

## 'A CELEBRATION OF SCIENCE' Festival Showcases Intramural Research Program

BY ERIC BOCK

"I've never seen a time of greater excitement and promise across a broad range of areas from basic to clinical research as what we have right now," said NIH director Dr. Francis Collins during opening remarks at the 32nd NIH Research Festival on Sept. 12 in Masur Auditorium.

Research Festival highlights the diversity of scientific disciplines within the NIH Intramural Research Program. The 3-day event featured plenary, concurrent symposia and poster sessions, an award ceremony recognizing outstanding scientific research

performed by intramural fellows and several special exhibits highlighting resources available to the research community.

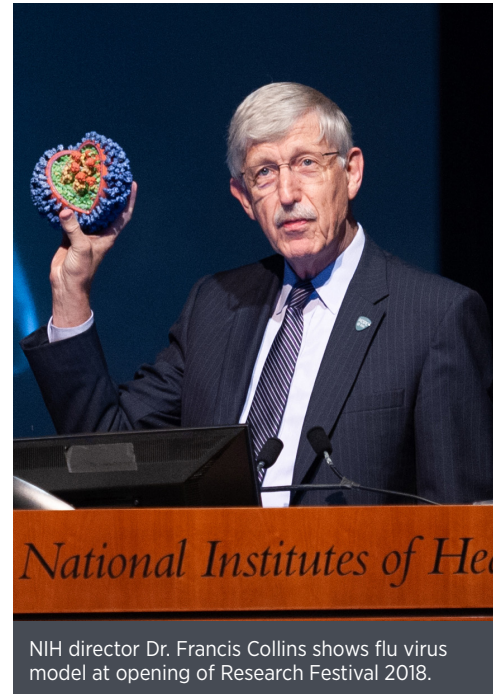
The festival's activities give intramural researchers opportunities to build networks with each other and come up with new ideas. "That's really what we're trying to achieve here," Collins said.

NIAID scientific director Dr. Steven Holland and NCI Center for Cancer Research scientific director Dr. Tom Misteli co-chaired the festival. This year, four IC directors spoke at the opening plenary session about scientific accomplishments and research advances in their own labs.

### Pregnancy is not an isolated event

The 9 months of pregnancy are the most important 9 months in each of our lives, said NICHD director Dr. Diana Bianchi. There are fetal origins of cardiovascular disease,

SEE FESTIVAL, PAGE 6



NIH director Dr. Francis Collins shows flu virus model at opening of Research Festival 2018.



Faculty needed for science adventures, p. 2.

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## BASE HITS Advances in DNA Editing Are Changing the Field

BY DANA TALESNIK

Dr. David Liu had to think outside the box. Facing limitations from traditional genome-editing techniques, he pursued a multidisciplinary approach that's revolutionizing the field.



Dr. David Liu

Fusing biology, chemistry and technology, Liu created a more efficient, more precise

SEE LIU, PAGE 4

## 'Worktime's Over' Wings It, Wins Relay

BY DANA TALESNIK



Dr. James Gilman starts race.

The atmosphere seemed different at the 35th NIH Institute Relay. Teams didn't appear to be quite as competitive as in years past, though there was plenty of team spirit. One thing was certain: there would be a new winner. Reigning two-time champ

SEE RELAY, PAGE 8

Oct. 30

### Ceremony To Honor NCI's Rabson

The life, legacy and accomplishments of the late Dr. Alan Rabson, former deputy director of the National Cancer Institute, will be celebrated on Tuesday, Oct. 30 from 2 to 4 p.m. in Kirschstein Auditorium, Natcher Conference Center. Rabson died July 4 at age 92.

The event will honor a distinguished scientific career that spanned six decades and included senior leadership roles at NCI and in the cancer community. A reception hosted by the Foundation for the NIH will follow.

RSVP to attend at <https://events.cancer.gov/od/rabson-remembered>. As part of the RSVP process, you will have the opportunity to post photos of Rabson. These may be shared at the commemoration and will be given to the family. If you are unable to attend but would like to share photos or a particular remembrance, you may do so through <https://events.cancer.gov/od/rabson-remembered/sentiments>.

Sign language interpretation will be provided. Individuals who need reasonable accommodation to participate should contact Kathy McBrien at (240) 276-5320 and/or the Federal TTY relay number 1-800-877-8339.

### 'Adventure in Science' Seeks Faculty

After 25 years of holding Saturday morning science classes for children at NIH—often taught by NIH postdocs and other staff—Adventure in Science (AIS) is planning its program for next year, but with a difference: the classes will be held at a nearby school rather than on the NIH campus.



AIS student Kiran Nadanam gets the feel of a real mammoth tusk.

PHOTO: YIN YANG

The program is still designed to show 8-11 year-olds the fun of science using hands-on activities—from building (and launching) model rockets to dissecting frogs, visualizing the activity of enzymes, measuring their own lung volumes, and more.

Teachers at AIS have been mostly volunteers from the NIH community and organizers hope NIH participation will continue even as classes move

to an off-campus site. Volunteering at AIS offers a great opportunity to exercise your teaching skills with an enthusiastic audience. You can volunteer to teach for only one Saturday, or for several.

If you are interested in AIS, read the "About Us" section at [www.adventureinscience.org](http://www.adventureinscience.org). If you want to volunteer, think about topics you might teach and send your ideas and contact information to Ed Max ([eemax68@gmail.com](mailto:eemax68@gmail.com)).

Enrollment for children is completed for this year, but will be open for 2019-2020 next spring, as will be announced at [www.adventureinscience.org/ais-registration](http://www.adventureinscience.org/ais-registration).



On hand at the award ceremony were (from l) Dr. Karen Parker, director, Sex and Gender Minority Research Office; awardees Dr. Jesse Ehrenfeld and Dr. Annesa Flentje; and Dr. James Anderson, director, DPCPSI.

PHOTO: CHIA-CHI CHARLIE CHANG

### Inaugural Award Features Early Investigators

The Sexual & Gender Minority Research Office recently held the inaugural NIH Sexual & Gender Minority Research Investigator Award event in Wilson Hall. Two awardees presented on their research and answered questions from the audience. Their lectures highlighted research on health disparities faced by sexual and gender minority (SGM) populations; both awardees are early investigators who are making significant contributions to SGM research.

The first presentation by Dr. Jesse Ehrenfeld, the Joseph A. Johnson, Jr. distinguished leadership professor of anesthesiology, surgery, biomedical informatics and health policy at Vanderbilt University, was titled, "Informatics and Health Policy: Building the Evidence to Improve Transgender Health."

The second presentation by Dr. Annesa Flentje, assistant professor, School of Nursing, University of California, San Francisco, was titled, "Reducing Health Disparities Among Sexual and Gender Minority Individuals." Both researchers are already leaders in the field.

You can watch the event in its entirety at <https://videocast.nih.gov/launch.asp?26058>.



Honoring Dr. Kenner Rice (third from l) were (from l) NIDA's Dr. Amy Newman, Dr. Alex Makriyannis, CPDA founder and director, and Dr. James Bean, provost and senior vice president of Northeastern University.

