



UCLA Health
David Geffen School of Medicine

FALL 2019



ANSWERS, AT LAST

The California Center for Rare Diseases at UCLA is working to unravel the mysteries of undiagnosed illnesses.



A publication of
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Patients quoted and/or photographed in this publication have given their consent to have their names and/or images used and their stories told.

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Photo: Ann Johansson

Unlocking the Unknown: The Power and Promise of Collaboration

As the nation's youngest top-10 medical school, the David Geffen School of Medicine at UCLA has already made an indelible impact on science and medicine. Across every area of advancement, one common strength has fueled our ability to discover, teach and heal: collaboration.

At the David Geffen School of Medicine at UCLA,

collaboration is in our DNA. Dating back to our school's inauguration on November 2, 1951, Edward A. Dickson, then-chairman of the UC Board of Regents, delivered a commemoration address in which he heralded what we now call "team science" as the cornerstone of complex problem solving: "A new [and] beneficent lesson has been learned in modern research — the essentiality of cooperation; the application to any problem, biological or otherwise, of every specialist, every technique which can be brought to bear upon it. [In] the solution of the great majority of problems which confront us, group research is necessary for the effort."

Today, a growing body of research has shown that team-based science is significantly more likely than isolated investigation to produce novel solutions that unlock scientific breakthroughs. From mapping the human genome to identifying emerging viruses, our progressively complex biomedical landscape now requires hyperconnected networks of problem-solvers with common interests but also unique skills and expertise. As we write our next chapter, leveraging this strength requires both the right infrastructure and the right culture, which is why we have taken a series of steps to redesign where and how we work together.

In September of 2018, 33 UCLA laboratories and hundreds of biomedical researchers moved from historically siloed units into a new, shared space — the Center for Health Sciences South Tower. The physical amalgamation, which already has yielded more frequent collaboration among our researchers, preceded a deeper cultural one — changing *how* we think, work and interact.

Eight months after the move, the medical school launched the Cultural North Star, a school-wide values system that is designed to harness the exponential power of collaboration by uniting us in our shared mission to heal humankind.

The Cultural North Star comprises three overarching pillars: "Do what's right," "Make things better" and "Be kind." Each pillar is defined by four unique purpose statements, among them: "We seek out diverse voices," "We are grounded in ethics and data" and "We have the courage to be honest." These, and nine other guiding principles, were derived from an 18-month culture audit that has helped codify our school's identity and inform the design and implementation of new Cultural North Star initiatives, including a new values-based recognition program, medical curriculum and professional development strategy.

While building a more collaborative culture will be a slow and organic process, it is critical to our ability to achieve our mission. And our community agrees. Within months of its launch, the Cultural North Star has inspired a stunning display of engagement across our academic enterprise — a moving and contagious phenomenon that has made me deeply proud. With such an extraordinary team of optimists and problem-solvers, I have no doubt that the spirit of discovery at the David Geffen School of Medicine at UCLA will continue to unlock the unknown and enlighten the course of human medicine.

Kelsey C. Martin, MD, PhD

Dean, David Geffen School of Medicine at UCLA



To learn more about the Cultural North Star and program developments, go to:
medschool.ucla.edu/cultural-north-star



To submit feedback or ideas, email:
culturalnorthstar@mednet.ucla.edu

Students Travel to a Remote Peruvian City to Learn about Medicine with Limited Resources



Above: Dr. Molly Sprague cradles a newborn baby during a home visit in Iquitos, Peru. **Opposite Page:** (Top) Drs. Sprague (left) and Nahda Harati (right) observe as the director of the maternal-child clinic instructs new mothers on infant care. (Second) Dr. Harati (center) high-fives a little girl in the hospital. (Third) The busy waiting room of the clinic. (Fourth) Dr. Alexandra “A.J.” Greene shares a laugh with a patient. (Bottom) Homes and walkways in the community are elevated to stay above flood waters from the Amazon River during the rainy season.

Photos: Jake Whitman/NBC News

Shortly before their graduation, five medical students flew to Peru to complete a clinical rotation at a hospital in Iquitos. Surrounded by the Amazon jungle, it's the world's largest city that's unreachable by road. After four years of working with the latest technology and state-of-the-art treatments, the students found their interaction with patients, who

sometimes traveled weeks by boat on the Amazon River from remote villages, a life-changing experience.

Organized by the global health program in the David Geffen School of Medicine at UCLA, the three-week training immersed the budding doctors in an entirely new culture and health care system. The tight-knit

group included Alexandra “A.J.” Greene, MD ’19; Aleksandr Gorin, MD ’19, PhD ’19; Nahda Harati, MD ’19; Molly Sprague, MD ’19; and Diana Partida, MD ’19.

Limited access to the equipment and medications that the students took for granted at UCLA forced them to trust their instincts and depend on the new skills they acquired. “I learned to rely on my diagnostic findings from physical examinations and how to make decisions in clinical settings where resources are not readily available,” Dr. Partida says. She added that what she learned in Peru will make her a better doctor in “countless” ways. “The experience taught me to recognize my emotional resilience and to have confidence in the training I received at UCLA.”

The students encountered tropical diseases, an unfamiliar Spanish dialect and prickly gender dynamics in a hospital culture where female physicians are a rare sight.

“Working in the infectious diseases unit of the hospital allowed me to meet patients with malaria, dengue fever and tuberculosis,” Dr. Gorin says. “The opportunity to see tropical parasites under the microscope and learn how they are diagnosed was an experience I won’t soon forget.”

Co-founded in 2010 by Lee Todd Miller, MD, associate dean for student affairs and professor of pediatrics, UCLA’s global health program offers research opportunities abroad after the first year of medical school and clinical rotations for senior medical students. “Our students gain a priceless dose of perspective,” Dr. Miller says. “They return with a deeper understanding of health care disparities, richer cultural sensitivity and a greater commitment to addressing inequities in their own backyards.”

Designed with UCLA’s medical partners in China, India, Malawi, Mozambique, Peru, South Africa and Thailand, the global health program is among the most popular rotations offered to students. This year alone, almost one-third of the graduating class flew overseas to learn from host medical teams how physicians practice in that country.

According to Kelsey C. Martin, MD, PhD, dean of the David Geffen School of Medicine at UCLA, the program has a dual focus: developing sustainable health care programs in low-income countries, while delivering a transformative learning experience to UCLA medical students. “Our program embeds students in settings in which UCLA has established larger partnerships for capacity building, clinical care and research,” says Dr. Martin, who accompanied Dr. Miller and the students to Peru.

Perhaps the trip’s most valuable lesson was that compassion is a universal language.

“The experience taught me to never lose my humanism,” Dr. Greene says. “Sometimes the best medicine I could provide a patient was a brief conversation, a warm smile or a hand to hold.”

— Elaine Schmidt



To view a video produced for NBC’s *Today* about the students’ experience in Peru, click on the link to this article at: uclahealth.org/u-magazine



The Brains of Pairs of Animals Synchronize during Social Interaction

UCLA researchers have observed that the brains of pairs of animals synchronize during social situations. The synchronized activity not only arose during various types of social behavior, but also the level of synchronization actually predicted how much the animals would interact. The team also found that brain synchrony arises from different subsets of neurons that encode the behavior of the self vs. the social partner and that the dominant animal's behavior tends to drive synchronization more than behavior of the subordinate.

Considerable research has been devoted to studying brain activity in individual animals behaving alone. Much of animals' lives are spent interacting with one another — socializing, competing and so forth — and these social behaviors are generally quite complex, as an animal must not only react to other individuals, but also actively predict their future behavior. Less is understood about how brain activity might function *across* interacting animals. Using sophisticated recording devices, the research team set out to simultaneously monitor activity in the brains of two interacting mice, making this the first study to use the technique in two animals behaving naturally together.

The researchers attached tiny, high-tech microscopes to the heads of each mouse which recorded activity in hundreds of individual brain cells. Fitted with the devices, the mice were placed together in pairs, first in open arenas to freely interact and later in plastic tubes — a common method of observing competition and social hierarchy, as the dominant mouse tends to claim more of the tube's "territory" by pushing against the subordinate mouse or pushing it out of the tube completely.

When the mice interacted with each other, their brain activity was correlated, or synced up. The more engaged they were with one another, the more coupled were their brains. This brain synchronization arose from

individual cells — interestingly, some cells responded preferentially to the behavior of the self, while other cells responded only to the behavior of the social partner. The dominant mouse's behavior tended to have more of an effect on synchronization than that of the subordinate mouse, likely because both animals in a pair are paying attention to the dominant animal.

This is the first time that interbrain synchrony has been observed in socializing mice. Researchers believe that the insights gained from this study may shed new light on how brain activity synchronizes across humans during social interaction. Beyond adding clarity to fundamental properties of brain function in social interaction, the findings also may enable researchers to understand more about certain psychiatric and developmental disorders, including autism spectrum disorder, since many of these conditions include symptoms such as social deficits.

— Elaine Schmidt



"Correlated Neural Activity and Encoding of Behavior across Brains of Socially Interacting Animals," *Cell*, July 11, 2019

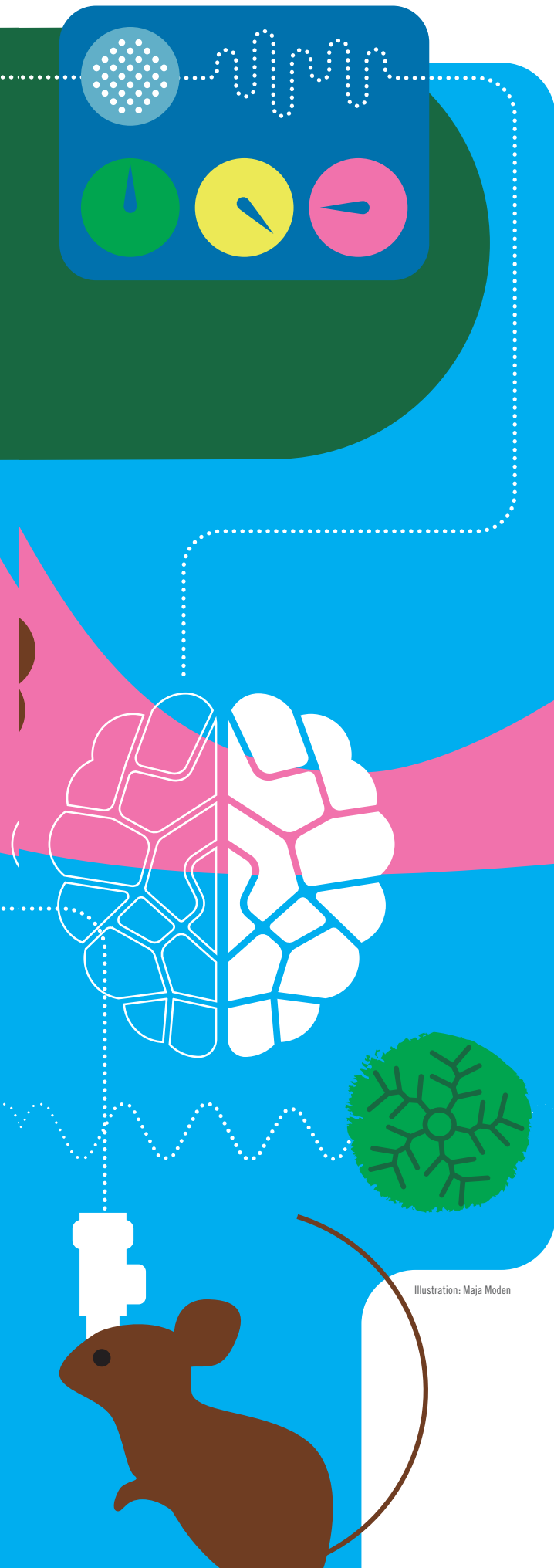
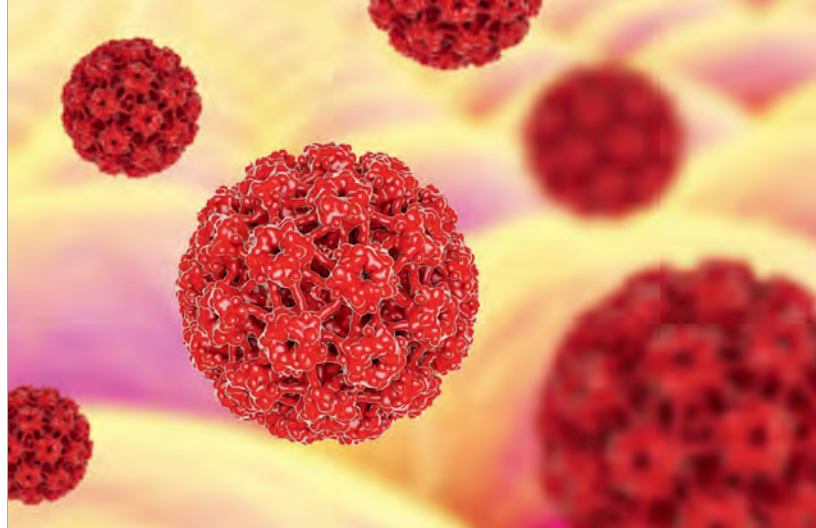


Illustration: Maja Moden



Computer illustration of human papillomavirus.

Image: Science Source

More HPV Vaccinations could Prevent Cancer in 1,300 Californians

Based on a 2017 rate of vaccination against HPV among a group of California 20-year-olds, researchers estimate that this group is at risk for an excess of 1,352 cases of cancer that could be prevented with a 99.5 percent vaccination rate. Treatment for these preventable cancers would cost the health care system \$52.2 million. The size of the group was 296,525 people, the approximate number of 20-year-olds in California in 2017.

Human papillomavirus, or HPV, is the most common sexually transmitted infection in the United States and is linked to seven types of cancer: cervical, vaginal, vulvar, penile, rectal, anal and oropharyngeal (throat). There are more than 150 types of HPV, and an estimated 80 percent to 90 percent of sexually active people will be infected with one of those types during their lifetime. Short-term HPV infections are common, particularly in sexually active young people, and usually clear up on their own. Infections that persist for several years pose a cancer risk. HPV-related cancers can take 10 to 30 years to develop.

The researchers estimated the number of HPV-related cancer cases and associated medical costs among all California's 20-year-olds. Using vaccine coverage rates from 2017 (60.9% for adolescent girls, 46.3% for adolescent boys), they estimated the lifetime number of cancer cases caused by vaccine-preventable HPV strains among this group. They also estimated the excess cancer cases that would occur based on the 2017 vaccination rate compared to the expected rates if an optimal 99.5% of girls and boys were vaccinated.

An increase in California's HPV vaccination rate would reduce the number of preventable cancers and the financial burden that treatment for these cases would put on the health care system.

— Enrique Rivero

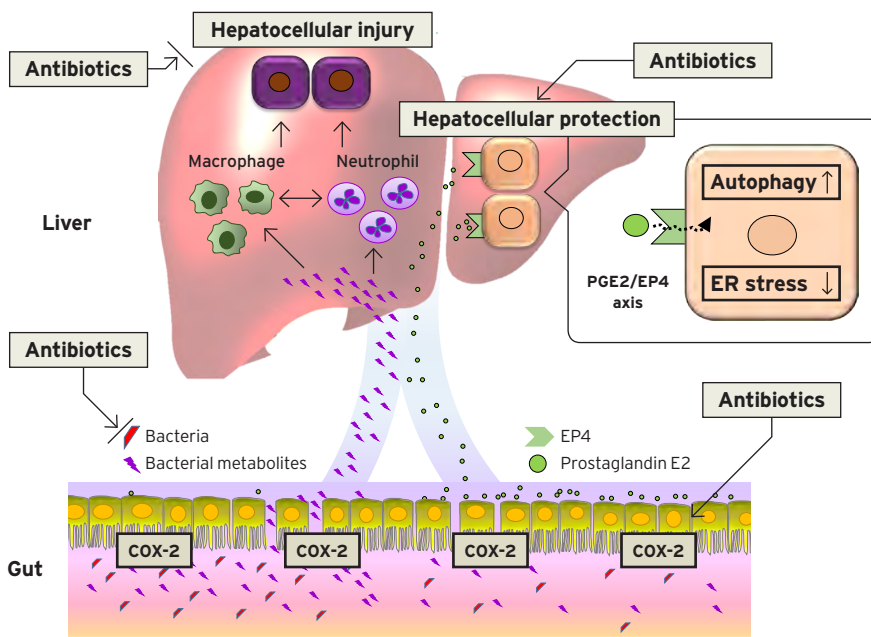


"Excess Cancer Cases and Medical Costs Due to Suboptimal Human Papillomavirus Vaccination Coverage in California," *Sexually Transmitted Diseases*, August 2019

Antibiotics before Liver Transplants Leads to Better Results

A UCLA-led research team has found that giving mice antibiotics for 10 days prior to a liver transplant leads to better liver function after the surgery. After concluding the experiment on mice, the scientists discovered data from liver transplants performed between October 2013 and August 2015 at the Ronald Reagan UCLA Medical Center that revealed the same phenomenon appears to hold true in humans.

those studies, the UCLA researchers were able to zero in on some bacteria that appeared to help ensure more successful transplants. In the mice that received antibiotics over the 10 days before transplants, the livers showed less damage — deterioration caused by dead cells, for example — than those in mice that were not given antibiotics before undergoing the same procedure.



