

Blavatnik gift will fund research into the biology of survival

Medzhitov will investigate how organisms adapt to the most severe of environments

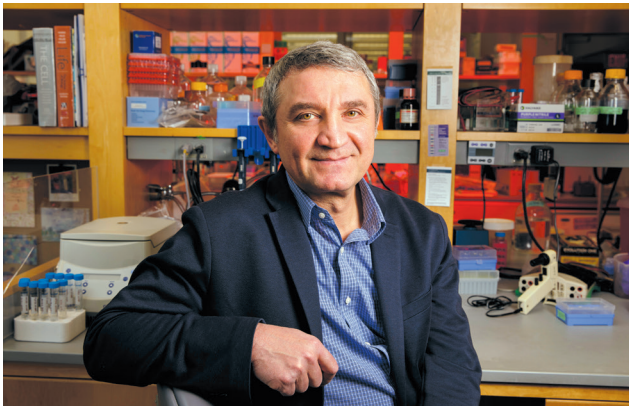
At first glance, a hibernating ground squirrel and a person with the flu appear to have little in common. But both are protected by physiological systems that have evolved to help them survive challenging conditions. Evolutionary principles tell us that all living systems—including humans, animals, and plants—allocate their precious resources to promote three major goals: growth, reproduction, and survival.

Each of these efforts, driven by fundamental biological processes, is essential for life and the preservation of species. But not all of them are well understood.

“We know a lot about growth and reproduction,” said Ruslan Medzhitov, PhD, Sterling Professor of Immunobiology and a Howard Hughes Medical Institute Investigator. “In contrast, we know little about the biology of survival.” To fill this gap, Medzhitov and his research team are working to uncover the mechanisms underlying survival strategies—also known as maintenance programs—an endeavor that will both advance fundamental biology and provide new therapeutic targets to prevent and treat disease.

Recognizing the potential to improve human health on a grand scale, the Blavatnik Family Foundation has donated \$5 million to Medzhitov’s research into the biology of survival. The contribution continues an important chapter in philanthropy for

medical research at Yale. In 2013, the Blavatnik Family Foundation, led by American industrialist and philanthropist Len Blavatnik, granted Medzhitov and Richard Flavell, PhD, Sterling Professor of Immunobiology, \$10 million to further develop a groundbreaking theory linking inflammation and chronic disease. Three years later, the foundation gave \$10 million to establish the Blavatnik Fund for Innovation at Yale, which provides support to expedite the development, application, and commercialization of life science breakthroughs taking place on campus.



Ruslan Medzhitov has received a \$5 million gift from the Blavatnik Family Foundation, in support of his research into mechanisms that organisms use to adapt and survive in extreme conditions.

Last year, the foundation expanded the fund with a \$15 million grant. “The generous, farsighted support of the Blavatnik Family Foundation equips our researchers // Gift (page 8)

A scholarship begets more scholarships

Donors want today’s and tomorrow’s students to receive what meant so much to them

Stephen C. Schimpff, MD ’67, speaks with appreciation when he talks about his years at Yale School of Medicine. “I started medical school two weeks after my wife Carol and I got married,” says Steve, a quasi-retired internist, professor of medicine and public policy, and former CEO of the University of Maryland Medical Center—and author of six books, including *Longevity Decoded: The 7 Keys to Healthy Aging*.

Now married to Carol for 55-plus years, Stephen says that med school was challenging but also that it shaped who he later became. “There is something unique about the Yale system of medical education. Instead of memorizing everything, we were taught to truly think about what we were learning, to always want to learn more.” While Steve was in school and residency training, Carol worked with the late Alvan



R. Feinstein, MD, Sterling Professor of Medicine and Epidemiology, who became a mentor to both of them. The couple draw a direct line from their experiences in New Haven to what they were able to achieve in their careers. “Yale set us up for success,” says Steve. “Now, after long careers, raising a family, and living a thrifty lifestyle, we decided to share with Yale.”

The lives of Carol and Stephen Schimpff received a boost when a scholarship let Carol go to college. They want to similarly help Yale medical students.

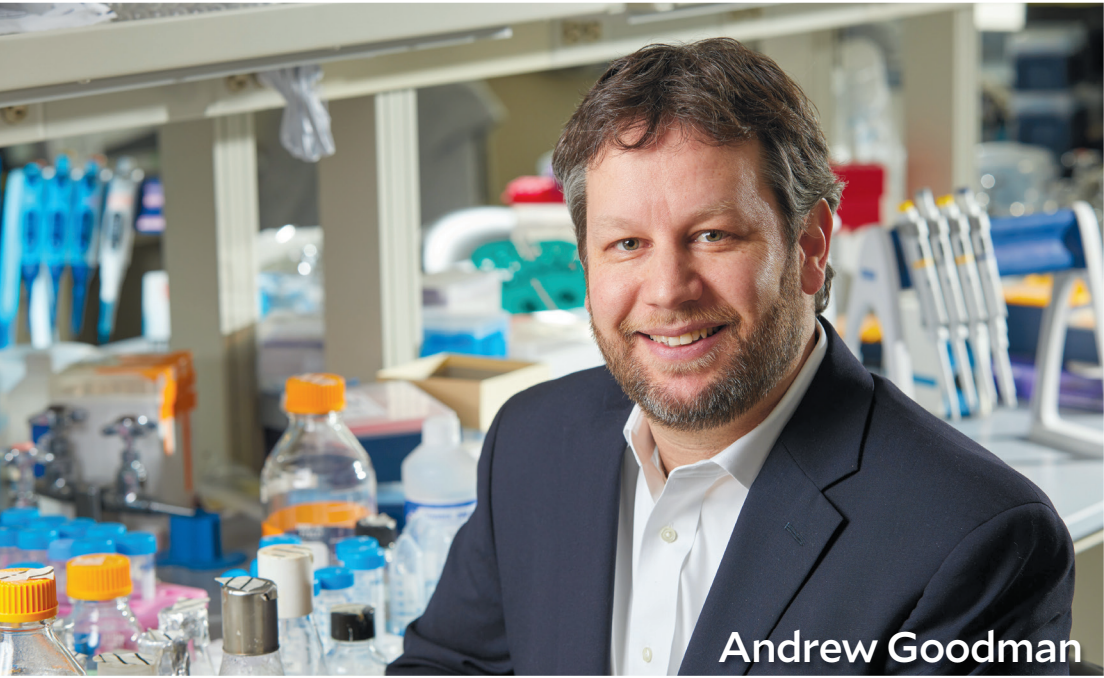
They have given back, generously, in the form of the Carol R. and Stephen C. Schimpff Scholarship Fund for medical students, which will enable more students from all socioeconomic backgrounds both to attend the // Scholarship (page 4)

New orthopaedics chair is named, will arrive in September



Lisa Lattanza, MD, has been appointed as chair of the Department of Orthopaedics & Rehabilitation at Yale School of Medicine and chief of Orthopaedics at Yale New Haven Hospital, beginning September 2019. She is currently professor of orthopaedic surgery and vice chair for orthopaedic surgery at the University of California, San Francisco (UCSF). She also serves as chief of the Division of Hand, Elbow and Upper Extremity Surgery and program director for the Hand and Upper Extremity Fellowship at UCSF.

Lattanza obtained her medical degree at the Medical College of Ohio (now the University of Toledo College of Medicine and Life Sciences). She did her internship at the Harbor-UCLA Medical // Chair (page 7)



Andrew Goodman's interest in the human microbiome has made him a premier investigator in that area. In collaboration with scientists from other disciplines, he has made discoveries that add to the understanding of organisms within our bodies, including evidence that the microbiome may affect how the body reacts to drugs.

Andrew Goodman

ROBERT A. LISAK

Revealing secrets of the microbiome

Goodman finds that gut organisms are responsible for more than digestion

In ecology, the branch of biology that investigates how organisms relate with each other and their environment, the points of interaction seem infinite. Those points riveted Andrew Goodman, PhD, C.N.H. Long Professor of Microbial Pathogenesis, as he grew up near Portland, Oregon, and continued to absorb him throughout his undergraduate studies in ecology and evolutionary biology at Princeton University.

Toward the end of his time in New Jersey, intricate ecosystems of a different sort—communities of bacteria—caught Goodman's attention. "I realized that microbial communities can be viewed as ecological systems that allow us to test our ideas in a way that is very hard to do in other environments," Goodman says.

His academic interests instantly took a sharp turn. He shifted from a broad study of ecology that included tracking tigers in their natural habitat, to a focus on molecular biology. He began studying bacterial genetics for his graduate work at Harvard Medical School. "I've been fascinated with this intersection of ecology and mechanisms—the genes, pathways, and molecules—for 20 years," Goodman says.

During his postdoctoral studies at Washington University School of Medicine in St. Louis, Goodman decided to focus on the bacterial communities that live in humans. He worked to bring techniques that were initially developed for studying disease-causing bacteria to the then-new field of the

human microbiome, and developed new approaches of his own. "The discovery that commensal bacteria are equipped with numerous specialized adaptations to live in the gut changed the way I thought about the microbiome," he says.

In 2010, when Yale offered Goodman an opportunity to join the newly formed Microbial Sciences Institute on Yale's West Campus, he did not hesitate. Goodman saw the "West Campus idea"—to bring together researchers from different departments that would normally be separated into different buildings or campuses—as especially advantageous for addressing the challenge of understanding microbial diversity. In this environment, Goodman and colleagues collaborate with ecologists, chemists, and geneticists. In Goodman's view, "What Yale has built at West Campus is truly unique in this regard. We get the chance to see more different approaches to thinking about microbes than you would at any other university in the country due to the proximity of different specialists."

When Goodman came to Yale, he says, "these ideas were mainly aspirational, but I think our research validates and extends this vision." His lab currently works to bring together ecology and microbiology to understand how gut microbial communities form and persist—despite sparse resources, attacks from the immune system, and even warfare between commensal bacteria themselves.

His lab's second research focus directly translates to human health: how microbes affect a person's response to drugs. "If we understood the link

between a person's microbiome and their drug response, we could select the dose, delivery route, or specific drug that would be most likely to succeed," Goodman says. In this area, the group has made recent progress. In research published in February in the journal *Science*, Goodman's lab showed that gut bacteria can play an enormous role in producing toxic drug metabolites, in certain cases having a larger adverse impact than the liver. These hidden activities of our gut microbes could prevent drugs from achieving their intended benefits and even can cause harm to the patient.

During his time at Yale, Goodman's bold strokes of scientific inquiry have been recognized with a Presidential Early Career Award for Scientists and Engineers, a National Institutes of Health Director's New Innovator Award, and a Howard Hughes Medical Institute Faculty Scholar Award. Goodman appreciates how important his lab team's contributions have been. "I've been very lucky to have wonderful postdocs, research scientists, and students join our research group, and I feel privileged to get to work with this team," he says.

While these are still early days for his laboratory's newest initiatives, Goodman says he hopes to contribute to answering the basic question of how microbes recognize drugs. "We don't know whether microbes have a few enzymes that target many drugs, or if it's more one-to-one," he says. But knowing those answers could lead to exciting new therapies. "I think it's safe to predict that we will be temporarily and reversibly changing people's microbiomes before we're changing their genomes."