PHOTO: CPDA

### NIDA's Rice Honored at Conference

Dr. Kenner Rice, chief of the drug design and synthesis section, NIDA, received a Lifetime Achievement Award at the 3rd annual Chemistry and Pharmacology of Drug Abuse Conference (CPDA) held in Boston recently.

The conference takes place annually on the Northeastern University campus, bringing together top medicinal chemists and pharmacologists to discuss the latest in drug abuse research and how this research applies to the design and testing of future pharmacotherapies that treat drug addiction.

Rice was honored for his more than 40 years of research on substance abuse. He began substance abuse research in 1974 as a postdoctoral fellow at NIDDK before joining NIDA in 2006, with a secondary appointment at NIAAA.

Rice has been the recipient of a number of major research awards, including the Nathan B. Eddy Award of the College of Problems of Drug Dependence.

### NICHD's DePaolo Wins Award

Dr. Louis DePaolo, chief of NICHD's Fertility and Infertility Branch, recently received the Suheil J. Muasher Distinguished Service Award of the



American Society for Reproductive Medicine. The award is given in recognition of individuals and organizations providing distinguished service to the society. DePaolo was cited for his efforts as chief of the branch, the support of which has fostered

groundbreaking contributions in reproductive medicine by established researchers and developing scholars.

## NIBIB Holds Workshop on AI in Medical Imaging

BY RAYMOND MACDOUGALL

Artificial intelligence (AI) is tantalizingly close to being incorporated in medical practice, perhaps more quickly into the field of medical imaging than anywhere else. Through AI, computers can be trained to rapidly and reliably assist doctors with clinical information-gathering and image analysis that may improve diagnoses, treatment plans and patient outcomes.

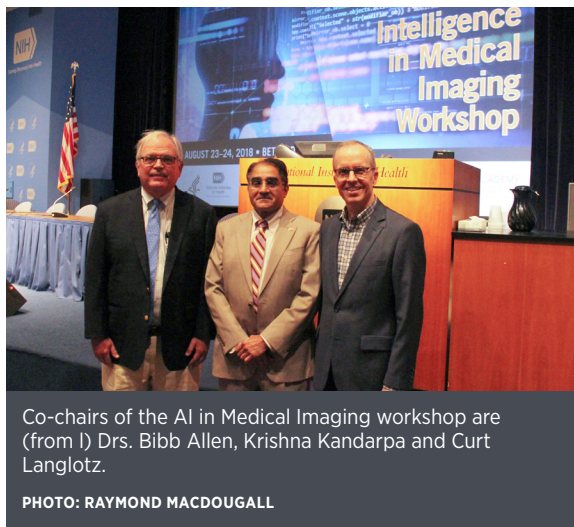
The National Institute of Biomedical Imaging and Bioengineering recently hosted a 2-day workshop to consider the increasingly sophisticated and powerful capabilities of AI in medical imaging. The workshop drew national and international experts to attend and view the videocast; they represented universities, federal agencies and industry as well as various science and medicine specialties. Many have experienced the early advances of AI. In a raised-hand survey, most indicated they have already used AI tools in their research; only an estimated 5 percent, however, have ever used AI tools in their clinical practice.

Workshop co-chair Dr. Krishna Kandarpa, director of research sciences and strategic directions in the Office of the NIBIB Director, explained that much of the research and development related to AI in medical imaging is impressive, but has occurred independently and in silos. “Interdisciplinary collaboration and interoperability of systems are important necessary developments going forward,” he said, noting that the timing of the workshop is important for fostering an environment for future collaborative partnerships that will accelerate progress for the field. “The promise of AI application to medical imaging is essentially limitless.”

The meeting addressed state-of-the-art AI applications in medical imaging, hurdles that would impede their quality, reproducibility and reliability and ways AI can improve the value of medical imaging to health care overall. Among the challenges impeding faster implementation is that annotation of images is expensive and at times inconsistent, underscoring the importance of improving annotation methods and curation of images.

Stanford University School of Medicine’s Dr. Curt Langlotz, professor of radiology and biomedical informatics, co-chaired the workshop. He also serves on the board of directors of the Radiological Society of North America (RSNA) as liaison for informatics. He described AI and machine learning as entirely new paradigms for the analysis of images and the creation of clinical decision support systems for imaging professionals.

“These machine learning methods are compelling because of their accuracy relative to the methods



Co-chairs of the AI in Medical Imaging workshop are (from l) Drs. Bibb Allen, Krishna Kandarpa and Curt Langlotz.

PHOTO: RAYMOND MACDOUGALL

they are replacing,” Langlotz said. “Every imaging research laboratory I know is experimenting with these tools. We need to avoid re-inventing the

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*“The promise of AI application to medical imaging is essentially limitless.”*

—DR. KRISHNA KANDARPA

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wheel and efficiently deploy research resources for the benefit of the entire research community.”

He outlined several areas where AI research could improve the use of clinical images in medical practice, such as when medical images are ordered, acquired and interpreted. He described not only how machine learning can enhance computer-aided disease detection and classification to increase diagnostic accuracy, but also how AI applications can provide decision support throughout the imaging life cycle in patient care.

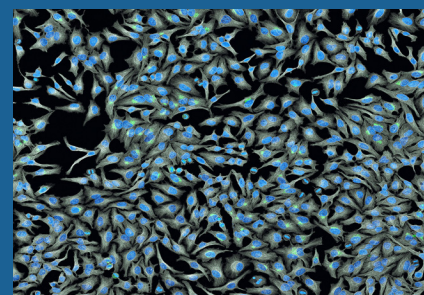
For example, AI methods can optimize the imaging request, enhance image reconstruction to reduce radiation dose, triage images for timely identification of critical abnormalities and assure result communication for appropriate follow-up. “Although we are already seeing clinical applications, we are still a few years away from widespread implementation of these machine learning algorithms,” Langlotz said.

Also co-chairing the workshop, Dr. Bibb Allen is chief medical officer for the American College of Radiology Data Science Institute and a radiologist at Grandview Medical Center in Birmingham, Alabama. “We are seeing multiple specialty societies become engaged in assessing and guiding

the impact of AI on their specialties,” he said. “I see AI in health care as an important enough advancement that as a society we cannot afford to have such tools reserved only for large, well-funded medical centers. Certainly, business models will need to be developed to help deliver AI tools to widespread medical practice. One issue is that these models must avoid a two-tier system where some health systems are able to afford AI tools for their patients and others are not.”

The workshop discussions will be distilled and published in a report that provides a roadmap for future research geared towards accelerating the development and implementation of AI technology in clinical imaging, which promises to change the practice of medicine.

In addition to NIBIB, the workshop was co-sponsored by NHLBI, NCI, NIAID, NIDCR, the American College of Radiology, RSNA and the Academy for Radiology & Biomedical Imaging Research. **R**



ON THE COVER: Panoramic view of HeLa cells, a cell line many scientists use to study a large variety of research questions. The cells’ nuclei containing the DNA are stained in blue with cytoskeletons in gray.

