

LA JOLLA INSTITUTE FOR ALLERGY AND IMMUNOLOGY

Immune

MATTERS

SPRING 2016



Women in Science

Closing the gender gap

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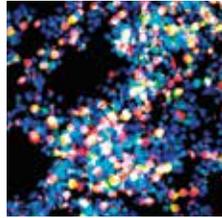
Mapping T Cells

A global immunoprofiling effort

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IMMUNE MATTERS CONTRIBUTORS

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Letter from the President

I am pleased to report that on many levels the La Jolla Institute finds itself in a remarkably good position in 2016. After nearly three decades of intense effort since our founding, we have reached a number of exciting high water marks, based on the internationally recognized science we continue to produce. These include the millions of dollars we are attracting in federal research grants, the rapidly expanding public awareness of the power of the immune system, which has contributed to burgeoning private philanthropy, and the growing confidence of our scientists that we can harness our unique insights on the immune system to fight disease.

As always, the core of our success is the groundbreaking science being conducted in our labs by some of the world's leading researchers in immunology. We are particularly proud that women scientists at all levels are conducting a significant and increasing portion of that research. In our cover story we'll show you why the work of our talented women investigators is so important to the field and the future of the Institute.

As part of that coverage, we've launched a new feature about the Institute's "up-and-coming" young scientists to recognize the skills and drive of the next generation of scientific leaders. I think you'll be fascinated by the story of Rana Herro, Ph.D., who survived war-torn Lebanon to become one of the Institute's stars of the future. Hopefully, she'll have a career as outstanding as her mentor, one of the Institute's true luminaries, Michael (Mick) Croft, Ph.D., Professor and Division Head of Immune Regulation. Mick is the subject of this issue's Q&A, where you'll learn how this world-renowned investigator's discoveries with proteins called tumor necrosis factor receptors are leading to new drugs to treat a variety of diseases.

Much of the Institute's research relies on grants, and our track record in attracting public funding continues to rank among the best nationally. Inside, we highlight an \$18 million consortium grant a team led by the Institute's Alessandro Sette, Ph.D., received from the NIH to investigate the immune response to dengue virus and *Mycobacterium tuberculosis*.



Philanthropic dollars are also critical to the Institute's work, as they allow us to engage in activities not covered by government grants. They include keeping projects alive between grant cycles, purchasing most of the scientific equipment the Institute needs, and recruiting new faculty members. Fortunately, our increased focus on philanthropy is paying major dividends. Among our recent major donations: a landmark gift from Susan and John Major, and just this past February, Pfizer Inc.'s \$5 million gift, the largest donation in Institute history.

I believe growing public awareness of immunology's potential and the Institute's increasingly effective role are fueling much of the attention we're receiving, including attracting the type of exceptional new board members we profile inside this issue. As always, we express appreciation to our partners—the foundations, individual donors, and federal funding sources—who have been so instrumental in getting us to where La Jolla Institute stands today in creating a path to *Life Without Disease*®.

Sincerely,

A handwritten signature in dark ink that reads "Mitchell Kronenberg". The signature is written in a cursive, flowing style.

Mitchell Kronenberg, Ph.D.
President & Chief Scientific Officer
La Jolla Institute for Allergy and Immunology



Women

in Science



ON THE COVER

Women now receive half of all doctorates in the life sciences and are just as likely as men to be employed as biological and medical researchers. Yet, stubborn obstacles remain.

Marie Curie, the first scientist to win two Nobel Prizes (1903, 1911), was unquestionably one of the most brilliant scientific minds in history, but in one sense—and through no fault of her own—her outsize career was an inspirational failure: It would take nearly a century for significant numbers of women to come even anywhere close to the French physicist in terms of scientific achievement and recognition.

There are a number of reasons why Madame Curie's career did not inspire a generation of women to follow her down a scientific path, with lack of education, opportunity, and gender bias among the key limiting factors. The good news is that in 2016, with burgeoning numbers entering the “STEM” fields, women have a firm and rapidly expanding place in science and are taking their seats at the pinnacles of scientific achievement alongside their male counterparts in ever greater numbers.

This trend is clearly manifested at La Jolla Institute. Some of the most amazing immunological research in the world—everything from creating potential new vaccines against the scourge of global infectious disease, to developing lasting cures for some types of cancer, to unraveling the mysteries of the immune system to create powerful new weapons to battle many types of inflammatory diseases—is being conducted by the remarkable group of women scientists at the Institute.

Whether they're senior professors with worldwide reputations, postdocs, students, technicians, or core directors, the dedicated women at LJI are all deeply committed to producing groundbreaking discoveries that will ultimately translate into clinical treatments to improve and save lives in all corners of the planet.

n

In the U.S.

52.4%
share of Ph.D.s in
life sciences awarded
to women in 2012*

48.5%
share of female life
scientists in 2013*

22.4%
share of female
full professors
at research
institutions 2013*



Graduate student Dari Spasova

“One of the most exciting developments in recent years is watching the growth both in numbers and scientific results of the Institute’s women scientists,” says Mitchell Kronenberg, Ph.D., President and Chief Scientific Officer. “When I became president in 2003, we had just one female faculty member. Today, there are five women among our two dozen PIs, 30 percent of the faculty recruited during that time are women, and the percentage of female postdocs and instructors has expanded to 47 percent.