Medical school lowers student unit loan substantially



Laura Ment

Yale School of Medicine announced in February that it is reducing the unit loan—the amount that medical students who receive need-based scholarships are expected to borrow—from \$23,000 to \$15,000 per year for all students attending in the 2019-2020 academic year and thereafter. Together with the unit loan reduction that went into effect for the just-ended academic year—from \$30,000 to \$23,000—it is a reduction of 50% in two years.

"Reducing our students' debt burden has been one of our highest priorities," said Robert J. Alpern, MD, dean and Ensign Professor of Medicine.

According to the Association of American Medical Colleges, 71% of medical students had educational debt in 2018, with a national average debt of \$197,000 per student for all medical schools. With an average debt of \$116,000 for the Class of 2018, Yale already was well below the norm. Starting with the Class of 2023, students with demonstrated need should not graduate with more than \$60,000 in debt.

"Students who would never have considered applying to Yale School of Medicine can now be assured that Yale can be affordable for those of modest means," says Laura R. Ment, MD, professor of pediatrics and neurology and associate dean for admissions and financial aid. Ment led a committee formed in 2017 that examined ways to provide financial relief to medical school students.

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New faculty leaders named at Yale Center for Clinical Investigation

With the retirement of Robert S. Sherwin, MD, C.N.H. Long Professor Emeritus of Medicine (Endocrinology) and longtime associate dean for clinical and translational research, the Yale Center for Clinical Investigation (YCCI), of which Sherwin was founding director, has announced new leadership.

Brian Smith, MD, deputy dean for scientific affairs (clinical departments), professor and chair of laboratory medicine, and professor

of biomedical engineering, is co-director for YCCI and co-principal investigator of the Yale Clinical and Translational Science Award program, along with John Krystal, MD, Robert L. McNeil Jr. Professor of Translational Research, professor and chair of psychiatry, and professor of neuroscience and psychology.

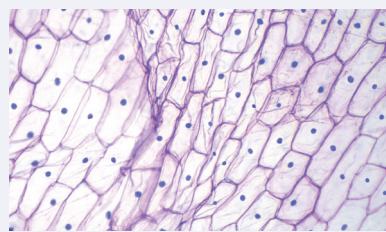
Eric J. Velazquez, MD, Robert W. Berliner Professor of Medicine (Cardiology) becomes YCCI's deputy director of clinical trials innovation.



Brian Smith (left) and John Krystal, both longtime experts in translational and clinical research, are the new co-directors of the Yale Center for Clinical Investigation (YCCI), following the retirement of YCCI's founding director Robert Sherwin.

ROBERT A. LISAK

Circadian rhythms are found in cells



Whether pathogens appear in your body at midnight or at noon could make a difference in your ability to fight them, a new study suggests. Ruslan Medzhitov, PhD, Sterling Professor of Immunobiology, and colleagues probed how macrophages—a type of white blood cell—responded to components of bacteria.

The amount of an immune signaling molecule called IL-12p40 that the macrophages produced in response varied among cells. Some of this variation, the team showed, could be attributed to the phase of the circadian clock to which the cells were tuned. Just as the human body as a whole follows a circadian rhythm when it comes to such behaviors as sleep and eating, individual cells have fluctuations over a 24-hour time course. However, not all cells may be perfectly in sync all the time.

The new findings, published on March 5 in *Science Signaling*, give scientists a new avenue to pursue in controlling immune responses. By altering levels of circadian genes, they may be able to alter immune function.

Cell activity returns in postmortem brain

Yale scientists took the brains of pigs slaughtered at a meatpacking plant and, four hours after death, perfused them with a preservative solution that included hemoglobin, nutrients, oxygen, and cytoprotective components—which restored some cellular activities. The results, published on April 17 in *Nature*, suggest that postmortem brain decline may not be as rapid and irreversible as scientists previously thought.

Researchers led by Nenad Sestan, MD, PhD, Harvey and Kate Cushing Professor of Neuroscience, and professor of comparative medicine, genetics, and psychiatry, connected each pig brain to a mechanical circulatory system called *BrainEx*, which pumped the solution through the brain. While other brains circulated with a control solution deteriorated during the six-hour perfusion, those perfused with the preservative mixture maintained intact brain structures, functioning blood vessels, and metabolic activity. Hippocampal neurons fired spontaneously and in response to stimulation. The investigators did not observe any brain-wide electrical activities associated with consciousness. Had they, the research would have been stopped.

The possibility of restoring cellular activities in a postmortem brain may lead to research that could shed new light on brain disorders, such as stroke.

Recruiting for inclusive clinical trials

Yale and the Food and Drug Administration join forces to further increase minority trial participation and produce more useful results

There is a longstanding reluctance among minority populations to participate in clinical trials designed to evaluate therapies for treating disease. From the now-infamous Tuskegee syphilis studies where infected African American men were deliberately left untreated, to the sterilization of many women in Puerto Rico without their informed consent, people of color have learned through bitter experience that their interests and those of the health care establishment may not coincide. “There was a kind of apprehension and kind of fear on the part of our community,” says Rev. Leroy Odinga Perry, DMin, pastor of St. Stephens AME Zion Church in Branford, Conn.

In and near New Haven, a wariness of working with researchers from Yale was a natural consequence, as it has long been in many minority communities located near American research universities. Yale has joined forces with the federal Food and Drug Administration (FDA) to ameliorate that, through a Memorandum of Understanding (MOU) they signed in 2018 to encourage more minority participation in clinical trials.

Among the nation’s medical schools, Yale is especially well positioned to participate, because since 2011 it has worked to engage the local community through its Cultural Ambassadors program. The Ambassadors are leaders from Connecticut’s African Methodist Episcopal (AME) Zion Church—including Perry—and from Junta for Progressive Action, which advocates for Latino/Latina people and provides social services. They have formed an alliance with Yale to convince their constituencies that the trials benefit both those who participate and the wider community. Perry calls it “a link that had been missing between the community and the scientific community.”

According to the FDA, “experience has shown that there can be important differences in how people of diverse groups respond to medical products . . . so it is important for patients in those populations who are more likely to be treated for a condition to be included in a trial.” African Americans are known to have disproportionately high rates of diabetes and heart disease, for instance, but unless they participate in trials affecting those conditions, their differing needs may be overlooked before the FDA approves new treatments. “We need to have enough diversity in clinical trials of drugs and devices to ensure therapies are effective in all populations,” says Tesheia H. Johnson, MBA, MHS, deputy director and chief operating officer of the Yale Center for Clinical Investigation (YCCI), which receives substantial support from a National Institutes of Health Clinical and Translational Science Award (CTSA).

Tuskegee and Puerto Rico—and society’s wider racism—made that logic a tough sell for Johnson when she first wanted to create the Ambassadors program, even to her own uncle. The late Rev. Timothy Howard was AME Zion’s presiding elder in the state. Johnson recalls that she told him, “‘I need a favor,’ and he said, ‘anything for you,’ and I said, ‘I need your help with clinical research.’ His response was, ‘no way!’”

But when Howard and other ministers agreed to at least hear her out, the path forward was established. “Once we realized that we could be part of something great and historic,” recalls Perry, “and that we could be a part of something that’s going to help find cures and could save so many lives, we could not say no to that.” Celina Fernández, a case manager at Junta, and also an Ambassador, says her community needed to overcome a perceived lack of basic respect. “A lot of people say, ‘my doctor mocked me because I couldn’t speak English,’ or ‘my doctor ignored my symptoms. We go into our doctor’s office and are told we don’t matter, yet all of a sudden when it comes to creating research we’re very important?’” But Fernández, too, is now firmly on board.

She and the other Cultural Ambassadors meet monthly with leaders from YCCI as well as members of the Yale faculty who design and conduct trials, and take the time at these meetings to explain them. “They give us a wonderful overview of exactly what they’re covering,” says Fernández. “‘This is who we are looking for, this is the treatment we are looking at.’” From there, an Ambassador might suggest names of suitable participants, or go back to the community and share what the Yale researcher has said. Just as important,

they will share with the investigator how certain approaches to potential participants might be ineffective or even offensive for cultural reasons.

Ambassadors, for instance, guided Monica R. Ordway, PhD, APRN, associate professor of nursing, as she designed a study to examine how sleep may be connected to stress among diverse, multi-ethnic toddlers. Ordway says common behavioral sleep interventions for young children were developed by studying mostly middle-to-high-income educated white families, “without consideration of the unique circumstances of those with lower socio-economic status, such as work schedules and shift work, cultural beliefs, crowded housing, issues around light and noise in the neighborhood, and safety.” Ambassadors, she says, provided constructive feedback to her proposal as she and they discussed the state of science regarding sleep and health in early childhood.

They also advised Ordway on how to approach families in terms that would resonate with their lives, such as speaking of sleep deprivation as affecting children’s behavior and school performance rather than more distant concerns such as health risks later in life. “When I think about the success of my program, one of the first things that I think about is that meeting where they talked to me about how I frame this with families.” In turn, when some community members resisted cooperating with her, Ambassadors became her advocates. “Because they had already met with me and vetted my study, they were able to then speak to the quality, and the safety,



(l-r) Cultural Ambassadors including Celina Fernández and Rev. Leroy Perry advise Tesheia Johnson of the Yale Center for Clinical Investigation—as well as others from Yale who shape clinical trials—on how best to design, promote, and conduct the trials so that members of minority communities will feel comfortable participating. It is increasingly evident that inclusion of underrepresented populations in trials enhances their scientific validity and makes it more likely that FDA-approved treatments will meet those populations’ unique needs.

and express to concerned community members their support of the study,” says Ordway.

Ambassadors’ valuable advice has included hiring diverse clinical trial staffs to whom participants can relate. “Hearing the information from people who look like them, people who sound like them, people who have had similar experiences, is the relief that they need,” says Fernández, “and it creates some of that open-mindedness that’s needed to make these trials really successful.”

Johnson says Yale’s relationship with its Cultural Ambassadors has been invaluable. “Last year Yale hit a record high—30% across all of our clinical research was from underrepresented populations,” she says. And through the MOU, even more is now happening. Cultural Ambassadors are receiving additional training to be certified as community health workers who can recognize early signs of illness among their neighbors and parishioners, discuss their health needs frankly, and connect them with the right resources. Yale has worked to help Duke University establish a Cultural Ambassadors program, and also is building relationships with groups in Puerto Rico and with University College London. And Perry is developing a proposal for Hood Theological Seminary in North Carolina, which trains many future AME Zion pastors, to provide health-related instruction as part of the curriculum.

It marks a major turnaround from Perry’s initial thinking, and Perry credits Johnson. “She has been phenomenal in the sense that she wants to keep this collaborative,” Perry says. “There is no, ‘you must.’ We are able to critically do our own thinking and to participate in these studies as partners. I appreciate that and I think that’s part of our success.”