IMAGE: TOM DEERINCK, NATIONAL CENTER FOR MICROSCOPY AND IMAGING RESEARCH

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**Editor:** Rich McManus  
[Rich.McManus@nih.gov](mailto:Rich.McManus@nih.gov)

**Associate Editor:** Carla Garnett  
[Carla.Garnett@nih.gov](mailto:Carla.Garnett@nih.gov)

**Staff Writers:**  
Eric Bock • [Eric.Bock@nih.gov](mailto:Eric.Bock@nih.gov)  
Dana Talesnik • [Dana.Talesnik@nih.gov](mailto:Dana.Talesnik@nih.gov)

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## Liu

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method called base editing, which has the potential to target and treat genetic diseases.

“He’s doing organic chemistry inside the cell,” said NIH director Dr. Francis Collins, introducing Liu’s recent Dr. Marshall Nirenberg Lecture. “Liu’s research has taken us to the next level in gene editing, not where you cut the DNA and hope something good happens after that, but where you very precisely go in and do an edit of one base to the one you wanted it to be.”

There are more than 60,000 genetic variants associated with disease, most of which are point mutations that could be repaired by a single base change. Base editors can directly, permanently convert one base pair to another without the double-stranded DNA breaks, deletions and rearrangements that often occur with standard genome-editing methods.

“We imagined: what if you could do chemistry directly on a target nucleotide within the genome of a living cell and directly catalyze the conversion of [the bases]?” said Liu, Richard Merkin professor and vice-chair of the faculty at the Broad Institute of Harvard and MIT.

Using protein engineering, Liu and his lab have developed and continue to optimize two classes of base editors that can efficiently make four types of base-to-base changes (C to T, T to C, A to G and G to A) in DNA in many cell types and organisms. “Collectively, these four transitions account for about 62 percent of pathogenic [variants],” said Liu.

One of the early challenges was figuring out how to correct a point mutation with precision, since most catalysts would operate on many DNA bases near the target site. The solution involved a bit of insight and chemical surgery. The Cas-9 gene editor unwinds the DNA’s double helix, so Liu began testing various enzymes that only accepted single-stranded DNA.

“Since the vast majority of your genome is double stranded, we wouldn’t expect that activity would promiscuously spread to dozens or hundreds of bases nearby,” said Liu. “This simple idea was really exciting to us because we thought maybe we could programmably direct this chemical transformation on DNA.”

It’s been 2 years since Liu published his

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*“We imagine that locally administering a base editor might be able to permanently shut down chronic pain in certain tissues.”*

—DR. DAVID LIU

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first papers on base editing and already researchers around the world are using these tools widely, developing their own variants across different organisms, from bacteria, yeast and wheat to plants, fish, insects, even mammals. One scientist tested the editor on goats toward increasing the cashmere yield. Another used base editing to correct the Marfan syndrome mutation in human embryos.

The first-generation base editor Liu developed performed well in a test tube but needed modifications to potentially work in humans. If you alter a DNA base in a mammalian cell, “the cell will freak out,” he explained. “It will interpret that change as damage and initiate a highly evolved set of systems of DNA repair that will respond to, and probably try to undo, the change.”

To solve this challenge, Liu’s lab engineered a method to trick the human mismatch repair system. They’re also chemically engineering ways to target stubborn, uncooperative cells, which could have applications in such areas as pain management.

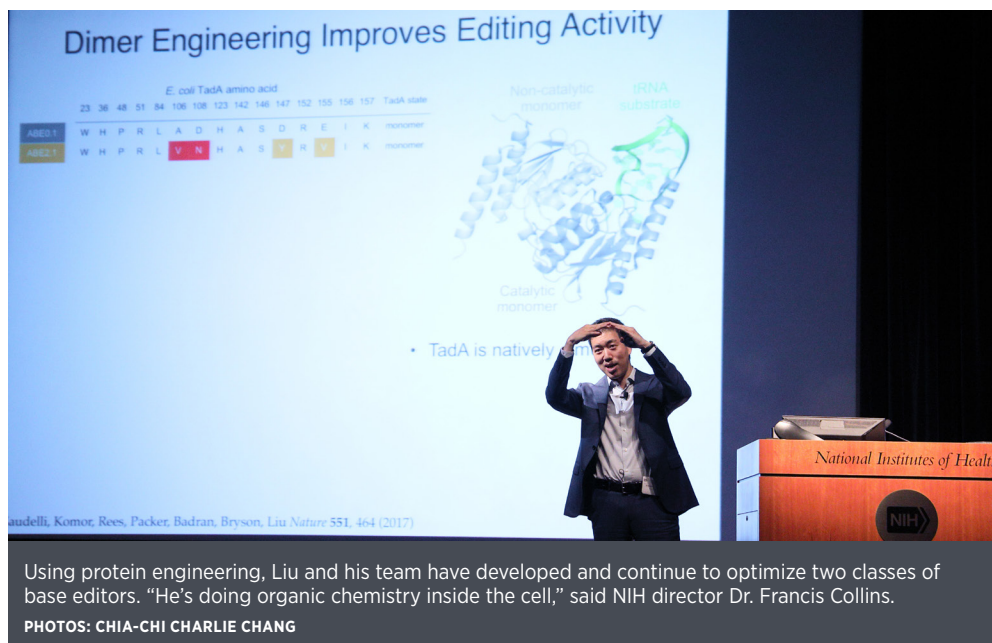
“We imagine that locally administering

a base editor might be able to permanently shut down chronic pain in certain tissues,” he said.

Liu’s newer base editor can tackle previously difficult-to-edit sites, including mediating the conversion of AT to GC base pairs, which could fix some of the most common point mutations in human disease. Unveiled only a year ago, this base editor already has been tested by numerous labs in plants and mammals, and recently was used to correct muscular dystrophy in adult mice.

And now, Liu can evolve base-editor variants much faster. Liu’s lab recently developed PACE (phage-assisted continuous evolution), a system that automates the many steps of protein evolution. “It’s enabled us to perform lots and lots of rounds of evolution that would otherwise take more than a Ph.D. lifetime to do,” he said.

Using PACE, Liu’s lab developed xCas9, an enzyme Liu calls “a picky eater” due to its editing specificity. Liu is working to further improve editing efficiency and develop editors that can mediate additional base conversions.




Using protein engineering, Liu and his team have developed and continue to optimize two classes of base editors. “He’s doing organic chemistry inside the cell,” said NIH director Dr. Francis Collins.

PHOTOS: CHIA-CHI CHARLIE CHANG

Liu also used the opportunity of speaking at NIH to describe new research on a disease long studied by Collins, using a mouse model the NIH director previously created. Progeria, a syndrome that causes premature aging and early death, stems from a single point mutation, a mutant of the lamin A protein. Using traditional gene editors in these cases isn't optimal because of the need to correct the mutation, and because they may inadvertently create other splicing defects.

After applying base-editing techniques in the mouse model, Liu's team observed correction of the lamin A mutation from T back to a C. The treated cells exhibited correction at the DNA, RNA and protein levels.

"We were pretty stunned to find this extent of editing," said Liu. "It provides us with an exciting glimpse of how one might use an integrated, engineered base editor... to address a mouse model of a serious human genetic disease." 

### Caprara Heads CSR Review Group

Dr. Mark Caprara has been named chief of the interdisciplinary molecular sciences and training (IMST) integrated review group at the Center for Scientific Review. He previously served as scientific review officer for CSR's biodata management and analysis and instrumentation and systems development study sections.



