leading an innovative new study into cow's milk allergy with funding from the Institute's Tullie and Rickey Families SPARK Awards program, via the Rosemary Kraemer Raitt Foundation. Dr. Lewis wants to know how a subset of immune cells, called monocytes, responds to milk proteins in children with cow's milk allergy. Her goal is to see whether monocytes can reveal an "immune signature" that might help doctors diagnose cow's milk allergy quickly and accurately.

"We do have non-invasive diagnostic tests for allergens, and they can work decently well, but they're not very reliable. There are a lot of false positives and false negatives," says Dr. Lewis.

Doctors often begin allergy testing with a titer test, which analyzes the blood for antibodies specific for different foods. Some patients also endure skin prick tests, where doctors prick the skin to expose patients to different allergens to see how they respond.

"The gold standard diagnostic method right now is the food challenge," says Dr. Lewis. "Doctors give kids whatever they're allergic to and they see what happens to them—and obviously this is horribly stressful, super expensive, and high risk."

Dr. Lewis thinks food allergy tests could be much more precise and a lot less risky. Her work in cow's milk allergy started with a project in the laboratory of LJI Professor Bjoern Peters, Ph.D. The team worked with scientists at Rady Children's Hospital-San Diego, Johns Hopkins, and the University of Southampton to collect blood samples from children with cow's milk allergy.

The researchers then studied how T cells in these samples responded to proteins in cow's milk and tracked down which proteins sent T cells into attack mode. Drs. Peters and Lewis then compared T cell responses from these patients to T cell responses from pediatric patients with other food allergies—but not milk allergy.

This investigation revealed T cell characteristics only seen in kids with cow's milk allergy—an immune signature that may prove useful in designing a future diagnostic.

Before she worked with T cells, Dr. Lewis was a monocyte expert. Monocytes are fascinating cells because they are part of the innate immune system, the body's first response against disease. Rather than fighting a pathogen directly, monocytes ring the alarm bells and call T cells to the battlefield. Monocytes might also fuel food allergies by mistakenly sounding the alarm against certain proteins in foods.

"A few studies have hinted that monocytes and other kinds of innate immune cell populations are involved in food allergies," says Dr. Lewis. "But there's not a lot known about monocytes in cow's milk allergy."

So Dr. Lewis has to start at the very beginning. Her first question is whether the donor blood samples (the same ones from the T cell study) contain more or less than the normal amount of monocytes. In short—are monocytes doing anything weird inside these kids with cow's milk allergies? Answering this type of fundamental immune system question may help researchers finally understand how food allergies develop and why some disappear over time.

Dr. Lewis thinks this work may shed light on immune signatures related to subtypes of cow's milk allergy. For example, some children allergic to liquid cow's milk do just fine when cow's milk is baked into a food. "There are also kids who are allergic to both, and they do not grow out of it," says Dr. Lewis. That distinction would be important for caregivers, doctors, and kids to know as early as possible.

In the end, Dr. Lewis hopes this research may offer a better way to diagnose and treat many different food allergies. "It was eye-opening for me when I started talking to people about this research," she says. "So many people are affected by food allergies. The prevalence is surprising—and clinicians are very interested in what we find."

Two potential drug strategies may deliver relief for patients with severe asthma

An estimated 10 Americans die every day from asthma, and the disease leads to around 439,000 hospitalizations and 1.3 million emergency room trips each year.

"Asthma is one of the most important allergic diseases to study," says Professor Toshiaki Kawakami, M.D., Ph.D., a member of the Center for Autoimmunity and Inflammation at La Jolla Institute for Immunology (LJI).

Dr. Kawakami and his colleagues recently published important research into the molecular drivers of severe asthma and rhinovirus-induced asthma exacerbation (a type of asthma that can accompany a common cold). Their study suggests people with both types of asthma may benefit from therapies that block interactions between a molecule called histamine-releasing factor (HRF) and antibodies called immunoglobulin E (IgE).