OUT & ABOUT

November 30 After a **documentary film screening of *Far From the Tree***, based on the namesake book by author **Andrew Solomon** YC '85, **John Krystal**, MD, Robert L. McNeil, Jr. Professor of Translational Research, chair and professor of psychiatry, and professor of neuroscience, led a panel discussion about families' deep compassion and acceptance while raising children whom society might describe as "abnormal." From left, filmmaker and director **Rachel Dretzin**; Krystal; **James McPartland**, PhD, associate professor in the Yale Child Study Center and of psychology; Solomon; and **Christy Oleszeski**, PhD, assistant professor of psychiatry.



TONY FORINI



January 25 A **retirement party** honoring **Robert Sherwin**, MD, C.N.H. Long Professor Emeritus of Medicine (Endocrinology) and longtime associate dean for clinical and translational research, for 44 years of service to the School of Medicine, was held at the New Haven Lawn Club. During his career, Sherwin provided invaluable guidance to generations of clinician scientists and was founding director of the Yale Center for Clinical Investigation (YCCI). **1.** From left, **Sara Sapire**, Sherwin's daughter; Sherwin; his wife, **Leslie Sherwin**; his son, **Benjamin Sherwin**; and daughter **Jenny Blumberg**. **2.** From left, Sherwin; one of his mentees, **Ania Jastreboff**, MD, PhD, assistant professor of medicine (endocrinology) and of pediatrics (endocrinology); **William Tamborlane**, MD, professor of pediatrics (endocrinology); and **Paul Barash**, MD, professor emeritus of anesthesiology. **3.** Sherwin, **John Krystal**, MD, Robert L. McNeil, Jr. Professor of Translational Research, chair and professor of psychiatry, professor of neuroscience, and co-director of YCCI; and **Rajita Sinha**, PhD, Foundations Fund Professor of Psychiatry and professor in the Yale Child Study Center, and co-director of education at YCCI.



ROBERT A. LISAK (3)

December 6 The 26th annual **Hunger & Homelessness Auction** held at Harkness Hall raised money to support organizations in the New Haven area that work to help people in need. **1. William Stewart**, PhD (left), associate professor of surgery (gross anatomy), and **Jack Tang**, Class of 2022, admire a bow tie, one of the biddable prizes, which brought in \$2,078 toward fundraising; **2. John "Jack" Hughes**, MD, professor of medicine (general medicine) served as auctioneer for the evening.



HAROLD SHAPIRO (2)



HAROLD SHAPIRO (2)

March 30 In the **Fourth-Year Show**, a theatrical performance that resurrected the 70-year tradition of what had been the Second-Year Show, medical students mimicked, impersonated, and mocked other students, faculty, and administrators. **1.** From left, **Tess O'Meara** as David Stitelman, MD; **Andrea Roberts** representing Kirsten Wilkins, MD, FW '06, and **Anusha Singh** as Auguste Fortin VI, MD, MPH. **2.** The show, called "The Final Master Course," was produced by, and starred, members of the Class of 2019.



ANTHONY DECARLO

April 5 Medical faculty, students, fellows, and residents attended the annual **M.O.R.E. (Minority Organization for Retention and Expansion) Retreat**, hosted by **Darin Latimore**, MD, (far right) deputy dean and chief diversity officer and associate professor of internal medicine (general medicine), at the New Haven Lawn Club.

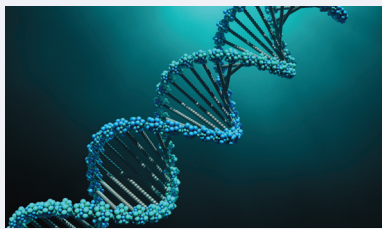
// **Scholarship** (page 1) medical school and to graduate with as little financial burden as possible. Their support of scholarships has a direct connection to their own experiences. A scholarship from an employer that Carol received while a part-time student allowed her to attend Douglass College, the women's division of Rutgers University, where she and Steve met. That scholarship is what propelled her toward her job at Yale and ultimately to a career as an architect. Last year, of the 496 students enrolled at Yale School of Medicine, 182 received scholarships based on need. "I like to say that talent and drive are distributed equally, but opportunity is not," says N'Kenge Haines, the school's director of financial aid.

"Need-based financial aid allows talented, driven students who would do well at YSM, but who may not have the resources, to attend." Admission to the School of Medicine is need-blind, which is why gifts from donors like the Schimpffs are crucial. "We are committed to meeting the full financial need of students. That is the bedrock of our recruitment policy," says Laura R. Ment, MD, professor of pediatrics and neurology and associate dean for admissions and financial aid. Adds Haines, "The hope is not just to attract a more diverse student body, but also to ensure that students graduate with less debt, so they feel free to pursue a discipline that speaks to them, rather than focusing solely on what they'll earn."

The fund established by the Schimpffs—who have been honored as Sterling Fellows—will afford that freedom to even more students. Over the years, the couple considered different ways to donate, eventually making a half dozen gifts through what is known as a charitable gift annuity (CGA). "A charitable gift annuity offers a way to strengthen your future and Yale School of Medicine's future at the same time," says Mary Beth Congdon, university director of planned giving at Yale. "If predictable fixed payments, tax savings, and the satisfaction of benefitting Yale are potential goals, the CGA is an excellent vehicle." Once an individual makes a gift through a CGA, Yale invests that

money and pays the donor (or the donor's designated beneficiary) a fixed annual amount as long as they live. The original sum (and any additional investment return) goes to Yale when the donor dies. That appealed to the Schimpffs. "Since Yale manages the annuity," Steve says, "we get income without having to manage the investment, even if there's a stock market downturn." Steve is working on a new book and does a weekly TV show on health and wellness at their retirement community, while Carol is docent emerita at the Walters Art Museum and a water-color artist, and helps to manage the large community gallery. "I am proud that Carol and I were at Yale as a student and an employee," says Steve. "If we had to do it over, that is where we would want to be."

Gene discoveries on neurological disease



In a new mouse study, researchers at Yale uncovered the impact of a gene mutation that has been associated with autism, schizophrenia, bipolar disorder, and epilepsy. Studies have previously shown that mutations in the gene, *TRIO*, are found in a significant number of people with these neurodevelopmental disorders. Now, a team led by Anthony Koleske, PhD, professor of molecular biophysics and biochemistry and of neuroscience, genetically engineered mice to lack one of their two copies of *TRIO*.

The animals, they found, had higher levels of anxiety, impaired social behaviors, and decreased coordination than normal mice. Moreover, the mice had smaller brains and their brain cells did not have the same branching patterns or connections with each other. The researchers went on to discover a set of proteins that are found at lower levels when *TRIO* is missing. Using drugs to increase levels of these proteins helped repair the brain cell defects.

Similar drugs might treat neurodevelopmental diseases in humans with *TRIO* mutations, the researchers suggest. The results were published on March 5 in *Cell Reports*.

Gene pairs are tied to cancer spread

Cancer is most deadly when it metastasizes, or spreads. While metastasis might result from malfunctions of single genes, interactions among multiple genes may also be the cause, complicating metastasis genetics. As reported April 8 in *Nature Methods*, Sidi Chen, PhD, assistant professor of genetics, has developed an approach designed to sort out which gene pairs most drive cancer's spread.

Using the gene-editing technique CRISPR, Chen and colleagues knocked out 325 pairs of genes individually suspected of promoting metastasis from lung cancer cells. Next, with a subcutaneous injection, they transferred the cancer cells, which carried genetic barcodes indicating which genes had been knocked out, into immunodeficient mice. Six weeks later, the researchers removed both the primary tumors from under the skin and those that had metastasized to the lungs.

Through the barcodes, they determined which gene-knockout combinations were more prevalent in the lung tumors than in primary tumors and, therefore, which combinations had likely promoted metastasis. In addition to helping scientists understand cancer genetics, this approach could help researchers probe gene interactions in other contexts, the authors write.

Ongoing support from paralyzed veterans

Research into spinal injury, nerve damage, and pain forges a strong relationship

David Zurfluh can walk using leg braces and a cane, and that is a major step forward from where he once found himself. While a member of the U.S. Air Force in 1995, Zurfluh fractured his neck in a motor vehicle accident in Hachinohe, Japan, and was diagnosed with incomplete quadriplegia. It took four years of therapy for him to be able to walk again.

Zurfluh is now the national president of Paralyzed Veterans of America (PVA), a veterans' service organization with a history that is intertwined with Yale's. With the support of funding from PVA, in 1986 Stephen G. Waxman, MD, PhD, Bridget M. Flaherty Professor of Neurology and of Neuroscience, launched the Center for Neuroscience and Regeneration Research (CNRR) at the VA Connecticut Healthcare System in West Haven.

The missions of the CNRR and PVA complement each other: PVA focuses on advocating for medical research on spinal cord injury, paralysis, and neuropathic pain, and the CNRR brings together world-class researchers and cutting-edge science to advance important research and inform therapies.

PVA leaders return to Yale every five years—most recently last October 25—for a dinner and a tour of research labs at the CNRR and School of Medicine. Waxman and CNRR Associate Director Jeffrey D. Kocsis, PhD, professor of neurology and of neuroscience, lead a diverse team of more than 30 scientists whose work collectively aims to improve the lives of such people as Zurfluh, who was given a steroid shot as part of his initial treatment at an International Red Cross facility in Hachinohe before going to the VA in Seattle for a long course of rehabilitation. The injection was instrumental in helping him regain his ability to walk. “Had it not been for scientists and researchers at that time, I may not have had that opportunity,” he says. “It’s very personal to me what you do here at Yale.”

Beyond spinal cord injury, CNRR scientists study a variety of conditions and their underlying mechanisms, including multiple sclerosis and neuropathic pain. Waxman’s research has focused on understanding the molecular basis for functional recovery after central nervous system injury, and has examined the activity of sodium channels in neurologic disease.

Recent work has led to the identification of a particular sodium channel, encoded by the gene *SCN9A*, as a major contributor to pain after injury to the nervous system. That



Stephen Waxman (left) and David Zurfluh display a print that celebrates the 30-year partnership between Yale and Paralyzed Veterans of America.

discovery suggests new possibilities for treating pain.

Kocsis’s team is interested in therapies for spinal cord repair that involve the restoration of myelin, the insulating sheath that coats nerve-cell axons and is vital for the conduction of nerve signals in the brain and spinal cord.

Over the past 30 years, PVA has gifted \$15 million to the School of Medicine for research surrounding pain that follows spinal cord injury—including phantom pain—and nerve tissue regeneration. Said Yale President Peter Salovey, PhD ’86, “Your service to our country and your dedication to improving the quality of life for all people living with spinal cord injury and disease are examples of what we hope to achieve through that wonderful interface where research, education, and clinical service come together.”

Foundation’s generosity bolsters two areas of research

Research into cancer as well as epilepsy is boosted by gifts from the Swebilus Trust

In fostering biomedical research at Yale, the C.G. Swebilus Trust has a particular focus: to inspire research or study of the causes, prevention, treatment or cure of cancer and epilepsy. For more than 44 years, Yale has been the most frequent recipient of funds from the trust, at the discretion of the trustees. The trust’s contributions to Yale School of Medicine have recently passed the \$18 million mark. This enduring relationship has given rise to notable discoveries through advanced research in the areas of cancer and epilepsy at Yale.