“We’re proud that our ongoing focus on increasing the number of women scientists has been accompanied by an equally important effort to create a research environment that is as bias-free and as supportive as possible, not only regarding gender of course, but extending more broadly,” Kronenberg adds.

“I believe female scientists do feel appreciated and treated equally here and are able to do their best work. The proof of that is that our women scientists have come to represent such a potent force for scientific excellence, and their contribution to the Institute’s strength and success cannot be overstated.”

What’s almost as amazing as the research success of the Institute’s women scientists is they achieved it by overcoming challenges most male scientists have never faced. Among them: gender bias making it more difficult to obtain

grants, jobs, and promotions; unequal compensation; being shut out of male-dominated networking crucial for career advancement; and in some cases, being penalized for bearing children and raising a family.

Remarkably, for most of the Institute's women scientists, these challenges have barely slowed them down. In fact, these obstacles have only served to make them stronger.

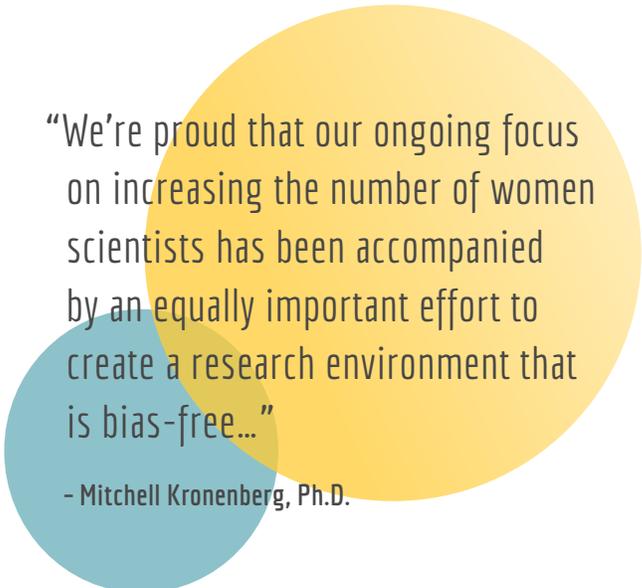
Overcoming barriers

"I've had to deal with a lot of barriers as a woman over my 20 years in science, but they not only didn't keep me down, they just fueled my fire to demonstrate that my work and career are equal to that of male scientists," says Professor Lynn Hedrick, Ph.D., one of the Institute's brightest stars. Dr. Hedrick late last year published a paper in *Science* with one of her postdocs, Richard Hanna, Ph.D., outlining fascinating research that could lead to the use of monocytic therapy to treat and possibly cure metastatic lung cancer.

Dr. Hedrick says she's pleased to report that conditions and opportunities for women scientists have improved greatly, and she's optimistic that 20 years in the future most of the obstacles faced by female researchers today will be gone for good, resulting in an equal playing field. But since she believes multiple challenges remain, she's actively working on behalf of women on a number of fronts, including serving on a committee on the status of women in science for the American Association of Immunologists.

"Things are certainly better, but it's important to raise awareness that we still have a ways to go," Dr. Hedrick says. "I'll give you an example. A national study conducted a couple of years ago provided identical CVs to academic and corporate recruiters. One CV had a man's name at the top and the other identical CV had a woman's name. When asked which person they would hire or promote, 75 percent of the respondents chose the man. What this example shows is that even though it's 2016, there are still serious gender discrimination issues that must be addressed if women scientists are to achieve full equality with their male counterparts."

Interestingly, there are some women who do not believe that being a female scientist presents any problem at all. They claim they have never been discriminated against in their careers and that just raising the issue indicates



"We're proud that our ongoing focus on increasing the number of women scientists has been accompanied by an equally important effort to create a research environment that is bias-free..."

- Mitchell Kronenberg, Ph.D.

gender actually matters. Some even say being a woman can be an advantage in pursuing grants and positions where there may be preferences for hiring women to compensate for past discrimination.

There's a certain amount of denial and wishful thinking in those concepts, says Sonia Sharma, Ph.D., Assistant Professor in the Division of Cell Biology, and Director of the Functional Genomics Facility. Dr. Sharma, who is one of the Institute's youngest principal investigators, has already shown her mettle. Last year, Dr. Sharma was awarded a five-year \$1.1 million grant from the National Cancer Institute to study how the body's innate immune system recognizes and is stimulated by DNA released by damaged or dying tumor cells.

"It's not whether challenges exist for women in science, because they certainly do, but it's how we respond to those challenges; how we mitigate them; how we rise above them, and ultimately how we serve as mentors for the next generation of female scientists," Dr. Sharma says, adding that she's observed issues related to male-centric networking in science.

"During my graduate studies I made observations related to our lab's research that should have led to significant networking opportunities in the field," Dr. Sharma recalls. "But although I wanted my supervisor to introduce me to other scientists in the field, I think it always felt more natural for him to promote some of my male co-authors to fellow colleagues and collaborators, which did contribute to some great opportunities that I felt sort of left out of. Looking back,



Postdoctoral researcher Annie Elong Ngono, Ph.D.