As Dr. Kawakami explains, immune cells secrete molecules to "talk" to each other. One of these molecular messengers is HRF. When a person encounters an allergen, certain immune cells and cells in the lungs start churning out more HRF. The HRF then courses through the body and looks for special antibodies to bind to. Over the last decade, Dr. Kawakami and his colleagues have shown that interactions between HRF and IgE antibodies drive harmful inflammation in mouse models of asthma.

For their latest study, published in *The Journal of Allergy and Clinical Immunology*, Dr. Kawakami collaborated with clinicians and scientists at the University of Pittsburgh School of Medicine, Boston Children's Hospital, and the University of Virginia to investigate HRF and IgE interactions in humans. The team collected samples from patients aged 6 to 65—both from healthy controls and from patients with varying forms and severity of asthma.

The team found that HRF and IgE interactions drive inflammation specifically in patients with severe asthma and patients with rhinovirus-induced asthma exacerbation. These findings were in line with the lab's previous findings in mice. The scientists further confirmed the importance of HRF and IgE interactions in laboratory experiments using a line of human bronchial cells.

Dr. Kawakami now hopes to test two potential asthma therapies in clinical trials. The first therapeutic approach would harness a molecule developed by the Kawakami Lab. This molecule, called HRF-2CA, appears to inhibit asthma and severe food allergy symptoms in mice, and there's reason to think it could help treat humans as well. The researchers are also interested in studying a therapeutic antibody called SPF7-1, which acts as a sort of HRF decoy, binding to IgE and blocking interactions with the real HRF.

Shane Crotty, Ph.D., takes on new role as LJI Chief Scientific Officer

LJI Professor Shane Crotty, Ph.D., has stepped into a new role as Chief Scientific Officer of La Jolla Institute for Immunology (LJI). In this role, Dr. Crotty leads LJI's overall scientific strategy and oversees research operations to support the success of the Institute's scientific initiatives.

"Shane's visionary leadership and foresight became newly apparent as the COVID-19 pandemic unfolded and he drew on his deep scientific expertise to help guide vaccine efforts worldwide," says LJI Professor, President, and CEO Erica Ollmann Saphire, Ph.D., MBA, "He is an outstanding scientist and innovator whose exceptional breadth and depth of knowledge will serve him well as he works to implement the Institute's scientific vision. I couldn't have wished for a more thoughtful leader on my side as we build LJI's future together."

> **"He is an outstanding scientist and innovator whose exceptional breadth and depth of knowledge will serve him well as he works to implement the Institute's scientific vision."**
>
> ERICA OLLMANN SAPHIRE, PH.D., MBA
> LJI PROFESSOR, PRESIDENT, AND CEO

"I am incredibly honored to have been selected to help guide the Institute's scientific direction," says Dr. Crotty. "We are at an inflection point in our understanding of the immune system's central role in both health and disease and I can't think of a better place to be than LJI during this exciting time in immunology."

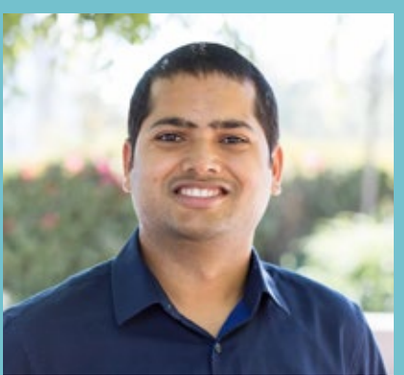
Dr. Crotty is known as a global leader in vaccine research. His work has guided the development of vaccine candidates against HIV and shed light on how the human body fights SARS-CoV-2. Dr. Crotty's findings throughout the COVID-19 pandemic were published in a series of high-impact papers and lauded in Congressional and White House hearings for helping inform public health measures at the federal level.

Dr. Crotty succeeds LJI Professor Mitchell Kronenberg, Ph.D, who served as Chief Scientific Officer in addition to serving as LJI President and CEO for many years.