“The Swebilus Trust plays a critical role in stimulating novel and impactful cancer research during its early stages,” says Charles S. Fuchs, MD, MPH, Richard Sackler and Jonathan Sackler Professor of Medicine (Medical Oncology), and director of Yale Cancer Center. Grants from the trust help researchers develop pilot data derived from small-scale studies aimed at determining the feasibility of more extensive investigation, he notes. Many researchers who begin with funding from the Swebilus Trust move on to larger awards from agencies such as the National Institutes of Health (NIH).

Ranjit Bindra, MD, PhD, associate professor of therapeutic radiology, benefited from early funding from the

trust. His lab focuses on novel therapies for glioblastoma. “The Swebilus Trust provided essential pilot funding for my laboratory when we were just getting started,” Bindra says. “It allowed us to develop a core set of drug screening reagents that we use in our lab even today. We are very grateful for their commitment to cancer research.”

The trust also promotes the importance of multidisciplinary approaches to biomedical research. “A field can be much more productive where there is work across departments and across institutions on a single concept,” says Dennis Spencer, MD, Harvey and Kate Cushing Professor of Neurosurgery and chief of epilepsy surgery. “For example, if you take scientists engaged in basic research who are interested in cellular-related activity in the brain, and you provide them with the resources to translate that work as it pertains to epilepsy, the field can go in a direction in which it was not headed before.”

Christopher Benjamin, PhD, assistant professor of neurology, recently completed a year of Swebilus Trust research support. He aims to understand language function in epilepsy patients, and predict how language and memory may respond to surgery. “Epilepsy is a neurological condition that we can



(l-r): Stephen Hotchkiss, co-trustee; Charles Fuchs, Yale Cancer Center director; co-trustees Amy Lynch (for Bank of America, N.A.) and John Brennan; Dennis Spencer, chief of epilepsy surgery.

potentially cure with surgery, but surgery may not be an option if there are potential risks to language or memory,” says Benjamin.

With his award, Benjamin was able to show that there is a tremendous opportunity to improve our ability to map language in patients and ensure better outcomes. This initial research enabled Benjamin to secure additional funding after his Swebilus award concluded.

“Department chairs, faculty, and researchers have met with the trustees annually and consistently impressed us with their knowledge, dedication, and progress in scientific advancement toward the objectives established by the Swebilus estate,” says Stephen Hotchkiss, co-trustee. “We continue to be impressed by the responsible manner in which the funds are applied.”

Grants and contracts awarded to Yale School of Medicine

January 2018–June 2018

Federal

Nita Ahuja, NIH, (PQD3) *Molecular Profiles Associated with Long-Term Survival in Pancreas Cancer*, 1.3 years, \$405,835 • **David Assis**, NIH, *Defining the Role of MIF and CD74 in Autoimmune Cholangitis*, 2 years, \$251,250 • **Anton Bennett**, NIH, *Signaling by Shp2 Mutants in RASopathies*, 3.9 years, \$1,976,944 • **Ronald Breaker**, **Barbara Kazmierczak**, NIH, *Exploiting Riboswitch Sensors to Reveal Antibiotics Uptake and Retention in Gram Negative Bacteria*, 5 years, \$360,125 • **Jason Cai**, NIH, *Development of Novel SV2A PET Agents for Early Detection of Alzheimer's Disease*, 2.8 years, \$2,407,083 • **Rui Chang**, NIH, *GLP1R Neurons in the Subfornical Organ and Integration of Thirst and Satiety Cues*, 3.2 years, \$508,840 • **Eunice Cho**, NIH, *PPP6C Regulation of ERK Signaling in Melanoma*, 3 years, \$87,744 • **Keith Choate**, NIH, *Genetics and Pathobiology of Cutaneous Mosaic Disorders*, 4.9 years, \$2,915,522 • **Paul Cleary**, NIH, *Center for Interdisciplinary Research on AIDS*, 5 years, \$7,666,752 • **Gary Cline**, **Andrew Goodman**, **Gerald Shulman**, NIH, *Microbiome Origins and Insulin Regulatory Responses of the Short Chain Fatty Acid Acetate*, 4 years, \$2,404,168 • **Vaughn Colleluori**, NIH, *Characterizing the Role of MINK1 in Congenital Heart Disease and Mucociliary Clearance*, 3 years, \$120,200 • **J. Lucian Davis**, **Achilles Katamba**, **Arthur Reingold**, NIH, *TB and Other Pulmonary Complications of AIDS Research Training Program*, 4.9 years, \$1,821,503 • **Swetha Dravida**, NIH, *Neural Mechanisms of Live Joint Attention In Autism Spectrum Disorders: An fNIRS Hyper-scanning Investigation*, 3 years, \$124,992 • **Erol Fikrig**, **Richard Flavell**, NIH, *The Role of NLRP6 and DHX15 in Control of Infection by RNA Viruses*, 5 years, \$2,093,750 • **Richard Flavell**, NIH, *The Inflammasome as a Novel Mediator and Therapeutic Target of GI Syndrome*, 5 years, \$1,904,285 • **Lisa Fucito**, NIH, *Development and Pilot Testing of a Multimodal Mobile Sleep Intervention Using Wearable Technology to Reduce Heavy-Drinking in Young Adults*, 3 years, \$753,342 • **Jorge Galan**, NIH, *Host Cell Signaling Pathways Induced by Salmonella*, 5 years, \$2,697,553 • **Pallavi Gopal**, NIH, *TDP43 mRNA Complex Transport in Physiologic and Pathologic States*, 2.6 years, \$531,371 • **Valentina Greco**, NIH, *Understanding Skin Tissue Repair in Live Mammals*, 4.9 years, \$2,875,240; NIH, *Live Imaging of Skin Regeneration*, 4.9 years, \$2,515,492 • **Patricia Ann Gruner**, NIH, *Dissecting Causal Reasoning Abnormalities in Obsessive-Compulsive Disorder (OCD)*, 4 years, \$787,536 • **Giovanna Guerrero-Medina**, NSF, *NSF RAPID: Evaluation of Disaster-related Science Lesson Plans to Promote Learning Continuity after Hurricane Maria*, 1.9 years, \$186,086 • **Kevan Herold**, **Harriet Kluger**, NIH, (8) *Mechanisms of Autoimmune Endocrine Diseases in Patients Receiving Checkpoint Inhibitors*, 5 years, \$3,276,090 • **Ellen Hoffman**, NIH, *High-throughput Functional Analysis of Autism Risk Genes*, 4.8 years, \$2,093,750 • **Mark Horowitz**, NIH, *7th International Conference on Osteoimmunology: Interactions of the Immune and Skeletal Systems*, 1 year, \$20,000 • **Yasuko Iwakiri**, NIH, *Hemodynamics and Hepatic Remodeling*, 4 years, \$1,507,500 • **Daniel Jane-Wit**, NIH, *Complement-Induced Endothelial Cell Activation by a Novel Rab5-ZFYVE21-SMURF2 Signaling Axis*, 5 years, \$2,093,750 • **Caroline Johnson**, **Sajid Khan**, NIH, *Understanding Sex Differences in Colon Cancer Metabolism*, 2 years, \$400,744 • **Leonard Kaczmarek**, NIH, *Cellular Regulation of Sodium-activated Potassium Channels*, 5 years, \$1,832,030 • **Harriet Kluger**, NIH, *The Yale Cancer Center Calabresi Immuno-Oncology Training Program (IOTP)*, 5 years, \$2,944,160 • **Melissa Knauert**, NIH, *Circadian Rhythm as a Novel Therapeutic Target in the Intensive Care Unit*, 4 years, \$699,536 • **Anthony Koleske**, NIH, *Control of Dendritic Spine Stability via Regulation of a Stable Actin Pool*, 5.2 years, \$1,971,039 • **Anthony Koleske**, **Michael Higley**, NIH, *Impact of Excitatory Synapse Maturation on Synaptic Plasticity and Stability*, 5 years, \$2,362,914 • **Peter Krause**, **Sukanya Narasimhan**, NIH, *Determining the Health Burden of Borelia Miyamotoi with a Next-Gen Diagnostic Assay*, 2 years, \$470,983 • **Irina Krykbaeva**, NIH, *Modeling the Immune Response to Melanoma Brain Metastases in Mice*, 3 years, \$58,980 • **Alan Lewis**, NIH, *A Translational Approach to Understand Hippocampal Neural Circuitry Regulating Impulsive Aggression*, 5 months, \$56,593 • **Chiang-Shan Li**, NIH, *Imaging the Monoaminergic Midbrain and Cognitive Control in Cocaine Addiction*, 2 years, \$367,500 • **Judith Lichtman**, NIH, *Disparities in Patterns of Recurrent Stroke in the Elderly*, 4 years, \$2,750,809 • **Haifan Lin**, NIH, *Function of PIW1/Argonate Proteins in Spermatogenesis*, 4.9 years, \$2,197,771 • **George Linderman**, NIH, *Efficient Methods for*