Caprara will oversee IMST's eight study sections that review NIH grant applications related to emerging technologies used to answer molecular questions and training applications in the molecular sciences. The breadth of fields covered include bioengineering, biochemistry,

biophysics, cancer biology, cell biology, chemistry, molecular biology and genetics. IMST review panels also review small business grant applications.

Caprara earned his Ph.D. in biology from Temple University and conducted postdoctoral research at the Institute for Cellular and Molecular Biology at the University of Texas. He then went to Case Western Reserve University, where he was an assistant professor and researched the structural/functional relationships of proteins involved in the regulation of RNA processing. His lab also conducted research on mobile genetic elements.

## National Physical Therapy Month Observed

PT IN SPOTLIGHT

October is National Physical Therapy Month. Physical therapists, including those at the Clinical Center, are licensed medical professionals who work with patients following an illness or injury and provide interventions to allow patients to be as independent as possible.

Physical therapists work in a variety of health care settings including outpatient clinics, private practices, hospitals, rehabilitation facilities, nursing homes, home health care, sports and fitness settings, schools, hospice facilities, occupational settings, government agencies and research centers.



The Clinical Center physical therapy team includes (from l) Joe Shrader, Pat Connors, Aron Mebrahtu, Capt. (ret.) Michael Smith, Capt. Bart Drinkard, Mina Jain, Adrienne Jackson, Melissa Waite, Lauren Gornoski, Lt. Zavera Brandon, Lt. Kerry Quinn.

Therapists treat patients with diverse illnesses and injuries, including helping an infant meet developmental milestones, rehabilitating a torn ACL in a high school soccer player and assisting a 30-year-old recovering from a traumatic brain injury or an older adult recovering from a hip replacement. Physical therapists help people maximize quality of life by providing a holistic approach through addressing physical, psychological, emotional and social well-being.

Additionally, physical therapists are helping combat the opioid epidemic. Americans continue to be prescribed and misuse opioids at an alarming rate. Physical therapy is a safe and effective alternative to opioids for treatment of chronic pain conditions. The CDC Guideline for Prescribing Opioids for Chronic Pain states "many non-pharmacologic therapies, including physical therapy... can ameliorate chronic pain."

Furthermore, "there is high-quality evidence that exercise therapy (a prominent modality in physical therapy) for hip or knee osteoarthritis reduces pain and improves function immediately after treatment and that the improvements are sustained for at least 2-6 months. Previous guidelines have strongly recommended aerobic, aquatic and/or resistance exercises for patients with osteoarthritis of the knee or hip. Physical therapists partner with patients, their families and other health care professionals to manage pain, often reducing or eliminating the need for opioids. Research has shown that a simple education session with a physical therapist can lead to improved function, range of motion and decreased pain. Before you agree to a prescription for opioids, ask if physical therapy might be right for you."—Zavera Brandon, Kerry Quinn

### NIDA Issues FOAs on HEALing Communities Study

NIDA recently issued two funding opportunities for cooperative agreements to support components of the HEALing Communities Study—an integrated approach to test interventions for opioid misuse and addiction in communities hit hard by the opioid crisis. This study is part of the recently launched NIH initiative Helping to End Addiction Long-term (HEAL), a trans-agency, multi-faceted effort that uses science to bring hope to families and communities affected by the opioid crisis. NIH partnered with the Substance Abuse and Mental Health Services Administration to launch this study.

For more information on the funding opportunities, go to <https://grants.nih.gov/grants/guide/rfa-files/RFA-DA-19-017.html> and <https://grants.nih.gov/grants/guide/rfa-files/RFA-DA-19-016.html>.

## Festival

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cancer, hypertension, diabetes, obesity, allergies and mental illness.

“Your mother’s health and experiences when she was pregnant with you permanently affect your organs,” she said. “Pregnancy is not an isolated event.”

In 2014, NICHD launched the Human Placenta Project, the goal of which is to understand the role of the placenta in health and disease. The placenta functions “as a respiratory, cardiac and endocrine organ.”

It also provides oxygen and nutrients to the fetus.

Traditionally, the placenta has been studied after delivery, Bianchi explained.

Using non-invasive imaging technology, researchers aim

to study the organ as it develops in real-time to better understand its function and ultimately improve on maternal care. One grantee is measuring the transfer of oxygen through the placenta to determine its effects on fetal growth and brain development.

Bianchi’s own intramural lab aims to advance knowledge regarding the biomedical significance of cell-free DNA sequencing results, particularly when these screening tests yield unexpected findings in pregnant women, such as cancer. They are also working to “to treat Down syndrome prenatally to improve neurocognition.”

She concluded, “What happens in the womb influences your lifelong health.”

## Billions of neurons, trillions of connections

A person’s brain is incredibly complex. That complexity sets up both normal and dysfunctional human behavior, said NIMH director Dr. Joshua Gordon.

“There are billions of neurons, trillions of connections,” he said. “Understanding and acknowledging that complexity of human behavior is at the crux of what we’re trying to do at NIMH.”

When Gordon became NIMH director 2 years ago, he set 3 overarching research priorities: learn how neurocircuits perform calculations and translate this knowledge into novel treatments for mental illness, build mathematical models that explain behavior and develop better tools to prevent death by suicide.

NIMH-funded researchers, for example, are using animal models to study ways to detect, measure and monitor anxiety-like behavior, he said. By learning how circuits function in animals, scientists hope to translate those findings into treatments for people, an area Gordon acknowledges “we’re behind in.”

Scientists are also creating mathematical equations to predict behavior. One researcher, for instance, wrote a happiness equation, which is “some function of your baseline happiness plus how many rewards you get out there in the world.” Gordon believes that breaking down the “fuzzy



Dr. Joshua Gordon

concept of happiness” into quantifiable parameters might lead to better understanding of and novel treatments for diseases such as depression or post-traumatic stress disorder.

A third priority for NIMH is suicide prevention. Over the past 20 years, death by suicide has been increasing. Researchers have found “if you don’t ask about suicide or suicidal thoughts, you don’t find out about them.” Extramural scientists have focused on developing risk predictors that can identify adults at high risk of suicide attempt. NIMH’s intramural program has developed a screening instrument to help health professionals identify youth at risk for suicide.

## Resources are the research support

The National Library of Medicine is almost 180 years old, said NLM director Dr. Patricia Brennan. Over the past 20 years, the library “has been able to touch almost every single discovery of health information.”

She said NLM resources are “the research support we provide worldwide.” In addition, at NLM there are several programs of research: computational approaches to basic biology and public health, tools for better research and discovery from health data.

One example is the use of a computational strategy to study large sets of DNA to find



Dr. Diana Bianchi



At the NIH Animal Care and Use Program’s 3rd annual celebration and reflection ceremony were (from l) Dr. Stephen Denny, acting director, Office of Animal Care and Use; Dr. Heather Narver, clinical veterinarian, NINDS; Dr. Christin Davidson, postdoctoral fellow, NCATS; and Dr. Richard Wyatt, deputy director, Office of Intramural Research.