Onyeka Chukwudozie wins new Merkin Fellowship to pursue Lassa virus research

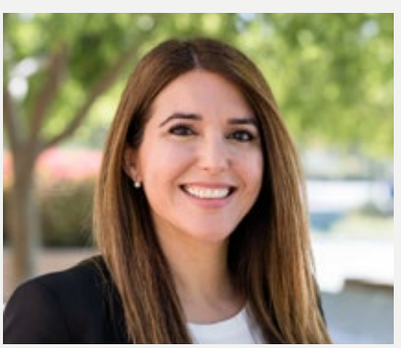
Onyeka Chukwudozie, a graduate student in LJI's Saphire Lab, is poised to advance critical virology research thanks to support from the Merkin Graduate Fellows Program at UC San Diego. As a Merkin Graduate Fellow, Chukwudozie traveled to London this fall for a six-month research collaboration in the IAVI Human Immunology Laboratory at Imperial College London. One of Chukwudozie's goals at LJI is to use high-resolution imaging from cryo-electron microscopy tools to reveal key parts of the deadly Lassa virus in more detail than ever before. Through the fellowship program, Chukwudozie is working closely with vaccine experts to learn how his research may help patients in a clinical setting.

Rinkesh Gupta, Ph.D., wins support for allergy and autoimmunity research



LJI Postdoctoral Researcher Rinkesh Gupta, Ph.D., is the inaugural winner of the new Michael Croft Fellowship in Immunology, funded by long-time LJI partner Kyowa Kirin, Inc. Dr. Gupta leads investigations in the Croft Lab to shed light on diseases such as asthma, psoriasis, and atopic dermatitis. "Receiving this support from Kyowa Kirin and LJI gives me the encouragement to keep me on the path that I'm on," says Dr. Gupta.

Estefania Quesada-Masachs, M.D., Ph.D., honored for type 1 diabetes discoveries



LJI Instructor Estefania Quesada-Masachs, M.D., Ph.D., has received the 2023 Young Investigator of the Year Award from the Network for Pancreatic Organ donors with Diabetes (nPOD). This prestigious award recognizes Dr. Quesada-Masachs' groundbreaking research in type 1 diabetes.

Mark Atkinson, Ph.D., founder and Executive Director of nPOD, says the nomination committee was unanimous in selecting Dr. Quesada-Masachs for the 2023 award. "The primary mission of nPOD is to increase our understanding of how and why type 1 diabetes develops," says Dr. Atkinson. "At nPOD, we believe Dr. Quesada-Masachs' work brings us one step closer toward that goal. We take pride in her receiving this well-deserved award."

Dr. Quesada-Masachs' research delves into the behavior of T cells, the immune cells that can mistakenly kill insulin-producing beta cells in the pancreas and cause type 1 diabetes. She also studies the local pancreatic environment and the behavior of insulin-producing pancreatic beta cells.

Erica Ollmann Saphire, Ph.D., MBA, to receive 2023 Marion Spencer Fay Award

LJI Professor, President, and CEO Erica Ollmann Saphire, Ph.D., MBA, has received the 2023 Marion Spencer Fay Award by the Lynn Yeakel Institute for Women's Health and Leadership of Drexel University College of Medicine. The honor recognizes Dr. Saphire's "transformative, uniquely impactful ongoing research and groundbreaking discoveries in structural virology, as well as her visionary international leadership contributions in immunology and her demonstrated commitment to mentorship." Dr. Saphire will receive the award at a Drexel University ceremony this November, where she will present a lecture on "How to Turn Competitors into Collaborators."

Alessandro Sette, Dr.Biol.Sci., elected to the American Academy of Microbiology

The American Academy of Microbiology (AAM) recently elected LJI Professor Alessandro Sette, Dr.Biol.Sci., as a fellow of the Academy. AAM is the prestigious honorary leadership group within the American Society for Microbiology (ASM), one of the largest life science societies in the world. Dr. Sette was recognized for his major advances in understanding how the body's T cells remember previous invaders and vaccines, react to current threats—and protect us from emerging diseases. The new AAM honor also recognizes his commitment to sharing scientific research with a wider audience. His outreach efforts include media interviews and projects to fuel immune system and microbiology research around the globe.