Commensal bacteria increasingly are recognized as an important factor in multiple aspects of human health and disease. Recent evidence that microbiome modifications alter allograft success indicates the potential to leverage the microbiota to improve clinical transplantation success. Prolonged antibiotic pretreatment in mice and humans decreased liver transplant injury and improved outcomes by reducing hepatic inflammation and ER stress and increasing autophagy as a result of enhanced prostaglandin E2 signaling (COX-2) in the gut.

Illustration: Courtesy of Dr. Jerzy W. Kupiec-Weglinski

The researchers concluded that the antibiotics inhibited bacteria that cause inflammation, which in turn can lead to organ rejection. Specifically, they found that in both mice and humans, the treatment prior to a transplant reduced damage that could occur when blood flow is restored to the liver after a period of time without oxygen, and it reduced inflammation and cell damage while accelerating the removal of damaged cells. As a result, liver function was better than in the mice and human patients who did not receive antibiotics before a transplant.

Studies in the past four years at the University of Chicago and University of Maryland have shown that in mice that received antibiotics before skin or heart transplants, those transplants lasted longer without rejection than in mice that did not receive antibiotics pre-surgery. From

To further substantiate the effect of the antibiotics, the researchers then transplanted fecal matter from the untreated mice into those that had been given the medication. The mice that received the fecal transplants suffered inflammatory damage to their livers, despite the fact that they had been given antibiotics earlier in the experiment. “That showed that antibiotic-mediated benefits clearly relate to the microbiota,” says Jerzy Kupiec-Weglinski, PhD, Paul I. Terasaki Professor of Surgery in the David Geffen School of Medicine at UCLA.

The data on the UCLA patients covered 264 people who had received liver transplants — 156 who, because they were sicker before their surgeries received antibiotics for 10 or more days prior to the transplant, and 108 who were given antibiotics for less than 10 days, or not at all prior to surgery. “To our total surprise, livers functioned better after transplantation in those patients who were very sick and required prolonged antibiotic therapy,” Dr. Kupiec-Weglinski says.

The researchers then narrowed their focus to human patients who had been given one specific antibiotic, rifaximin, prior to the transplants. (To pull together a larger sample size, the team analyzed data for transplants for a longer period of time than the original set

of UCLA patients, from January 2013 through July 2016.) They found that in patients who received rifaximin, which stays in the bowel and has a low risk for inducing bacterial resistance, early liver failure was significantly delayed or stopped.

Dr. Kupiec-Weglinski says that the study opens the door to further research that could determine which microorganisms protect liver function after transplants and which bacteria need to be “turned down” to limit their negative effects.

— Enrique Rivero

“Antibiotic Pretreatment Alleviates Liver Transplant Damage in Mice and Humans,” *Journal of Clinical Investigation*, July 22, 2019

Immunotherapy Improves Five-year Survival Rate of People with Advanced Lung Cancer

In a study led by UCLA investigators, treatment with the immunotherapy drug pembrolizumab helped more than 15 percent of people with advanced non-small cell lung cancer live for at least five years — and 25 percent of patients whose tumor cells had a specific protein lived at least that long. When the study began in 2012, the average five-year survival rate was just 5.5 percent for people with that type of cancer.

The study, conducted by researchers at the UCLA Jonsson Comprehensive Cancer Center and more than 30 other centers, was the first to evaluate pembrolizumab as a treatment for lung cancer. “We can no longer look at this disease as one in which we should always be measuring survival in months,” says Edward Garon, MD (FEL '06), associate professor of medicine and a member of the Jonsson Cancer Center. “These findings substantially alter the outlook for people with advanced non-small cell lung cancer. The fact that we have patients in this trial who are still alive, and thriving, seven years after starting pembrolizumab is quite remarkable.”

The study involved 550 participants, 101 of whom had not received any previous treatments for advanced cancer and 449 who had. All participants were given pembrolizumab every two-to-three weeks. In 2015, just three years into the study, the participants’ positive

early responses to pembrolizumab prompted the Food and Drug Administration to approve the treatment for some people with non-small cell lung cancer. Since then, the drug has been approved for broader use, becoming a staple for managing the disease.

Pembrolizumab is an immune checkpoint inhibitor that works by blocking the interaction between PD-1 and PD-L1, which are both proteins on the surface of T cells. By blocking this interaction, which generally inhibits the body’s immune response, pembrolizumab activates the immune system to better attack the cancer. The researchers found that the drug worked better in people who had higher levels of PD-L1, regardless of whether they had been previously treated for cancer.

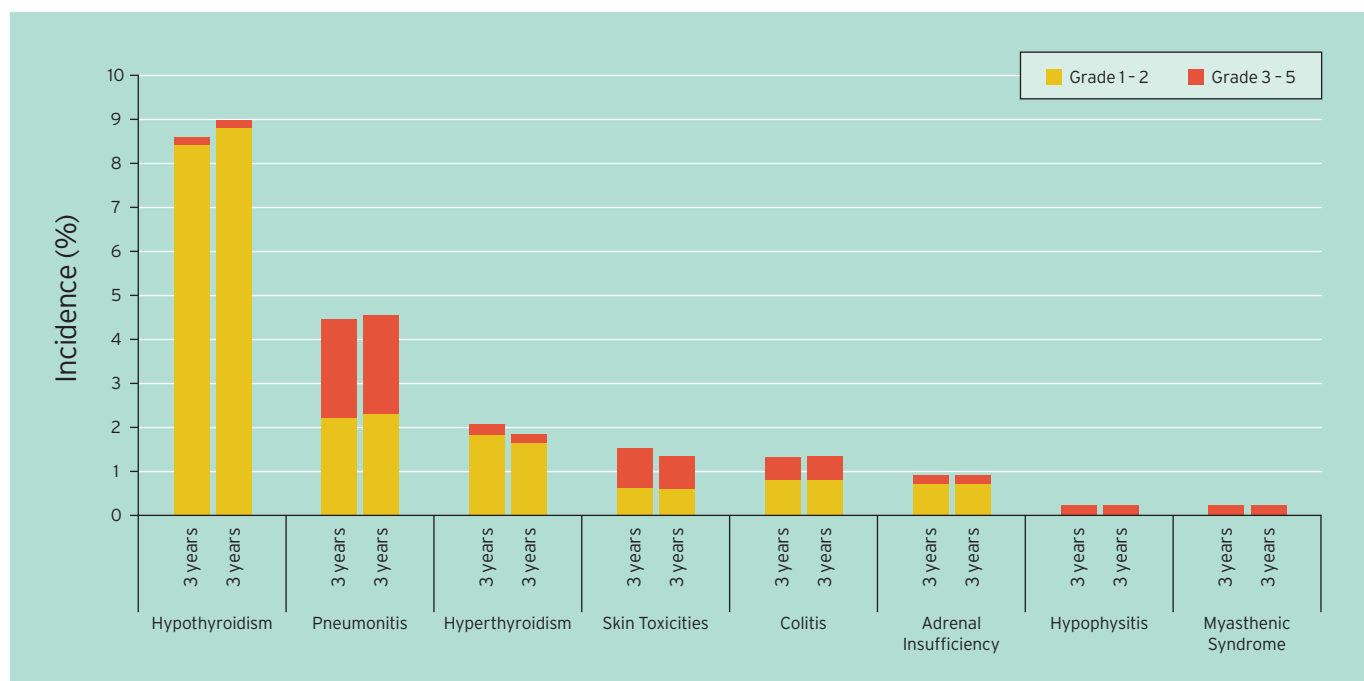
Among those who were previously untreated, 29.6 percent of those with PD-L1 expression in at least half of their tumor cells were alive after five years, versus 15.7 percent of those with low PD-L1 expression. For people who had received prior cancer treatment, 25 percent who had PD-L1 expression in at least half of their tumor cells were alive after five years, while 12.6 percent of those with low PD-L1 levels and 3.5 percent with no PD-L1 expression lived that long.

According to the National Cancer Institute, lung cancer is the leading cause of cancer deaths in the U.S. and worldwide. Only about one-third of patients see substantial tumor shrinkage with standard chemotherapy, and people with the disease survive for an average of just a year after they are diagnosed. More than 228,000 people this year will be diagnosed with the disease in the U.S., and the American Cancer Society estimates that nearly 143,000 will die of lung cancer in 2019.

— Denise Heady



“Five-Year Overall Survival for Patients with Advanced Non-small-cell Lung Cancer Treated with Pembrolizumab: Results from the Phase I KEYNOTE-001 Study,” *Journal of Clinical Oncology*, June 2, 2019



Immune-mediated adverse events at three years (September 6, 2016) and at five years (November 5, 2018) of follow-up. Immune-mediated adverse events were classified based on a list of preferred terms identified by the sponsor as having an immune etiology. Because there were changes in events included in this list between the three- and five-year analyses, certain events classified as immune-mediated at three years may not have been so-classified at five years.

Graphic: Courtesy of Dr. Edward Garon

Research Explains How Eyes See Continuously in Bright Light

A study by researchers from the UCLA Stein Eye Institute describes a molecular pathway that helps our eyes see continuously in bright light. The findings help answer a long-standing question about mammalian vision: Why don't our eyes become less sensitive when they're bombarded with bright light? The research conducted in mice reveals that a special molecule, which uses sunlight itself, rapidly recycles visual pigments after the pigments sense light and change structure.

To see, all animals rely on a molecule known as 11-*cis*-retinal, which is present in both the rods and cones of our eyes. When 11-*cis*-retinal is exposed to light, some atoms in the molecule move in response, changing the structure and forming all-*trans*-retinal molecules, which then triggers signals to the nervous system that our brain interprets as images. For the eye to sense light again, the molecule is then converted back to its original 11-*cis*-retinal form. This is a slower process in rods than cones, which is why a sudden bright light in a dark room can momentarily “blind” a person. In daylight, however, that temporary blindness doesn't occur, suggesting there's a faster way the eyes can regenerate 11-*cis*-retinal.

The researchers suspected that a molecule called RGR opsin might play a role in an alternative molecular pathway to regenerate 11-*cis*-retinal. Using cells isolated from the retinas of mice and



Image: Victorien Ameline Unsplash

exposed to constant bright light, the team discovered that RGR opsin, together with a second molecule — Rdh10 — converts all-*trans*-retinal back to the 11-*cis* form when exposed to light. Notably, the reaction results in 11-*cis*-retinol, a slight variant of 11-*cis*-retinal. Only the cones of the eye, and not the rods, can then modify the molecule to the needed 11-*cis*-retinal.

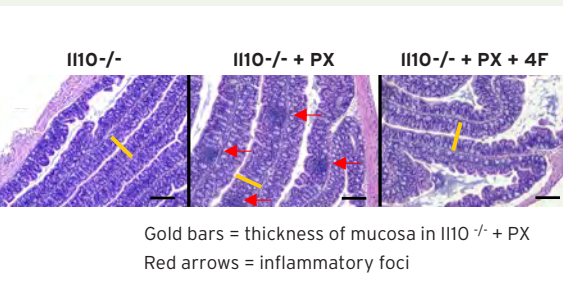
The researchers noted that in mice that lacked the gene for RGR opsin, the cones in the animals' eyes temporarily lost sensitivity during continuous exposure to light — just as the rods do when exposed to bright light in the dark.

The findings are a critical step in the basic understanding of how humans see. They suggest that RGR opsin is needed for constant vision in the daytime; without the molecule, flashes of bright light would diminish our vision. The findings also have some clinical implications: The human gene for RGR opsin is mutated in a small subset of families with retinitis pigmentosa, which causes blindness. Blindness in these families may be caused by the loss of function of RGR opsin, and the study helps explain the molecule's role.

— Elaine Schmidt



“Light-Driven Regeneration of Cone Visual Pigments through a Mechanism Involving RGR Opsin in Müller Glial Cells,” *Neuron*, June 19, 2019



Gold bars = thickness of mucosa in II10^{-/-} + PX
Red arrows = inflammatory foci

ApoA-I mimetic peptide 4F treatment abrogates intestinal inflammatory foci in mouse models of inflammatory bowel disease.

Image: Courtesy of Dr. Srinivasa Reddy

Peptides that Mimic ‘Good Cholesterol’ Reverse Inflammatory Bowel Disease in Mice

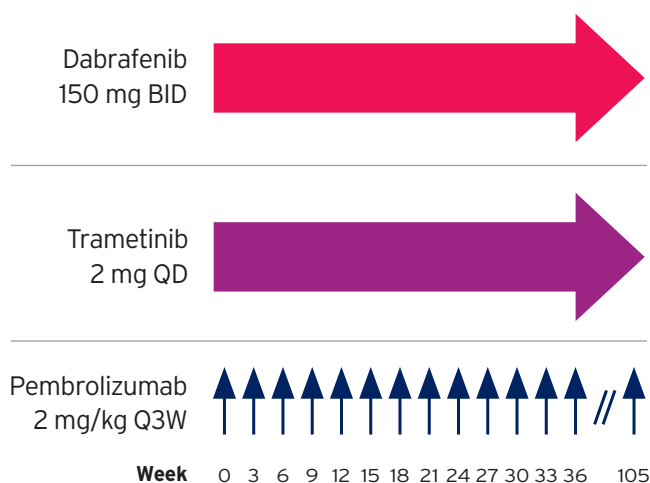
Peptides that mimic the function of HDL cholesterol, which has been dubbed “good cholesterol,” can treat the underlying inflammation associated with inflammatory bowel disease (IBD), according to new research in mice. The same work revealed new details on how IBD can develop and what other types of drugs may work to treat the disease.

The most common types of IBD, a chronic inflammatory disease of the digestive tract, are Crohn's disease and ulcerative colitis. There are few effective treatments for IBD, and a majority of patients will eventually need surgery, according to previous studies. Researchers already knew that people with IBD have lower levels of ApoA-I, the main protein component of HDL, in their colons

Three-drug Combination Helps Curb the Growth of Deadly Type of a Cancer

A UCLA-led research team has pinpointed a three-drug combination that could prove to be an effective new therapy for people with a specific type of advanced melanoma.

The approach shows promise for extending the lives of people with a type of melanoma that contains a potent gene mutation, BRAF V600E. In clinical trials, it appeared not to cause the debilitating side effects that are caused by a combination of one targeted drug and an immunotherapy drug.



Patients in this study received daily dosing with the BRAF inhibitor dabrafenib taken orally twice daily at 15 mg, the MEK inhibitor trametinib taken orally once daily at 2 mg and intravenous infusions of the anti-PD-1 antibody pembrolizumab every 3 weeks at 2 mg/kg.

Graphic: Courtesy of Dr. Antoni Ribas

The researchers found that people with the melanoma survived longer without the cancer progressing or growing when they received a combination of two targeted inhibitors that block the BRAF mutation (dabrafenib and trametinib) and an immune checkpoint inhibitor drug (pembrolizumab) as the initial treatment for their disease.

“Utilizing the three drugs together sensitized the patient’s own immune system to bolster the power of immunotherapy and block the growth of two genes — BRAF and MEK — that cause cancer cells to reproduce and grow out of control,” says Dr. Antoni Ribas, MD (FEL ’98, ’01), PhD, professor of medicine and director of the UCLA Jonsson Comprehensive Cancer Center’s Tumor Immunology Program.

In the phase one trial, the scientists tested the three-drug combination for safety in 15 people with BRAF-mutated metastatic melanoma. In 11 of them, the tumors shrank and remained stable and did not grow again for 12 to 27 months. In the phase two trial, those who received the three-drug combination had progression-free survival — meaning that the disease did not worsen or progress — for an average of 16 months. Those who received trametinib, dabrafenib and a placebo lived for an average of 10.3 months without the disease progressing.

Previous studies have found that using one of the three drugs alone can dramatically shrink tumors in a small percentage of people with melanoma. A majority of people on the treatment, however, do not see any benefit or end up experiencing a relapse. Two-drug combinations also have been tested, but they, too, have had limited success. “Earlier attempts to combine a targeted agent with an immune checkpoint inhibitor as a double-combination therapy had debilitating side effects for patients, and it was just too toxic to continue testing, so we went back to the drawing board,” says Dr. Ribas, who also is director of the Parker Institute for Cancer Immunotherapy Center at UCLA. “We found that by using two targeted inhibitors, instead of just one, in combination with a checkpoint inhibitor, we could safely and effectively treat the cancer.”

— Denise Heady

“Combined BRAF and MEK Inhibition with PD-1 Blockade Immunotherapy in BRAF-mutant Melanoma,” *Nature Medicine*, June 6, 2019.

“Dabrafenib, Trametinib and Pembrolizumab or Placebo in BRAF-mutant Melanoma,” *Nature Medicine*, June 6, 2019.

compared to healthy people. ApoA-I also is known to ease inflammation and act as an antioxidant — which can prevent cell damage — elsewhere in the body.

UCLA researchers studied mice that had been genetically engineered to develop molecular changes, inflammation and symptoms similar to that seen in people with Crohn’s disease. The team detailed how IBD developed in these mice, pinpointing some new key pathways and molecules in the process. They then treated the mice with two oral drugs, one designed to mimic ApoA-I and another designed to mimic a

specific inflammation-resolving molecule. Each of the compounds successfully eased inflammation in the intestines of the mice and lowered the levels of inflammatory molecules in the animals’ blood. One of the mimicking proteins, Tg6F, appeared to have reversed the disease process after it had progressed to an advanced stage, while the other treatments were effective in preventing the progress of the disease.