Imputation, Dimensionality Reduction, and Visualization of Single Cell RNA-Sequencing Data, 3 years, \$107,544 • **Angeliki Louvi**, NIH, *Candidate Pharmacological Therapies for Cerebral Cavernous Malformations*, 2 years, \$460,625 • **Alice Lu**, NIH, *Characterizing Global Regulatory Networks in Human Embryonic Stem Cells*, 3 years, \$102,192 • **Jun Lu**, NIH, *CRISPR-based Enhanced Molecular Chipper Technology for Identifying Functional Noncoding Elements in Cancer*, 3 years, \$1,187,022 • **Patrick Lusk**, NIH, *The Mechanism of ESCRT-mediated Surveillance of the Nuclear Envelope Barrier*, 4 years, \$1,373,500 • **Robert Malison**, **David Ross**, NIH, *Integrated Mentored Patient-Oriented Research Training (IMPORT) in Psychiatry*, 5 years, \$1,165,037 • **Nikhil Malvankar**, NSF, *CAREER: Mechanism of Metallic Conductivity in Bacterial Pili Filaments*, 5 years, \$800,000 • **Nikhil Malvankar**, **Victor Batista**, DoD, *Stretchable, Transparent & Biodegradable Electronic Material with Tunable Functionality*, 1.5 years, \$509,699 • **Malaiyalam Mariappan**, NIH, *Retro-proteomics to Identify Misfolded Proteins from the ER and Their Quality Control Pathways*, 2 years, \$460,625 • **Kathleen Martin**, NIH, *Novel Insights into Intimal Hyperplasia in Cardiac Allograft Vasculopathy*, 3.8 years, \$2,415,720 • **David Matuskey**, **James McPartland**, NIH, *Social-communicative Deficits in Autism Spectrum Disorder as Measured by mGluR5 Positron Emission Tomography*, 1.8 years, \$460,625 • **Lisa McLean**, NIH, *The Intersection of Alzheimer's Disease and Ribosome Biogenesis through Amyloid Beta Precursor Protein Binding Family B Member 1 (APBB1; FE65)*, 3 years, \$127,143 • **Adam Mecca**, NIH, *Investigation of Molecular Changes in mGluR5 and SV2A to Study Synaptic Alterations in Alzheimer's Disease using PET*, 4.9 years, \$977,376 • **Matt Meizlish**, NIH, *Macrophage Regulation of Tissue Repair and Fibrosis Through Sensing of Extracellular Matrix Mechanics*, 2 years, \$76,944 • **Edward Melnick**, **Gail D'Onofrio**, NIH, *EMBED: Pragmatic trial of user-centered clinical decision support to implement EMergency department-initiated Buprenorphine for opioid use Disorder*, 1 year, \$819,454 • **Wang Min**, NIH, *The Role of Novel Aip1 Isoform in Pathological Lymphangiogenesis*, 4 years, \$1,937,402 • **Peggy Myung**, NIH, *Dissecting the Temporal Role of Dermal Wnt/beta-catenin Signaling in Hair Follicle Induction during Development and Regenerative Wound Healing*, 2 years, \$167,500 • **Michael Nathanson**, NIH, *Molecular Regulation of Cholestasis in Cholangiocytes*, 4 years, \$1,928,048; NIH, *Ca2+ Waves in Hepatocytes: Mechanisms and Effects*, 5 years, \$2,586,991 • **Karla Neugebauer**, NIH, *The Dynamic Energy Budget of Vertebrate Embryogenesis*, 2 years, \$460,625 • **Laura Niklason**, **Mahboobe Ghaedi**, NIH, *Engineered Airway Construct for Cystic Fibrosis Disease Modeling*, 1.8 years, \$444,995 • **Corey O'Hern**, **Lynne Regan**, NSF, *REU Site: Interdisciplinary Research Training Across Biology, Physics, and Engineering*, 3 years, \$23,110 • **Kutluk Oktay**, NIH, *Characterization & Prevention of Chemotherapy-Induced Damage to Ovarian Reserve*, 2 years, \$1139,377 • **Sunil Parikh**, NIH, *TRANSMIT: Tracking Antimalarial Resistance in Mosquito Populations*, 2 years, \$449,950 • **Joao Pereira**, NIH, *Mechanisms of Peripheral B Cell Differentiation and Homeostasis*, 2 years, \$460,625 • **Jordan Pober**, **George Tellides**, NIH, *Combined Human Myeloid and Lymphoid Engraftment in MISTRG Mice for Transplantation Research*, 3 years, \$460,625 • **Faye Rogers**, NIH, *Role of XPD in DNA Damage Response Pathway Choice*, 2 years, \$753,750 • **Ethan Rundell**, NIH, *Using Intrabodies to Identify Determinants of Intrinsic Antibiotic Resistance in Pseudomonas aeruginosa*, 2 years, \$58,980 • **Mehran Sadeghi**, DoD, *Monitoring Mitochondrial in Diabetic Heart*, 1.5 years, \$334,998 • **Nicola Santoro**, NIH, *Mechanisms of Obesity and Its Metabolic Complications in Youth*, 5 years, \$1,901,497 • **Jason Schwartz**, NIH, *Medicine by Committee: Expert Advice and Health Care in Modern America*, 2 years, \$93,172 • **William Sessa**, NIH, *Insights into the Molecular and Cellular Mechanisms Governing Endothelial Function*, 7 years, \$6,612,025 • **Robert Sherwin**, **Jonathan Bogan**, **Richard Flavell**, **Kevan Herold**, **Raimund Herzog**, **Tamas Horvath**, **William Philbrick**, **Gerald Shulman**, **William Tamborlane**, **Li Wen**, NIH, *Yale Diabetes Research Center*, 4.9 years, \$8,374,991 • **Gerald Shulman**, NIH, *Glucagon Regulation of Hepatic Mitochondrial Activity and Glucose Metabolism by InsP3R-1*, 3.9 years, \$1,675,000 • **Frederick Sigworth**, NIH, *Curriculum: Principles of Cryo-EM Structure Determination*, 3 years, \$372,120 • **Sandra Springer**, NIH, *Evaluations of Medication Assisted Treatments for Substance Use Disorders Among Persons Living with and at Risk for HIV Infection*, 5 years, \$619,190 • **Serena Spudich**, NIH, *Single Cell*

RNAseq of CSF to Dissect CNS Cellular Perturbations in Long-term Treated HIV, 1.9 years, \$460,625; NIH, *In Vivo Imaging of Synaptic Density in Virally Suppressed HIV-1 Infection Using 11CUCB-J PET*, 1.9 years, \$460,625 • **Richard Sutton**, NIH, *Helper-dependent Adenoviral Vectors for Targeted In Vivo Gene Delivery to Both CD4 T Cells and Hematopoietic Progenitors*, 2 years, \$460,625 • **Hemant Tagare**, NIH, *Principal Subspace Analysis of Cryo-EM Heterogeneity*, 4 years, \$1,374,551 • **Jeffrey Testani**, NIH, *Mechanism and Effects of Manipulating Chloride Homeostasis in Heart Failure*, 4.8 years, \$4,181,973 • **Dongnhu Truong**, NIH, *Molecular Genetic Examination of Co-Occurring Learning Disabilities*, 2 years, \$202,004 • **Silvia Vilarinho**, NIH, *Deciphering the Genetic Basis of Portal Hypertension*, 4.9 years, \$850,920 • **Emily Wang**, NIH, *JUSTice-Involved Individuals Cardiovascular Disease Epidemiology (JUSTICE)*, 3.8 years, \$3,120,989 • **Francis Wilson**, NIH, *Optimizing Electronic Alerts for Acute Kidney Injury*, 5 years, \$3,142,030 • **Yong Xiong**, NIH, *Comparative Structure and Function Analyses of Human and Mouse SAMHD1 Proteins*, 2 years, \$464,691 • **Sarah Yip**, NIH, *Effects of Oxy-codone on Functional Connectivity*, 2 years, \$460,625 • **Mark Youngblood**, NIH, *PBAF Signaling in Meningioma Tumorigenesis*, 4 years, \$111,111 • **Heping Zhang**, **Hongtu Zhu**, **Fei Zou**, NIH, *Analysis of Big Data Squared in Biomedical Studies*, 4.7 years, \$2,343,916

Non-federal

Takaomi Adachi, American Diabetes Association, *Integrating Metabolic and Vascular Protective Effects of Apelin Signaling*, 3 years, \$179,722 • **Jean Adnopo**z, Child Health & Development Inst. of Connecticut, *Singh SBDI FY18 Agreement*, 3 months, \$18,017 • **Jean Adnopo**z, Holy Family Institute, *Allegheny County Service Agreement*, 1 year, \$18,325 • **Heather Allore**, Oregon Health Sciences University (NIH), *Changes in Multimorbidity and Disability Among Race/Ethnic Older Adults*, 1.3 years, \$120,272 • **Frederick Altice**, Comer Family Foundation, *Syringe Services Program Expansion*, 1 year, \$3,000 • **Sarah Amalraj**, Howard Hughes Medical Institute, *The Congenital Heart Disease Candidate Gene Myelin Regulatory Factor (MYRF) Plays an Unexpected Role in Left Right Patterning*, 1 year, \$38,000 • **Gustavo Angarita-Africano**, Peter F. McManus Charitable Trust, *Imaging Synaptic Density in Opiate Addiction in Vivo Using 11C-UCB-J PET*, 2 years, \$50,000 • **Nancy Angoff**, Arnold P. Gold Foundation for Humanism in Medicine, *2018 Leonard Tow Humanism in Medicine Award*, 1.8 years, \$1,000 • **Alan Anticevic**, Vanderbilt University Medical Center (NIH), *Development of Thalamocortical Circuits and Cognitive Function in Healthy Individuals and Youth At-Risk for Psychosis*, 1.3 years, \$195,100 • **Florent Barthas**, Brain & Behavior Research Foundation (formerly NARSAD), *Prefrontal Cortex Neural Dynamics in Stress-Induced Mood Disorders*, 1 year, \$35,000 • **Choukri Ben Mamoun**, L2 Diagnostics (NIH), *An Antigen-detection Assay to Diagnose Babesia Microti Infection*, 1 year, \$90,050 • **Anton Bennett**, Monash University, *Role of ROS and PTPs in Skeletal Muscle Metabolism*, 1.5 years, \$19,672 • **Curtis Benson**, Paralyzed Veterans of America, *Clarifying the Mechanism Underlying Hyperreflexia after SCI*, 2 years, \$100,000 • **Ranjit Bindra**, Oligo Nation/Cure, *Targeting IDH1 Mutant Oligodendroglioma with CNS-Permeable PARP Inhibitor, BGB-290*, 2 years, \$125,000; Alex's Lemonade Stand, *Small Molecule Screening for Novel DIPG Inhibitors*, 2 months, \$5,000; Alex's Lemonade Stand, *Probing the Metabolome in DIPG*, 2 months, \$5,000 • **Michael Bloch**, **Nix Zelin**, Gay & Lesbian Medical Association, *Examining Implicit and Explicit Healthcare Provider Bias Toward Sexual Minority Women*, 1 year, \$10,000 • **Linda Bockenstedt**, Icahn School of Medicine at Mount Sinai (ISMMs) (NIH), *High-throughput Immunophenotypic Analyses of Humoral Responses in Lyme Disease*, 1 year, \$83,750 • **Daniel Boffa**, American College of Surgeons, *American College of Surgeons, the Society of Thoracic Surgeons Health Policy Scholarship to Attend the Course Leadership Program in Health Policy and Management*, 1 year, \$2,800 • **Carmen Booth**, The John B. Pierce Laboratory (NIH), *Evaluating the Therapeutic Potential of Vagal CART Circuitry for Treating Metabolic Disease*, 7 months, \$3,223 • **Marc Brackett**, Pure Edge, *Integrating Mindfulness and Compassion with Emotional Intelligence Training*, 1.3 years, \$100,000; Anthony & Jeanne Pritzker Family Foundation, *Trauma-Informed Social Emotional Learning in LAUSD: Integrating the RULER and FOCUS*, 2 years, \$408,470 • **James Brewer**, American Cancer Society, *Investigating Nuclear Inflammasome Effector Functions*, 3 years, \$163,500 • **Emanuela Bruscia**, Cystic Fibrosis Foundation (CFF), *Ezrin and Macrophage Dysfunction in Cystic Fibrosis*, 2 years, \$260,000 • **Linda Cantley**, Stanford University, *Fee-for-Service Agreement Between Linda Cantley and Stanford University*, 1 year, \$41,835 • **Michael Cappello**, Texas Tech University, *Proof of Concept Trial of Sm-p80/GLA-SE Schistosomiasis Vaccine*, 1.2 years, \$51,855

