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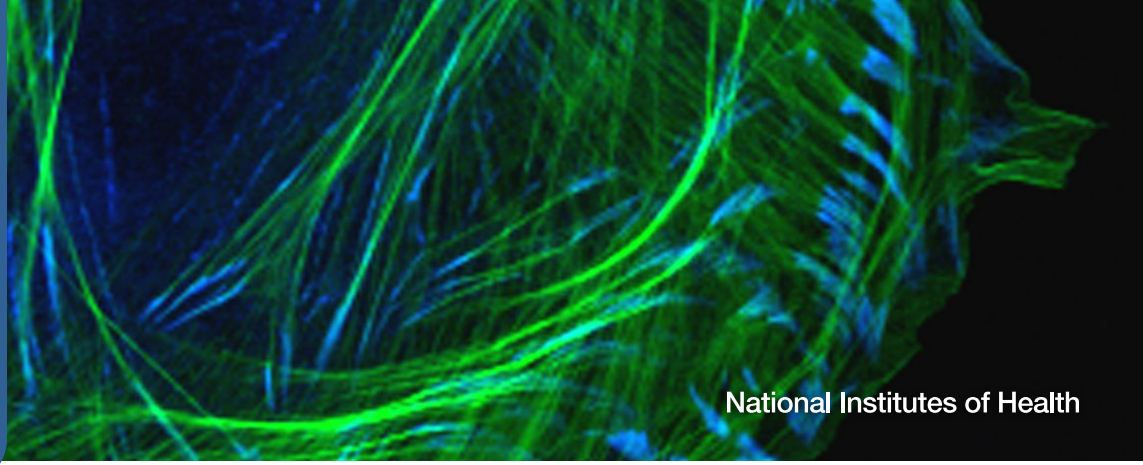


National Institutes of Health

POTENT PROTECTORS

Tolia Creates Algorithm to Improve Vaccines

BY DANA TALESNIK

This story is part of an ongoing series highlighting makers and inventors working in NIH's Intramural Research Program.

While many scientists experienced research delays over the past few years, Dr. Niraj Tolia's work accelerated during the pandemic.

For 20 years, Tolia had been studying how to improve the body's immune response to vaccines. He was searching for a way to take readily available biological information—the structures of proteins and antigens and how antibodies interact with them—to create immunogens that help the body defend against a parasite or other outside invader.

Dr. Niraj Tolia

"What was missing was the ability to use that information to generate something new that then replicates what we want the immune system to do," said Tolia, a senior

SEE **TOLIA**, PAGE 4

BRAIN Initiative Scientists Share Cutting-Edge Research

BY SHANNON E. GARNETT

More than 2,500 participants gathered for the ninth annual Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Initiative Meeting: Open Science, New Tools on June 12-13.

Dr. Nita Farahany

The two-day hybrid conference brought together federally funded scientists, staff and leadership, as well as non-federal organizations, researchers interested in joining the BRAIN community, media and the public.

The initiative is a large-scale effort

SEE **BRAIN**, PAGE 10

Take-a-Hike Day supporters cheer on participants, in near-perfect weather.

Take-a-Hike Day Draws More Than 900

BY JEFF YOUMANS

NIH kicked off its 15th Take-a-Hike Day on June 15 with the traditional whistle start by Dr. Alfred Johnson, NIH deputy director for management.

Sponsored by the Office of Research

SEE **HIKE**, PAGE 6

Fogarty Celebrates 55 Years of Global Impact

BY MARIAH FELIPE

July 1 marks 55 years since the creation of the Fogarty International Center (FIC). Named after the late congressman John E. Fogarty of Rhode Island, FIC remains the smallest center at the NIH, but among the most impactful in advancing NIH's mission of promoting scientific innovation, knowledge exchange and sustainable development across the globe.

The late Rep. John Fogarty, the Fogarty International Center's namesake, was a staunch supporter of NIH.

Though 2023 marks its 55 years, Fogarty's

SEE **FOGARTY**, PAGE 8

NIH's own ARRA Band rocks Camp Fantastic BBQ. See p. 12.

ALSO THIS ISSUE

NIH Research Fest Back After Three-Year Hiatus

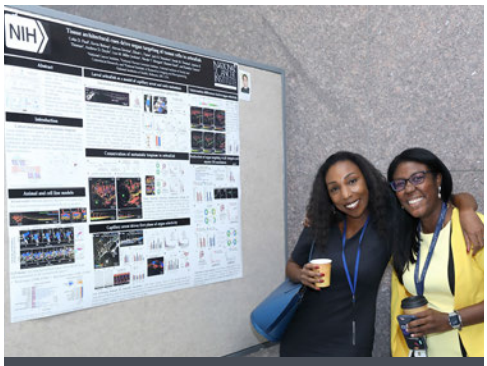
Sept. 18-22

The NIH Research Festival will be held Sept. 18-22.