I know I should have spoken up more.” Far from being resentful, Dr. Sharma, like her colleague Dr. Hedrick, has used experiences like that as motivation.

“I think it’s made me work twice as hard, and that has paid off in working to create my own opportunities,” Dr. Sharma says. “I think that the reality of gender issues or bias hasn’t prevented me from continuing to push ahead. There are many different avenues to success, and in the end there should be no barrier that can prevent anyone from going as far as their drive and talent can take them. I do think that one of those avenues is creating networks that are inclusive of other women, that in fact we have a responsibility to help and support each other.”

The importance of mentorship

Assistance from other scientists, especially those with many years of experience, has been a critical factor in the careers of most of the female researchers at the Institute. Associate Professor Sujana Shresta, Ph.D., one of the world’s leading researchers on infectious diseases, including

dengue fever, credits several fellow faculty members, including Anjana Rao, Ph.D., for helping her grow as a scientist. As a member of the National Academy of Sciences, Dr. Rao is one of the Institute’s luminaries whose research is revealing how specific genes are regulated and how the TET family of tumor suppressors, discovered in her lab, prevent cancer and autoimmune disease. “Anjana was eager to help and met with me several times,” says Dr. Shresta. “She essentially showed me how to make my project more compelling to reviewers. I’m very grateful to her because the proposal was funded at the beginning of March.”

Dr. Shresta herself is an inspirational figure to younger female colleagues, including those in her native Nepal and other developing countries where female scientists face even greater obstacles in education and advancement. “Diversity is a key driver of academic innovation and creativity,” emphasizes Dr. Shresta. “It will take nothing short of a diverse group of scientists of different ages, ethnic and national origins, genders, and training to tackle the serious diseases that still afflict many of us.”

Dr. Shresta accepts the job of role model enthusiastically, especially in one of the remaining areas challenging women scientists: motherhood. “Even with a supportive partner and helpful colleagues, pregnancies affect a lot of women at a critical time of their career: Usually when they are postdocs in the final stretch to their biggest paper, or as young investigators establishing a brand new lab and starting to work toward tenure,” says Dr. Shresta, mother of two children.

“Academic research is a highly competitive field where you have to work all the time at 110 percent. That’s why a lot of women wait until they’re in their mid-to-late 30s to have children, and some decide to forgo having families altogether. Women shouldn’t be penalized for undertaking something that is so important in their lives and for society in general. Whether it’s helping women to work from home, offering families better child care support, or other types of assistance, such as lactation rooms, we have to address this issue if women are ever going to be able to fully contribute to scientific progress. Ensuring that women can, like men, realize their full potential as scientists is not just a matter of fairness. It’s a necessity that benefits everyone.”

A new generation

Fortunately, that seems to be one of the last remaining issues facing women today, with the overall scientific environment increasingly conducive to providing women with equal opportunity. This has been the experience of some of the Institute’s younger scientists, including Annie Elong Ngono, Ph.D., a postdoc in Dr. Shresta’s lab who was raised in France and Cameroon.

“I think my generation has benefited from the efforts of Dr. Shresta and all of the women who have gone before us,” Dr. Elong Ngono says. “You can see the mentality has changed and things are so much better for women from what it was in years past, especially at places like the La Jolla Institute, where we are all treated fairly and equally. Fortunately, it seems to be changing everywhere and men are becoming champions for women as well. I remember my professor in France for my Ph.D. pushed me and told me all the time that I was a scientist and that I shouldn’t be afraid as a woman to achieve anything I wanted. I felt so lucky to have his support and it’s helped me realize I didn’t have to worry about some of the pressures I felt being a woman in science, that I’m just as capable as everyone else.”

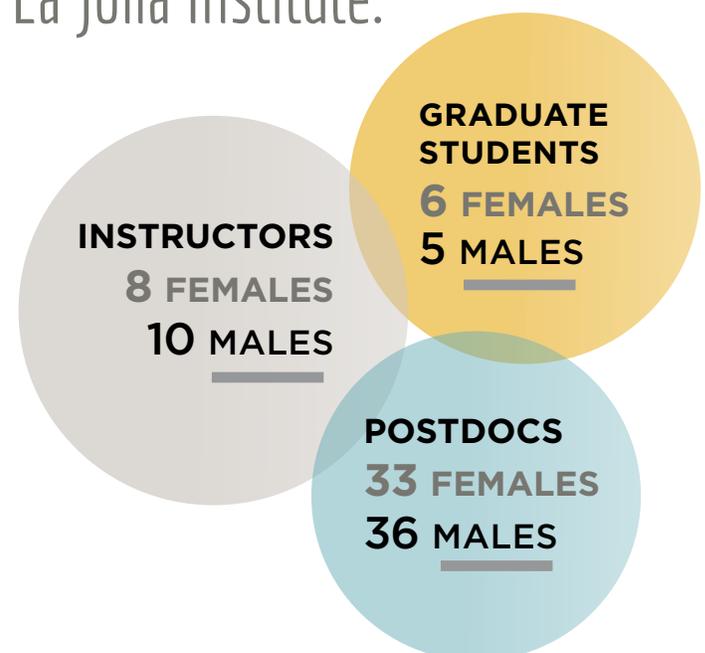
If there is one issue most women scientists believe will be the last barrier to fall, it’s the “glass ceiling” they believe is preventing

females from rising to top academic and management positions in greater numbers. It’s a concern for another young scientist, Dari Spasova, a native of Bulgaria and a grad student who will receive her doctorate this summer in the lab of adjunct professor Charles Surh, Ph.D. Spasova is pleased to see statistics showing that women are entering science in equal numbers to men, but having worked in a number of labs across the world, she has seen the problem of advancement first-hand.