Left to right: LJI Professors Michael Croft, Ph.D., and Mitchell Kronenberg, Ph.D., with Ambassador Esteban Moctezuma Barragán during a 2023 campus visit.

LJI strengthens ties between U.S. and Mexican scientists

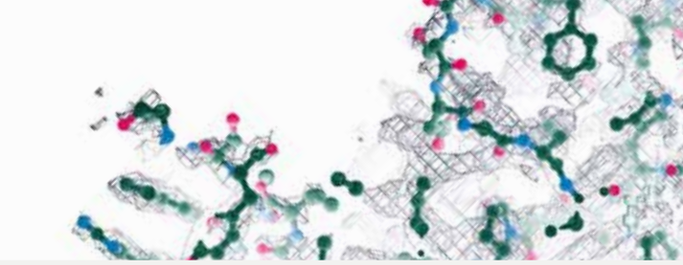
Throughout 2023, La Jolla Institute for Immunology (LJI) has opened its doors to diplomats, young scientists, and biomedical research leaders visiting from Mexico. These campus visits are an important step in establishing a thriving cross-border partnership, an effort co-organized by the Border Philanthropy Partnership, the Consul General of Mexico in San Diego, and the Center for U.S.-Mexican Studies at UC San Diego.

"LJI has always welcomed international scientists and worked to establish strong collaborations around the world," LJI Professor, President, and CEO Erica Ollmann Saphire, Ph.D., MBA. "We're glad to continue our support for this cross-border partnership and expand our work with young scientists and research leaders just across the border."

The cross-border effort launched in 2021, and expanded since then with several visits to LJI by delegations of representatives from Mexico's biological sciences industry. These visits included scientific presentations by LJI scientists and tours of the Institute's Cryo-Electron Microscopy (Cryo-EM) Core, where researchers work to capture high-resolution images of viral proteins, live-saving antibodies, and more.

> **"LJI has always welcomed international scientists and worked to establish strong collaborations around the world."**
>
> ERICA OLLMANN SAPHIRE, PH.D., MBA, LJI PROFESSOR, PRESIDENT, AND CEO

LJI Research Technician Cindy Manriquez Rodriguez, a member of the Myers Lab, speaks to a delegation of Mexican scientists and biotech leaders during a campus visit.



"I'm really excited about the collaborative nature of LJI's work and the commitment to global good."

ANDY CAREY
EXECUTIVE DIRECTOR OF U.S.-MEXICO BORDER PHILANTHROPY PARTNERSHIP

"When speaking with the Institute's professors and lab specialists, I was moved to hear about their efforts to map SARS-CoV-2 and share their findings with global scholars," says Ambassador Carlos González Gutiérrez, Consul General of Mexico in San Diego. "I was very proud to learn that an essential part of that work was Dr. Rubén Díaz-Avalos, a Mexican scientist who directs the Cryo-Electron Microscopy Core at LJI. Thanks to his research, scientists around the world have been able to see detailed images of the coronavirus and advance vaccine-finding efforts."

"I'm really excited about the collaborative nature of LJI's work and the commitment to global good," adds Andy Carey, Executive Director of the U.S.-Mexico Border Philanthropy Partnership. "We're truly honored to partner with the Institute and to share the work of Mexican nationals who are part of the LJI community."

This May, the LJI Advancement Department hosted a visit by Esteban Moctezuma Barragán, Ambassador of Mexico to the United States. In July, LJI also arranged a visit for representatives from UC San Diego's Center for U.S.-Mexican Studies and a delegation of young professionals from Mexico who are members of Citi's NextGen group. These groups attended a special presentation by LJI Professor Mitchell Kronenberg, Ph.D., and LJI Associate Professor Sonia Sharma, Ph.D., and toured the LJI Flow Cytometry and Microscopy Core Facilities.