In 2015 and 2016, about 3 million U.S. adults reported receiving diagnoses of IBD, according to information on the Centers for Disease Control and Prevention website. New

drugs are needed to put IBD in remission permanently rather than treat symptoms only temporarily. The UCLA researchers involved in the study are planning to seek FDA approval to study their new ApoA-I based drug, Tg6F, in humans.

— David Olmos

“Apolipoprotein A-I Mimetics Mitigate Intestinal Inflammation in COX2-dependent Inflammatory Bowel Disease Model,” *Journal of Clinical Investigation*, June 11, 2019

Giving Where the Rubber Meets the Road

When Jodi and Greg Perlman consider how best to direct their philanthropic giving, they think about the lives that will be directly touched. For UCLA Health, that meant the creation of the Angel Fund, designed to help patients and families cope with the burden of nonmedical needs associated with hospitalization.

As developers and owners of thousands of Section 8 housing units across the country, Jodi and Greg Perlman have been struck by the rampant generational poverty they have observed and the difficulty many individuals and families have breaking free of it. Their philanthropy began with the establishment of a foundation, All Ways Up, which provided college scholarships to young people living at their properties. After seeing the impact of this effort, the foundation expanded its scope and reach, and today, All Ways Up partners with nearly 50 non-profit organizations and provides scholarship support to more than 450 young men and women. When the Perlmans decided to become involved with UCLA Health, they wanted to keep their giving focused on individuals rather than on programs or the institution. So, in November 2018, they created the Angel Fund to support inpatient families — identified by case managers, social workers, nurses and doctors — who need assistance due to the

disruption of their lives that can occur around illness. The Perlmans sat down with *U Magazine* editor David Greenwald to talk about philanthropy and the philosophy that motivates their giving.

Let's start by talking about the Angel Fund. What was your motivation for creating it?

Greg Perlman: During a conversation we had with someone we met who is involved with UCLA Health, we started talking about our philanthropic giving and shared that we supported UCLA, but only on the athletic side. He offered to set up a meeting with Johnese Spisso, the president of UCLA Health and CEO of UCLA Hospital System. At that meeting, Johnese told us about some of the things the hospital was doing for its patients that were perhaps a bit under the radar, but things that directly touch the lives of patients. That really resonated with Jodi and me, and it fit in with some of the other things that we do philanthropically. All Ways Up supports



Jodi and Greg Perlman.

Photos: Jessica Pons

people who are on an amazing path, but who need a little extra help along the way, a bridge to help them get ahead. After we met with Johnese, we started thinking about what happens when someone who doesn't have a lot of resources is hospitalized. Maybe they find themselves in a situation where they are at risk of losing their job or their home, or they can't take care of day-to-day needs like transportation or the cost of a hotel room for a family member to stay while they are in the hospital. So, we decided to create the Angel Fund to help people deal with these nonmedical financial burdens that occur around their hospitalization.

How are potential recipients identified?

Greg Perlman: When we worked with UCLA to create the fund, we wanted to ensure that it is the direct caregivers, the ones who hear the patients' stories every day, who are empowered to identify potential recipients.

Jodi Perlman: We want the support to go wherever the need exists, and we gave UCLA a lot of leeway to determine how to use all of their support sta

to identify patients in need of extra assistance. After seeing the success of the initial fund, and receiving some very heartbreaking requests from the pediatric oncology section, we decided to create a second, separate fund, along the same lines as the original Angel Fund, to support the needs of families with children in the pediatric oncology division of the hospital. For parents with a child hospitalized with cancer, their lives are completely stopped. They are there with their child 24/7, and many of them need financial assistance to hold their lives together during this crisis. We want to make it a little easier to get through this unimaginable ordeal.

You hear the patients' stories. What is that like for you?

Jodi Perlman: It can be heart-wrenching, so much so that sometimes I have trouble reading them. But, we want for the Angel Fund to help as many patients as possible. We give all the credit to the nurses, the social workers and the case managers who are with the patients every day and who bring these stories to our attention.

“We want for the Angel Fund to help as many patients as possible. We give all the credit to the nurses, the social workers and the case managers who are with the patients every day and who bring these stories to our attention.”

“Giving is a drug, an amazing drug, and it is exponentially better when you can see the impact it has directly on people’s lives.”

Is there a particular story that has moved you?

Greg Perlman: They all are moving, but there was a request from a family in Las Vegas that was particularly difficult for us. A 17-year-old girl had died while at UCLA. The family needed money to bring her body back home. The Angel Fund covered those costs.

How has the Angel Fund, as well as your foundation and other philanthropic efforts, affected you?

Greg Perlman: It has made me think deeper about things. Jodi and I donate a significant amount of our personal net worth, and, sometimes, I think about some of the very wealthy people we know who give relatively very little, and I wonder why that is. They are good people, but I don’t think they are fulfilled by their giving. Writing a large check can be an empty experience if you don’t really know where your money is going. We have found that the way to get true fulfillment in giving is to see where your dollars are going and how they are working and to really know that you are touching lives.

Jodi Perlman: Giving is a drug, an amazing drug, and it is exponentially better when you can see the impact it has directly on people’s lives.

Greg Perlman: It is. Since our engagement with UCLA, we have started other Angel Funds at organizations focusing on homelessness, foster youth, recidivism — a lot of different issues, but all directly touch the lives of individuals.

Because the individual gifts from the fund to patients are not very large — they are, as you describe it, bridges to help people get past difficult times — it seems this could be a model for philanthropy in which people of more modest means can engage.

Jodi Perlman: When someone is trying to decide whether or not to give, it does not have to be a numbers game. It is nice if someone is able to give a lot of money, but people don’t realize they can give a small amount directly to somebody through a fund like this, and that can make a huge difference in that person’s life. People can be intimidated by charitable giving. They see others giving very large amounts of money and they don’t think that their contribution will have an impact, so they decide

not to give anything at all. I firmly believe that any amount you can give can make a difference. It may not fund a program or a building, but it can have a direct and immediate impact on the life of someone who really needs it.

Greg Perlman: It is not just the patient or family who is helped by this kind of philanthropy; it helps the caregivers, too. We recently received a personal note from a UCLA social worker who wrote: “Your generosity has changed my life.” That is something you might expect from the person who receives the money, but this letter was from a caregiver. We’ve changed her life by empowering her to help a patient in a way that was not otherwise possible. That says so much to me about the power of what we are hoping to accomplish with the Angel Fund.

Jodi Perlman: That’s it, right there. We want to empower everyone in the chain to be philanthropists.

Greg Perlman: It’s as if the caregiver is now the philanthropist — we have transferred our philanthropy to them — because they are on the ground doing the work. They are the ones who are calling the patients to our attention, and they are seeing the patient’s or family’s reaction when they receive a gift from the fund.

Did you have a model or a mentor who pointed you in this direction in your approach to philanthropy.

Greg Perlman: Since I was a young kid, my family has been doing Christmas giveaways to low-income people and foster kids throughout Los Angeles. We used to get the kids’ Santa requests and go out and personally shop for sometimes hundreds of kids. We would hand each kid their gifts and watch them open them up, and we just felt so overjoyed and fulfilled. That is what we are doing now, obviously on a much greater scale.

As the giver, you take responsibility for providing the resources. What do you expect back from the recipient?

Jodi Perlman: We want the recipients to show gratitude, especially when they realize these gifts came from a family.

Greg Perlman: Yes, gratitude. But that doesn't mean gratitude to us. We have described this process as a chain. We provide the financial resource, yes, but it is the caregivers who truly are the essential links in the chain. They are the ones who carry the patients' stories, who are empowered to bring them forward. It is to them that we would like recipients of these gifts to show gratitude, to say thank you. For us to hear back from a caregiver that the patient or the family said thank you to them is sometimes all that we need. Our hope is that the recipient knows that there is someone out there who wants to help and that one day they will pay it forward.

What is your long-term vision for the Angel Fund? How would you like to see it evolve?

Greg Perlman: We want it to grow over the next year and to increase the number of gifts that are made. When we feel it is the right time and we have established a solid track record, we will open it up to others who are interested in donating either through our funds or by setting up their own Angel Funds. My mother wants to put money into the pediatric oncology fund right now.

Jodi Perlman: (laughing): We'll probably let mom come in right now!

Greg, your childhood experience was a model for your approach to philanthropy. Do you now see yourselves potentially as models for others?

Greg Perlman: A hundred percent.

Jodi Perlman: A hundred percent.

Greg Perlman: This is exactly why we're doing it. I want to show people I know from different areas of our life the light of giving. They're going to see the kinds of requests that we receive from all of our Angel Funds, and they are going to want to jump in and open up their wallets and give. I'm convinced of it.

Jodi Perlman: There are many people who want to give, but they don't know how. It sounds funny to say that — what do you mean you don't know how to give? It's not that difficult. But, like we talked about before, many people are intimidated. Even people who have a lot of money can be intimidated. No matter what, no one ever thinks their gift is large enough. But what we are doing can show them that no matter what they give, it *will* be enough, and it *will* make a difference. So, yes, I definitely think that we are setting a new tone, a new direction.

Greg Perlman: It's not just about how much impact a gift can have on the life of a recipient; it also is about changing the way that giving can be done so that more people can be fulfilled in their giving.

Jodi Perlman: Exactly.

You sound somewhat evangelical about the subject.

Greg Perlman: (laughing): My partners call me Missionary Greg! Fifty percent of my time is spent driving all over Southern California to meet with new organizations to set up Angel Funds.

“For us to hear back from a caregiver that the patient or the family said thank you to them is sometimes all that we need. Our hope is that the recipient knows that there is someone out there who wants to help and that one day they will pay it forward.”



The Accidental Scientist

Tamir Gonen, PhD
Professor, Biological Chemistry and Physiology

ILLUSTRATIONS BY COLLEEN O'HARA



When Dr. Tamir Gonen was working to develop microcrystal electron diffraction (MicroED), his greatest challenge was “convincing the scientific community that [it] really does work.” This powerful method utilizes samples a billionth the size of what’s normally required, enabling him to generate subatomic-resolution images to discern the structure of proteins and open the door to the potential development of new therapies for such diverse diseases as cataracts, diabetes and Parkinson’s.

Dr. Gonen steps into the *U* Magazine spotlight

When did you first start to think seriously about science?

It was not until I was at university. In high school, in South Africa, where my family had moved from Israel, my teachers steered me away from science because my English was not very good, and they were concerned that I would bring down the ranking of the school’s science program. After moving to New Zealand, I began to pursue a degree in business at the University of Auckland. And I was bored out of my mind. My sister was going to the same university, and I said to her, “Enroll me in whatever it is you are doing.” I didn’t realize she was enrolled in pre-med, so that’s what she enrolled me into. During that year, I did chemistry and biochemistry, and I really liked it. I changed my major, and I ended up graduating with a double major in inorganic chemistry and biological sciences. I kind of became a scientist by accident.

What was your first science experiment?

One day, when I was a kid, there was a cockroach in my room on its back. I wondered what would happen if I ran electricity through this thing. I had a simple nine-volt battery and I fashioned some electrodes, and I found that, depending on where you put the electrodes, you could move different legs, and that fascinated me.

Who is your science hero?

Michael Rossmann [professor of biological sciences at Purdue University]. Michael was there from the very start of structural biology. He was responsible for some of the most important developments in the field, and he moved freely between different approaches to doing things. He had such an open mind.

Where are you happiest?

I find that disconnecting from the world is quite nice, and the only way to actually do it is on a cruise ship, where you are completely out of reach. So, I guess I’m happiest somewhere in the middle of the ocean.

What do you consider to be your finest achievement?

My finest achievement is creating a welcoming and supportive environment in my lab. Most of my past trainees are now tenure-track assistant professors at top universities in the U.S., and this I consider to be a real legacy.

What are the qualities of a great scientist?

To keep an open mind and to really follow your nose. Having said that, it is possible to find yourself going down a pretty deep rabbit

hole, and so another very important quality for a scientist is to know when to stop.

What is your motto?

I don't have one, but if I did, I would say it is follow your nose and keep an open mind.

When don't you think about science?

When I'm on a cruise. ☒ at's the only time. It is very, very di☒ cult to turn science o☒.

If not a scientist, what would you be?

I think I would have been a chef. I quite enjoy cooking. I think my approach to cooking is more like a biochemistry experiment — plus or minus 10 percent of this or that, and it's usually OK.

What's your most treasured possession?

My Aria Pro II electric guitar that I bought when I was 16 years old and on which I taught myself to play. I have been carrying it around with me across four continents.

What keeps you up at night?

Now that we have clearly demonstrated that MicroED is a very powerful method, I see my job as trying to come up with a bigger picture and trying to project my vision for this lab and for this field that we started over the next five-to-10 years. I have a lot of sleepless nights thinking about that.

What has been your greatest challenge?

Convincing the scientific community that MicroED really does work. Many of my scientific colleagues had tried to do something similar for decades, but, for whatever reasons, they couldn't get it to work. We were able to figure out how to do it, but there was 20 or 30 years worth of negative literature that we had to work against.

What is your definition of happiness?

Being able to pursue the science that most excites you at any moment, without funding constraints.

What is your definition of misery?

Not being able to get a really good cup of coffee readily — that is misery. I think the coffee is, in general, quite awful here. When we lived in Seattle, we became coffee snobs because coffee was amazing there. And then we come to L.A., and most places sell what I call gasoline.

What music do you listen to while you work?

Anything from very mellow elevator music playing in the background if I need to focus on something to, if I don't really need to focus, Ozzy Osbourne, Metallica, Led Zeppelin, Black Sabbath — something very loud.



Dr. Gonen's responses have been edited for length and clarity. To read a fuller transcript of his responses to these and other questions, click on the link to this article at: uclahealth.org/u-magazine




Answers

BY CASEY RENTZ

PHOTOGRAPHY BY

ANN JOHANSSON



Ram and Ishani Gowri were desperate to know the cause of the illness that was afflicting their son Rylan when they learned of the Undiagnosed Diseases Network at UCLA. Today, the family, with daughters Neyla (left) and Ceyla (right), has answers.

One family's odyssey to find a diagnosis for their sick child is a case study of the challenges of addressing a rare or undiagnosed illness. The California Center for Rare Diseases at UCLA aims to change that trajectory.

Rylan Gowri was just 2 years old and already had logged more trips to the hospital than most adults would in a lifetime. Ten times in just 12 months, the child's parents Ram and Ishani rushed him to the hospital when what seemed like a common cold or flu turned into cyclical vomiting and seizure-like shaking. "We had done it so often, we had a packed bag ready to go," Ram Gowri says.

The hospital tests proved to be inconclusive. EEGs showed that Rylan's shakes were not true seizures, so the doctors ruled out epilepsy. He also had weak muscles and lagged behind in speech and motor development, which pointed to a possible genetic disease, but tests came back negative. Rylan's grandmother is a pediatric neurologist who diagnoses such conditions as cerebral palsy and autism; she also was stumped.

, At Last



Nobody knew what was wrong with Rylan, and the uncertainty was dizzying. “It felt like chaos fatigue,” Ram says.

“Enjoy your time with him,” the family was told. They returned home with a half-dozen medications but no plan for Rylan’s ongoing care. “We had no answers,” Ishani says.

Back at home, Rylan continued to suffer bouts of nausea and shakes, and he still hadn’t learned to speak or walk. But his irrepressible ear-to-ear smile charmed everyone. “He doesn’t seem to know his limitations,” Ishani says. “He is the happiest kid ever.”

The Gowris struggled to find the answers on their own. They researched Rylan’s test results and Googled his symptoms, hoping to match the constellation of signs to known diseases.

Ishani frequented Facebook groups for parents of children with mitochondrial disease, leukodystrophy and something called hypoxic-ischemic encephalopathy, trying to find a familiar story.

One day, a friend told the Gowris about the website of the Undiagnosed Diseases Network (UDN) at UCLA. After reading the information on the website, the Gowris felt that maybe, at last, they had found a place that could offer them some answers — and hope. The criteria for eligibility, as outlined on the site, was straightforward: Rylan had gone through many tests, been seen by numerous specialists and he remained undiagnosed. Ishani filled out the online application and hoped that UCLA’s program would select them to participate.



Left: Dr. Stanley F. Nelson: “Families live without knowing what is wrong, but when we can figure out their exact genetic mutation, we can develop strategies that may make it possible to treat the disease and provide appropriate guidance for the family.” **Right:** Dr. Julian A. Martinez: “It all starts with a gene. That’s the magic of what happens here.”

“There are so many children in the United States, as well as adults, who suffer from undiagnosed rare diseases. For parents, and individuals, the diagnostic odyssey can last for more than a decade. We want this to be a safe place where patients can come and receive the care they need.”

UCLA IS AMONG 15 INSTITUTIONS NATIONWIDE WITHIN THE NATIONAL INSTITUTES OF HEALTH (NIH)-SUPPORTED UDN, which has been engaged in research studies to improve and accelerate the diagnosis of rare and undiagnosed conditions. NIH created the network in 2014 after its original Undiagnosed Disease Center was overwhelmed with patients, and it expanded the network in 2018.

UCLA’s program — which is a key element of the California Center for Rare Diseases at UCLA — is headed by Stanley F. Nelson, MD, professor of human genetics, pathology and pediatrics and director of the California Center for Rare Diseases; Julian A. Martinez, MD (RES ’03, FEL ’06), PhD, professor of human genetics and pediatrics; and Christina Palmer, PhD, professor of psychiatry and biobehavioral sciences. In the last two years, it has accepted 130 patients from Southern California, as well as from other parts of the country. Thus far, UCLA’s program has identified the exact DNA mutation in 30 patients and provided them with a diagnosis. “Families live without knowing what is wrong, but when we can figure out their exact genetic mutation, we can develop strategies that may make it possible to treat the disease and provide appropriate guidance for the family,” Dr. Nelson says.