“What I’ve seen is that a lot of women start out with a lot of ambition and hope at the postdoc level and in their first jobs, but as time goes by they gradually become discouraged and many of them give up because they run into this glass ceiling where it’s very difficult to advance to become professors and department heads, let alone heads of institutions,” Spasova says.

“I’m actually really optimistic this will begin to change fairly soon as the old guard begins to retire and is replaced by younger men who are more willing to advance women, or are replaced by women themselves. That’s really exciting to think about. I think the best thing we, as women, can do to speed up the process is to work as hard as possible, know that we have the potential to become the best scientists in the world, and never compromise. If we do that, we may not all become Marie Curies, but we will be guaranteed the chance of having amazing careers that I truly believe will result in some of the most important scientific achievements in history.” ●

La Jolla Institute:



United States

Population in millions: **319**
Dengue in 2015: **748** (72% imported)
TB in 2015: **9,500**

Sweden

Population in millions: **9.6**
Dengue in 2015: **119** (imported)
TB in 2015: **648**

Nicaragua

Population in millions: **6.08**
Dengue in 2015: **49,000**
TB in 2015: **35,000**

Peru

Population in millions: **30**
Dengue in 2015: **40,000**
TB in 2015: **36,000**

TUBERCULOSIS:

Tuberculosis, or TB, is an infectious bacterial disease caused by *Mycobacterium tuberculosis*, which most commonly affects the lungs. In healthy people, infection with MTB often results in latent infection with no symptoms. Overall, without treatment, about 5 to 10 percent of people with latent TB will develop contagious active disease at some point in their lives. In 2015, almost 10 million people fell ill with tuberculosis and 1.5 million died from TB.

United States

Cleveland Clinic

Doctors will administer tuberculin, the same substance used for tuberculosis tests, to the lungs of healthy volunteers and individuals with latent TB infections. After 48h, they will collect T cells by flushing a small area of the lung with fluid and collect blood samples from the same individuals.

La Jolla Institute

All samples will be shipped to La Jolla Institute, where scientists isolate T cells that recognize *Mycobacterium tuberculosis* or dengue virus. The team will then apply cutting-edge technologies to identify “immune profiles” that are linked with protection from or susceptibility to disease.

Nicaragua

Doctors will collect samples from people with acute dengue infection, upon their discharge from the hospital and after they have made a full recovery. In addition, LJI will receive samples from local blood banks since sweeping epidemics have exposed the whole population to the virus.

Peru

Samples will be drawn from individuals who have received the BCG tuberculosis vaccine, or have been diagnosed with latent or active TB, as well as three and nine months after treatment started. In 2010, Peru had the highest number of multi-drug resistant TB cases in the Americas.

Mapping T cells

An international team led by LJI investigator Alessandro Sette, Dr. Biol. Sci., characterizes the immune response to dengue virus and *Mycobacterium tuberculosis* around the globe.

Dengue fever and tuberculosis pose serious health challenges: Aided by increasing globalization and climate change, dengue has reached Hawaii, Puerto Rico, and Florida while antibiotic-resistant strains of TB have become increasingly common. La Jolla Institute, a national leader in infectious disease research, was recently awarded an \$18 million grant by the National Institutes of Health (NIH) to map how T cells, a type of white blood cells, respond to dengue virus and *Mycobacterium tuberculosis* (MTB).

Known as the Human Immune Profiling Consortium (HIPC), a global network of researchers will collect thousands of samples from infected or vaccinated people around the world (see map for details) and ship them to La Jolla Institute to be analyzed. The profiling effort specifically focuses on T cells, since they directly affect the development of immunity as well as the risk of severe disease caused by these pathogens.

“By identifying the elements that make up an effective immune response, we will better understand what kind of immune responses vaccines should induce in order to be protective,” says Bjoern Peters, Ph.D., Associate Professor in the Division of Vaccine Discovery, who is spearheading the tuberculosis project in addition to performing the bioinformatics analysis for both pathogens. In addition to direct implications for vaccine development, the research will provide novel insights into T cell responses to viral pathogens in general, which will have fundamental impact on the understanding of human immunology. ●

Sri Lanka

Population in millions: **20.5**

Dengue in 2015: **30,000**

TB in 2015: **13,000**

DENGUE:

Dengue is a viral infection caused by five types of closely related viruses, which are transmitted through the bite of infected *Aedes aegypti* and *Aedes albopictus* mosquitoes. In most cases, the infection causes flu-like symptoms but the illness may progress to dengue hemorrhagic fever and dengue shock syndrome. Contracting dengue more than once increases the risk of developing severe disease. Currently, 40 percent of the world's population is at risk from dengue.