Marius Chiasseu, Alzheimer's Association, *Role of Brain Injury in the Induction of Alzheimer's Disease*, 3 years, \$174,999 • **Jean-Ju Chung**, Rensselaer Polytechnic Institute, *The Contraceptive Vaccine Project*, 2.3 years, \$716,539 • **Theodore Cohen**, Emory University (NIH), *The Role of Casual Contact and Migration in the XDR TB Epidemic in South Africa: A Geospatial, Genomic and Social Network Study*, 4.8 years, \$55,575; Vital Strategies (Formerly The International Union Against Tuberculosis and Lung Disease, Inc. D/B/A Vital Strategies), *Genomic, Spatial, and Epidemiological Analysis to Inform Targeted TB Interventions in Moldova*, 2.9 years, \$1,400,004 • **James Comer**, New Haven Board of Education, *SDP NHBOE 2018 Agreement*, 5 months, \$225,000; Carnegie Corporation of New York, *James Comer 50th Anniversary Conference*, 9 months, \$110,000 • **Zack Cooper**, Dartmouth College (NIH), *Causes and Consequences of Healthcare Efficiency*, 5 years, \$1,101,476 • **Daniel Cooperman**, Pediatric Orthopaedic Society of America, (POSNA), *Guiding Scoliosis Evaluation with a Humeral Head Ossification Algorithm*, 1 year, \$10,000 • **Cindy Crusto**, New York University (NIH), *Intergenerational Impact of Genetic and Psychological Factors on Blood Pressure*, 1.2 years, \$74,049 • **Leslie Curry**, Patrick and Catherine Weldon Donaghue Medical Research Foundation, *Translating Leadership Saves Lives for Greater Impact*, 1 year, \$33,000 • **Abigail Cutler**, Society of Family Planning, *Project Title: The Impact of Shouting Your Abortion on Community-Level Abortion Stigma: A Randomized Clinical Trial*, 1.4 years, \$97,414 • **Dibyadeep Datta**, Alzheimer's Association, *Leaky Ryanodine Receptors: Potential Role in the Pathogenesis of AD*, 3 years, \$174,946 • **Enrique De La Cruz**, University of Chicago (DoD), *Mechanisms of Force Sensing in Adherent Cells as Inspiration for New Materials*, 1 year, \$166,666 • **Jennifer Dearborn-Tomazos**, Robert Leet and Clara Guthrie Patterson Trust, *Intentional Weight Loss in Obese Patients after Ischemic Stroke: A Feasibility and Safety Study*, 2 years, \$95,000 • **Jonathan Demb**, Icahn School of Medicine at Mount Sinai (ISMMs) (NIH), *Regeneration of Rod Photoreceptors from Muller Glial Cells in Adult Mouse Retina*, 1.2 years, \$29,569 • **Sabrina Diano**, Monash University, *Stress and Weight Gain*, 1.5 years, \$18,047 • **James Dodington**, The Avielle Foundation, *Hospital-Based Violence Intervention Program (HVIP) Development through Community-Engaged Research*, 2 years, \$50,000 • **Deepak D'Souza**, Heffter Research Institute, *IIT Psilocybin-Induced Neuroplasticity in the Treatment of Major Depressive Disorder*, 2 years, \$132,335 • **James Duncan**, Georgia Institute of Technology (NIH), *A Novel Computing Framework to Automatically Process Cardiac Valve Image Data and Predict Treatment Outcomes*, 4 years, \$505,952; Academy of Clinical Laboratory Physicians and Scientists, *Automated Image Analysis: Clinical Validation*, 2 years, \$7,500 • **Marie Egan**, **Jonathan Koff**, Cystic Fibrosis Foundation Therapeutics (CFFT), *Yale Cystic Fibrosis Therapeutic Development Center*, 1 year, \$88,150 • **Ashley Eltorai**, Society for Education in Anesthesia, *Working Memory Interruptions and Errors in Anesthesiology: A Randomized, Controlled, Simulation-Based Study*, 1 year, \$10,000 • **James Farrell**, **Nikhil Joshi**, Ron Foley Foundation, *Pancreatic Cancer Mouse and Human Organoids: Translational Research in Early Detection and Precision Medicine*, 1 year, \$70,000 • **Vince Faustino**, University of California, Los Angeles (NIH), *Ancillary to ABC PICU to Study MOD in Critically Ill Children*, 4 years, \$50,000 • **Arash Fereydooni**, Radiological Society of North America, *Irinotecan-eluting LC Bead-M1 (DEBIRI-M1) for Patients with Liver Metastases from Colorectal Cancer: A Phase II Single-Center Study*, 2 months, \$3,000; Howard Hughes Medical Institute, *The Effects of Rapamcyin on Adaptive Venous Remodeling to Improve Arteriovenous Fistula Patency*, 1 year, \$38,000 • **Katie Ferguson**, Brain & Behavior Research Foundation (formerly NARSAD), *Developmental GABAergic Control of Cortical Function And Dysfunction*, 2 years, \$70,000 • **Thomas Fernandez**, **Eunice Yuen**, Brain & Behavior Research Foundation (formerly NARSAD), *Somatic Mosaicism and Copy Number Variation in Obsessive-Compulsive Disorder*, 2 years, \$69,020 • **Erol Fikrig**, New York Medical College (NIH), *The Role of UBXNs in Antiviral Immunity*, 7 months, \$45,225 • **Sarah Fineberg**, American Foundation for Suicide Prevention, *Pilot Study of Ketamine to Reduce Suicidality in Borderline Personality Disorder*, 2 years, \$84,995 • **Francine Foss**, **Elias Lolis**, Drs. Martin and Dorothy Spatz Charitable Foundation Trust, *Chemokine Receptor Antagonists for Cutaneous T-cell Lymphoma*, 1 year, \$200,000 • **Abigail Friedman**, Robert Wood Johnson Foundation, *A Comprehensive Approach to Tobacco Policy in the Age of E-Cigarettes*, 3 years, \$337,679 • **Charles Fuchs**, **Mandar Muzumdar**, Lustgarten Foundation for Pancreatic Cancer Research, *Obesity-driven PDAC: A Comprehensive Study to Define New Targets for Prevention and Therapy*, 2 years, \$736,062 • **Kathleen Garrison**, The Mind & Life Institute, *A Real-Time fMRI Study to Link*

Subjective Experience with Brain Network Dynamics During Craving, 2 years, \$14,999 • **Joel Gelernter**, Johns Hopkins University School of Medicine (NIH), *Fine Mapping a Gene Subnetwork Underlying Alcohol Dependence*, 1 year, \$65,342 • **Mark Gerstein**, **Valerie Reinke**, University of Washington, Seattle (NIH), *Creating Comprehensive Maps of Worm and Fly Transcription Factor Binding Sites (wormfly2)*, 3.8 years, \$692,586 • **Michael Girardi**, Drs. Martin and Dorothy Spatz Charitable Foundation Trust, *Precision Medicine Approach to the Treatment of CTCL*, 1.5 years, \$119,403 • **Giovanna Guerrero-Medina**, University of Puerto Rico en Cayey (NIH), *Enhancing Research Training Through Empowerment, Resilience, and Civic Engagement*, 1 year, \$86,145 • **Hilary Hahn**, International Association of Chiefs of Police, *IACP Changing Minds Project*, 1.7 years, \$150,000 • **Ruth Halaban**, **Alfred Bothwell**, **Jian Cao**, **Qin Yan**, Melanoma Research Alliance, *Patient Focused Therapy for Acral Melanoma*, 3 years, \$800,000 • **Nicola Hawley**, Brown University (NIH), *Impact of the Obesity-risk CREBRF p.Arg457 Variant on Energy Expenditure, Intake, and Substrate Utilization in Samoans*, 2 years, \$418,500 • **Roy Herbst**, Columbia University (NIH), *Integrating Radionics into S0819 and Lung-MAP, Biomarker Driven Clinical Trials for Lung Cancer*, 5 years, \$85,985 • **Kenneth Hoehn**, Pharmaceutical Research & Manufacturers of America (PhRMA) Foundation, *Evolutionary Models of B Cell Migration and Differentiation*, 2 years, \$80,000 • **Jun Young Hong**, Cancer Research Institute, *Developmental Programming of T Cell Immunity and Cancer Susceptibility*, 3 years, \$175,500 • **Cristian Ionita**, Parent Project Muscular Dystrophy, *CDCC Liaison Grant Award*, 1 year, \$22,000 • **Christopher Jackson**, Howard Hughes Medical Institute, *Synthetic Sensitization of MGMT-methylated Tumors to Temozolomide Using DNA Repair Inhibitors*, 1 year, \$38,000 • **Daniel Jane-Wit**, Vasculitis Foundation, *Endothelial Cell Inflammasomes in ANCA-Associated Vasculitis*, 2 years, \$50,000 • **Ania Jastreboff**, American Diabetes Association, *Effect of Liraglutide on Neural Responses to High Fructose Corn Syrup in Obese Adolescents with Prediabetes*, 2 years, \$276,000 • **Ryan Jensen**, New York University School of Medicine, *Elucidating the Replication Fork Protection Problem Caused by PARP Inhibitors in BRCA2-mutated Ovarian Cancers*, 3 years, \$525,000 • **Lucia Jilaveanu**, Indiana University (NIH), *Epigenetic Mechanisms of Drug Resistance in Renal Cell Carcinoma*, 5 years, \$33,804 • **Jason Johannesen**, Hartford Hospital (NIH), *Mechanisms of Hyperventilation in Anxiety Disorders*, 1.8 years, \$43,038 • **Nikhil Joshi**, Melanoma Research Alliance, *Investigating the Mechanistic Basis for Tumor Immunogenicity in Melanoma*, 3 years, \$225,000 • **Karen Jubanyik**, New York University School of Medicine (NIH), *Primary Palliative Care for Emergency Medicine*, 1 year, \$10,360 • **Amy Justice**, Vanderbilt University Medical Center, *Clinical and Genetic Determinants of Peripheral Artery Disease, Microvascular Disease, and Major Adverse Limb Outcomes*, 1 year, \$43,705 • **Naftali Kaminski**, National Jewish Health (NIH), *Use of Src Family Kinase Inhibitor Saracatinib in the Treatment of Pulmonary Fibrosis*, 1 year, \$198,585 • **Jason Karimy**, Howard Hughes Medical Institute, *Molecular Mechanisms of TLR4-mediated CSF Hypersecretion in Post-Infectious Hydrocephalus*, 1 year, \$38,000 • **Robert Kerns**, Pro-Change Behavior Systems (NIH), *Evidence-Based Pain Intervention for Veterans: Leveraging Mobile & Social Media*, 1.2 years, \$50,659 • **Richard Kibbey**, Monash University, *Got2 Be In It: Establishing a Link Between Liver Integrative Metabolism and Systemic Metabolic*