The annual festival highlights the diversity of scientific disciplines within the NIH Intramural Research Program. It will feature an NIH information fair, workshops, lectures, poster sessions, NIH Green Labs Fair and biotech vendor information booths in and around Bldg. 10. This will be the first such festival since September 2019.

For more information, visit https://researchfestival.nih.gov/.

To stay up-to-date with the latest developments, sign up for the Research Festival listserv or email researchfest@mail.nih.gov.



Poster and attendees from NIH Research Festival 2019, the last time a traditional in-person festival was held

PHOTO: CHIA-CHI CHARLIE CHANG

2023 Hybrid Summer Poster Day Scheduled, Aug. 3 and 4

2023 Hybrid NIH Summer Poster Day will take place both in-person and virtually on Aug. 3 and 4. The event gives summer interns an opportunity to share the research projects they conducted at NIH and enhance their skills in communicating scientific ideas and findings to wider audiences. As many of the trainees will be presenting for the first time, they will greatly value the support of the NIH community. For more information, visit https://www.training.nih.gov/summer_poster_day.

Feds Feed Families 2023 Virtual Giving Campaign at NIH

NIH is participating in "Feds Feed Families," the annual federal government summer food drive. The 2023 virtual campaign is now active through Sept. 30. Many families are still facing food insecurity and hunger. The NIH community has always given generously through this campaign to support those in need. Visit https://go.nih.gov/KTzYfk6 to learn ways the NIH community can donate online to fight hunger.

Shown at an event celebrating a new cancer center are (from l) Sen. Jerry Moran; Rachel Pepper, chief nursing officer, Kansas City Division, University of Kansas Health System; Dr. Joseph McGuirk, director, Division of Hematologic Malignancies and Cellular Therapeutics, University of Kansas Cancer Center, Kansas City; Britany Leiker, nurse manager, University of Kansas Medical Center, Kansas City; Tammy Peterman, president, Kansas City Division, University of Kansas Health System; Dr. Roy Jensen, director, University of Kansas Cancer Center, Kansas City; Dr. Doug Girod, chancellor, University of Kansas, Lawrence; Bob Page, president and CEO, University of Kansas Health System, Kansas City; and NIH Acting Director Dr. Lawrence Tabak.

PHOTOS: ELISSA MONROE/UNIVERSITY OF KANSAS MEDICAL CENTER

Tabak Travels to Kansas for Announcement of New Cancer Center

Acting NIH Director Dr. Lawrence Tabak traveled to Kansas on June 27 and joined U.S. Sen. Jerry Moran (R-KS) to celebrate progress toward construction of a new building for the University of Kansas Cancer Center (KUCC). The $143 million facility will be built using a combination of government and private funding and will bring together KUCC's seven current unique sites.

"As I witnessed firsthand, the strong community support for the new facility illustrates the power of a vibrant public-private partnership to enhance cancer care within the state," Tabak posted later. The event was held at the University of Kansas Health Education Building in Kansas City.

While there, Tabak toured the Cambridge Street site of KU's cancer center, visiting the blood and marrow transplant unit, and the Alzheimer's Disease Research Center, which is located several miles south of Kansas City in Fairway, Kan.

Above, Tabak (l) chats with Jensen during a tour of University of Kansas health facilities. Below, a group assembles to hear about construction of a new building bringing together several sites.

Squishy Sea Creature Yields Clues to Aging, Healing

NIH researchers uncovered insights into healing and aging by studying how a tiny sea creature regenerates an entire new body from only its mouth.

Researchers sequenced RNA from *Hydractinia symbiolongicarpus*, a small, tube-shaped animal that lives on the shells of hermit crabs.

PHOTO: ANDY BAXEVANIS/NHGRI

The researchers sequenced RNA from *Hydractinia symbiolongicarpus*, a small, tube-shaped animal that lives on the shells of hermit crabs. As the *Hydractinia* were beginning to regenerate new bodies, the researchers detected a molecular signature associated with the biological process of aging, also known as senescence.

According to the study published in *Cell Reports*, *Hydractinia* demonstrate that the fundamental biological processes of healing and aging are intertwined.

Humans have some capacity to regenerate, like healing a broken bone or even regrowing a damaged liver. Some other animals, such as salamanders and zebrafish, can replace entire limbs and replenish a variety of organs. However, animals with simple bodies, like *Hydractinia*, often have the most extreme regenerative abilities, such as growing a whole new body from a tissue fragment.