Sweden

Blood samples will be collected before and after individuals receive the BCG tuberculosis vaccine. Sweden uses the BCG (Bacillus Calmette-Guerin) vaccine, the only available tuberculosis vaccine, to protect high-risk groups against infection.

Sri Lanka

The Sri Lanka-based team will collect samples from people with acute dengue infection, upon their discharge from the hospital and after full recovery. Local blood banks will provide additional samples, since most blood donors have been exposed to the virus. TB samples will be drawn from individuals, who have been vaccinated, diagnosed with latent or active TB, as well as three and nine months after treatment started.



Michael Croft

The role of T cells has long been overshadowed by their antibody-producing brethren. The work of Michael Croft brought them into the light.

As a high school student, Michael Croft, Ph.D., Professor and Head of the Division of Immune Regulation, was interested in biology and not much else—with one exception: “Pretty much all I did was play soccer,” remembers Dr. Croft, who grew up in a small village in the Midlands of England. Ultimately, his scientific interests gained the upper hand and he pursued a bachelor’s degree in applied biology. The four-year degree required him to work several months each year in a research lab in the pharmaceutical industry to gain hands-on experience in a real world setting.

During one of these stints Dr. Croft landed in the immunology department at Glaxo Pharmaceuticals in London and he credits that experience for triggering his interest in immunology. “As part of the degree, we didn’t learn much about immunology,” he says. “Back then, there really wasn’t much immunology anywhere.” But Dr. Croft was hooked. He returned to Glaxo for a short period as a technician before starting his Ph.D. in immunology at Sussex University in Brighton, U.K. During his doctoral thesis he studied T cell factors that induced B cells to produce antibodies, laying the groundwork for his career as a pioneering T cell researcher.

WHAT HAS CHANGED SINCE YOU ENTERED THE FIELD?

We are much more precise in what we do. When I started out you would take fluid from cultured T cells that may contain 20 or 50 different proteins and you would throw the mixture onto other cells and see what happens. Now, we know most of the proteins that play a role in the immune system. We don’t necessarily have a complete picture of how and where they function but they all have been characterized to a certain degree.

WHAT IS THE ROLE OF IMMUNOLOGY FOR THE FUTURE OF MEDICINE?

Most people probably still don’t quite appreciate how many diseases are caused by the immune system or how many diseases can be prevented by the immune system. Cancer is a great example. Most of the work that has been done on cancer in the last 20 years was not immune-related. No one really believed that you could manipulate the immune system and get any strong anti-tumor effect.

ARE THERE OTHER EXAMPLES?

Cancer is probably the main one but some of the successes we’ve had with biologics, the large manufactured drugs such as antibodies that are being used more and more for treating patients, have shown that the immune system is really a major player in many types of inflammatory disease. The fact that you can manipulate the system and can get therapeutic benefits in patients is tremendous. Certainly, when I started in immunology there was little to say about how you can target the immune system and heal disease.

WHAT ARE THE BIG QUESTIONS YOUR RESEARCH FOCUSES ON?

First and foremost, I consider myself a T cell biologist. The primary question guiding my research has been how can you generate more T cells that are either protective or pathogenic and how can you manipulate those T cell responses? The focus has been on so-called co-stimulatory molecules that drive better and more effective T cell responses and that really has been my primary expertise for over 15 years.



Dr. Michael Croft on Mt. Palomar

CAN YOU EXPLAIN WHAT A CO-STIMULATORY MOLECULE IS?

Essentially, it is a molecule that stimulates a T cell to do something that it couldn't do without it. For example, it stimulates that cell to divide and accumulate in great numbers, or to make specific proteins. I started with the concept of co-stimulation and concentrated almost exclusively on what's known as the TNF family of proteins. There are a set of six or seven of these proteins that are really strong regulators of T cells, which means they play an important role in antiviral, inflammatory, and autoimmune responses.

ARE THERE ANY CLINICAL APPLICATIONS FOR YOUR WORK?

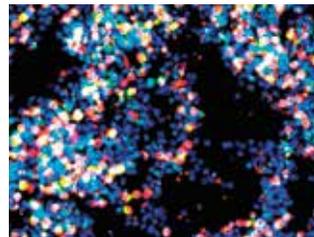
One of our initial discoveries has been in asthma and there are clinical trials blocking the molecules we have worked on, but there are other indications, such as inflammatory bowel disease and organ transplants. In general terms, we can suppress the immune system and there's a potential application for anything where the immune system is overactive. On the flip side, the molecules we work on are targets for stimulatory agents in clinical studies of cancer, in this case trying to generate better anti-tumor immune responses.

WHAT'S THE BEST PART OF BEING A SCIENTIST?