PHOTOS: MARLEEN VAN DEN NESTE

CRISPR-Cas proteins and the findings validated by experiments. This has yielded foundational tools for biotech research and development.

Another example is the development of novel machine learning algorithms to identify diseases affecting the developing world, such as cervical cancer, tuberculosis and other cardiopulmonary findings in HIV-positive patients and malaria, she said. Nurses and other community health care providers will be able to use these tools deployed on smartphone apps and other commonly available computational resources in areas that lack experts and where it's difficult to conduct screenings.

"The tools for better research emerge because we study the uses of our massive data systems and then create reusable resources for others," she explained.

### Undetectable means untransmissible

Theoretically, the end of the HIV/AIDS epidemic is achievable—only if every person infected with HIV receives treatment and those who are at higher risk for HIV take a pill that helps reduce the chance of infection, said NIAID director Dr. Anthony Fauci.

Scientists have made great advances in AIDS research since it was first observed 37 years ago. These include understanding the life cycle of the virus, developing an arsenal of drugs to suppress it and slowing its spread with prevention tools.

Three recent studies have led the World Health Organization to conclude "if you have no evidence of the virus in your blood, there is essentially no chance" of transmission. "Undetectable means untransmissible,"

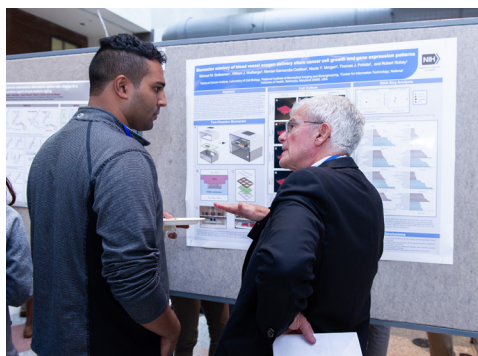


Dr. Patricia Brennan

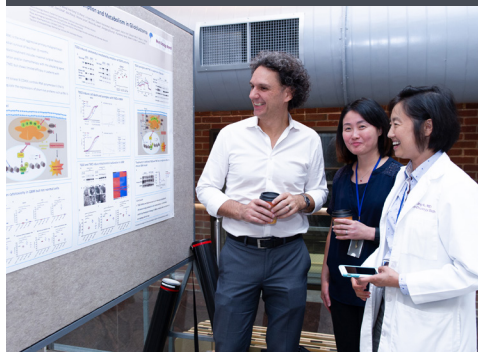
Fauci said. Treatment of uninfected individuals can also prevent HIV acquisition. One study showed a once-daily antiretroviral pill can prevent infection.

In the real world, however, the epidemic is far from over. In the United States, 1.1 million people are living with HIV. Of that population, 15 percent are unaware they have the disease. Almost 40,000 people are diagnosed each year.

A safe and effective preventive HIV vaccine remains elusive. The vaccine "really would be the nail in the coffin of our attempt



Above, Dr. Michael Gottesman (r), NIH deputy director for intramural research, discusses a poster with a festival attendee. Below, Dr. Tom Misteli, scientific director at NCI's Center for Cancer Research, does likewise with visitors to his poster.



to end the epidemic," Fauci explained.

He cautioned that "following the science" alone won't end the spread of the virus. Scientific advances must be implemented in an aggressive way. That's where political will, resources and sustained commitment to ending the pandemic come in.

"If we do that," Fauci said, "I am really quite confident that within our lifetime, or at least our professional life, we will actually see the end of the HIV/AIDS pandemic." **R**

### NIH Veterans Day Celebration, Nov. 7

The NIH community is invited to join our military and Public Health Service colleagues to celebrate Veterans Day and to recognize their service and continued contributions to the nation. This year's celebration will be held on Wednesday, Nov. 7 in Natcher Auditorium from 10 to 11 a.m. The event will include a military band, remembrance table ceremony, exhibits from veteran-oriented companies and uniformed services organizations and more. NIH veterans and families of veterans are especially encouraged to attend.

This year's keynote speaker is retired U.S. Navy Capt. Pius Aiyelawo, who currently serves as chief operating officer of the Clinical Center. Welcoming remarks will be delivered by retired U.S. Army Lt. Col. Cathy Troutman, currently serving as management analyst at NHLBI. Additionally, a veterans recognition address will be delivered by NIH principal deputy director Dr. Lawrence Tabak.

Sign language interpreters will be provided. Individuals who need reasonable accommodation to participate should contact Jayne Lura-Brown at [luraj@de45.nidr.nih.gov](mailto:luraj@de45.nidr.nih.gov) or (301) 594-5342 and/or the Federal Relay (1-800-877-8339). To find out more about how veterans contribute every day to the NIH mission, visit <https://jobs.nih.gov/veterans/vrf.htm>.

### Monti To Give Mendelson Lecture, Oct. 23

Dr. Peter M. Monti will deliver the 2018 Jack Mendelson Honorary Lecture on Tuesday, Oct. 23 at 1:30 p.m. in Lipsett Amphitheater, Bldg. 10. His talk is titled "Alcohol Misuse and HIV: Biology, Beliefs and Behavior."

Monti is an internationally distinguished scientist who has increased our understanding of the biobehavioral mechanisms that underlie addictive behavior. During his nearly 40-year career in addiction research, his work has spanned human laboratory and clinical studies of the behavioral and psychopharmacological effects of alcohol and other drugs as well as the assessment of addictive behaviors, mechanisms of behavior change and early intervention. He has been at the forefront of the development and testing of evidence-based treatment approaches for alcohol-related problems in a wide range of populations.

Monti currently serves as the Donald G. Millar distinguished professor of alcohol and addiction studies, professor of behavioral and social sciences and professor of psychiatry and human behavior and director of the Center for Alcohol and Addiction Studies at Brown University.



Dr. Anthony Fauci

## Relay

CONTINUED FROM PAGE 1

Charm City NeuRUNS, whose members used to train together intensively for months, was not among the 98 teams in the running.

This year, many teams didn't train at all; some even cobbled together teams in the days or even hours before racetime. Some admitted they were just winging it, which is true of this year's winners, Worktime's Over, a bunch of workaholics who barely made it out of the lab to run.

"We actually frown upon any effort that's not completely dedicated to a productive work environment, so we meshed well as a team," said the team's Andrew Gravunder, a research engineer in the Clinical Center's rehabilitation medicine department (RMD). "In fact, [teammate] Amanda Guth showed up 5 minutes before our heat because she



"I love this race; I do it every year," said Andrew Gravunder (r) of first-place Worktime's Over. Joining him are (from l) Matthew Short, Amanda Guth, Cameron Fick and Erin Heald. All work in RMD except Guth, from NINDS.

was so busy with work...I didn't even meet Erin (Heald) or Cameron (Fick) until a day before the race.

"NIH puts on such a great event every year to bond the community," Gravunder added. "It's just a disappointment that we lost 15 minutes of worktime."

This was the second year the relay took place behind Bldg. 10, where each runner raced the 500-meter course around the 10H parking lot before passing the baton to 1 of 5 teammates. David Browne, co-president of NIH's Recreation & Welfare Association, said teams usually register weeks in advance, but this year nearly half the teams signed up within days of the event.