A regenerative role for senescence stands in contrast to findings in human cells.

Dr. Andy Baxevanis

"Most studies on senescence are related to chronic inflammation, cancer and age-related diseases," said Dr. Andy Baxevanis, senior scientist at NHGRI and an author of the study. "Typically, in humans, senescent cells stay senescent, and these cells cause chronic inflammation and induce aging in adjacent cells. From animals like *Hydractinia*, we can learn about how senescence can be beneficial."

In humans, stem cells mainly act in development, but highly regenerative organisms like *Hydractinia* use stem cells throughout their lifetimes.

Hydractinia stores its regeneration-driving stem cells in the lower trunk of its body. However, when the researchers remove the mouth—a part far from where the stem cells reside—the mouth grows a new body. Unlike human cells, which are locked in their fates, the adult cells of some highly regenerative organisms can revert into stem cells when the organism is wounded. The researchers therefore theorized that Hydractinia must generate new stem cells and searched for molecular signals directing this process.

The researchers scanned the genome of *Hydractinia* for sequences like those of senescence-related genes in humans. Of the three genes they identified, one was "turned on" in cells near the site where the animal was cut. When the researchers deleted this gene, the animals' ability to develop senescent cells was blocked and, without the senescent cells, the animals could not regenerate.

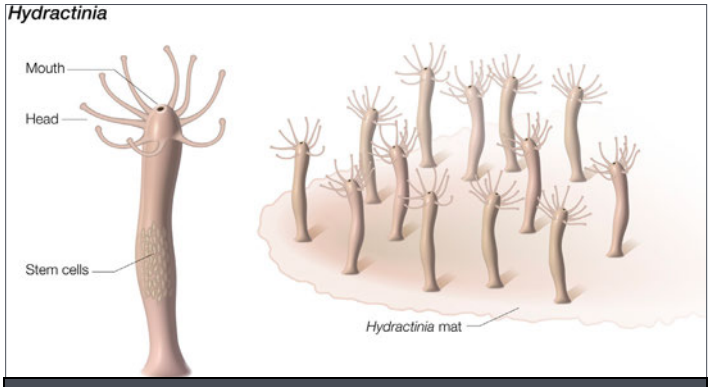
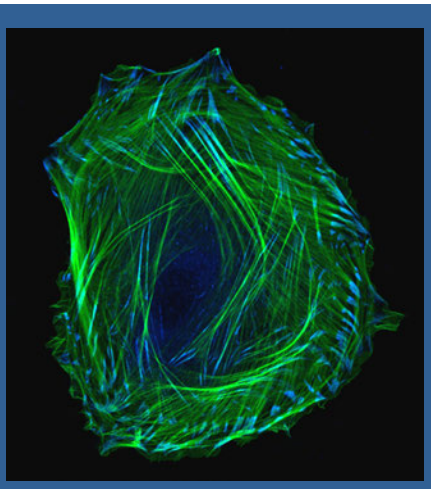


Diagram showing the composition of the *Hydractinia symbiolongicarpus*

IMAGE: DARRYL LEJA/NHGRI

We humans last shared an ancestor with *Hydractinia*—and its close relatives, jellyfish and corals—over 600 million years ago, and these animals don't age at all. Therefore, the researchers theorize that regeneration may have been the original function of senescence in the first animals.

"We still don't understand how senescent cells trigger regeneration or how widespread this process is in the animal kingdom," said Baxevanis. "Fortunately, by studying some of our most distant animal relatives, we can start to unravel some of the secrets of regeneration and aging—secrets that may ultimately advance the field of regenerative medicine and the study of age-related diseases as well." R



ON THE COVER: *Embryonic smooth muscle cell. Immuno-fluorescently labeled actin cytoskeleton (green) and vinculin in cell adhesions (blue). Laser scanning confocal microscopy.*

IMAGE: NIDCR

NIH Makers photo of culturing bacteria in a petri dish in a lab: **CAWEE/SHUTTERSTOCK**

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Editor:
Carla Garnett • *Carla.Garnett@nih.gov*

Associate Editor:
Dana Talesnik • *Dana.Talesnik@nih.gov*

Assistant Editor:
Eric Bock • *Eric.Bock@nih.gov*

Staff Writer:
Amber Snyder • *Amber.Snyder@nih.gov*

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National Institutes of Health
Turning Discovery Into Health

Tolia

CONTINUED FROM PAGE 1

investigator at the National Institute of Allergy and Infectious Diseases (NIAID).