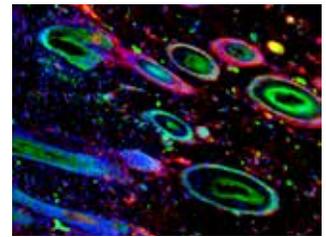
The discovery part—simply the fact that you can learn new things all the time is the most attractive part of what we do. We are all experts to a certain extent but we are not truly experts because we are always learning something new.

BY THAT DEFINITION THERE'S NO SUCH THING AS AN EXPERT?

[Laughs.] There are people who know a lot about certain things.



Normal human fibroblast



Fibrotic skin biopsy showing disease progression

ANY POINTERS FOR STUDENTS CONSIDERING A CAREER IN ACADEMIA?

First of all, you have to have a major passion for your area of research, whatever it may be. And then it requires a certain type of logic that not everybody has, but which I think helps tremendously. One of the toughest things is to not just understand the work you are doing, but the work everybody else is doing in the area. It is too easy to become focused on your own little universe and what you are working on. If you can see the big picture it helps push your own research further and of course, it is much more interesting if you can also understand what other people are doing. It comes back to being an expert. We are all fairly intelligent people and fairly good at what we do. But ultimately we are feeding off of each other since we learn from other people just as much as we learn from the experiments we do in our own labs. I think that's key.

WORK-LIFE BALANCE IS IMPORTANT TO YOU. HOW DO YOU RECHARGE?

I spend a lot of time tending to my garden. I like being surrounded by things that grow. The other thing I really enjoy is riding my motorbike. I own a Yamaha FJR1300, which is a mix between comfort and speed. I don't go slowly but I don't race like a 20-year old either. On weekends, I like to go out into the mountains by myself and enjoy the twisties. ●

Rana Herro

Rana Herro, Ph.D., will never forget the first 12 years of her life because she was never sure she was going to live to see another day.

Surrounded by death and devastation that came from the bombs, gunfire, hunger, and disease generated by war-torn Lebanon, Herro not only survived the harrowing experience, she believes it strengthened her character and is one of reasons today she is among the up-and-coming young researchers at La Jolla Institute. That and having a mother who refused to let living in a battle zone hinder her daughter's education.

"Every day we would be in the shelter hiding from the bombs and my mother would force us to read our school books," says Dr. Herro, an instructor in the lab of Professor Michael Croft, Ph.D. "My brother and I were terrified and certain we were going to die, but even though she was also scared, our mother made sure we got our education no matter what was going on around us."

By the early 1990s, ceasefire allowed the lives of her Christian Lebanese family to normalize, and Rana could focus on her dream of becoming a scientist. She moved to France to get her Ph.D., eventually coming to San Diego to work first as a postdoc at The Scripps Research Institute and then moving to Dr. Croft's lab where she's a rising star engaged in groundbreaking work, including demonstrating how combining two types of immunotherapies may someday cure mostly untreatable diseases like pulmonary fibrosis.

"I'm so excited that we're getting close to taking our novel treatment to human trials," Dr. Herro says. "The whole reason I've been so passionate about pursuing science as a career is because I saw the horrible health problems my parents have gone through on top of dealing with war. My dad had a stroke at 43 and my mother has battled an excruciatingly painful lupus-like disease for years. Remembering their medical challenges and courage, along with my desire to take our science from the lab and into the clinic to help real patients, is what keeps me going." ●

INSTITUTE NEWS



LJI DENGUE EXPERT NAMED TO RODALE 100

Dr. Sujan Shresta, Associate Professor in the Institute's Center for Infectious Disease, has been elected to the inaugural Rodale 100 list in recognition of her pioneering dengue research.

"Infectious disease knows no geographic boundaries and half the world's population is now at risk for dengue," Dr. Shresta says. "Knowing that my research may contribute to the development of a successful dengue vaccine that prevents disease and suffering around the globe and particularly in Nepal, where I was born and spent my childhood years, gives me a tremendous sense of accomplishment and satisfaction."

The Rodale 100 honors innovative ideas and accomplishments that make the world a better place. ●



LJI PRESIDENT ELECTED FELLOW OF AAAS

Dr. Mitchell Kronenberg, President and Chief Scientific Officer of the La Jolla Institute, has been named a Fellow of the American Association for the Advancement of Science (AAAS). Election as an AAAS Fellow is an honor bestowed upon AAAS members by their peers for scientifically or socially distinguished efforts to advance science or its applications.

A world-renowned expert in the fields of mucosal and innate immunity, Dr. Kronenberg was recognized for his distinguished contributions to understanding T lymphocyte biology, particularly analysis of anti-bacterial immune responses, natural killer T cells, and T cells residing in the intestinal mucosa.

MOST ADMIRED CEO

Dr. Kronenberg has been named one of San Diego's "Most Admired CEOs" by the *San Diego Business Journal*. He was recognized for his outstanding leadership in the category of large non-profit organizations. Under his guidance the Institute grew from 15 faculty members in 2003 to 24 in 2016 and the Institute's operating budget tripled.