It takes cutting-edge technology to diagnose patients with rare diseases. “UCLA is one of the first places in the world to use whole-exome sequencing,” says Daniel H. Geschwind, MD (RES ’95, FEL ’97), PhD, Gordon and Virginia MacDonald Distinguished Chair in Neurology, Psychiatry and Human Genetics

and associate vice chancellor for precision medicine. Dr. Geschwind also is director of the UCLA Institute for Precision Health, of which the California Center for Rare Diseases is a core component. “Advances in genomics now allow us to diagnose people who 10 years ago were undiagnosable.”

Specifically, adding RNA sequencing to the diagnostic mix is an advance that UCLA innovated. “UCLA is one of the UDN sites that has pioneered RNA sequencing for rare diseases and also has been instrumental in leading the genetic counseling aspect,” says Jon Bernstein, MD, PhD, of the Stanford Center for Undiagnosed Diseases.

A tighter connection between multidisciplinary research laboratories and clinicians is something that UCLA’s new California Center for Rare Diseases and the UCLA Institute for Precision Health help to promote. The goal is to “leverage the expertise of our clinicians at UCLA and the research and innovation that have been going on at UCLA for decades in the fields of genomic medicine,” says Clara M. Lajonchere, PhD, deputy director of the UCLA Institute for Precision Health. “There are so many children in the United States, as well as adults, who suffer from undiagnosed rare diseases. For parents, and individuals, the diagnostic odyssey can last for more than a decade. We want this to be a safe place where patients can come and receive the care they need.”

THE GOWRIS BEGAN THEIR JOURNEY AT UCLA WITH DR. MARTINEZ, who keeps a statue of the Hindu god Ganesh on a windowsill in his office. Ram Gowri, who is from a Hindu family in Sri Lanka,

took notice. While Dr. Martinez is not Hindu, he keeps the statue that was given to him as a gift “as a reminder to me of friends who care” — similar to the caring role that he and other members of the UDN team play in helping to overcome obstacles for the patients who come seeking answers.

Dr. Martinez began his career as a physician-scientist with an interest in neurodevelopment. He joined UCLA’s UDN in 2017. “Our goal is to help end these diagnostic journeys,” he says. “People with rare diseases are an underserved population, and we want to change that.”

The Gowris’ first day began with a simple skin scrape of both parents and the child that would be used for RNA sequencing. Then came visits with different clinicians, during which Rylan underwent X-rays of his bones, a sonogram to check his kidney function and an echocardiogram of his heart. Doctors also drew blood from each member of the family for genome sequencing.

“Everyone was really kind and generous with their time,” Ram says. Every doctor took time to explain the tests fully and to manage expectations, he says. They also met other families from other parts of the U.S. and abroad who were going through the testing process. The next day, the Gowris returned for an MRI of Rylan’s brain.

The days were exhausting, but the Gowris came away feeling supported and that, for the first time, they might receive some answers and a cohesive plan to help their son. “Now there was a team behind Rylan. It wasn’t like that before,” Ishani says. “After that, I didn’t feel the need to look up things all the time. Someone actually was working on it for me.”

UCLA’s genetic counselors kept in touch with the Gowris over the next nine months, sending updates about Rylan’s physical and genetic-test results and analysis. Still, Ram and Ishani were cautious about getting their hopes up about a diagnosis. They determined to put it out of their minds for the time being and started to grow accustomed to life with their unique but super-happy son. Rylan’s febrile seizures had left him disabled: At 3 years old, he still can’t speak or walk, he can’t focus his eyes very well and his head swivels a bit as he moves. He also continues to sometimes get the shakes when he is sleeping or sick. His parents ferry him around the house from table to couch to bed, and they give him a number of supplements throughout the day. His father takes him to physical therapy, and he loves when his parents read books to him and his two

younger sisters, tucking his body against his mother or father as they tell the story of *The Very Hungry Caterpillar*. He smiles often. “Bad things happen, and he just chooses to be happy,” Ram says.

AS LIFE MOVED FORWARD IN THE GOWRIS’

HOME, evidence for Rylan’s diagnosis filtered in to UCLA. The family’s blood samples were sent to the regional UDN genetic laboratory, which sequenced each person’s entire genome — every region of DNA that codes for a gene. The results generate a vast amount of information, many orders of magnitude greater than what can be determined from a standard genetic work-up that sequences only certain sections of DNA where mutations are known to occur in common genetic diseases. Such tests had turned up nothing for Rylan.

UCLA’s geneticists waded through the sea of results, eventually honing in on a specific gene, SLC25A46. A University of Miami study in 2015 had found that this gene was faulty in four families with members who had symptoms like Rylan’s — optic atrophy, muscle weakness and development problems. The SLC25A46 gene makes a protein that is important in membranes of mitochondria, which provide energy to muscle cells, and it also is vital for growth of nerve cells. A damaged gene and lack of protein would explain Rylan’s weak muscles and other nerve-related problems.

Upon examining SLC25A46 in the Gowris’ genomes, the geneticists found a mutation in Rylan that was inherited from Ishani. It fit one piece into the puzzle; Rylan had inherited a faulty copy of this gene from his mother. But it didn’t complete the whole puzzle. To be disease-causing, Rylan also would have to have inherited a faulty copy of this same gene from his father. Geneticists checked the protein-coding sequence of Rylan’s DNA that was inherited from Ram, and, to their surprise, it looked normal — there was no mutation. It didn’t make sense. But there was another possible explanation; something was wrong with Ram’s DNA that they couldn’t see, something nearby the gene that was affecting its ability to make proteins. They had to look closer.

That is where RNA sequencing comes in — the tool that UCLA has pioneered in conjunction with rare-disease diagnosis. RNA is the middle product of our DNA — between gene and protein. The family’s skin biopsies taken by Dr. Martinez allowed geneticists to take special kinds of cells called

“Now there was a team behind Rylan. It wasn’t like that before. After that, I didn’t feel the need to look up things all the time. Someone actually was working on it for me.”

“At that moment of diagnosis, we share in the closure we hope we communicate to families. But then we realize it’s not the end for them.”

fibroblasts, grow them, extract their RNA and look for errors. Sure enough, the RNA from both Ram and Rylan was scrambled at what corresponded to the SLC25A46 gene, which means that something was going on with the SLC25A46 gene inherited from Ram, too. Through the new techniques developed at UCLA, they found a DNA deletion in a non-coding area essential for gene splicing. Although Ram’s SLC25A46 gene that was passed to Rylan looked OK from typical genetic testing, it was, in fact, non-functional as well, and Rylan had inherited two faulty copies of that gene: his mother’s copy, mutated at the gene, and his father’s copy, with missing material somewhere close to the gene. It was as precise a diagnosis as you can get. UCLA’s lab re-ran the tests to make sure everything was right.

When the program’s diagnostic roundtable — a group of 30 or so UDN-associated doctors, bioinformatics staff, lab members, trainees and genetics counselors — reviewed the findings, there was a palpable sense of excitement. Everyone checked the work, and all agreed: They indeed had diagnosed Rylan Gowri.

“It all starts with a gene,” Dr. Martinez says. “That’s the magic of what happens here.”

Genetic counselor Rebecca Signer is coordinator of the Undiagnosed Diseases Network at UCLA and a key participant in the program’s work with patients and families.



DR. MARTINEZ AND HIS COLLEAGUES

PREPARE CAREFULLY when it is time to tell families about what they have found. They know that although the result is impressive, there is another side to diagnosis — the family’s future. “At that moment of diagnosis, we share in the closure we hope we communicate to families,” Dr. Martinez says. “But then we realize it’s not the end for them.” For the family of a sick child, after all, a diagnosis of a rare genetic disease means a more determined fate — a future with an illness that likely will be with them for the rest of their lives.

While learning the diagnosis for what previously was a mystery disease can be cathartic, that knowledge also carries with it a significant burden. During their research into Rylan’s case, the UCLA team found 10 other families in the U.S. with children who had a similar diagnosis. Most of them were highly disabled. The Gowris now must contend with knowing that if they have more children naturally, each new baby would have a 25 percent chance of inheriting Rylan’s condition. If in vitro fertilization, combined with preimplantation genetic testing, is used, it would greatly reduce the chance of this disease in subsequent pregnancies.

Genetic counselor Rebecca Signer, coordinator of the UDN at UCLA, has worked with Dr. Martinez to help plan such meetings, discussing psychological considerations and drafting handouts and other materials to help families understand their diagnosis and potential treatments. When she called the Gowris to invite them in to talk, Ishani initially thought that, rather than being given news of a diagnosis, they would be told that nothing had been found. “I thought we’ll go in, they’ll tell us they didn’t find anything and then we’ll move on,” she says. Ram, on the other hand, had an inkling of what was to come. “I come from a medical family,” he says, “and most of the time, when you get a phone call from a doctor, it’s not a negative result — it’s something.”

On the morning of February 11, 2019, Ram and Ishani walked into Dr. Martinez’s office and settled into chairs opposite him and Signer. Dr. Martinez spoke first.

“Well, the diagnosis we found ...,” he began. Before he could finish, Ishani burst into tears. Dr. Martinez paused and smiled.

“I didn’t believe it. I didn’t believe they had done it,” Ishani says.

Dr. Martinez started again, explaining Ram's genetic contribution, the deleted DNA, and Ishani's contribution, the faulty gene. He explained how this would have caused Rylan to develop his current symptoms. Signer showed them the handouts.

"The most interesting part was the combination of the gene deletion and the misspelling [on the DNA segment]," Ram says. "And there wasn't a name for the disease; it was SLC25A46, and that in itself took a few hours to memorize."

While finally identifying what is wrong with their son was a relief for Ram and Ishani, Dr. Martinez also had to explain to them that there currently is no treatment or cure for Rylan's condition, which is true for almost all patients with a rare and previously undiagnosed disease. That, says Dr. Nelson, often can be the hardest part. "Telling a parent why his or her child is sick is very meaningful and necessary, but it can be hollow if we don't have the next step, which is what to do to repair it," he says.

Dr. Martinez reassured the Gowris that "UCLA would still be their team." They could continue to see their UCLA neurologist and neuro-optometrist, who now would be armed with greater knowledge about Rylan's condition. And UCLA would continue to seek out experimental therapies or medicines that might help Rylan.

Ram and Ishani left Dr. Martinez's office a bit overwhelmed, but optimistic. "Emotions were all over the place," Ishani says. "Overall, it was a good experience."

ALTHOUGH DR. MARTINEZ COULD NOT OFFER RYLAN ANY TREATMENT, THE GOOD NEWS IS that there are a number of precision medicine techniques for treating rare diseases in the works. UCLA is using its technology and experience to push these treatments into reality. Dr. Nelson, for example, currently is testing a custom drug for another patient with a rare genetic mutation like Rylan's. The drug is an RNA therapy that works by altering the RNA of mutated genes to restore protein expression. Such drugs usually are developed only when they will benefit a large number of people, but advances in genomics technology point to the possibility that one day these drugs could be individualized based on the specific gene sequence of the individual and the exact mutation or mutations identified. Researchers elsewhere on the UCLA campus are conducting similar work.

Sometime in the near future, perhaps, a diagnostic meeting such as Dr. Martinez and Signer had with the Gowris also will include a genetically personalized treatment plan. In that way, the California Center for Rare Diseases at UCLA and the UCLA Institute for Precision Health would lead in the field of precision medicine and serve as a model for the future of clinical diagnostics.

"At the end of the day," says Dr. Lajonchere, "this is about giving patients hope."

For now, the Gowris have a diagnosis, and they have their family's future to consider.

"Many times, diagnosis is the beginning of a new journey, with its own challenges," Dr. Martinez says.

A new journey, yes, but after their experience at UCLA, the Gowris feel, finally, that they have some stability. "We still have bad days, but we don't have days where we wonder if we are going to have to call 911 again" because they don't know the underlying reason for what is happening to their son, Ram says.

Life continues. During a recent physical therapy session, Rylan reached out with his arm and swept a nearby glass off a table, sending it crashing to the floor. In spite of the broken glass, such directed movement was a major leap for him. He also has started to stick out his tongue to signal that he is ready to eat — a precursor to improved eating and, perhaps, even talking.

It still is hard, but every advance, no matter how small, offers a glimmer of hope. "Rylan has changed our lives because he's given us such a different perspective on things," Ishani says. "And he's also given us a community and a purpose."

Casey Rentz is a science writer in Los Angeles. Her work has been published in *New Scientist*, *Smithsonian*, *The Scientist* and *NPR*, and her story "How to Stop a Hurricane" was included in *The Best Science Writing Online 2012* (*Scientific American* / Farrar, Straus and Giroux).



For more information about the California Center for Rare Diseases at UCLA and the UCLA Institute for Precision Health, go to: uclahealth.org/precision-health



Ishani Gowri (with Rylan): "He doesn't seem to know his limitations. He is the happiest kid ever."

Coal Miner's Son

By Mark Wheeler

UCLA's Dr. Dennis J. Slamon has traveled a long road from Western Pennsylvania to Westwood and now has received the "American Nobel," the Lasker-DeBakey Clinical Medical Research Award, for his research leading to the development of the lifesaving breast cancer drug Herceptin.

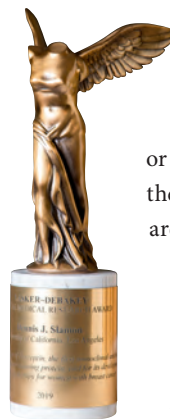
It is roughly 2,500 miles from New Castle, Pennsylvania, to Los Angeles, California, but distance alone doesn't define how far the two communities are apart. New Castle is a mill town that was known as the tinplate capital of the world in the early 1900s. L.A. is ... L.A. Yet, UCLA's Dennis J. Slamon, MD (FEL '82), PhD, the 2019 recipient of the Lasker-DeBakey Clinical Medical Research Award — widely regarded as America's top biomedical research honor — really hasn't strayed far from his roots. His father, uncle and grandfather all were coal miners in West Virginia before Dr. Slamon's parents moved to New Castle, where Dr. Slamon was born. Dr. Slamon chooses to mine a different vein: data.

It is his belief in data and a dogged perseverance that led Dr. Slamon, professor and chief of hematology/oncology at the David Geffen School of Medicine at UCLA, to the groundbreaking development of the breast cancer drug Herceptin, a lifesaving monoclonal antibody for women with HER2-positive breast cancer, a particularly aggressive form of the disease. Monoclonal antibodies are proteins created in a lab that, when injected into humans, bind to and destroy specific invader organisms like cancer cells. He shares the award with H. Michael

Shepard, PhD, an American cancer researcher then working at the biotechnology company Genentech, and Axel Ullrich, PhD, a German cancer researcher also formerly of Genentech and now at the Max Planck Institute of Biochemistry outside of Munich, Germany.

The Lasker Awards were established in 1942 by Albert and Mary Lasker to recognize researchers, clinical scientists and public servants who have made major advances in the understanding, diagnosis, treatment, cure or prevention of disease and to raise awareness of the ever-present need for research funding. They are known as the "American Nobel" — eighty-eight Lasker winners have gone on to be awarded Nobels. Dr. Slamon, who also is director of clinical and translational research at the UCLA Jonsson Comprehensive Cancer Center, is the second David Geffen School of Medicine scientist to win the award in the past two years; Michael Grunstein, PhD, Distinguished Professor Emeritus of biological chemistry, received the Albert Lasker Basic Medical Research Award in 2018 for his groundbreaking research on gene expression.

The key finding by Dr. Slamon and colleagues showed that the monoclonal antibody Herceptin binds to, and destroys, abnormal cells without harming





Research by Dr. Dennis J. Slamon and his colleagues showed that the monoclonal antibody Herceptin binds to, and destroys, abnormal cells without harming nearby healthy tissue, a major departure from then-common chemotherapies that Dr. Slamon refers to as the “hand grenade” approach, indiscriminately killing healthy as well as diseased cells.

Photos: (This Page) Jessica Pons; (Opposite Page) Kate Milford/Albert and Mary Lasker Foundation



Dr. Dennis J. Slamon (second from right) with 2019 Lasker-DeBakey Clinical Medical Research Award co-recipients Dr. H. Michael Shepard (left) and Dr. Axel Ullrich (right). With them is Dr. Claire Pomeroy, president of the Albert and Mary Lasker Foundation.

Photo: Ellen Jaffe/Albert and Mary Lasker Foundation

Between 2.7 million and 3 million women have been treated with Herceptin, and women with HER2-positive breast cancer now have among the highest survival rates compared with all women with breast cancer.

nearby healthy tissue, much like a laser-guided missile hitting a select target. It was a major departure from then-common chemotherapies that Dr. Slamon refers to as the “hand grenade” approach, indiscriminately killing healthy as well as diseased cells. Proving that antibodies that bind to cancerous cells are an effective method for treating solid tumors transformed cancer care at a time, in the 1980s, when most cancer therapies were focused on excising tumors and developing better chemotherapies. The discovery opened up new research avenues, leading to multiple other targeted treatments that utilize antibodies to attack the disease at its genetic roots. Between 2.7 million and 3 million women have been treated with Herceptin, and women with HER2-positive breast cancer now have among the highest survival rates compared with all women with breast cancer.