"We just signed up yesterday and have been training all morning," said CC



NCBI's Generic 'cool' Name placed second. They are (from l) Alexander Goncareenco, Rebecca Sarto Basso, Jan Hoinka, Anna-Leigh Brown and Yaroslav Markov.

department of perioperative medicine lab chief Dr. Andrew Mannes of team Smooth Operators.

"I hadn't worked out in more than a year," said an NHLBI runner who asked to remain anonymous. "I should've saved my energy. The uphill at the end was killer; I was walking by that point."

Added Scott Tompkins of OER's Happy Feeters, "I was anticipating walking but nobody else was...I haven't run in years!"

Others had trained, a little. "We've been leisurely jogging around the Rockledge circle for a month to train and stay in shape," said Patrice Nickens, medical officer with NHLBI's Heart Failure and Arrhythmias Branch, from team Power & Rhythm.

Dilraj Singh, an IT specialist with Need for Speed, said, "We're excited to represent CSR and..." Before he could finish the thought, he realized his team was in the next heat and rushed off to the starting line.

"The relay was a good excuse to get on the main campus," said Dan Gowetski, staff scientist with a Vaccine Research Center



"Two of us are real runners," said NIAID's Alex George of third-place 2 Fast, 3 Furious, pointing to two teammates. The team includes (from l) Samuel Chauvin, Sarah Cook, Alex Waldman, George and Ellen Kim.

lab based in Gaithersburg, who ran with the mAbericks (mAb stands for monoclonal antibodies).

"I'm just going to jog and enjoy," said Jenny Serra, an NHGRI postdoc from Barcelona who ran with the Twinbrook Trotters.

"It was too short," lamented Benson Maloba, the newest member of NIAID's long-running team Pox Jox. "In Kenya, we like to run long distances."

Each team was required to have 5 members, including members of both genders, but organizers made some exceptions. Blaise Delahoussaye, an OD accounting tech who is deaf and blind, participated solo with the assistance of a colleague.

"I really enjoyed myself," said Delahoussaye, who last ran the relay in 2005. "David [Rice] did a superb job holding my arm to run together. No matter without sight, I



"Next year, we're going with tutus and tiaras because the lion was hot to wear while running," joked Andrea Keane-Myers of CSR's CSzars, who all wore costumes.

PHOTOS: MARLEEN VAN DEN NESTE

felt great and inspired to be a part of the NIH community. Thanks for keeping this event continually for so long."

Larry Jones of NHLBI's Running with the Jones ran one member short. Their fifth member forgot to bring his running clothes.

"I love seeing employees working together and everyone getting an opportunity to take a break and enjoy themselves," said Chris Gaines, program manager with ORS's Division of Amenities and Transportation Services, who has worked at NIH for 25 years and overseen 25 relays.

"It was an individual victory for me; I chased everyone on the last lap," said Chris Grant, a Georgetown graduate student who ran with NCI's Unincredibles. "But I'm proud of the whole team. I'm going to start training tomorrow for next year." **R**



## Diet Rich in Fried and Processed Foods Linked to Increased Hypertension in Black Americans



Diet appears to be a major contributor to the increased risk of hypertension in black compared to white Americans.

New findings suggest that diet is a major contributor for the increased risk of hypertension in black compared to white Americans. The results, published in the *Journal of the American Medical Association*, are part of the Reasons for Geographic and Racial Differences in Stroke (REGARDS) study, which looks at the incidence of stroke in approximately 30,000 individuals. The study is funded by NINDS.

“This study addresses a lead cause of racial disparity in mortality and identifies potential lifestyle changes that could reduce racial disparities in both stroke and heart disease,” said Dr. Claudia Moy, NINDS program director and one of the study authors.

In the study, led by Dr. George Howard, a biostatistics professor at the University of Alabama at Birmingham, researchers studied individuals over the age of 45 over a period of 10 years and looked to identify risk factors associated with the higher likelihood of developing high blood pressure in the study participants.

“The majority of disparities we see in the health of black versus white Americans are cardiovascular in nature,” said Howard, “and of these, all are tied to an increase in high blood pressure.”

For both men and women, a diet composed of high amounts of fried and processed foods and sweetened beverages was the greatest factor associated with why blacks are at a greater risk of developing

high blood pressure compared to whites. For both men and women, other important factors included salt intake and education level. For women, additional factors contributing to the racial difference in high blood pressure included obesity and waist size.

“One of the main factors affecting the difference between the black and white population is cardiovascular disease, and the increased risk of high blood pressure among black Americans could help explain why their life expectancy is 4 years shorter than that of whites,” said Howard. “Understanding how we can prevent this increased risk of hypertension in blacks is critical for reducing health disparities among the black population.”

## Fecal Microbiota Transplantation Helps Restore Beneficial Bacteria in Cancer Patients

Researchers at Memorial Sloan Kettering Cancer Center have shown that autologous fecal microbiota transplantation (auto-FMT) is a safe and effective way to help replenish beneficial gut bacteria in cancer patients who require intense antibiotics during allogeneic hematopoietic stem cell transplantation.

In their study, patients who underwent the procedure were randomly assigned into two groups: one group received standard care and the other received auto-FMT. The researchers found that auto-FMT resulted in the recovery of beneficial gut bacteria to near baseline levels within days, thus restoring patients’ digestive, immune and other essential functions. With standard care, beneficial bacteria typically take many weeks to recover from antibiotic treatment, leaving patients at risk of other infectious diseases, including *Clostridium difficile*.

NIAID provided funding for part of the project. The study report appears in *Science Translational Medicine*.

“This important study suggests that clinical intervention using auto-FMT can safely reverse the disruptive effects of broad-spectrum antibiotic treatment,” said NIAID director Dr. Anthony Fauci. “If validated in larger studies, this approach may prove to be a relatively simple way to quickly restore a person’s healthy microbiome following intensive antimicrobial therapy.”

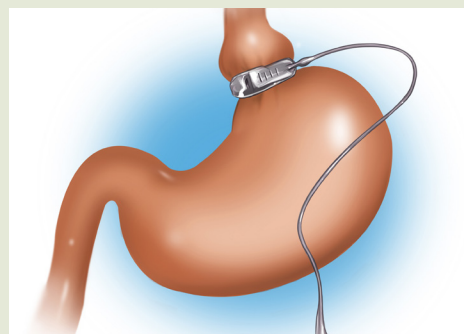
Allogeneic hematopoietic stem cell transplantation involves a donor—often but not exclusively a family member—who gives the recipient stem cells that re-establish bone marrow production of blood cells and immune function to combat cancer. Antibiotics are essential to prevent bacterial infections in stem cell recipients. However, antibiotics also destroy beneficial bacteria that enhance immune function and resistance to infection. The loss of beneficial bacteria increases the risk of certain life-threatening infectious diseases and graft-versus-host disease.

## Gastric Banding as Effective as Metformin in Slowing Progression of Prediabetes, Type 2 Diabetes

People with prediabetes or new-onset type 2 diabetes who had gastric banding, a type of bariatric surgery for weight loss, had similar stabilization of their disease to those who took metformin alone, according to a study supported by NIH. These findings were published on Oct. 3 in *Diabetes Care*, coinciding with a presentation during the European Association for the Study of Diabetes annual meeting in Berlin.