Control, 1 year, \$14,047 • **Robert King**, Rutgers, the State University of New Jersey (NIH), *1/7-Colaborative Genomic Studies of Tourette Disorder*, 10 months, \$52,051 • **Steven Kleinstein**, Icahn School of Medicine at Mount Sinai (ISMMS) (NIH), *Identification, Standardization and Dissemination of HIPC Immune Signatures*, 1 year, \$100,500; Icahn School of Medicine at Mount Sinai (ISMMS) (NIH), *Dengue Human Immunology Project Consortium (DHIPC) - Development of HIPC Data Standards*, 1 year, \$108,875 • **Melissa Knauert**, American Sleep Medicine Foundation, *Daytime Bright Light, Circadian Abnormalities, and Delirium in Medical Intensive Care Unit Patients*, 2 years, \$249,985 • **Emma Knowles**, Brain & Behavior Research Foundation (formerly NARSAD), *Peripheral Versus Central Levels of Phospholipids and Their Compounds: Validating Potential Biomarkers of Affective Disorders Using a Combination of Mass Spectrometry and Spectroscopy*, 10 months, \$34,731 • **Gary Kupfer**, American Society of Hematology, *Novel Mechanisms of Congenital Dyserythropoietic Anemia*, 1.5 years, \$150,000; Icahn School of Medicine at Mount Sinai (ISMMS), *Regional Hemophilia Network*, 1 year, \$18,826 • **Audrey Leasure**, American Heart Association, *Variations within Deep Intracerebral Hemorrhage*, 3 months, \$2,000 • **Rafael Lefkowitz**, Association of Occupational and Environmental Clinics, *Development of a Continuing Education Module in Environmental and Occupational Medicine on Health Concerns Related to Asthma*, 7 months, \$25,001 • **Angela Lek**, Muscular Dystrophy Association, *Identifying Genetic Modifiers of FSHD*, 2.5 years, \$155,000 • **Becca Levy**, Patrick and Catherine Weldon Donaghue Medical Research Foundation, *Creating the Community Health Empowerment Site (CHES)*, 1.5 years, \$59,895 • **Jaechul Lim**, Human Frontier Science Program Organization, *Deciphering the Mechanism and Significance of Common Stress Program*, 3 years, \$175,020 • **Haifan Lin**, Connecticut Innovations, *Continued Support and Technology Development for Shared Core Facilities at the Yale Stem Cell Center*, 1.1 years, \$500,000 • **Kasia Lipska**, Kaiser Foundation Research Institute (NIH), *Severe Hypoglycemia: Ascertainment, Surveillance and Pharmacovigilance*, 1.4 years, \$25,016 • **Jun Liu**, East Carolina University (NIH), *Delineation of Unique Flagellar Proteins in Spirochetes*, 4 years, \$142,375 • **Patricia LoRusso**, Rising Tide Foundation, *Phase 2 Study of PARP Inhibition and Anti-PD-L1 Therapy in BRCAmt TNBC*, 2.5 years, \$779,845 • **Amanda Lowell**, **Amanda Van Scoyoc**, American Psychological Foundation, *Understanding Stigma Surrounding Pregnant Women with Substance Use Disorders*, 1.3 years, \$19,622 • **Carrie Lucas**, Immune Deficiency Foundation, *Novel Signaling Aberrations in a Novel Primary Immunodeficiency Disorder*, 1 year, \$50,000 • **Maricar Malinis**, Johns Hopkins University (NIH), *HOPE in Action Prospective Multicenter, Clinical Trial of HIV+ Deceased Donor Kidney Transplants for HIV+ Recipients*, 1.6 years, \$7,500 • **Robert Malison**, Brain & Behavior Research Foundation (formerly NARSAD), *Imaging Complement Component 4 (C4) Gene Dose Effects on Human Synaptic Density in Schizophrenia In Vivo using 11C-UCB-J PET*, 2 years, \$108,000 • **David Matuskey**, Cure Huntington's Disease Institute Foundation (CHDI), *[11C] UCB-J Positron Emission Tomography (PET) Imaging of SV2A in Manifest Huntington's Disease (HD) Gene Expansion Carriers*, 1.4 years, \$11,560 • **James McPartland**, Alan B. Slifka Foundation, *Incidence of Abnormal Electroretinograms (ERG) in Children with Autistic Disorder*, 1 year, \$108,195 • **Ruslan Medzhitov**, Broad Institute, *Pathobiology of Food Allergy*, 3 years, \$363,231 • **Eric Meffre**, Hospital for Special

Surgery, Role CXCR3 Agonists in the Generation of Autoreactive B Cells in Scleroderma Patients, 1 year, \$50,000 • **Wajahat Mehal**, Pfizer Inc., U.S. Pharmaceuticals Group, *Conducting Fibroscan to Assess Liver Stiffness*, 1.9 years, \$269,560 • **Peggy Myung**, American Cancer Society, *Using Live Imaging to Reveal Novel Mechanisms to Suppress Skin Cancer*, 4 years, \$792,000 • **Rachel Nelson**, Lupus Foundation of America, *Modulation of Antiphospholipid Antibody-induced Trophoblast Inflammatory Response by Infectious Components*, 4 months, \$4,000 • **Laura Niklason**, Foundation for Anesthesia Education & Research, *Medical Student Anesthesia Research Fellowship 2018*, 5 months, \$4,200 • **Maria O'Connell**, State of CT Dept of Mental Health and Addiction Services, *Emergency Rooms, Recovery Coaches and MAT: Statewide Comparisons*, 1 year, \$250,000 • **Patrick O'Connor**, Boston Medical Center (NIH), *Advancing Clinical Research Training within Addiction Residency Programs*, 1.3 years, \$69,396 • **Hasan Oez**, Cystic Fibrosis Foundation (CFF), *Role of miR-199a-5p in CF Chronic Lung Inflammation and Remodeling*, 2 years, \$128,550 • **Tess O'Meara**, Howard Hughes Medical Institute, *Characterizing the Anti-tumor Immune Response in Triple Negative Breast Cancers of African American and Non-African American Women Through Cell Population and Genomic Methods*, 1 year, \$38,000 • **John Onofrey**, ZMK Medical Technologies, Inc. dba Eigen (NIH), *Image Analysis Tools for mpMRI Prostate Cancer Diagnosis Using PI-RADS*, 1 year, \$157,609 • **Lubna Pal**, The John B. Pierce Laboratory (NIH), *Mechanisms of Hypertension in Women with Polycystic Ovary Syndrome*, 1.9 years, \$51,627 • **Candice Paulsen**, International Association for the Study of Pain, *Uncovering the Regulation of TRPA1 by Irritants and Proteins*, 1 year, \$20,000 • **Peter Peduzzi**, University of California, Los Angeles, *Comparative Effectiveness of Health System-based versus Community-based Dementia Care*, 5 years, \$3,345,754 • **Rafael Perez-Escamilla**, PATH (path.org), *The Maternal and Child Survival Program in Mozambique*, 1.1 years, \$64,489 • **Quentin Perrenoud**, Brain & Behavior Research Foundation (formerly NARSAD), *Disruption of Peri-Neuronal Nets in a Model of Schizophrenia*, 2 years, \$70,000 • **Richard Pierce**, Charles H. Hood Foundation, *Assessment and Mechanisms of Blood Vessel Dysfunction in Critically Ill Children*, 2 years, \$150,000 • **Christopher Pittenger**, Nancy Taylor Foundation for Chronic Diseases, *Targeted Neurofeedback: A Novel Nonpharmacological Treatment for Obsessive-Compulsive Disorder*, 2 years, \$216,000 • **Krystal Pollitt**, McGill University, *Identifying and Evaluating New Environmental Risk Factors for Cancer, Cardiovascular and Neurological Diseases through Innovative Approaches to Population Based Exposure*, 4 years, \$123,218 • **Vinod Ramgolam**, L2 Diagnostics (NIH), *SBIR: Therapeutic Inhibition of MIF to Restore Glucocorticoid Response*, 1.5 years, \$136,347 • **Julie Ramseyer**, Howard Hughes Medical Institute, *Elucidating the Role of Interleukin-6 Signaling in the Anti-Melanoma Immune Response*, 1 year, \$38,000 • **Chin Reyes**, The Chapin Hall Center for Children, *Training on the Climate of Healthy Interactions for Learning & Development (CHILD): A Tool to Assess the Mental Health Climate in Early Child Care and Education Settings*, 6 months, \$6,000; UNICEF New York, *Technical Assistance Visual Analytics*, 1 year, \$58,275; Michigan Public Health Institute (DHHS), *CHILD Training in Michigan*, 1 year, \$38,440; University of Florida, *PPF Evaluation*, 7 months, \$49,999; Pennsylvania Key, *Training on the Climate of Healthy Interactions for Learning & Development (CHILD): A Tool to Assess the*

Mental Health Climate in Early Child Care and Education Settings, 1.5 years, \$7,500 • **Aaron Ring**, Gabrielle's Angel Foundation for Cancer Research, *Hacking Cytokine Pathways for Precision Cancer Immunotherapy*, 3 years, \$225,000 • **Doug Rioux**, Howard Hughes Medical Institute, *Identification and Characterization of Chemosensory Neurons Involved in Respiration in the Model Organism Drosophila melanogaster*, 1 year, \$38,000 • **Harvey Risch**, Cedars-Sinai Medical Center (NIH), *Expediting the Diagnosis of Pancreatic Cancer Leveraging Big Data*, 1 year, \$16,634 • **Cai Roberts**, American Cancer Society, *Crosstalk between p53 and TWIST in Chemoresistant Ovarian Cancer*, 3 years, \$163,500 • **Kurt Schalper**, Case Western Reserve University (NIH), *Computerized Histologic Risk Predictor (CHIRP) For Early Stage Lung Cancers*, 2 years, \$28,705 • **Martin Schwartz**, New York University (NIH), *Altered Mechanotransduction as a Therapeutic Target for Thoracic Aortic Aneurysm*, 5 years, \$510,952 • **Esen Sefik**, Damon Runyon Cancer Research Foundation, *The Effect of Microbes, Diet on the Intestinal Immune System in the Context of Obesity and Cancer*, 4 years, \$231,000 • **Cortlandt Sellers**, Radiological Society of North America, *Immune-Profiling and Loco-Regional Therapy for Hepatocellular Carcinoma*, 3 months, \$3,000 • **Andrew Sewell**, Medical Device Business Services, *Tuition/Travel Grant Andrew Sewell*, 2 months, \$1,700 • **Eugene Shapiro**, Rhode Island Hospital (NIH), *Trial of Oral Antibiotics for the Treatment of Childhood Lyme Meningitis*, 1 year, \$10,162 • **Arietta Slade**, Metodecentret - Center for Innovation og Metodeudvikling, *MTB Metodecentret Agreement*, 6 years, \$813,740 • **Dana Small**, University of North Carolina at Chapel Hill (NIH), *Neurobehavioral Plasticity to Regular Sugar-Sweetened Beverage Intake: An fMRI Experiment*, 1 year, \$29,011 • **Angeliki Stamatouli**, Endocrine Fellows Foundation, *Proposal for Testing Electronic Health Record-enabled Management of Diabetes with Telemedicine*, 1 year, \$5,000 • **Michael Strambler**, University of Connecticut, *PDG evaluation*, 1.2 years, \$143,918 • **Joann Sweasy**, American Cancer Society, *Yale Comprehensive Cancer Center ACS Institutional Research Grant*, 3 years, \$360,000 • **Tamara Taggart**, FHI 360 (NIH), *The Influence of Religiosity and Other Psychosocial Factors on HIV Risk Behaviors among Black Men Who Have Sex With Men*, 4 months, \$26,174 • **Christian Tschudi**, University of Connecticut Health Center (NIH), *Gene Expression Control by Trypanosome Cyclin-Dependent Kinase CRK9*, 1 year, \$37,296 • **Flora Vaccarino**, Blackswan Foundation, *Gene Targets of FOXG1 in Human Brain Progenitors*, 1 year, \$130,641 • **Eric Velazquez**, Duke University (NIH), *PTICHES*, 9 months, \$78,780 • **Narendra Wajapeyee**, University of Massachusetts Medical School (NIH), *A Novel Druggable Epigenetic Vulnerability Pathway in HCC*, 1 year, \$233,887 • **Joshua Warren**, Emory University (NIH), *Extreme Heat Events and Pregnancy Duration: A National Study*, 1 year, \$47,994 • **Adam Wisniewski**, International Isocyanate Institute, *PIP701: Glutathione Reactivity Assay with MDI Substances*, 8 months, \$83,904 • **Yang Yang-Hartwich**, Colleen's Dream Foundation, *Effects of Exercise on Ovarian Cancer Progression*, 1.3 years, \$25,001 • **James Yu**, Alex's Lemonade Stand, *Impact of Racial Disparities on Survival for Children and Adolescents—a Gamma Knife Retrospective Population-Based Study*, 2 months, \$5,000 • **Eunice Yuen**, **Jerome Taylor**, Brain & Behavior Research Foundation (formerly NARSAD), *Inhibitory Synaptic Dysfunction in Autism Spectrum Disorder*, 2 years, \$70,000