MEDICINE CAPTURED DR. SLAMON'S ATTENTION EARLY IN HIS LIFE.

As a child growing up in New Castle, he regularly was exposed to the doctors who treated him and his family. His father Joseph had quit coal mining, after surviving two mine cave-ins, only to lose his leg in a horrible car accident. So doctors making house calls were not infrequent visitors to the family's home. The young Dr. Slamon was impressed by what he observed. “It made a big impact on me, even at a very young age,” he says. “They made people feel better, and I saw the respect my parents gave them. So I always thought it would make a pretty cool profession.”

at early idea lingered as Dr. Slamon came of age in a town where, culturally, education was not a big deal and sons usually followed their fathers into the mills or mines. But that would not be Dr. Slamon's path. “There was no gravitational pull,” he says. “My parents never made me feel not to do something. They always told me if it is what I want, then I can do it.”

So Dr. Slamon focused on his education, and he excelled. “If something interested me, I would throw myself into it,” he says. It is an attribute that continues to this day. In high school, he developed a keen interest in biology, he says, and started to muse about his two interests — medicine and biology — and how to marry the two.

From there, it was a scholarship to Washington and Jefferson College, a small liberal arts school in nearby Washington, Pennsylvania. Dr. Slamon was the first in his family to go to college. He spent summers working in a steel mill to help pay for his education. The experience was clarifying: “It cemented that this wasn't what I wanted to do with my life,” he says.

After graduation, he entertained multiple scholarship offers — West Virginia University, the University of Pittsburgh and the University of Chicago. He vacillated about the choice. “To show how naive I was at that time, I wasn't sure where to go. Chicago was the best school, but it was a little intimidating; I had never spent time in a major city.” He sought advice from his college counselor, who looked at him like

he was crazy. “There shouldn’t be any choice,” he told me. ‘Chicago. Go!’”

TO CHICAGO HE WENT, GRADUATING IN 1975 FROM ITS COMBINED MD/PHD PROGRAM.

After completing his residency and chief residency in 1979, he accepted a fellowship to UCLA’s Department of Hematology-Oncology. It was not, Dr. Slamon acknowledges, the most obvious choice. UCLA today is a top-tier academic institution, with a medical school that is ranked No. 6 in the nation for research. But in the 1970s, it was still a “baby” among its peers, Dr. Slamon says. “UCLA graduated its first medical class in 1955; Harvard and Columbia graduated their first classes in the 1700s.” But that youthful energy is what attracted him to UCLA. “The place was still young,” he says. “It wasn’t ossified, and if you had some resources and a good idea, you could pursue it.”

Dr. Slamon hit the ground running, beginning his “marriage” of research and patient care. He became interested in a recently discovered class of genes called oncogenes. Oncogenes are mutated, but when healthy, they are “growth regulating” genes involved in normal cell growth. When mutations occur, though, they can cause a cell to grow out of control — cancer. With support from UCLA’s Jonsson Cancer Center Foundation and UCLA, he began to build a bank of human tumors — lung, colon, liver, breast — from physicians who had removed them from patients for therapeutic purposes. His collection may have been macabre, but Dr. Slamon believed that understanding the molecular composition of a tumor was key to understanding cancer’s origins. Most of his peers thought it was a waste of time — his application to the National Institutes of Health for a grant to fund the bank “essentially came back with a laugh track,” he says — arguing that it was hard enough to find a single mutation in a cancer cell in a petri dish; looking for one within the complex architecture of a tumor would be impossible.

But Dr. Slamon’s idea paid off. Knowing that most oncogenes are mutated forms of genes that regulate cell growth and division, he entered into a collaboration with Dr. Ullrich, who had isolated a number of growth regulating genes. As reported in the book *Her-2: The Making of Herceptin, a Revolutionary Treatment for Breast Cancer*, by the Yale University developmental biologist and former NBC News science and health correspondent Robert Bazell, “Ullrich was at

UCLA giving a seminar. Slamon took the opportunity to make a suggestion. He knew that Ullrich had genes for growth factors and receptors, the chemicals that carry grow-and-divide signals through the body. Slamon wanted to know which of these genes, if any, caused cancer. Slamon’s own collection of cancer tissues seemed like a natural place to look for links between Ullrich’s growth-factor genes and specific types of human cancer. Collaboration made sense. The two sealed a deal over a long dinner at a Thai restaurant in Santa Monica: Ullrich would send Slamon samples of DNA from his gene collection, and Slamon would try to match them to the DNA he had extracted from his tumor collection.”

There was little money at this early stage of his career, so Dr. Slamon hired a UCLA freshman, Wendy Levin, and taught her how to find matches between the oncogenes and the tumors. Now a physician, Dr. Levin is an oncologist in San Diego County, but while an undergraduate, she spent nights and weekends “sometimes sleeping on the floor in the lab,” she says, extracting DNA from tumors. It was tedious work, taking a piece of tumor tissue that had been frozen in liquid nitrogen, grinding it up, extracting the DNA and looking at one gene at a time for something awry. But the work bore fruit on a Saturday afternoon in June of 1986, when she found a match between the HER2 gene and a breast cancer tumor. “My heart started thumping,” Dr. Levin says. “It was a true eureka moment.” She excitedly called Dr. Slamon at home, offering to drive out to his house to show him the results. Dr. Slamon decided it would be OK to wait until Monday.

THE GOAL NOW WAS TO FIND A WAY TO “FIX” THE HER2 ONCOGENE.

“If we can understand what’s broken in a normal cell that makes it become a cancer cell,” Dr. Slamon says, “then we can develop smarter drugs that would only attack the cancer cells and leave healthy cells alone.” In other words, a guided missile as opposed to a hand grenade.

Dr. Slamon began testing monoclonal antibodies from different biotech companies and university labs. But it was while working with Dr. Ullrich that Dr. Slamon tested a monoclonal antibody developed at Genentech on cancer cells cultured in a petri dish. It was another eureka moment. When the monoclonal antibody was added to HER2 breast

Dr. Slamon believed that understanding the composition of a tumor was key to understanding cancer’s origins. Most of his peers thought it was a waste of time — his application to the National Institutes of Health for a grant to fund the [tumor] bank “essentially came back with a laugh track.”

“If we can understand what’s broken in a normal cell that makes it become a cancer cell, then we can develop smarter drugs that would only attack the cancer cells and leave healthy cells alone.”



After years of prodding by Dr. Slamon, the biotech firm Genentech agreed in 1992 to support a Phase I clinical trial of Herceptin. The results of that trial convinced the company and the FDA to proceed with the larger Phase II and Phase III trials. Herceptin received FDA approval in 1998.

Photo: ScienceSource

cancer cells, the cancerous cells stopped growing and dividing. When the researchers removed the antibody, the cancer began growing again. Just as remarkable, the antibody had no effect on other cells in the dish. The first antibody was Herceptin.

At this point, Dr. Slamon had the data in hand to proceed to clinical trials. In 1987, he and Dr. Ullrich published their research in the prestigious peer-reviewed journal *Science*. Yet Genentech, which owned the rights to the drug, wanted no part of it. Having been burned by failures of earlier cancer drugs, the company had grown cautious. And Dr. Slamon still was a young researcher, without a track record. And, at that time, chemotherapy and cutting still were the gold standards.

There was a core group of Genentech scientists, led by Dr. Shepard, who believed in Drs. Slamon and Ullrich’s science, but it took years of cajoling and outright arguing to advance the cause with Genentech’s executives. Frustrated, Dr. Ullrich left for Germany. Dr. Slamon would fly from Los Angeles to San Francisco at every opportunity to buttonhole Genentech executives and press reams of data into their hands. “There was a lot of eye rolling. They called me Dennis the Menace,” he says. “Looking back, a small part of me is sympathetic to those decision-makers. Clinical trials are enormously expensive and time-consuming. If you go out on a limb and fight for one and it fails, that’s a career ender.”

Still, it was maddeningly frustrating for Dr. Slamon. “I would sit in the conference room and roll out the data. ‘Here it is, here’s the proof, it works,’ I’d tell them. And they’d still say no.”

It was 1989. The only bright spot during this period was an infusion of research dollars that flowed from the intercession of an appreciative family. Lilly Tartikoff, the wife of Brandon Tartikoff, then the president of NBC, was grateful for the care that Dr. Slamon had provided to her husband during his fight against Hodgkin’s disease — Brandon Tartikoff died in 1997 — and she went to Ronald Perleman, the owner of the cosmetics company Revlon, and urged him to support Dr. Slamon’s research. “He’s Frankenstein and I’m the monster,” Lilly Tartikoff joked in an article about the development of Herceptin published in *UCLA Magazine* in 1998. “Together, there’s no stopping us.”

Tartikoff brought Dr. Slamon and his colleague John A. Glaspy, MD ’79, a Jonsson Comprehensive Cancer Center scientist who today is the Estelle, Abe, and Marjorie Sanders Endowed Chair in Cancer

Research and director of the center’s clinical research unit and the Women’s Cancer Research Program, to make a pitch. Step-by-step, Dr. Slamon laid out his HER2 findings to Perleman’s representative, Jim Conroy. Dr. Glaspy’s pitch was more blunt. It could take two-to-three years to receive funding from the government to advance the research, he said, and in that time “you’ve got a Rose Bowl full of women dead from breast cancer.”

In response, Perleman and Revlon came on board with a \$2.4 million gift over three years. “It would have taken four concurrent National Cancer Institute grants to build the equivalent of the program Revlon funded with just the stroke of a pen,” Dr. Slamon said in the *UCLA Magazine* article. “And there was no writing a grant, submitting it, waiting eight-to-12 months to hear. The gift allowed us to follow our leads almost instantaneously and made a huge difference in this whole story.”

Now with substantial funding in hand, Dr. Slamon moved full-steam-ahead with his HER2 research. He was able to conduct the first small study in humans, using the mouse version of the antibody, proving it safe, and in lab work found that adding the chemotherapy drug cisplatin to the antibody enhanced its effects.

Finally, in 1992, Genentech agreed to support a Phase I clinical trial, which is designed to test the safety and side effects of a new drug. Dr. Slamon recruited 15 women for the study. “All of us had been told we have Stage IV cancer, and all of us were told we were going to die,” says Barbara Bradfield, a participant in the trial.

With nothing to lose, the women agreed to participate in the trial, hoping it would help them, and, if nothing else, help future women with breast cancer. Still, Bradfield had to be persuaded. “I was done with chemotherapy (the trial involved Herceptin combined with the chemotherapy drug cisplatin), and when [Dr. Slamon] first called, I refused. But he called back the very next morning and gently persuaded me to reconsider. He has a way about him that is both compassionate and passionate in his belief about his research.”

Only five of the women were able to complete the trial. Bradfield, the sole remaining survivor of the group, now is a touchstone in the history of cancer research and therapy; at the trial’s conclusion, Bradfield, who was 49 when she started the trial and now is 77, had gone from a diagnosis of Stage IV cancer to being cancer free.



“I have had the empowering advantage of standing on the shoulders of others including my co-awardees, and I thank all of those many individuals and you for this amazing honor,” Dr. Slamon said from the podium during the Lasker Award ceremony.

Photo: Kate Milford/Albert and Mary Lasker Foundation

“Patient care is gratifying,” Dr. Slamon says. “But if that was all I did day in and day out, I would find it frustrating. Because there’s only so many tools we have. It’s why being able to participate in something new, the research, is so important to me. It gives all of us hope.”

The results of the Phase I trial were enough to convince Genentech and the FDA to proceed with the larger Phase II and Phase III trials. Herceptin, finally, received its initial FDA approval in 1998.

THE SUCCESS OF HERCEPTIN HAS BEEN NOTHING SHORT OF REMARKABLE. In the early 1990s, women with the HER2+ subtype had an average life expectancy after diagnosis of three-to-five years. Today, women with the HER2+ type of breast cancer now have among the best prognoses of women with breast cancer. Dr. Slamon’s research has shown that Herceptin increases the amount of time that patients live after their diagnoses by more than 50 percent. Depending on the stage of diagnosis, women with the HER2+ subtype now average seven-to-10 years of disease-free survival. In total, an estimated 2.7 million to 3 million women around the world have been treated with the drug. “Every time now, when I inject Herceptin into a patient, I still get chills down my spine thinking about how far we’ve come,” says Dr. Levin, Dr. Slamon’s former freshman assistant.

Now 71 years old, Dr. Slamon has no plans to retire. “Not until they throw me out,” he says, smiling. “The great thing about UCLA is working with great people who keep it fresh. I have 25 people in my lab now, and they bring new ideas and approaches all the time, and they keep me as challenged as I’ve ever been.”

Dr. Slamon notes there were sacrifices that he had to make, especially with his family. “I missed things that I today regret,” he says. “My wife Donna should have turned me out years ago. I missed a lot of things with my kids, although Donna always explained to them what I was working on.” Dr. Slamon has two grown children; one does market research for Major League Baseball and the other has a successful writing career in the entertainment business.

But Dr. Slamon says that his sacrifice was nothing compared to that of his patients, especially the ones who agreed, without much hope, to participate in the trials. He holds particular fondness for Bradfield and the 14 other women who were part of the Phase I trial. “Those patients who entered the Phase I trials are not research subjects or patients, they’re colleagues,” he says. “They are every bit as much of the story as anyone else who is involved because they participated in a trial knowing that we might be giving them something that could hurt them, and because it was a safety test we had to start at levels that were not likely to even help them. But they all agreed and volunteered with the attitude that while it may not directly help them, it might help the next woman behind them.”

Dr. Slamon is grateful for the recognition he and his colleagues have received from the Lasker Foundation. But there’s another prize for which he is grateful, too. Melody Cobleigh, MD, an oncologist at Rush-Presbyterian-St. Luke’s Medical Center in Chicago, had helped to recruit patients for the Phase III trial. At its conclusion, she asked her patients to write a note to Dr. Slamon, telling him how Herceptin had affected their lives. Dr. Slamon keeps the 17 notes he received from the women, and to this day they still move him.

Mark Wheeler is a freelance science writer in Los Angeles and a former writer and editor for *Discover* magazine and senior media relations officer for UCLA Health.



To read an interview with Dr. Dennis J. Slamon in the journal *Cell* about the development of Herceptin, to listen to an audio file of the interview and to view a video of Dr. Slamon’s acceptance remarks, click on the link to this article at: uclahealth.org/u-magazine

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A Minnie Mouse rattle and pager are essential tools of the trade for child life specialist Karleen Wray as she moves through her day supporting pediatric patients in the OR.

KARLEEN WRAY'S WORKDAY STARTS WELL BEFORE MOST PEOPLE HAVE HAD THEIR FIRST MORNING CUP OF COFFEE.

A child life specialist with UCLA's Chase Child Life Program, she often is in her surgical scrubs by 5:30 am, checking the day's roster of young patients she will help to ease through the experience of undergoing surgery.

Wray is among 18 specialists in UCLA's child life program who give support to patients and families who are experiencing healthcare challenges. While that support, delivered through a combination of play and education, is provided in a variety of both in- and outpatient settings at UCLA's hospitals in Westwood and Santa Monica, Wray alone works exclusively with children in the OR or who

are receiving anesthesia for a nonsurgical procedure, managing an average of 200 cases each month.

"Supporting them through this experience, which can be particularly confusing and frightening for a child, is so important," Wray says. "I'm meeting the kids and families before their surgeries, helping them to understand what's going to happen and then going through the experience with them to support both the child and the family."

While many people might associate "child life" with fun and games — staffing the hospital playroom and joyfully delivering toys to bed-bound patients — the challenges of the job can sometimes deliver a strong emotional punch. "We hear a lot, 'You're so lucky, you have such a fun job,'" Wray says. "Yes, it can be fun



A DAY IN THE LIFE

PHOTO ESSAY BY NICK CARRANZA

working with children and families, but the members of our child life team also are supporting them through times that can be extremely painful and challenging and that sometimes ultimately end in loss and bereavement.”

Her days begin on the surgical floor of Ronald Reagan UCLA Medical Center with a review of the pediatric surgical calendar — on some days there can be upwards of a dozen cases that are scheduled to start at 7:30 am. “I never know until I meet the patients and their families exactly what their needs will be,” Wray says. “A big part of my job is assessing each patient and family to see what their potential stressors are going to be throughout the day and prioritizing my time to be able to provide support in those moments. Every situation is different.”

It also is important in these first moments to help parents feel some sense of control by providing them with essential information about what is going to happen over the next several hours with their child. “I’m preparing the child, but also preparing the parents,” Wray says.

Wray stays with the child as he or she is prepped for surgery and, in many cases, accompanies them into the operating room to provide further comfort and support while



they undergo anesthesia. Often she will be the first face the child sees when he or she awakens after surgery.

The photographs on these pages follow Wray through a typical day.



BEING HOSPITALIZED AND UNDERGOING SURGERY ARE STRESSFUL FOR ANYONE, and that is especially true for a young child. But child life specialists are trained in a technique called stress potential assessment to help them prioritize even before meeting a patient how to best give the necessary emotional and physical support to them and their family.

For 2-year-old Genesis (above), providing that support and building trust mean getting down on the floor at her level (above) and offering her a choice of what gown she wants to wear while in the hospital. It is all about giving the patient — even a very young child — a sense of control over something in a situation that is, in almost all other ways, beyond their control, Wray explains.