"Mitch embodies the best attributes of a great leader: visionary, inspiring, and deeply concerned about the well-being of the people and the organization under his charge," says Amnon Altman, Ph.D., Director of Scientific Affairs. "He seeks out the very best people to do a job, provides them with the resources to be successful, treats them fairly, and encourages them to share their ideas." ●

COMMUNITY CAUSES

The Ohio State Buckeyes and the Michigan State University Spartans, which are part of the San Diego-based *Friday Night Lights* flag football league, are looking just as fierce and competitive as college football players. Flag football's popularity has exploded as brain autopsies of former football players point to repeated brain injuries as a likely cause behind chronic traumatic encephalopathy (CTE). Mounting evidence shows that the body's immune response to repeated hits to the head, and not just the impacts themselves, may contribute to CTE. The La Jolla Institute proudly supports fun and safe sports like flag football. ●



La Jolla Institute receives landmark gift

The La Jolla Institute has received a \$1 million gift from John Major, Chairman of LJI's Board of Directors, and his wife, Susan, to support the merging of precision medicine and immunotherapy. "John and Sue have been tremendous advocates of the Institute's mission to marshal the immune system's power to improve health and prevent disease," says Mitchell Kronenberg, Ph.D., President and Chief Scientific Officer.

"La Jolla Institute is a world-class organization that's on the right track to create a world without disease," says John Major. "It deserves all the energy and support we can provide."

The landmark gift from the Majors was instrumental in recruiting Ferhat Ay, Ph.D., an accomplished bioinformaticist, to La Jolla Institute as part of a strategic effort to increase the Institute's expertise in human genomics and bioinformatics.

"Gaining a much more complete understanding of how the immune system works and how it can be manipulated to maintain good health will have a profound impact on the future of medicine," says Susan Major. "We couldn't be more pleased to support the efforts of LJI's world-renowned scientists to tap into the immune system's power to enhance human health in ways we once could only dream about." ●



John and Susan Major

Pfizer donates \$5 million to Institute

Pfizer Inc. has made the largest philanthropic contribution in Institute history to help establish the Mission Support for Cancer Immunology and Oncology Research. The gift by Pfizer, one of the world's largest pharmaceutical companies, recognizes LJI's impact on the field of immunology over the last three decades and the immune system's important role in fighting cancer.

The idea to mobilize the immune system to fight cancer has been around for decades but the painstaking fundamental research that revealed how the immune system works only recently started to pay dividends in clinical practice.

The Institute will use the majority of the funds to establish the Pfizer Endowed Chair in Cancer Immunology and Oncology and support research on the immune system and oncology. Dr. Anjana Rao, a world-renowned immunologist and cell biologist at LJI and a member of the National Academy of Sciences, will be the inaugural holder of the Pfizer Endowed Chair in Cancer Immunology and Oncology. ●



Computational biologist joins LJI faculty



Ferhat Ay was on course to become a game developer when biology captured his imagination

Dr. Ferhat Ay has joined the ranks of faculty as Institute Leadership Assistant Professor of Computational Biology in the Division of Vaccine Discovery. Born and raised in Turkey, Dr. Ay received a dual B.S. in computer engineering and mathematics from the Middle East Technical University in Ankara, Turkey. "My dream had always been to become a video game developer but during my computer graphics class I realized how much work goes into designing visuals of a game compared to my favorite part of crafting its artificial intelligence," he says. At the same time, a bioinformatics class captivated his imagination. In short order, he abandoned his dream of creating the next *World of Warcraft* and turned his attention to bioinformatics.

Ay uses his expertise in algorithms, graph theory, data mining, and machine learning to search for answers to complex questions in biology. He is particularly interested in understanding the relationship between the genome's three-dimensional structure and the regulation of gene activity in the malaria parasite *Plasmodium falciparum* as well as related questions concerning genome architecture in different organisms and cells, such as human breast cancer and leukemia cells. "Our DNA has a compact and highly organized 3D structure. How this structure relates to genome function is still unclear," says Ay. ●

La Jolla Institute Board of Directors expands membership, elects four outstanding leaders from varied fields

As part of its long-range objective of expanding the expertise and diversity of its membership, the La Jolla Institute (LJI) Board of Directors recently elected four outstanding leaders from a variety of fields, including technology, investment, law, and biomedical research.

Elected to the Board to three-year terms were Mark V. Bowles, board member and past Chairman of the San Diego Venture Group; Barton J. Cohen, Chairman and Chief Executive Officer of Casco, Inc., in Kansas City; Kris Charton, a Rancho Santa Fe, Calif.-based attorney and philanthropist and Hiroshi Okazaki, Ph.D., Executive Officer, Vice President and Head of the Research Development Division at Kyowa Hakko Kirin Co., Ltd. in Tokyo, Japan, who joined the board *ex officio*.

The LJI Board three years ago amended its bylaws to expand the number of board members from 20 to 30. The recent election brought the total number of LJI Board Members to 24.

“The world of science and more specifically the field of immunology do not operate in a vacuum,” says Mitchell Kronenberg, Ph.D., President and Chief Scientific Officer. “In fact, we often find ourselves at the intersection of multiple forces in society which influence our mission and our research. We believe the addition of 10 more board members, mostly from non-scientific areas, will help us maintain the Institute’s international pre-eminence in immunology.”