// **Chair** (page 1) Center, completed her residency in orthopaedic surgery at the University of Missouri Kansas City and did a fellowship in hand surgery at Columbia College of Physicians and Surgeons/Roosevelt Hospital. She did additional fellowship training in pediatric hand and upper extremity surgery at Texas Scottish Rite Hospital for Children in Dallas, Texas. She joined the faculty of UCSF in 1999. “I have been impressed not only with the people at Yale, but also Yale’s forward thinking in terms of new ways of providing musculoskeletal care at a very high level and reaching all people who need that care,” she said. Although Lattanza treats all conditions and traumatic injuries in the upper extremity, she specializes in post-traumatic and congenital reconstruction for pediatric and adult

elbow problems, treating patients from around the country and across the globe. She is a world-renowned leader in patient-specific 3D surgical planning and technology for deformity correction. She led a team that performed the world’s first elbow-to-elbow transplant in 2016, transplanting a patient’s left elbow into his right arm to give him one functioning extremity after a devastating accident. Lattanza frequently travels to Nicaragua and other countries on mission trips to perform hand surgery and is eager to expand upon the global initiatives already in place in her new department at Yale. Her research interests include 3D surgical planning for deformity correction, elbow instability, and other post-traumatic elbow conditions in children and adults, as well as diversity

in orthopaedic surgery—specifically the underrepresentation of women. When she begins her appointment at the School of Medicine, Lattanza will become one of only two current female chairs of orthopaedics in the U.S. In 2009, she co-founded the Perry Outreach Program to increase exposure of high school girls to orthopaedic surgery and biomechanical engineering. Now known as the Perry Initiative, the program is named after Lattanza’s mentor, Jacquelin Perry, MD, who was one of the first women orthopaedic surgeons in the country. It began with 18 high school girls in San Francisco and has now reached more than 10,000 high school, college, and medical students across the country. Lattanza’s research has shown that young women who complete the program are applying

and matching to orthopaedic surgery residencies at a rate of about 24%, compared to the national average of about 14%. Her goal is to reach 30% within the next three years. Lattanza has received numerous awards for both her clinical care and outreach efforts. She received UCSF’s Compassionate Physician Award in 2013 and Exceptional Physician Award in 2014, and the Jefferson Award for Community Service in 2014, and has been ranked by her peers as a Bay Area Top Physician for multiple years. In addition to her other leadership roles, she served as president of the Ruth Jackson Orthopaedic Society in 2017 and is active in the American Academy of Orthopaedic Surgeons, the American Society for Surgery of the Hand, and the American Orthopaedic Association.

A major gift to support LGBTQ-related work at YSPH

YSM alumnus' donations aid research, education, and global health interventions

As a psychiatrist, David R. Kessler, MD '55, understands the swirling mix of anxiety and fear that can consume individuals who identify as LGBTQ during their struggle to come out about their sexual orientation.

Kessler is not only trained in such knowledge. He lived it. From the intense anxiety attacks he suffered as a closeted gay medical student in the 1950s to the fears of persecution he and other closeted gay doctors shared in the 1970s, Kessler lived through a turbulent time for LGBTQ people in American history.

Now retired and living on the West Coast, Kessler publicly affirmed his sexuality in 1978. He helped launch the country's first formal gay doctors' organization, the Bay Area Physicians for Human Rights. Kessler later served as president of the National Gay Caucus of Members of the American Psychiatric Association, which became the American Association of Gay and Lesbian Psychiatrists.

He now wants to help additional LGBTQ individuals who may be struggling to come out or who are dealing with stigma, oppression, and other issues that have an impact on their mental health.

"Coming out was a fantastic experience for me and that's why I'm so interested in helping others," Kessler says, "because I realized from my own

experience what a meaningful, life-changing event it is." Kessler recently made a gift of \$200,000 to support the work of Yale School of Public Health (YSPH) Associate Professor John Pachankis, PhD, and his Esteem Research Group, which is dedicated to addressing the depression, anxiety, and substance use problems that disproportionately affect the LGBTQ community and can erode healthy relationships and behaviors. A clinical psychologist, Pachankis is internationally known for his development of novel psychosocial interventions to improve LGBTQ individuals' mental health.

"I'm very supportive of his work not only in this country but internationally, which is really unbelievable," says Kessler. "People around the world are dealing with issues related to coming out and John is studying how it affects them in a scientific and rigorous manner, which is very impressive."

Kessler also is directing \$5 million from his estate to YSPH, part of which is intended for the creation of a David R. Kessler Endowed Professorship. The professorship and accompanying resource fund will support teaching and research associated with improving LGBTQ mental health.

"As a stigmatized minority in society, people who identify as LGBTQ are subject to continuous assaults on their self-esteem and sense of belonging in their families, schools, and workplaces," says Sten H. Vermund, MD, PhD, dean and M.R. Lauder

Professor of Public Health, and professor of pediatrics. "I cannot think of a higher impact program in which Dr. Kessler could invest than Dr. Pachankis' Esteem Program."

Pachankis' research is dedicated to delivering effective LGBTQ-affirmative mental health treatments to populations both in the United States and around the world—such as those in rural Appalachia, China, and Eastern Europe.

Some of the programs Pachankis has initiated since arriving at Yale in 2013 involve improved training for mental health providers, delivering mental health treatment via the internet and mobile applications, and finding ways to sustain such treatments in areas where LGBTQ stigma is present and strong.

"David's journey inspires all of us to be as courageous and creative as his generation has been in living proudly and meaningfully in the face of societal and emotional barriers," says Pachankis. "For a lot of LGBTQ people, that journey includes supporting the next generation of LGBTQ individuals."

Kessler says he was interested in creating something at Yale for years, but it took two tries to get it done. The first time he approached the university in the early 1990s, the people



David Kessler (left) has pledged a gift of more than \$5 million to Yale School of Public Health to support work by John Pachankis (right) to reduce stigma and improve the health of LGBTQ people, and endow a professorship to enhance teaching, research, and training for mental health providers.

he met with were not sure where the funds should be directed or how they might be used, and Kessler chose instead to create the David R. Kessler Lectures in Lesbian and Gay Studies at his other alma mater, the City University of New York.

A longtime supporter of Yale School of Medicine, Kessler decided to make the estate gift to the School of Public Health after speaking with Vermund and YSM Deputy Dean and Chief Diversity Officer Darin Latiimore, MD, who introduced him to Pachankis last year.

"Now Yale is ready, willing, and able with a research program in full swing that is very close to my heart," Kessler says. "I am delighted to be able to come back and do it even bigger and better."

// Gift (page 1) to pursue essential questions and find new strategies for improving human life," said Robert J. Alpern, MD, dean and Ensign Professor of Medicine. "I am grateful for the foundation's many contributions."

"The Blavatnik Family Foundation has been an enthusiastic and longstanding supporter of science at Yale, and I thank Len Blavatnik for his continued generosity," said Yale President Peter Salovey, PhD '86.

When the surrounding environment is ideal—food and water are plentiful, the temperature is neither too hot nor too cold, there are no harmful pathogens, toxins, or predators—our bodies can put resources toward growth and reproduction. But when the environment becomes unfavorable and we lack necessary nutrients or are faced with threats, maintenance programs, which conserve or reallocate the body's resources in order to promote survival, take over.

In the animal world, one striking example of this process is hibernation. As temperatures drop, some animals engage in life-prolonging tactics—lowering body temperature, respiration, and heart rates, and passing months without water, while gaining remarkable abilities to fight infection, heal wounds, and withstand below-freezing temperatures—abilities that Medzhitov likens to superpowers.

"When in that state, the animal becomes highly resistant to stressors and damage," Medzhitov said.

Similar programs are essential to our own physiological toolkit. For example, we see their effects in comas—initiated during severe threats to human survival—and protective effects that have been observed with fasting.

Medzhitov's research group is now tackling several fundamental questions about survival programs, including the control of maintenance programs, how cells enter maintenance modes, which maintenance programs contribute to aging, and whether sleep—the primary function of which is still unknown—is a type of periodic maintenance program.

Another avenue of investigation involves which brain circuits control maintenance programs. The hypothalamus, which governs many processes including appetite and temperature, also controls growth and reproduction. "Because the hypothalamus controls two of the three biological programs, it's likely the hypothalamus controls the third as well," said Medzhitov, who is exploring that hypothesis in the lab. "The continued support of the Blavatnik Family Foundation will enable my lab to pursue these essential questions and find new strategies for improving human life."

Understanding human maintenance programs is crucial. Knowing

how they function could, for instance, allow physicians to engage their protective benefits in situations where they are needed. Imagine being able to better prepare the body for an intense and complicated surgery, to protect organs that are being harmed by disease, or to limit damage resulting from a heart attack or stroke.

A deeper understanding of maintenance programs could also allow doctors to boost them when they begin to fade. As we age, maintenance programs wane, and without them, our bodies become susceptible to age-related complications and disease. "If we understand how to enhance maintenance programs, how to prolong their action, our bodies will be able to run longer," Medzhitov explained. "There are many important reasons why understanding these functions is really critical, not just from the basic perspective, but also regarding their applications to medicine."

"The Blavatnik Family Foundation is committed to supporting research that has the potential to significantly improve human health," said Blavatnik. "By deepening our understanding of human biology, the work taking place at Yale will identify important new approaches for preventing and treating illness and promoting longer, healthier lives."

Awards & Honors



James Rothman, PhD, chair and Sterling Professor of Cell Biology, and professor of chemistry, has been named to the Royal Society, a fellowship of many of the world's most

eminent scientists, and the oldest scientific academy in continuous existence. He is one of seven foreign members among the 50 new members announced in April. Rothman shared the 2013 Nobel Prize in Physiology or Medicine for his work on how molecular messages are transmitted inside and outside of our cells.



Paul E. Turner, PhD, Elihu Professor of Ecology and Evolutionary Biology, and professor of microbiology, has been elected to the National Academy of Sciences as well as the American

Academy of Arts and Sciences. Turner studies the evolutionary genetics and genomics of viruses. His lab's work has advanced the use of phage therapy—bacteria-killing viruses—to combat infection, and also knowledge of how viruses evolutionarily adapt to overcome such new challenges as emergence on novel host species, transmission via new arthropod vectors, survival at elevated temperatures, or changes in host immunity.