It also helps that Wray can speak Spanish — “I’m not perfect, but it’s ok,” she says — and provides an additional measure of comfort to both the child and her parents.

While Genesis is shy and timid at first, she quickly warms to Wray, who promises the little girl that she can watch an episode of her favorite show, *Peppa Pig*, before she goes to sleep in the OR.

LIKE SO MANY PEDIATRIC PATIENTS, 6-YEAR-OLD KAYLA (TOP RIGHT) ARRIVED IN THE OR FRIGHTENED AND IN TEARS. Lack of control, again, often is the root cause of such fears. “Illness and surgery can’t be controlled by the patient, but focusing on what we can do to alleviate the fear and to control the things we can control helps,” Wray says.

One way to do that is to help her young patients to understand what is going to happen as they are prepared for surgery. That may involve something as simple as explaining the mask that will be placed over their face as they are put to sleep before the operation. To help Kayla get comfortable with the mask (top right), Wray gives her a sheet of stickers with which to decorate it. Once a mask is decorated, the children get to choose a scented oil to give it a pleasant odor. Kayla chose strawberry.

Bubbles are another useful tool to both distract and delight a child (right), but sometimes it is hard to tell who is having a better time.





WRAY IS A MASTER AT FINDING INNOVATIVE WAYS TO CONNECT WITH HER PATIENTS.

When one patient became upset about having to be inked with a surgical marker to indicate the surgical site, Wray began engaging the child in a calm, soothing voice, asking, “Do you like to color? Do you like crayons or markers? Do you like superheroes?”

As the child calmed, Wray handed over a marker and extended her hand, on which the patient drew a happy face. What began as a moment of distress turned into interactive play, as the patient next drew a happy face on the hand of his father. Soon, the child, without tears, allowed the medical staff to make their necessary marks in preparation for surgery. Later in the day, as she does paperwork (bottom left), the happy face serves as a reminder of a job well done.

Back with Genesis (below), Wray feels that the child will be most comfortable if she is carried to the OR. It is a good time to bring out the Minnie Mouse rattle, as the little girl prepares to say goodbye to her parents before being taken inside for her surgery.





ARRIVING AT THE OR SLIGHTLY AHEAD OF SCHEDULE — set-up is not yet complete — Wray slips on her mask to distract Genesis for a few moments until they can enter (above). For Kayla, an impromptu game of Baby Shark (right) helps to lower the child's pre-surgery anxiety. "Whatever it takes to make patients comfortable, nothing is out of the question," Wray says.



INSIDE THE OR, WRAY IS A WELCOME TEAM MEMBER, as she assists the nurses and surgeons to calm and comfort the child before surgery. Sometimes that means something as simple as holding the child's hand or playing a song the child enjoys or even arranging for the child's parent to be there until he or she goes to sleep. For Kayla, Wray brings out a favorite stuffed toy (below left) for moral support, as the anesthesiologist prepares to put her to sleep — using the strawberry-scented mask that she decorated — for her

operation. Kayla's stuffed rabbit will reappear at her side when she wakes up in post-op.

With a break between cases, Wray takes an opportunity to review her patients' charts (below right). Continuity of care is an essential principal of the Chase Child Life Program, and charting ensures that Wray and other team members have the most up-to-date information about each patient as they move along their medical journey.



AS THE DAY WINDS DOWN, WRAY RECEIVES A CALL (RIGHT) FROM THE NURSES' STATION ON THE FIFTH FLOOR.

One of her patients is having a rough time and needs her. Continuity of care is a core principle of the Chase Child Life Program, and throughout the day, Wray stays in contact with her child life colleagues and nurses caring for her young charges elsewhere in the hospital.





IT OFTEN IS IN POST-OP WHERE THE RELATIONSHIP BETWEEN THE CHILD LIFE SPECIALIST AND THE PATIENT IS MOST EVIDENT — a familiar face can be a potent remedy for a distraught child as they awaken after surgery. When 2-year-old Genesis woke up in tears after her surgery, it was Wray's gentle touch and reassurance that comforted her (above).

While she can't always be bedside at the perfect moment, Wray tries to anticipate the needs of her patients before they wake up. Her careful planning and constant communication with the OR staff put her within a few short minutes of her patients at their most vulnerable moments (left). Simple gestures like gently stroking a patient's hand or making sure that a child has her favorite stuffed animal by her side as she awakens now are instinctual for her.

ARTWORK, CRAFTS AND HANDWRITTEN

NOTES (top right) from her young patients decorate Wray's small workspace tucked into a corner of the OR suite. Each reminds her of a patient or a moment during which she affected the life of a child and family.

Wray's commitment to her work and patients sometimes leaves her with little time to attend to daily necessities, like lunch (middle right). "I eat like a child," she says. "I have pouches and stuff."

Finally, after a long shift in the OR, she hurries down a corridor (below) for one more visit with a patient to ensure that all is well before heading home to rest up for the next day.

Nick Carranza is a photographer, video producer and content strategist for UCLA Health.



For information about the Chase Child Life Program, go to: uclahealth.org/mattel/chase-child-life



Journey of a Lifetime

By Elaine Schmidt



Dr. Lee Miller, associate dean for student affairs at the David Geffen School of Medicine at UCLA, in a pediatric clinic in a village in Mozambique, Africa.

Photo: Rob Stark

His journey began, as many do, with a train ride. Thirty years ago, Lee Todd Miller, MD, was a UCLA assistant professor traveling from Philadelphia to New York. After threading his way through the crowded aisles of every car, he eyed the last three vacant seats in the caboose. “I chose a fortuitous seat next to an elderly gentleman from Shanghai,” Dr. Miller recalls. “He was a pediatrician teaching students, just like me.

The ride passed quickly as the older physician recounted stories about his work in global health. When the two exchanged business cards at the end of the ride, Dr. Miller was astonished to learn that he had been chatting for two hours with Hu Ching-Li, MD, assistant director general of the World Health Organization (WHO).

That chance encounter led Dr. Miller to take a sabbatical from UCLA four years later to join the WHO, where he worked on a medical education project at the agency’s headquarters in Switzerland. Traveling frequently from Geneva to lead medical school workshops in countries like Egypt, Ethiopia, Myanmar and Zambia, Dr. Miller was working to

provide the foundation for his later career consulting in Afghanistan, Ecuador, Mozambique, Peru and South Africa.

In his 32-year career as a pediatrician and global health advocate, Dr. Miller has quietly made it his mission to address health care disparities in developing countries, while inspiring the next generation of young physicians to follow his example. Today, he is associate dean for student affairs at the David Geffen School of Medicine at UCLA.

The sabbatical he took, in 1994, coincided with the end of the civil war in Rwanda that August, when millions of ethnic Hutus fled their homeland to escape genocide by Tutsi extremists. Traveling by foot and acutely weakened by shock, fatigue, hunger and thirst, the survivors sought sanctuary in a refugee camp in Zaire, now the Democratic Republic of the Congo. When Dr. Miller arrived at the camp, he confronted unspeakable scenes of human suffering.

Because the region’s volcanic ground prevented the digging of latrines and graves, human waste and corpses slid into Lake Kivu, contaminating the refugees’ only drinking water. Dysentery and cholera swept through the camp. Cases of meningitis broke out, forcing doctors to perform spinal taps on people lying in the dirty grass. All told, starvation, dehydration and disease killed 2,000 children and adults each day in the camp.

“We would wake up early, grab coffee and a muffin and then a truck would drive us to the refugee camps,” Dr. Miller says. “Every morning, we rolled children’s bodies over to check if they were still alive. Frantic mothers surrounded us, begging for water for their own children, yet we only had enough to give to the sickest children. The experience remains indelibly and painfully imprinted upon my mind.”

As a physician there, Dr. Miller struggled to distance himself in order to help his patients. “You have to keep emotional blinders on,” he says. “You can’t process what you’re seeing at the time.”

Over the duration of his stay, the number of people dying in the camps dropped from 2,000 to 500 per day — still an unfathomable loss of life. Shaken by the horrors he had witnessed, Dr. Miller was unable to discuss his experience for several years. Upon his return to UCLA, he poured his energy into two new outlets. He co-founded the medical school’s global health program, where he still serves

as its director of overseas educational programs for senior medical students. And in partnership with UCLA Mattel Children's Hospital and the Department of Pediatrics, he launched Partners for Pediatric Progress, a non-profit project dedicated to improving children's health care. Its mission is to strengthen the ability of low-income communities to deliver health care by training local physicians to teach the next generation of health care leaders.

"Our students and residents come back changed," Dr. Miller says. He describes the story of one such trainee. Ryan Collier, MD (RES '10, FEL '12), MPH '12, was the first UCLA trainee to work in the children's hospital in Mozambique, one of the poorest countries in the world. One day, the third-year resident noticed a 2-year-old boy who had stopped breathing. He resuscitated the toddler, performed chest compressions and prepared to slide a tube into his throat to prepare him for artificial ventilation. When the battery died on the laryngoscope, he replaced it with a battery from the Walkman in his backpack.

Finally, he asked the medical team to bring a ventilator. "There are none available," he was told.

"You have to let the child go." The young student decided the best gift he could give the boy was to not let him die alone. He gently rocked him until the child died in his arms. Two years later, Dr. Collier joined the pediatrics faculty at UCLA Mattel Children's Hospital, and he accompanied Dr. Miller on another medical mission in Peru. Today, he is division chief for pediatric hospital medicine at the University of Wisconsin School of Medicine and Public Health-Madison.

"Global health work offers us a priceless perspective," Dr. Miller says. "It reminds us how fortunate we are to live in a resource-rich country, and what an incredible privilege it is to be a physician."

He offers a final word of encouragement: "Keep reaching out until you find your own fortuitous seat on the train."

Elaine Schmidt is a senior public information officer for UCLA Health.



For information about Partners for Pediatric Progress, go to: p3project.org



Top: Dr. Lee Miller is surrounded by children while working at a clinic in Mozambique. **Bottom:** Dr. Miller (center right) and Dr. Ryan Collier (center left) in Iquitos, Peru, conferring with their colleagues.

Photos: (Mozambique) Courtesy of Dr. Lee Miller; (Iquitos) Rob Stark

Awards & Honors

Dr. Reza Ardehali, assistant professor of medicine in the division of cardiology, was elected to the American Society for Clinical Investigation.

Dr. Keriann Backus, assistant professor of biological chemistry, was named 2019 Beckman Young Investigator by the Arnold and Mabel Beckman Foundation.

Dr. Elizabeth Barnert (FEL '14), assistant professor of pediatrics, received an Outstanding New Member Science Award from the Society for Pediatric Research.

Dr. J. Paul Finn, professor of radiological sciences and medicine, was inducted into the College of Fellows of the American Institute for Medical and Biological Engineering.

Dr. Jonathan Flint, professor-in-residence of psychiatry and biobehavioral sciences and a senior scientist at the Center for Neurobehavioral Genetics at the Jane and Terry Semel Institute for Neuroscience and Human Behavior at UCLA, was named a fellow of the Royal Society, the national science academy of the United Kingdom.

Dr. Gregg Fonarow (MD '87, RES '90, FEL '93), Eliot Corday Chair in Cardiovascular Medicine and Science and director of

the Ahmanson-UCLA Cardiomyopathy Center, received the 2019 Lifetime Achievement Award from the American Heart Association's Council on Quality of Care and Outcomes Research.

Dr. Beth Karlan, professor of obstetrics and gynecology and director of cancer populations at UCLA's Jonsson Comprehensive Cancer Center, was inducted into the 2019 class of Giants of Cancer Care in gynecologic malignancies by OncLive.

Dr. Deborah Krakow (FEL '89), chair of obstetrics/gynecology and a professor of human genetics and orthopaedic surgery, was inducted into the Association of American Physicians.

Dr. Siavash Kurdistani, professor of biological chemistry, was elected to the American Society for Clinical Investigation.

Dr. Keith Nuechterlein, Distinguished Professor of Psychiatry and Biobehavioral Sciences and director of the Aftercare Program in the Jane and Terry Semel Institute for Neuroscience and Human Behavior at UCLA, received the 2019 Outstanding Clinical/Community Research Award from the Schizophrenia International Research Society.

Dr. Antoni Ribas (FEL '98, '01), professor of medicine and director of the tumor immunology program at the UCLA Jonsson Comprehensive Cancer Center and the Parker Institute for Cancer Immunotherapy Center at UCLA, received the Thought Leader Award from Agilent Technologies.

Dr. Maureen Su, professor of microbiology, immunology and medical genetics, was elected to the American Society for Clinical Investigation.

In Memoriam

Dr. Patricia Bath, the first female faculty member in ophthalmology at the David Geffen School of Medicine at UCLA, died May 30, 2019. She was 76 years old. Dr. Bath held a faculty appointment in the UCLA ophthalmology department from 1974 to 1987. During Dr. Bath's time at UCLA, she also was a full-time employee of Los Angeles County and a faculty member at what is now Charles R. Drew University of Medicine and Science. She also co-founded the non-profit American Institute for the Prevention of Blindness.

Dr. Glenn Langer, a prolific cardiovascular researcher and longtime faculty member and administrator at the David Geffen School of Medicine at UCLA who in his retirement established a college-readiness program for underprivileged youth, died June 19, 2019. He was 91 years old. Dr. Langer came to UCLA in 1960 to join the recently established American Heart Association Cardiovascular Research Laboratories. He was the inaugural holder of the Castera Endowed Chair in Cardiology, director of the cardiovascular research laboratories, vice chair of the department of physiology and associate dean for research.

Dr. William H. Swanson, medical director of Harbor-UCLA Medical Center for 33 years and former associate dean of the UCLA School of Medicine, died July 13, 2019. He was 85 years old. Dr. Swanson completed his residency in internal medicine at UCLA, after graduating from the University of Washington School of Medicine. He was known as a humanitarian and philanthropist, who championed equal rights and freedom of speech, and he was an advocate for environmental causes.

Sold-out Wonder of Women Summit Celebrates Whole Health



Left: (From left): Laurie Gordon, chair of the Resnick Neuropsychiatric Hospital Board of Advisors; Dr. Nancy Glaser, founding chair of the Resnick Neuropsychiatric Hospital Board of Advisors; Lisa Kudrow and Vicky Goodman, founder and president, The Friends of the Semel Institute and Resnick Hospital board member. **Right:** (From left) Dr. Kelsey C. Martin, dean of the David Geffen School of Medicine at UCLA; Terry Hyman Hamermesh; Gordon; Cece Feiler; Dr. Glaser; and Dr. Thomas Strouse, medical director of the Stewart and Lynda Resnick Neuropsychiatric Hospital at UCLA and Maddie Katz Endowed Chair in Palliative Care Research and Education.

Photos: Thomas Neerken

#WOW the Wonder of Women Summit at the UCLA Meyer and Renee Luskin Conference Center on April 11, 2019, brought together thought leaders in science, health, culture and sports for a second consecutive year to create a day of learning and connection to benefit mental health education, research, innovation scholarships and clinical care programs at UCLA. Hosted by UCLA's *the Friends of the Semel Institute* and the Stewart and Lynda Resnick Neuropsychiatric Hospital at UCLA Board of Advisors, the event was emceed by actress, writer and producer Lisa Kudrow, a Resnick Neuropsychiatric Hospital board member. *The day* opened with remarks from Johnese Spisso, president of UCLA Health, CEO of the UCLA Hospital System and associate vice chancellor of UCLA Health Sciences, as well as #wow founding co-chairs Cece Feiler and Terry Hyman Hamermesh. A performance by UCLA alumna, singer-songwriter and actress Sara Bareilles followed, bringing the crowd to its feet.

The key message that whole health includes mental health resonated throughout the day, which began with a morning mindfulness session led by Diana Winston, director of mindfulness

education at the UCLA Jane and Terry Semel Institute for Neuroscience and Human Behavior Mindful Awareness Research Center. Julianne Hough, well-known for her role as a judge on ABC's *Dancing with the Stars*, and Dr. Wendy Suzuki, professor of neural science and psychology at New York University, got everyone moving with a dance break and spoke about Dr. Suzuki's research that illuminates the impact of dance and movement on the brain and mental health.

Speakers shared heartfelt stories and personal insights about providing service to others, overcoming challenges and achieving life goals. Attendees heard actionable, evidence-based ideas about how to improve health and well-being in their own lives and those of their loved ones. Panels included a discussion moderated by anchor and reporter Lisa Sigell about dating in the digital age, featuring author and journalist Laurie Burrows Grad; TV host Poppy Jamie, who founded the mental health well-being app Happy Not Perfect; and Dr. Gail Wyatt (PhD '73), director of the UCLA Sexual Health Program and the Center for Culture, Trauma, and Mental Health Disparities.

Dana Katz, UCLA Health Operation Mend's volunteer director of community engagement and buddy programs and Resnick Hospital board member, moderated a panel about personal experiences with Operation Mend and its innovative programs to treat post-traumatic stress and mild traumatic brain injury, featuring Dr. Jo Sornborger, director of psychological health programs for UCLA Operation Mend; and program participants Judy Cusack, a retired educator and mother of two U.S. Army veterans, and retired U.S. Army Major Yolanda Poullard, who commanded soldiers in Iraq and Afghanistan.