Dr. Kronenberg says he is particularly pleased about the diverse backgrounds of the recently elected board members.

“These four exceptional leaders from such a wide variety of fields represent a remarkable infusion of talent and vision for the La Jolla Institute,” he says. “With each of these individuals at the top their respective fields, we look forward to drawing upon their deep experience in a number of important areas to guide the Institute and increase the effectiveness our organization in the years to come.”



Mark V. Bowles

Bowles has had a long and distinguished career in technology, venture capital, and health care.

He is the founder of EcoATM, an electronic recycling kiosk-maker, which was acquired in 2013 by Coinstar’s parent company, Outerwall, a co-founder of Salveo DX, a San Diego-based stealth health care company, a board member of Edico Genome, and an investor in nascent San Diego businesses, including Wrapify, CleverPet, and TruMed Systems, a vaccine storage-tech company. Bowles is a board member and senior fellow at Pepperdine University’s Graziadio School of Business and University of San Diego’s Center for Peace and Commerce. He holds an M.S. in Technology Management from Pepperdine University, and a B.S. in Industrial Distribution from Texas A&M University. He and his wife and three sons live in La Jolla.

“I’m excited to join the LJI Board because I’m fascinated by the complexity of the immune system and its critical connection to our health and well-being,” Bowles says. “Like so many others, I’ve lost a number of family members and friends to cancer and other diseases in recent years. I feel the Institute is one of the only places in the world that has the scientific expertise to decode the intricate mechanisms of how our body succeeds or fails in protecting us from disease, and then using that knowledge to develop effective new treatments and cures by harnessing the immense power of this system.”



Barton J. Cohen

At Casco, Inc., Cohen heads up a family office that oversees the investment and philanthropic activities of the Cass, Cohen, and Gordon families. He was previously the Chairman of Accelerated Vision Group, LLC, co-founder and managing partner of C3 Holdings/Capital, LLC., President and CEO of Sector Distributing Co., and a risk arbitrageur at Goldman Sachs & Co. He is a trustee of the Arvin Gottlieb Charitable Foundation and an advisory board member for The Saint Luke’s Hospital Marion Bloch Neuroscience Institute. He holds an M.B.A. in Accounting and Finance from the Booth School of Business at The University of Chicago, and a B.S. in Accounting and Finance from the Wharton School of Business. He and his wife live in Kansas City, Mo.

"I've developed a keen personal interest in the findings of experimental immunology to provide powerful answers to the world's most pressing health issues, and the La Jolla institute is one of the most effective organizations in the world at understanding the immune system and applying this knowledge to translational medicine to find real cures. The Institute's research is truly leading edge and I believe it is important to note their scientists and doctors are able to collaborate in a safe, secure, and energized environment which creates a unique synergy and productivity that is absent in most organizations. I am confident their mission of 'life without disease' will become a reality and not just a dream."



Kris Charton

Charton spent most of her early life in Orange County, graduating from UC Irvine with a B.A. in dance and later obtaining her J.D. at the University of San Diego School of Law. She worked for the Orange County Counsel's office, spent two years at a private law firm, and then returned to public service at an Orange County public interest law center. Charton has also served on the boards, worked as a volunteer, and donated or raised money for a number of non-profit and community service organizations in both Orange County and San Diego County. She has become deeply involved with TERI, a San Marcos non-profit organization dedicated to serving individuals with autism and other developmental disabilities and their families. She is co-owner with her husband of Chartwell Management Corp., which owns and manages commercial real estate and investments.

"The research at La Jolla Institute isn't just cutting edge, it's potentially historic," Charton says. "The scientists there are learning how to use the body's own immune system to develop vaccines and actual cures for many types of disease that have been virtually impossible to treat effectively, including infectious and inflammatory disease, cancer, heart disease, and diabetes, which both my mother and grandmother suffered from. I'm thrilled to be involved with such a positive organization that has the potential to dramatically improve the lives of millions around the world."



Hiroshi Okazaki

Okazaki's company, Kyowa Hakko Kirin Co., Ltd., is a Japan-based global specialty pharmaceutical company, and its U.S. subsidiary, Kyowa Hakko Kirin Co., Ltd. California, collaborates with La Jolla Institute on a variety of scientific projects in UC San Diego's Science Research Park. Okazaki previously served as general manager of the Tohoku Sales Branch of Kirin Pharma Co., Ltd., and served in management positions and as a research scientist in the Pharmaceutical Division of Kirin Brewery Co., Ltd. He holds a Ph.D. in Medical Science from the University of Tokyo, a M.S. in Pharmaceutical Sciences from Chiba University, and a B.S. in Pharmaceutical Sciences from the Tokyo University of Science. He is a resident of Tokyo. ●

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Our Mission

La Jolla Institute for Allergy and Immunology is dedicated to understanding the intricacies and power of the immune system so that we may apply that knowledge to promote human health and prevent a wide range of diseases. Since its founding in 1988 as an independent, nonprofit research organization, the Institute has made numerous advances leading toward its goal:

Life Without Disease®.



For regular updates, visit us on Facebook and sign up for our email newsletter, Immune e-Matters.
www.facebook.com/LifeWithoutDisease