Left to right: Ambassador Carlos González Gutiérrez, Ambassador Esteban Moctezuma Barragán; and LJI Cryo-Electron Microscopy Core Director Rubén Díaz-Avalos, Ph.D., in the LJI Cryo-Electron Microscopy Suite.

Celebrating the annual LJI Art of the Immune System Student Competition

For this year's Art of the Immune System Student Competition, organized by La Jolla Institute for Immunology (LJI), the Institute invited local students to submit striking pieces that demonstrate how science and art can go hand-in-hand.

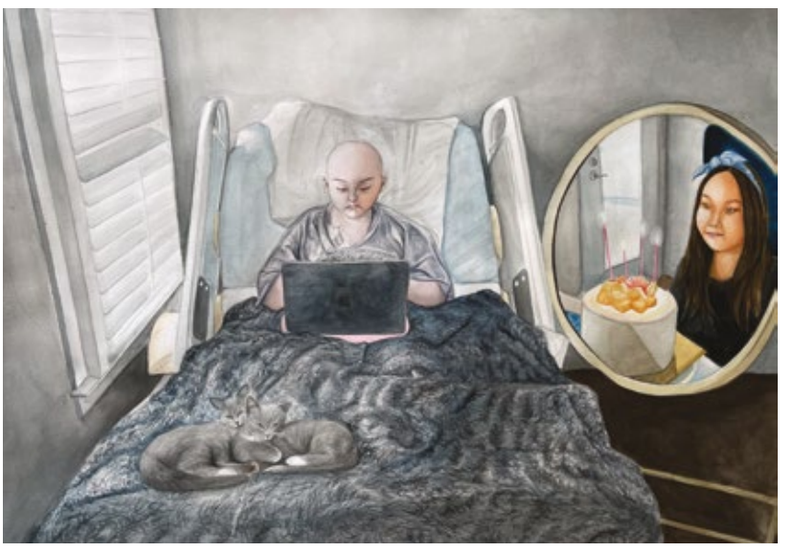
JUNIOR IMMUNOLOGIST CATEGORY

FIRST PLACE WINNER

Elisa "Isa" Asnani, age 11
High Tech Explorer Point Loma

Asnani used acrylic paint on canvas for her piece, titled "Healthy Heart. A Tribute to Tio Pablo."

SENIOR IMMUNOLOGIST CATEGORY



FIRST PLACE WINNER

Judith Kang, age 16
Westview High School

Kang used watercolors for a piece titled "Lost Childhood," which depicts the emotions surrounding a close childhood friend who was diagnosed with cancer earlier this year.

Asnani and Kang both received an Ultimate Dual Microscope, manufactured by National Geographic, and an engraved plaque from LJI.

A

B

C

D

A JUNIOR IMMUNOLOGIST CATEGORY
second place | Eleanor Boster, 11
Albert Einstein Middle School

B JUNIOR IMMUNOLOGIST CATEGORY
third place | Amrin B., 10
Del Sur Elementary

C SENIOR IMMUNOLOGIST CATEGORY
second place | Aspen Cotton, 16
Westview High School

D SENIOR IMMUNOLOGIST CATEGORY
third place | Keira Casey, 16
Sage Creek High School

View these pieces and learn more about the scientific concepts behind them.

MARCH 16 . 2023

On March 16, 2023, La Jolla Institute for Immunology (LJI) welcomed guests back to the Institute to hear LJI Research Assistant Professor Ceclilia Lindestam Arlehamn, Ph.D., present her new research into how the immune system's T cells may contribute to Parkinson's disease, Alzheimer's disease, ALS, and even long COVID. Her research has revealed how T cells can target vulnerable neurons in patients with Parkinson's disease, potentially driving disease onset. Following Dr. Lindestam Arlehamn's compelling presentation, attendees mingled with LJI scientists and leadership at a lively outdoor reception on LJI's back patio.

Event speaker, Cecilia Lindestam Arlehamn, Ph.D.