To spotlight the most recent science on the mind-gut connection and how to optimize nutrition to support brain health, Lori Corbin, nutrition and fitness reporter for *ABC7 Eyewitness News*, spoke with Dr. Zhaoping Li (FEL '94), Lynda and Stewart Resnick Endowed Chair in Human Nutrition and director of the UCLA Center for Human Nutrition. Dr. Nina Shapiro, UCLA professor of head and neck surgery and director of pediatric ear, nose and throat at UCLA Mattel Children's Hospital, dispelled medical myths to help attendees make informed choices. Dr. Robin Berman, UCLA associate professor of psychiatry and biobehavioral sciences and board of advisors member of the Resnick Neuropsychiatric Hospital, focused on motherhood in her discussion with Dr. Catherine Birndorf, co-founder and medical director of *the* Motherhood Center of New York.

In the afternoon, UCLA women's gymnastics senior student-athlete Katelyn Ohashi, who has earned 11 perfect-10 scores, including six this year, was joined by former UCLA gymnastics coach Valorie Kondos Field. Both women shared stories of friendship and resilience.

A highlight of the summit was the announcement of a new partnership to form the Women's Alzheimer's Movement Research Initiative at UCLA. The announcement was made by Dr. Kelsey C. Martin, dean of the David Geffen School of Medicine at UCLA and Gerald S. Levey, M.D., Endowed Chair; and Maria Shriver, journalist, author, *NBC News* special anchor and founder of *the* Women's Alzheimer's Movement. "This is groundbreaking, because if we understand the causes of Alzheimer's disease in women, then we'll be able to develop targeted and effective treatments," Dr. Martin said.

The day concluded with a panel moderated by Michele Ruiz, CEO of Ruiz Strategies, featuring two trailblazers in discovery science. Dr. Ming Guo (RES '01, FEL '02), P. Gene & Elaine Smith Chair in Alzheimer's Disease Research and UCLA professor of neurology and pharmacology, spoke about her discoveries in neurodegenerative disease and the possibilities of reversing aging at the cellular level. Dr. Linda M. Liao (RES '97, FEL '98, PhD '99), chair of the UCLA Department of Neurosurgery and the W. Eugene Stern Chair in Neurosurgery, described her focus on neuro-immunology and her pioneering work to prevent the recurrence of brain cancer.

 For more information, contact Karen Colimore at: 310-267-0496



Row 1: (From left) Dating in the Digital Age panel Laurie Burrows Grad, Dr. Gail Wyatt, Resnick Neuropsychiatric Hospital Board of Advisors member Poppy Jamie and Lisa Sigell. **Row 2 Left:** Katelyn Ohashi. **Row 2 Right:** Maria Shriver (left) and Dr. Kelsey C. Martin. **Row 3:** Dr. Wendy A. Suzuki (left) and Julianne Hough. **Row 4 Left:** Singer-songwriter Sara Bareilles performing at the event. **Row 4 Right:** (From left) Event co-chairs and Resnick Neuropsychiatric Hospital Board of Advisors members Terry Hyman Hamermesh and Cece Feiler, and Johnese Spisso, president of UCLA Health, CEO of the UCLA Hospital System and associate vice chancellor of UCLA Health Sciences.

UCLA Receives \$10 million from The Eli and Edythe Broad Foundation to Support Stem Cell Research



Eli and Edythe Broad.

Photo: Sam Comen

Expanding its long-standing commitment to UCLA and stem cell research, **The Eli and Edythe Broad Foundation** has made a \$10 million gift to UCLA that will fund education, faculty recruitment and retention and innovative research at the UCLA Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research.

Since its inception, the UCLA Broad Stem Cell Research Center has achieved successes in stem cell gene therapy, stem cell immunotherapy, cell replacement strategies and drug discovery. The new funding from the Broad Foundation will enable UCLA

scientists to build upon these achievements and advance promising therapies to clinical trials.

Beginning in 2005, the Broad Foundation invested more than \$80 million to create and sustain three namesake stem cell centers in California, of which UCLA is one. The Broad Foundation's recent gift of \$30 million provides \$10 million in funding for UCLA and each of the two other centers, bringing the foundation's total support of stem cell research centers in the state to \$110 million.

"We are proud to support California's growing stem cell research and treatment infrastructure led by the talented scientists and staff at the Broad Stem Cell Centers at UCLA, UC San Francisco and the University of Southern California," said Broad Foundation president Gerun Riley. "With their commitment to identifying potential treatments for cancers, heritable disorders and more, we believe the centers will continue to make life-changing medical breakthroughs that will impact the lives of people around the world."

Scientists at the three stem cell centers already have launched clinical trials for treatments of cancer, blinding eye diseases, spinal cord injuries, HIV and sickle cell disease and other life-threatening blood disorders.

"The Broad Foundation's transformative early investment enabled our three centers to attract the best and brightest investigators from around the world," said Dr. Owen Witte, founding director of the UCLA Broad Stem Cell Research Center and university professor of microbiology, immunology and molecular genetics at UCLA. "These pioneering researchers have embraced the Broads' mission of improving human health by building a truly collaborative scientific community in California."



For more information, contact Sara Kalish at: 310-983-3063

Taste for a Cure Raises Money for Cancer Research

Celebrating its 24th year, the **UCLA Jonsson Cancer Center Foundation (JCCF)** signature event, Taste for a Cure, was held on Friday, April 26, 2019, at the Beverly Wilshire Hotel to raise vital funds for leading-edge research at the UCLA Jonsson Comprehensive Cancer Center (JCCC). During this special evening, the 2019 Gil Nickel Humanitarian Award was presented to Sandra Stern, president of Lionsgate Television Group.

Stern has been a key member of Lionsgate’s senior management team for the past 16 years and helped guide the company’s business to record-breaking revenue growth. A graduate of the UCLA School of Law, Stern is a founding member of the school’s Leadership, Empowerment, Advancement and Distinction Program and serves on the board of the school’s Ziffren Center for Media, Entertainment, Technology and Sports Law, where she also teaches. In 2015, she received the UCLA Law Alumni of the Year Award.

“We are so pleased to honor Sandra Stern, who is respected and beloved for her commitment to fostering the next generation, a priority at the JCCC as well,” said Randy Katz, JCCF chairman. “As part of an educational institution, the JCCC is dedicated to training and empowering future cancer research leaders — all toward helping patients live healthier, happier lives.”

The evening was hosted by Soledad O’Brien, award-winning journalist, speaker, author and philanthropist who anchors and produces *Matter of Fact with Soledad O’Brien*. Stern’s award was presented by Brian Tannenbaum, who spearheads alternative programming for Jeffrey Katzenberg’s Quibi content team and was mentored by Stern while at Lionsgate. The evening also featured a special acoustic performance by Ryan Tedder from One Republic and star of NBC’s *Songland*.

Valorie Kondos Field, a cancer survivor and former UCLA gymnastics coach who led UCLA to seven NCAA Women’s National Gymnastics championships, a PAC-12 Coach of the Century awardee and UCLA JCCF board member, spoke to the audience on mentoring, saying that mentoring was instilled in her by the legendary UCLA basketball coach John Wooden. “From Coach Wooden, I learned most of all to believe in ourselves,” she said. “Spending hours with Coach Wooden is what helped me realize my own inner champion. That is why I wanted to become a part of the UCLA Jonsson Cancer Center Foundation — they help build champions. Champion scientists, champion thinkers, champion caregivers. With 1.6 million people diagnosed with cancer each year, there remains important work still to do.”

The event theme, A Culinary Journey through Asia, was curated by executive chef Helene An of House of An and Crustacean Beverly

Hills. Featuring tastings from wineries and distillers, as well as a sumptuous array of dishes from some of Los Angeles’s top Asian and Asian-influenced chefs and restaurants, the event highlighted culinary offerings from Crustacean, Hinoki and the Bird, Blackship, Dan Modern Chinese and the Beverly Wilshire Hotel.

Event co-chairs included Dana Walden, chairman of Disney Television Studios and ABC Entertainment; Gary Newman, chairman and CEO of 20th Century Fox Television; Joe Cohen, co-head of Television at Creative Artists Agency; Jon Holman, president of The Holman Group; Larry Maguire, president emeritus and founding partner of Far Niente Winery; and Paul Telegdy, co-chairman of NBC Entertainment. *Variety* served as media partner, and Delta Air Lines and the Four Seasons Hotel contributed generously to the live auction.

 For more information, contact Jacqueline Farina at: 310-794-7643



Top: (From left) Jon Holman, Joe Cohen, Elizabeth An, Gary Newman, Dana Walden and Paul Telegdy. **Middle Left:** Bobby Field (left) and Valorie Kondos Field. **Middle Right:** Sandra Stern. **Bottom Left:** Ryan Tedder. **Bottom Right:** Dr. Michael Teitell (PhD '91, MD '93), director of the JCCC, president of the JCCF and Lya and Harrison Latta Endowed Chair in Pathology in the David Geffen School of Medicine at UCLA.

Photos: Getty Images

Cyclists Help Tour de Pier Surpass Fundraising Target

Approximately 2,000 stationary cyclists braved the rain to participate in the **7th Annual Skechers Tour de Pier** on May 19, 2019. Held on the Strand, overlooking the Manhattan Beach Pier, participants rode for one-to-five hours and helped raise more than \$1.5 million for cancer research and services, once again exceeding previous records. Proceeds from the event benefit three cancer charities, whose missions are to accelerate novel research and provide support services for cancer patients and their families, two of which provide significant support for cancer studies at UCLA — the Hirshberg Foundation for Pancreatic Cancer Research and the Uncle Kory Foundation for brain cancer investigations.

“It’s like a dream come true,” said Lisa Manheim, Tour de Pier co-founder and executive director of the Hirshberg Foundation for Pancreatic Cancer Research. “Each year, the Tour de Pier becomes better and more exciting, and we’re amazed at the overwhelming support from riders, celebrities, businesses and the community. Thanks to their support, we reached our \$1.5 million goal that will advance innovative research and provide resources for cancer patients and their families.”

Lively music and fitness instructors helped motivate cyclists who rode as individuals or as part of a team. The event, sponsored in part by UCLA Health, also featured a free Health & Fitness Expo, a Cardio Kids Zone and interactive health and fitness booths.

UCLA radiology staff members rode in shifts as part of the UCLA Radiology Gold team. They were joined by Ric McGill, director of UCLA Radiology for the UCLA Health partnership with the Los Angeles Lakers; Dr. Timothy Cloughesy (RES ’91, FEL ’92), director of the UCLA Neuro-Oncology Program; Dr. David Nathanson (PhD ’11, FEL ’13), assistant professor of molecular and medical pharmacology; Dr. Robert Prins (FEL ’02), associate professor in the UCLA Department of Neurosurgery; and Dr. Benjamin Ellingson, associate professor of radiology, biomedical physics, psychiatry and bioengineering in the UCLA departments of radiology and psychiatry and biobehavioral sciences.

This year, Tour de Pier expanded its reach with its inaugural event in Seattle, Washington.



For more information, contact Liz Naito at:
310-206-6749



Row 1: (From left) Julie Weiss; Agi Hirshberg, founder of the Hirshberg Foundation; and Elissa Oblath. **Row 2:** (From left) UCLA alumna, event co-founder and executive director of the Hirshberg Foundation Lisa Manheim; entertainer George Lopez; and Heath Gregory, event co-founder and co-founder of the Uncle Kory Foundation. **Row 3:** (From left) Two-time Olympic gold medalist and two-time FIFA Women’s World Cup champion Mia Hamm; Olympic gold medalist Madison Kocian; and Manheim. **Row 4:** (From left) Stage riders for the fifth and final hour of the event Dylan Knowles, Jackie Leanza Kessel, fitness instructor PK Kessel, Ricky Bush and actress Liza Koshy.

Photos: Steve Gaffney and Angela Daves-Haley

UCLA Jonsson Comprehensive Cancer Center Names New Research Suite

On April 25, 2019, the **UCLA Jonsson Comprehensive Cancer Center (JCCC)** celebrated the naming of the Ali Jassim Family Cancer Research Suite in the South Tower of the UCLA Center for Health Sciences. Joined by family, friends and UCLA Health Sciences leadership, donor Ali Jassim, a member of the UCLA Jonsson Cancer Center Foundation Board of Directors, cut the ribbon to the laboratory suite that will provide a collaborative home to some of the JCCC's most innovative researchers, whose studies have resulted in a remarkable 11 U.S. Food and Drug Administration approvals for new cancer therapies. A scientific forum immediately followed the dedication ceremony, during which faculty recipients of seed grants funded by Jassim spoke about their research efforts and the significance of philanthropy in advancing scientific discoveries.



Left: (From left) Dr. Kelsey C. Martin, dean of the David Geffen School of Medicine at UCLA and Gerald S. Levey, M.D., Endowed Chair; Dr. John C. Mazziotta (RES '81, FEL '83), vice chancellor of UCLA Health Sciences and CEO of UCLA Health; Ali Jassim; Dr. Judith C. Gasson, senior advisor for research and innovation at the David Geffen School of Medicine at UCLA; and Dr. Michael Teitell (PhD '91, MD '93), director of the JCCC, president of the UCLA Jonsson Cancer Center Foundation and Lya and Harrison Latta Endowed Chair in Pathology. **Right:** Jassim (left) and UCLA Jonsson Cancer Center Foundation Board of Directors member Manizheh Yomtoubian.

Photos: Jessie Cowan

 **For more information, contact Margaret Steele at:** 310-794-5244

Semel Institute Introduces 2018-19 Max Gray Fellows



Top: (From left) Max Gray Fellows Drs. Artha Gillis, Hamid Naficy and Cassidy Zanko, and Laurie and Steven Gordon. **Bottom Left:** Arline Gluck (left) and Henry Gluck, chairman of the UCLA Health System Board. **Bottom Right:** Mental health advocates Gail Kamer Lieberfarb (left) and the Honorable Nancy Rubin.

Photos: Don Liebig/UCLA Photography

Laurie Gordon and the Jane and Terry Semel Institute for Neuroscience and Human Behavior at UCLA hosted the fourth annual **Max Gray Fellows in Mood Disorders Salon** on April 16, 2019, at the Dr. S. Jerome and Judith Tamkin Auditorium in Ronald Reagan UCLA Medical Center. Gordon

established the Max Gray Fund for Treatment of Mood Disorders in 2014 in memory of her son Max.

To date, the fund has raised more than \$1 million, allowing the Semel Institute to offer 13 postdoctoral Max Gray Fellowships. Currently, this has been the most successful fundraising year for the fund, enabling the Semel Institute to recruit four fellows in the 2019-20 academic year. The Max Gray Fellows train in the mood disorders clinics, working with children, adolescents and adults, and the fellowship program has increased the clinics' capacity to diagnose and treat more patients and families. In addition, the Child and Adolescent Mood Disorders Clinic is now able to remain open three days per week with a shorter patient waiting list.

Drs. Michael Gitlin (RES '79), director of the UCLA Division of Adult Psychiatry and the Mood Disorders Clinic, and David Miklowitz (PhD '85), director of the UCLA Child and Adolescent Mood Disorders Program, introduced the 2018-19 Max Gray Fellows, Drs. Artha Gillis and Cassidy Zanko of the Child and Adolescent Mood Disorders Clinic and Hamid Naficy of the Mood Disorders Clinic in the Division of Adult Psychiatry. The supervising faculty moderated a discussion in which fellows shared their experiences, growth milestones and goals for the coming year. They also discussed the progress in mood disorders fellowship training, made possible through the Max Gray Fund.

 **For more information, contact Dorin Esfahani at:** 310-267-1838

UCLA Women's Cardiovascular Center Hosts a Community Update on Women's Heart Health



(From left): Drs. Stephen Smale and Tamara Horwich, Shawn Casey-White, Louise Weiss-Reitz and Christine Cunningham.

Photos: Jessie Cowan

On April 2, 2019, the UCLA Women's Cardiovascular Center co-hosted **"Women's Heart Health: What We Know & What We're Doing About It,"** with the American Heart Association (AHA) at the California NanoSystems Institute at UCLA. Guests enjoyed refreshments while learning about 11 different research

projects being funded by UCLA and the AHA. Dr. Stephen Smale, vice dean of medical research for the David Geffen School of Medicine at UCLA, welcomed guests and shared the latest cardiovascular research across UCLA.

Shawn Casey-White, affiliate development officer for the Western State Affiliate AHA, spoke about the long-standing

partnership between the AHA and UCLA and the Go Red for Women campaign, which focuses on women-specific guidelines for the prevention and treatment of heart disease. Dr. Tamara B. Horwich (RES '02, FEL '06), co-director of the UCLA Women's Cardiovascular Center, discussed the big picture of women's heart health. She highlighted the growing need to increase awareness and invest in further research, since heart disease is the leading cause of death in women. Dr. Horwich was joined by Louise Weiss-Reitz, who shared her own experience of surviving a heart attack and recovering with the help of UCLA faculty. In a more scientific look at what is being done to advance women's heart health, Christine Cunningham, PhD candidate, wrapped up the program with an in-depth look at her research into the sex differences in cardiovascular disease. After a brief Q & A, guests walked away with a better understanding of the seriousness of women's cardiovascular disease and what UCLA and the AHA are doing together to fight it.



UCLA fellow Dr. Jijun Huang, one of 11 poster presenters, explains his research to a guest.



For more information, contact Laurel Zeno at: 310-825-1980



(From left) Drs. Bradley R. Straatsma, Bartly J. Mondino, Marvin Smotrich, Jule Lamm and Ava K. Bittner.