The Beta Cell Restoration through Fat Mitigation study, or BetaFat, enrolled 88 participants with mild to moderate obesity and either prediabetes or new-onset type 2 diabetes. Half of the participants were randomly assigned to receive a gastric banding procedure, involving placement of a band around the upper part of the stomach to slow digestion. The other participants received the drug metformin, the most common first-line medication for people with prediabetes and early type 2 diabetes.

After 2 years, people in the gastric banding group lost significantly more weight, an average of 23 pounds, compared to 4 pounds in the metformin group. The two treatment groups ended up with similar improvements in insulin sensitivity and relatively stable function of insulin-producing cells, with small improvements in blood glucose levels.



Study shows that gastric banding was similar in effect to drug in patients with prediabetes or new-onset type 2 diabetes.



NINR director Dr. Patricia Grady and NIH director Dr. Francis Collins at her recent retirement party in Bldg. 60

## NINR Director Grady Retires After 30-Year NIH Career

BY JO-ANN KRIEBEL AND DIANA FINEGOLD

Dr. Patricia Grady retired from federal service on Aug. 31 after 30 years at NIH, including 23 years as director of the National Institute of Nursing Research. She began serving as director of NINR in 1995, shortly after the National Center for Nursing Research had been elevated to institute status in 1993.

An internationally recognized researcher with a primary focus on stroke and an emphasis on arterial stenosis and cerebral ischemia, Grady first joined NIH in 1988 as a program administrator in the areas of stroke and brain imaging at the National Institute of Neurological Disorders and Stroke. She later served as NINDS deputy director and acting director.

Under Grady's leadership, NINR grew from its foundation in supporting the science of patient care to establish nursing science as an integral part of health research and an essential component of the NIH mission. During her time as director, NINR-supported investigators have made countless discoveries that have improved health and quality of life for individuals, families and communities across the nation and around the world.

During her tenure, Grady oversaw development of a strong intramural research program at the institute with NINR becoming a leader in symptom science research at NIH.

Recognizing the collaborative nature of nursing science, Grady championed NINR as a home for interdisciplinary science, with NINR-supported scientists leading teams of nurses, physicians, engineers and many others in developing cutting-edge technologies.

Grady's vision was vital to the significant growth in the field of nursing research throughout her tenure. She led the development of NINR's Summer Genetics Institute and Symptom Methodologies

Bootcamps, with graduates of both programs themselves becoming scientific leaders.

NINR's robust support of extramural training under Grady was key to growing the nursing science community. NINR, as a percentage of budget, has devoted more resources than nearly any other institute or center to extramural training awards that have supported new scientists. And, unique among NIH institutes, the majority of NINR grantees are women.

In addition to the institute's leadership in symptom science research, in 1997, NINR was designated the lead NIH institute for research to improve care of those at the end of life. Grady established NINR's Office of End of Life and Palliative Care Research, which continues to oversee a research program that has helped individuals, families and clinicians manage the symptoms of advanced illness through improved palliative care and has provided comfort to those at the end of life through better communication, decision-making and clinical care.

In recognition of Grady's NIH career, NINR hosted a tribute event on Aug. 23 on campus. Attended by NIH leaders and colleagues from throughout her career, the event featured speakers including NIH director Dr. Francis Collins, Dr. Dushanka Kleinman, associate dean for research and professor at the University of Maryland School of Public Health and former NIDCR deputy director, and Mary Woolley, president of Research!America.

Kleinman reflected on how Grady's work at NIH and her personal story have been "serious, substantial and foundational" and "stands as a model for others to emulate and to follow...and demonstrates the power that comes with combining the practice orientation of a skilled clinician with the focused inquiry of a seasoned basic scientist and the agility of a strategic science administrator."

Collins noted that the next NINR director will "have big shoes to fill, but they're going to come into a space where they can be quite confident there's a remarkable engine for research and science and discovery—and also people who really care about what they do and about the mission of NINR." To close out his tribute to Grady, Collins performed a song he had written for the event, sung to the tune of *Supercalifragilisticexpialidocious* from the Disney musical film *Mary Poppins*.

The guest of honor also took some time to reflect on her tenure as NINR director. Grady spoke of the significance of deciding to take the road less-traveled in her career: "I've been fortunate to be at the helm of a new institute that has grown and blossomed and is poised to do even more as



Grady marks her retirement with friends Dr. Janine Austin Clayton (l), director of the Office of Research on Women's Health, and former ORWH director Dr. Vivian Pinn.

PHOTOS: CHIA-CHI CHARLIE CHANG

our society increasingly values quality of life, citizen participation in health care, behavioral research and the science of symptoms."

Before beginning her career in public service at NIH, Grady held several academic positions and served on the faculties of the University of Maryland School of Nursing and School of Medicine.

Her decision to pursue a career in nursing grew from her interest in science and health. After completing her bachelor's degree in nursing at Georgetown University, she pursued a master's at the University of Maryland School of Nursing. She remained at the University of Maryland as an instructor of critical care nursing and leadership in the clinical setting. As a clinical nurse, she saw how devastating strokes were for both patients and their families and was intrigued by neuroscience—the science of the brain and the nervous system, which became the focus of her early teaching years.

After becoming director of the University of Maryland's newly created neurological and neurosurgical division in the School of Nursing, Grady pursued a Ph.D. in physiology from the School of Medicine and began her program of research in stroke. She was elected to the National Academy of Medicine (formerly the Institute of Medicine) and is a fellow of the American Stroke Association. She is also a member of the Society for Neuroscience, the American Academy of Nursing and the American Neurological Association.

Though she has yet to announce what her next professional endeavor will be, Grady will be recognized as NINR director emeritus. As Collins indicated in his statement to the NIH community, "We wish her well as she embarks on the next leg of her journey, which I'm sure will include new adventures in remote corners of the world. I wish her the very best."

## NHGRI's Kastner Named Federal Employee of the Year

Dr. Daniel Kastner, scientific director of the National Human Genome Research Institute, was named the Federal Employee of the Year as part of the 2018 Samuel J. Heyman Service to America Medals program, known as the "Sammies." Each year, the Sammies pay tribute to America's dedicated federal workforce, honoring those who have made significant contributions to our country.

Kastner was recognized for his work to uncover the genomic causes of multiple rare and debilitating autoimmune diseases and identifying and treating previously undiagnosed illnesses, efforts that have alleviated the suffering of thousands of patients in the United States and around the world.

The nonprofit, nonpartisan Partnership for Public Service presented the award to Kastner at a ceremony in Washington, D.C., on Oct. 2.

"I am surprised, humbled and elated for this acknowledgment," said Kastner. "Seeing my patients overcome debilitating diseases has been my biggest reward. This Sammie award is just icing on the cake."

Since 2010, Kastner has served as NHGRI's scientific director, where he is responsible for encouraging implementation of new genomic technologies, application of new treatments for rare genetic diseases and promotion of research collaborations. Before joining NHGRI, he completed rheumatology training at the National Institute of Arthritis and Musculoskeletal and Skin Diseases and then rose through the NIAMS investigator ranks to become NIAMS clinical director from 2005 to 2010.