Mandy Shefman, Susan Leonard, Juniper and Lee Stein, Linda Howard

Rebecca Vincent, Joseph and Joan Tarnowski

JUNE 13 . 2023

Women's Health Access Matters

On June 13, 2023, LJI Professor, President, and CEO Erica Ollmann Saphire, Ph.D., MBA, gathered with experts in Washington, D.C., for a special roundtable discussion on the importance of funding new research into diseases and conditions that exclusively, differently, or disproportionately affect women. The event, organized by Women's Health Access Matters (WHAM), included members of Congress on both sides of the aisle.

The discussion centered on the 30th anniversary of the signing of the 1993 National Institutes of Health (NIH) Revitalization Act, the piece of legislation that required, for the first time, inclusion of women and minorities in research funded by the NIH, and mandated that clinical trials be designed in such a way to indicate any differences in outcome between men and women.

LJI Professor, President, and CEO Erica Ollmann Saphire, Ph.D., MBA, (center) at the WHAM Roundtable Discussion event on June 13, 2023

The WHAM event included remarks by (left to right) WHAM Founder and CEO Carolee Lee, former U.S. Representative Connie Morella, former Senator Barbara Mikulski, and inaugural NIH OWR Director Vivienne Pinn, M.D. (Photos courtesy WHAM).

JUNE 1 . 2023

2023 SPARK Award winners from left to right: Felix Nettersheim, M.D., Erik Ehinger, Dawid Zyla, Ph.D., Sloan Lewis, Ph.D., Gregory Williams, Ph.D. (not pictured: Rosa Isela Gálvez, Ph.D.)

SPARK | THE TULLIE AND RICKEY FAMILIES SPARK AWARDS FOR INNOVATIONS IN IMMUNOLOGY

La Jolla Institute for Immunology welcomed guests to an outdoor reception on in celebration of the six winners of the 2023 Tullie and Rickey Families SPARK Awards. The reception was a chance for LJI to recognize both the supporters of the Tullie and Rickey Families SPARK Awards program and honor the newest cohort of SPARK Award winners.

Guests had the opportunity to hear remarks from two former SPARK winners, Tom Riffelmacher, Ph.D. ('20 SPARK Award winner), and Melissa Meyer, Ph.D., ('22 SPARK Award winner), who spoke about the impact the program has had on their careers and research.

Tom Riffelmacher, Ph.D., '20 SPARK winner

SPARK supporters Lizbeth Ecke, David Meyer, and Vann Parker

SPARK supporters Carol Kearney, Maria Silva, and LJI Board Director Barbara Donnell together with Maria Matias, Ph.D., '22 SPARK winner

AUG 18 . 2023

A DAY AT THE *Races*

HOSTED BY
LA JOLLA INSTITUTE FOR IMMUNOLOGY

La Jolla Institute for Immunology (LJI) hosted its 3rd annual A Day at the Races event at the renowned Del Mar Racetrack, joined by title sponsor UC San Diego. Guests of the event received access to Del Mar's exclusive Turf Club, where they experienced panoramic views of the horse races from Il Palio Restaurant. When not cheering on the ponies, attendees of the private party enjoyed live music on the patio, as well as entertainment provided by celebrated performers and conversation with LJI scientists and San Diego's community leaders.

"Magic Mike" Stilwell wows the crowd with his sleight of hand

LJI Board Director Tony Carr with LJI Professor, President & CEO Erica Ollmann Saphire, Ph.D., MBA, and UC San Diego Chancellor Pradeep Khosla, Ph.D.

Guests (clockwise) Tanya Shaffer, Ingrid Johnson, Amb. Diana Lady Dougan, and Brooke Sheridan

SEPT 8 . 2023

LJI leadership and the Institute's Board of Directors welcomed supporters to the Farmer & the Seahorse in La Jolla on Sept. 8, 2023, for a reception recognizing LJI Professor Shane Crotty, Ph.D., and his recent appointment to the position of Chief Scientific Officer.