Photo: Reed Hutchinson

Vision Specialists Establish Smotrich Family Optometric Clinician-Scientist Chair

On May 15, 2019, Dr. Bartly J. Mondino, director of the UCLA Stein Eye Institute, chairman of the Department of Ophthalmology, a liaison chairman of the Doheny Eye Institute and Bradley R. Straatsma, M.D. Endowed Chair in Ophthalmology, hosted an event at Stein Eye to celebrate the establishment of the **Smotrich Family Optometric Clinician-Scientist Chair** and the appointment of Dr. Ava K. Bittner as the inaugural

chair holder. A committee of dedicated optometrists and ophthalmologists helped raise funds for the chair, named in honor of Dr. Marvin Smotrich, a UCLA alumnus and an accomplished optometrist who served on the original chair campaign committee and played an integral role in bringing the chair to fruition.

The Smotrich Chair is dedicated exclusively to an optometrist and will help bridge the gap between optometrists and ophthalmologists and therefore be unique in academic ophthalmology. Funding from the chair will help further the development of broad-based research among the two professions and encourage the continuation of many of the advances in bilateral professional cooperation in research, education and public service.

Dr. Bittner, associate professor at UCLA Stein Eye and director of the optometric service, focuses her primary clinical interest on low vision rehabilitation and is experienced with conducting clinical trials to evaluate interventions to help improve visual function in patients with low vision.

UCLA faculty members, family and friends in attendance included Dr. Bittner's husband Andrew Jacobson and their daughter Annora, as well as optometrists from the UCLA Vision Rehabilitation Center and members of the chair campaign committee.



For more information, contact Gail Summers at: 310-206-9701

UCLA Stein Eye Institute Celebrates the Bert O. Levy Chair

On June 18, 2019, UCLA faculty members, family and friends gathered at the UCLA Stein Eye Institute to celebrate Bert O. Levy and his gift to establish the **Bert O. Levy Endowed Chair in Orbital and Ophthalmic Plastic Surgery**. Dr. Robert Alan Goldberg (MD '83, RES '87, FEL '88, '89), chief of the Division of Orbital and Ophthalmic Plastic Surgery at Stein Eye, was appointed as the inaugural chair holder. Funds from the chair will help Dr. Goldberg, a full-time member of the UCLA faculty since 1989 and division chief since 1990, continue advancing research, patient care and education. Within this subspecialty, Dr. Goldberg is the primary faculty mentor for medical students, residents, physicians and clinical and international fellows. Dr. Goldberg has authored more than 250 peer-reviewed papers and 64 books and book chapters, and he is on the editorial board for prestigious journals, including the *Aesthetic Surgery Journal* and *JAMA Ophthalmology* (formerly *Archives of Ophthalmology*).

Dr. Bartly J. Mondino, director of Stein Eye, chairman of the Department of Ophthalmology, a liaison chairman of the Doheny Eye Institute and Bradley R. Straatsma, M.D. Endowed Chair in Ophthalmology, presented Dr. Goldberg and Levy with commemorative chair trophies. Levy was joined by several family



(From left) Dr. Bartly J. Mondino, Bert O. Levy and Dr. Robert Alan Goldberg.

Photo: Reed Hutchinson

members and friends. Also in attendance were Dr. Goldberg's wife Dr. Jan Takasugi and members of the UCLA Orbital and Ophthalmic Plastic Surgery Division.



For more information, contact Gail Summers at: 310-206-9701

Innovations in Nutrition and Mindfulness on the Road to Health and Wellness

A community of UCLA friends was invited to learn more about the latest innovations in research and clinical practices in digestive health at **The Road to Health and Wellness** on January 31, 2019. The event was hosted by Paramount Pictures CEO Jim Gianopulos, an ambassador of the UCLA Vatche and Tamar Manoukian Division of Digestive Diseases, and his wife Ann, both UCLA donors. The evening began with a welcome from Dr. Eric Esrailian (FEL '06), chief of the UCLA Manoukian Division of Digestive Diseases and Lincy Foundation Chair in Clinical Gastroenterology, followed by a mindfulness exercise led by UCLA nurse and integrative health practitioner Suzanne Smith. She spoke about the UCLA Integrative Digestive Health and Wellness Program, which has a multidisciplinary and patient-centered approach that focuses on all aspects of health with an emphasis on whole-person care. She also discussed the benefits of incorporating mindfulness into everyday life and methods to increase awareness within oneself through physical sensations, thought patterns and emotions that allow individuals to acknowledge physical symptoms as they arise.



Top: (From left) Dr. Eric Esrailian; health and wellness consultant Vicky Vlachonis; singer and actress Barbra Streisand; Dr. Lin Chang (MD '86, RES '89, FEL '92), vice-chief of the UCLA Manoukian Division of Digestive Diseases; and actor James Brolin. **Bottom Left:** Jim Gianopulos (left) and his wife Ann. **Bottom Right:** Television host Daisy Fuentes (left) and husband songwriter/musician Richard Marx.

Photos: Jessie Cowan

Noting that nutrition is a key component that can help treat patients with digestive diseases, Nancee Jaḡe, a dietitian and integrative health expert in the UCLA Integrative Digestive Health and Wellness Program, shared the latest research in nutrition and the importance of finding a balance between managing symptoms and eating. She also addressed symptom management in the context of health enhancement and personal empowerment, enabling patients to move beyond simply coping to live with balance.



For more information, contact Laurel Zeno at: 310-825-1980

Two Young Friends Launch Toy Drive to Benefit Mattel Patients

Jackson Verner has spent most of his young life in and out of the hospital due to a brain tumor, and for his fifth birthday, he wanted the children with whom he shared his days at **UCLA Mattel Children's Hospital** to feel a measure of the love, care and attention that he received. He partnered with an older playmate, 10-year-old Alex Orozco-Rosten, to organize a toy drive through Alex's charity organization, Tiana Tuesdays, which Alex created as a monthly tribute in memory of his older sister Tiana. Many stepped up to Jackson and Alex's call to donate, including Mattel, Inc. The boys collected two truckloads of toys and nearly \$1,000 in donations to purchase more toys for UCLA's Chase Child Life Program.



Five-year-old patient Jackson Verner (center right) and playmate 10-year-old Alex Orozco-Rosten (center left) launched a toy drive to benefit children in UCLA Mattel Children's Hospital. Additional cash donations will help UCLA's Chase Child Life Program to purchase more toys. With Jackson and Alex are child life specialists (from left) Denise Matsuyama-Lai, Anna Pabustan, Katie Kolbeck and Megan Pike; Kelli Carroll (back), director of the Chase Child Life Program; and (from right) Christynna Cyrus, Alisha Sandalow, Christine Banderas and Clarissa Byrd.

Photo: Courtesy of the Verner family.



For more information, contact Danielle Dietz at: 310-267-4098

Gifts

The UCLA Department of Neurosurgery received a \$1 million commitment from the **Henry & Jessica Chen Foundation** to support the work of Dr. Daniel C. Lu, associate professor of neurosurgery and director of the UCLA Neuromotor Recovery and Rehabilitation Center. The Chens' contribution will help advance research on spinal cord injury and paralysis-related disorders and will enable Dr. Lu to develop and test potential groundbreaking therapies in larger patient groups.

The Susan De Boismilon Revocable Trust has contributed a total of \$1.4 million to three programs at UCLA. Facilitated by Ronald Reagan UCLA Medical Center Board of Advisors member Rebecca Rothstein, the gifts will provide \$750,000 to establish the Susan De Boismilon Fund for Cleft and Craniofacial Surgery in the UCLA Division of Plastic and Reconstructive Surgery, under the direction of Dr. Reza Jarrahy (FEL '06); \$300,000 to support the growth of the UCLA Health People-Animal Connection, UCLA's animal-assisted therapy program that offers companionship and warmth to ill children and adults; and in partnership with Teen Cancer America, \$350,000 to benefit the UCLA Adolescent and Young Adult Program.

The **Diller-von Furstenberg Family Foundation** has made a contribution of \$5 million to establish two endowed chairs — one in human genetics and one in precision clinical genomics. The gift directed to human genetics will fund the educational and research activities of a distinguished faculty member, talented graduate students and postdoctoral fellows and the development of new computational methods. The contribution benefiting precision clinical genomics will support the efforts of an esteemed faculty member in spearheading advancements in UCLA's precision diagnostics service and the new clinical division of genetics and genomics within the UCLA Institute for Precision Health and the UCLA Department of Human Genetics.

Dr. Howard Murad and his wife **Loralee Knotts-Murad** have made a gift to advance the mission of the Simms/Mann-UCLA Center for Integrative Oncology. This contribution aligns with their goals to provide integrative

health and wellness services and a diverse range of psychosocial, spiritual and health programs to patients and families faced with a cancer diagnosis. Dr. Murad, an associate clinical professor of medicine/dermatology in the David Geffen School of Medicine at UCLA, has dedicated himself to years of research on all aspects of modern wellness. The gift serves as an investment in the future of integrative, whole-person oncology care that fills the gap when medicine alone is not enough.

The Brain Tumor Center at the David Geffen School of Medicine at UCLA received a \$400,000 grant from the **PHASE ONE Foundation** to support the work of Dr. Linda Liao (RES '97, FEL '98, PhD '99), chair of the UCLA Department of Neurosurgery and the W. Eugene Stern Chair in Neurosurgery, and Dr. Timothy Cloughesy (RES '91, FEL '92), director of the UCLA Neuro-Oncology Program. The funding will help change the face and fate of brain cancer by advancing dendritic cell vaccine research and clinical studies. In 2017, the UCLA Brain Tumor Center and the UCLA Jonsson Comprehensive Cancer Center were designated a Specialized Program of Research Excellence by the National Cancer Institute—one of only six brain cancer programs in the nation to receive this prestigious recognition.



Jack and Maggy Simon.

Photo: Courtesy of the Simon family.

Maggy and Jack Simon have made a testamentary gift to support the UCLA Department of Urology. The legacy gift will facilitate collaborations in training and research that lead to innovations that enhance patient care.



Dr. Daniel Wallace and his wife Janice.

Photo: Courtesy of Lupus LA.

Janice and Dr. Daniel Wallace (FEL '79) have made a gift of \$100,000 to benefit the Fern Wallace Foundation Research and Enrichment Fund that Dr. Wallace recently established in memory of his mother Fern, who was an enthusiastic supporter of UCLA as a student during World War II. She received a master's degree in the 1970s and ran the gift shop at the Hammer Museum when it first opened. Dr. Wallace is passionate about training the next generation of rheumatologists, and he and his wife established the Fern Wallace Fund to support research and educational opportunities for fellows and junior faculty in the UCLA Division of Rheumatology. For the past 37 years, Dr. Wallace has served as a volunteer faculty member at UCLA.

Wounded Warrior Project (WWP) has continued its support of UCLA Health Operation Mend with a \$2 million contribution to benefit the Operation Mend surgical program. The gift will increase opportunities for post-9/11 U.S. service members to undergo surgery that improves their lives, such as the operation for Army veteran Michael Carrasquillo, who survived several gunshot wounds and an explosion while deployed in Afghanistan more than a decade ago. "Operation Mend doctors operated on my left hand and wrist, and it was life-changing. I couldn't really use that hand before; now it is much more functional," he said.



For more information, contact Health Sciences Development at: 310-206-6484

In Memoriam



Patricia T. Thomas.

Photo: Courtesy of the Patricia T. Thomas family.

UCLA alumna **Patricia Thompson Thomas** died on May 24, 2019. She was 93 years old. Thomas met Robert Thomas, the love of her life, in 1947 at the *UCLA Bruin* newspaper, where they both were college columnists. She received a master's degree in history from UCLA, specializing in ancient Greek and Roman history, and she was a teaching assistant at UCLA for eight years.

In addition to supporting fellowships and scholarships in the David Geffen School of Medicine at UCLA, Thomas and her

late husband made contributions to UCLA Health, the UCLA Library and the Chancellor's Greatest Needs. She also served for many years on the UCLA Medical Center Board, where she often was the only female member, advocating for hospital quality assurance. Thomas was a founding member of the UCLA Alumni Association group Las Doñas, supervising the publication of walking tours of UCLA. She became an advisory trustee to the board of The UCLA Foundation, and she was elected vice president of the UCLA Alumni

Association Board and received the University Service Award from the UCLA Alumni Association in 1976. Her volunteer work extended to other organizations, including groups working on juvenile protection and health services. Thomas was an avid reader who took many UCLA extension courses and enjoyed traveling. She is survived by three daughters, Nancy, Janet and Caroline; sons-in-law Kevin Goff and James McGowan; and grandsons Matthew Goff, Ryan McGowan and Tristan McGowan.

Thanks to the Ants

By Edwin L. Cooper, PhD

I GREW UP IN HOUSTON, TEXAS, a humid, subtropical environment where the advent of spring brought myriad pleasures to excite the imagination of a curious and budding zoologist. My neighborhood came alive with returning insects — butterflies and mosquitoes filled the air, and cockroaches and spiders busied themselves with various survival strategies on the ground. April showers would replenish streams and ponds for tadpoles, and flowers burst with dusty pollen for voracious honeybees.

My menagerie nourished my curiosity and, without my knowing it, encouraged my future course as a scientist — specifically, a zoologist with a particular interest in studying the evolution of the immune system.

Later, my interest in the field of immunology began to exert itself. Clearly, studying immune response was not nearly as esoteric as decoding the evolution of the immune system; after all, what could analyses of the evolution of the immune system have to do with immunizing humans against diseases?

I did not yet have an understanding of the underlying scientific basis of animal existence, of which the immune system is, of course, an essential component. What I did see, always with awe, was the behavior of animals, their sexuality, communication, potential agricultural importance and, just maybe, the role that they play in our world today.

Much later, I came to understand essential elements that distinguish individuality of species and what undergirds the basis for immunologic responses — the capacity of all living things, both plants and animals, to recognize *self from not-self*.

This capacity is essential for the survival of all species, irrespective of their position in the living world.

All organisms, beginning with protozoans, survive due to the precise function of self/not-self recognition. I vividly remember the first time this came into sharp focus for me. I spent hours watching ants traversing well-worn trails — formicidae superhighways,



as it were — in two directions. Ants that were obviously from one colony would politely greet each other with an appropriate antennal embrace, an ant kiss, and then move on in their opposite directions along the path. On the other hand, when ants from different colonies would encounter one another along the path, they would attack and destroy each other.

Could there be a clearer demonstration that clarifies the necessity of recognizing self from not-self? Any disturbance of this refined, sensitive recognition of similarities or differences between natives and outsiders would interrupt the well-worn path; this forms the fundamental core of the essence of immune recognition and response.

It was, for me, a Eureka moment: Self/not-self is an essential feature of all living creatures, no matter the level of animal organization. It is central to their being and is that which enables them to remain undisturbed by aggression and to survive.

It is what I learned from ants. Now let us think about humans and the immune responses that take place within our bodies. Our white cells behave like ants traveling along the well-worn paths of our blood vessels; when they encounter a foreign ant from another colony, they attack and destroy it, demonstrating, again, the basic necessity of recognizing the difference between self and not-self.

It is the analogy: If foreign components — bacteria, for example — gain entrance to the blood of a human, immune cells in the bloodstream will be ant-like and recognize the bacteria as foreign.

The germs will be attacked and eliminated in a healthy human. Analogous processes also

must be occurring in non-human animals, most of which have inhabited Earth much longer than have humans.

Studies of such processes have constituted much of my career. Little did I know as an adolescent wrapped in the humid warmth of a Texas spring that I would one day cobble together this understanding that transcends all organisms. At that time, I had not yet seen a microscope. I associated my understanding with that which ensures life's preservation as the components of innate immunity.

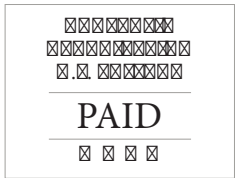
Ant behavior is ubiquitous and diverse, but it is not unique. Even one-celled animals like paramecia and amoebae are equipped to ensure their own viability by recognizing not-self as a potential threat. It is the analogy of ant behavior exists in many forms throughout the living world. We still have so much more to learn from them about the living world.

Illustration: Kim Johnson



Dr. Edwin L. Cooper has taught for 57 years at UCLA, where he is Distinguished Professor of Laboratory and Comparative Immunology. He is founding editor-in-chief of the journals *Developmental & Comparative Immunology* and *Evidence-Based Complementary and Alternative Medicine* and the author of *Advances in Comparative Immunology* (Springer, 2019, 1,092 pages).

Photo: Ann Johansson



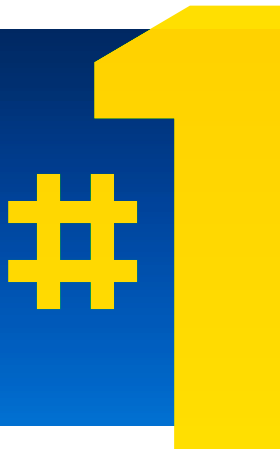
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U.S. News & World Report's Best Hospital Survey ranks UCLA #1 in California and #6 in the nation.

David Geffen School of Medicine at UCLA ranks #6 in Research and #5 in Primary Care nationwide.



UCLA Health ranked #1 in California and #6 in the Nation

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Putting U first keeps us first

At UCLA Health, we're proud to be ranked #1. According to *U.S. News & World Report's* annual best hospital rankings, UCLA Health is #1 in Los Angeles and #1 in California. We also happen to be #6 in the nation — we know this comes from putting patients first, with a culture that always strives to make healthcare the best it can be. With four hospitals and over 180 neighborhood locations, everything we do ... begins with U.