Throughout his 33-year career in the federal government, Kastner's research has focused on understanding the genomic underpinnings of inherited disorders of inflammation and treating patients at the Clinical Center. Inflammation is the body's response to injury, disease or irritation of the tissues. Kastner and his laboratory have made numerous fundamental advances, such as identifying the gene variant that causes familial Mediterranean fever and discovering the genetic basis for a recurrent fever syndrome named TNF receptor-associated periodic syndrome (TRAPS).

Kastner has won numerous awards and honors, including election to the National Academy of Sciences in 2010 and the Institute of Medicine of the National Academies in 2012. He obtained his A.B. *summa cum laude* in philosophy from Princeton University and a Ph.D. and M.D. from Baylor College of Medicine.—Kiara Palmer



Dr. Daniel Kastner

PHOTO: BRAUN FILM AND VIDEO, INC.

## NICHD's Yoshinaga Retires

Dr. Koji Yoshinaga recently retired from federal service after 40 years as program director in the Fertility and Infertility Branch of the National Institute of Child Health and Human Development. He joined the branch—then called the Population Research Grants Branch—in 1978 to develop a program on implantation biology and hormone action in the female reproductive tract. During his time at NICHD, he issued a number of successful funding opportunity announcements instrumental in establishing research efforts, including a cooperative program on markers of uterine receptivity and an interdisciplinary collaborative team on blastocyst implantation research.



Dr. Koji Yoshinaga

## Cancer Patients Sought for Study

NCI researchers are enrolling participants, 6 years and older, with alveolar soft part sarcoma into a new research study testing whether an immunotherapy drug called atezolizumab is able to shrink the cancer. For more information, contact the Clinical Center Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010) or [prpl@cc.nih.gov](mailto:prpl@cc.nih.gov). Read more online at <https://go.usa.gov/xUA4s>. Refer to study 17-C-0074.

## Patients with Batten Disease Needed

Researchers are conducting a research study on CLN3, Batten disease—a neurodegenerative disease, with typical onset in children—to identify markers of disease and to better understand CLN3 and how it develops over time. If you have juvenile neuronal ceroid lipofuscinosis (CLN3, Batten disease), you may be eligible. Study-related tests and procedures are provided at no cost. For more information, call 1-866-444-2214 (TTY 1-866-411-1010). Read more at <https://go.usa.gov/xnrrA>. Refer to study 18-CH-0002.

## NIAID Needs Healthy Vols

NIAID researchers seek healthy volunteers, 18-50 years old, for an investigational vaccine study targeting respiratory syncytial virus. Compensation is provided. For more information, call 1-866-833-5433 (TTY 1-866-411-1010). Email [vaccines@nih.gov](mailto:vaccines@nih.gov) or visit <http://bit.ly/2nOkOvY>.

## Do You Have a Food Allergy?

NIAID researchers are seeking volunteers age 2 and older who have at least one food allergy to participate in a study to better understand how food allergies affect health. Participants receive a comprehensive nutritional evaluation and meet with a dietitian for individualized counseling. Compensation for participation is provided. For more information, contact the Clinical Center Office of Patient Recruitment at 1-866-444-2214 (TTY 1-866-411-1010) or email [prpl@cc.nih.gov](mailto:prpl@cc.nih.gov). Read more at <https://go.usa.gov/xQYw9>. Refer to study 15-I-0162.

## Patients with SMM Needed

NCI researchers are currently enrolling people with smoldering multiple myeloma (SMM) to test the combination of carfilzomib, lenalidomide and dexamethasone as to their safety and effectiveness in treating SMM. For information, call the Office of Patient Recruitment at 1-866-444-2214. Refer to study 12-C-0107. Read more online at <https://go.usa.gov/xUy7r>.

## NIH Grantees Win Nobel Prizes

Three NIH grantees won 2018 Nobel Prizes, one in physiology or medicine and two in chemistry.

In medicine, Dr. James P. Allison of the University of Texas MD Anderson Cancer Center shared the prize with Dr. Tasuku Honjo of Kyoto University Institute, Japan, for their discovery of cancer therapy by inhibition of negative immune regulation.

The Royal Swedish Academy of Sciences said, “By stimulating the inherent ability of our immune system to attack tumor cells, this year’s Nobel laureates have established an entirely new principle for cancer therapy.”

Allison discovered that a particular protein (CTLA-4) acts as a braking system, preventing full activation of the immune system when a cancer is emerging. By delivering an antibody that blocks that protein, Allison showed the brakes could be released. The discovery has led to important developments in cancer drugs called checkpoint inhibitors and dramatic responses to previously untreatable cancers. Honjo discovered a protein on immune cells and revealed that it also operates as a brake, but with a different mechanism of action.

Allison has received continuous funding from NIH since 1979, receiving more than \$13.7 million primarily from the National Cancer Institute and National Institute of Allergy and Infectious Diseases.

Honjo was a postdoctoral fellow at NIH for a year early in his career, and also was a visiting fellow intermittently thereafter.

The chemistry award went to grantee

Dr. Frances H. Arnold of the California Institute of Technology, for directed evolution of enzymes, and to grantee Dr. George P. Smith of the University of Missouri-Columbia, who shares the prize with Dr. Gregory P. Winter of the University of Cambridge, U.K., for the phage display of peptides and antibodies.

The Royal Swedish Academy of Sciences said, “This year’s chemistry laureates have taken control of evolution and used the same principles—genetic change and selection—to develop proteins that solve humankind’s chemical problems.”

Arnold conducted the first studies on the directed evolution of enzymes, which are proteins that catalyze chemical reactions. These studies have demonstrated how rapidly some proteins can evolve under selection pressure to develop new properties such as faster catalysis or the ability to act on non-natural molecules. Enzymes produced through directed evolution are used to manufacture everything from biofuels to pharmaceuticals.

Smith developed a method known as phage display, where a virus that infects bacteria called a bacteriophage can be used to evolve proteins with new functions. Winter has used phage display to produce new drugs. Today, phage display is a fundamental technology used for drug discovery and has resulted in several important medications.

Both Arnold and Smith each have received more than \$2.5 million, primarily from the National Institute of General Medicine Sciences. Smith’s early work was also funded by NIAID.



PHOTO: UNIV. OF TEXAS MD ANDERSON CANCER CENTER



PHOTO: CALTECH



PHOTO: UNIVERSITY OF MISSOURI

**FROM TOP:** NIH grantees honored with 2018 Nobel Prizes are Dr. James P. Allison of the University of Texas MD Anderson Cancer Center, Dr. Frances H. Arnold of the California Institute of Technology and Dr. George P. Smith of the University of Missouri-Columbia.

## How Shiny Is a Nobel Prize Medal?

You don’t need sunglasses, but seeing a Nobel Prize in person is an awe-inspiring experience.

It’s bright. It’s beautiful. It’s impressive.

Anyone curious about what exactly a Nobel Prize looks like is welcome to visit the Reading Room of the National Library of Medicine’s History of Medicine Division, where the Nobel Prize awarded to Dr. Marshall Nirenberg is on permanent display.

The medal can be viewed upon request during library hours, Monday through Friday from 8:30 a.m.-5 p.m.