LJI Board Director Mark Bowles and President's Advisory Council Member François Ferré, Ph.D.

LJI Supporter Gene Lay, Ph.D., with LJI Professor and President Emeritus Mitchell Kronenberg, Ph.D.

LJI Chief Scientific Officer Shane Crotty, Ph.D., and LJI Professor, President, and CEO, Erica Ollmann Saphire, Ph.D., MBA

La Jolla Institute | BONSAI LEGACY SOCIETY

Make *Life Without Disease* part of your legacy!

Members of La Jolla Institute for Immunology's (LJI) Bonsai Legacy Society are among the Institute's most important benefactors. Gifts that qualify for LJI's Bonsai Legacy Society create a legacy that will shape the future of the Institute.

LJI's Bonsai Legacy Society honors individuals who share a commitment to the betterment of human health through world-class biomedical research. By including LJI in your will, trust, or other estate plans, you are investing in the future of research and *Life Without Disease*®.

If you have made plans to include LJI in your estate, please reach out to Vice President of Advancement **Kelsey Dale at kdale@lji.org, 858.752.6542** to let us know so that we can welcome you to LJI's Bonsai Legacy Society.

BONSAI LEGACY SOCIETY MEMBER LISTING AS OF JULY 31, 2023

Anonymous
Estate of Kim Ash*
B. Jack and Dorie DeFranco
Frank J.* and Marion* Dixon
Barbara Donnell
Glennie Ginder*
James B. Isaacs, Jr.
Jaime z"l and Sylvia Liwerant
John and Susan Major
Judith L. Bradley and David L. Mitchell
Eleanor Mosca
Joani Nelson
The Roberto Family Trust*
Paulette Roberts
Shelley Rowland*
Nancy L. Vaughan

**Deceased*

More information about planned gifts can be found at **lji.org/plannedgiving** or scan the QR code.

La Jolla Institute | VANGUARD GIVING SOCIETY

With your contribution of $1,000 or more to the La Jolla Institute for Immunology, you are joining our **Vanguard** and asserting your role at the forefront of the next breakthroughs in medical research. Our researchers are dedicated to assessing how the immune system can be harnessed to fight diseases ranging from asthma to Zika, so that one day we can all live free of the symptoms and frightening prognoses of many of the conditions we suffer from today. Your support ensures our scientists have the resources they need to accelerate the pace of their discoveries and turn "someday" into today.

As a member of LJI's Vanguard you are taking an active role in leading the way to **Life Without Disease®**.

van·guard | a group of people leading the way in new developments or ideas

$10,000,000+

Anonymous

$5,000,000 - $9,999,999

Pfizer, Inc.

$3,000,000 - $4,999,999

Anonymous

GHR Foundation

The William K. Bowes, Jr. Foundation

$1,000,000 - $2,999,999

Richard S. and Karna S. Bodman / Richard S. and Karna S. Bodman Donor Advised Fund at Fidelity Charitable

Fidelity Charitable

Jewish Community Foundation San Diego

Franklin and Catherine Johnson / The Franklin and Catherine Johnson Foundation

John and Susan Major / Susan and John Major Donor Advised Fund at Rancho Santa Fe Foundation

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The Conrad Prebys Foundation

Schwab Charitable

Ralph* and Fernanda Whitworth / Immunotherapy Foundation

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Anonymous

The Brehm Coalition

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Ken and Barbara Magid

inspire generational giving

Barbara and Ken Magid

Like many of us in August 2020, Ken and Barbara Magid were seeking trustworthy sources of information about the novel coronavirus. When could they stop wiping down their groceries? When would there be a vaccine? “We were trying to sort through so much information. What was real and not real?” says Barbara.

Around then, they read an article about Erica Ollmann Saphire, Ph.D., MBA, Professor at La Jolla Institute for Immunology (LJI), and leader of the Coronavirus Immunotherapy Consortium (CoVIC). They were intrigued by how LJI scientists combined structural biology and bioinformatics to uncover how the human immune system targets deadly viruses.

Ken embarked on an educational journey, learning more about immunology than he ever imagined. He attended LJI’s Live from the Lab webinars, read research papers, and listened to scientific seminars. He began to feel better having found sources of credible information and hope. Someone was doing something.

The Magids also explored other areas of immunology. After reading the book “T,” which examines the effect of testosterone in the development of physical and behavioral differences between the sexes, as well as recent news coverage of Alzheimer’s disease research, they met with LJI Associate Professor Sonia Sharma, Ph.D. They learned about her research looking at sex-based differences in disease and inflammation, specifically related to Alzheimer’s disease.

A few years ago, Ken created a private family foundation as a way for their family to make decisions together about their charitable giving. “Barbara and I are not going to be here forever, so I wanted to get our kids involved—to get them to start thinking about things outside of their own lives, and about where they’d like to make contributions,” he says.

Ken and Barbara conferred with their family, and decided to make a donation to the Sharma Lab. They also decided to support a new summer internship program at LJI.

The Magids believe it’s important for everyone to think about what causes are meaningful to them and to pass the important concept of philanthropy on to the next generation. “Really, anybody can do this,” says Ken. “We aren’t the Rockefeller Foundation, but we give enough so that it means something to us, and it means something to those receiving the donation.”

LA JOLLA INSTITUTE | VANGUARD GIVING SOCIETY

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Rosemary Kraemer Raitt

A joyful life and a lasting legacy of philanthropy

John Raitt and Rosemary Kraemer Raitt

"She was fun!"

Cheryl Hammond and John Kraemer agree that this describes Rosemary Kraemer Raitt, the name behind the Foundation for which they serve as co-trustees, and which has supported the Tullie and Rickey Families SPARK Awards for Innovations in Immunology for three years running.

Rosemary was also a savvy businesswoman, a lover of art—with an eye for design—a polio survivor, a cheerleader for the underdog, and a passionate philanthropist. In the mid-1980s, Rosemary reunited with her high school sweetheart, John Raitt (father of singer Bonnie Raitt). Later in life and a widower, John heard Rosemary was also single, picked some roses from the neighbor's garden, and went directly to her house. When she opened the door and smiled, John knew they were "instantly back in love."

John Kraemer

In the years since grade school, John had actually made it big on Broadway. In fact, he was Rodgers and Hammerstein's golden boy, having starred in the likes of *Oklahoma!* and more.

They married, and John and Rosemary Raitt spent the next two decades together in bliss. John remained a busy performer, and Rosemary focused on her vision for the Rosemary Kraemer Raitt Foundation.

Each year, Rosemary invited her closest confidants, including John Kraemer, her nephew, and Cheryl Hammond, her dear friend and business consultant, to her home for collaborative sessions about her dreams for the Foundation. It was a fun house to visit and John and Rosemary made it easy to stay for a while. "John would answer the door singing *Oklahoma!*," laughs Cheryl. "I went to her house for this collaborative process one time, and I ended up staying for three days," John reminisces.

These annual meetings went on until Rosemary's death in 2011. John and Cheryl were appointed co-trustees of the Foundation and by then, they were confident in their understanding of Rosemary's intentions. So when they learned about the Tullie and Rickey Families SPARK program, they knew Rosemary would approve. "She would have loved what it's doing for young scientists who are trying to swing for the fences," says John.

John and Cheryl continue to fund the SPARK program because the impact their gifts can have is clear. "What the Tullies and Rickeys have done with this program is perfect for a foundation of our size, because we see the leverage their gifts create," says John.

John and Cheryl enjoy carrying on Rosemary's legacy in this way, and intend to pass it on to the next generation. "It makes us all richer," says John. "I think we get as much as we give." Cheryl adds, "I consider being a trustee of this foundation as one of Rosemary's greatest gifts to me."

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Our goal this season is to raise $25,000, to cover one full SPARK award, and you can help us get there by making a gift today at

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