In 2018, when he arrived at NIH, Tolia wrote a computer algorithm using Rosetta, a protein manipulation and design program. The algorithm codes all the known structural data of a virus or parasite to create new protein sequences. "We've been able to apply it to many antigens very quickly to improve them," he said.

Two years later, a new outside invader arrived: Covid-19.

"Our development accelerated because we convinced NIAID when the Covid-19 pandemic hit that this would be a useful tool," said Tolia. "At that point, we had only applied it to a couple of malaria antigens and showed proof of concept." Would it work on the SARS-CoV-2 spike protein?

"We applied [our invention] and it improved the RBD (receptor-binding domain) of spike," Tolia said. "We applied it successfully to a new, emerging disease and the application is ready for the next pandemic."

Tolia's research focuses on malaria. For him, it's personal. Born and raised in Nairobi, Kenya, he had contracted the parasitic disease and knew people who died from it. He began to study malaria as a vaccine design approach during his Ph.D. graduate work at Cold Spring Harbor Laboratory in New York and while an associate professor at Washington University in St. Louis.

A health care worker injects a child with an anti-malarial vaccine.

PHOTO: RICCARDO MAYER/SHUTTERSTOCK

• • •

"Malaria has always stuck with me because, not only is it a devastating disease that continues to be a problem where I come from, it's also a complex scientific problem and you cannot just take simple approaches to solve it."

-DR. NIRAJ TOLIA

• • •

Unlike viruses, which are simpler structures, he explained, the malaria parasite has many genes that it uses to circumvent protection. Targeting them is much more complicated.

For decades, researchers have taken a protein out of the parasite and expected it would protect against malaria. "But the parasite is too smart for that," Tolia said. "It's evolved and has all this machinery to protect itself.

"Malaria has always stuck with me because, not only is it a devastating disease that continues to be a problem where I come from; it's also a complex scientific problem and you cannot just take simple approaches to solve it. This is why we're developing these advanced methods."

These new protein sequences—developed in an NIH lab built specifically for his research—are designed to be potent protectors. "They circumvent the virus or the parasite's ability to evade immune response because they are not natural," he said. "The virus or parasite hasn't gone down this road and so the designed antigens are able to be very protective."

The algorithm is ready and working, supported by preclinical data, said Tolia. NIAID has filed patent applications on multiple antigens and the method Tolia's team developed. Anyone potentially could run these calculations for their own research, provided they have access to a supercomputer.

Biowulf is one of two supercomputers at NIH that Tolia used to run his calculations. Pictured here are the coolers used to keep Biowulf's 99,000 computational cores at an appropriate temperature.

PHOTO: BEN CHAMBERS

The next hurdle is getting these antigens into the clinic, but there's an inertia among vaccine makers vested in their existing products, noted Tolia. Convincing them will take time.

Tolia said he remains grateful to NIH's Intramural Research Program. "I could only really develop these multiple inventions once I relocated to the NIH because of the resources and support. I am very grateful to be here."

At left, NIBIB intramural researcher Dr. Manu Platt (l) demonstrates how a pipette can be used to accurately dispense tiny amounts of liquid for gel electrophoresis experiments. At right, Dr. He (Helen) Huang and her student Brendan Driscoll describe how their technology can help to restore balance and stability among amputees with lower-limb loss.

PHOTOS: CHIA-CHA CHARLIE CHANG

NIBIB Welcomes Congressional Staff, Shows Pioneering Biotech

BY KAREN OLSEN

After a years-long, pandemic-induced break, NIBIB welcomed congressional staff back to NIH to showcase cutting-edge technologies supported by the institute. Held June 27, the event was at the invitation of the American Institute for Medical and Biological Engineering (AIMBE), an advocacy group that brings together academia, industry, government and scientific societies to advance innovative, high-impact biomedical technologies.

NIBIB Director Dr. Bruce Tromberg began with an overview of the institute's mission and key research areas with a special emphasis on Covid-19 pandemic technologies, spanning from over-the-counter diagnostic tests to artificial intelligence for medical imaging. Congressional staff then participated in five hands-on demonstrations given by NIBIB-supported grantees and intramural researchers.

One demonstration was given by NIBIB's newest intramural investigator, Dr. Manu Platt. Platt is inaugural director of the Center for Biomedical Engineering Technology Acceleration (BETA Center), an NIH-wide resource designed to accelerate technology development to address urgent national and global health needs.

Platt also established the NIBIB laboratory for Mechanics And Tissue Remodeling Integrating Computational and Experimental Systems (MATRICES). During the event, he demonstrated a low-cost method to determine if HIV-positive individuals are taking their prescribed anti-viral medications, giving legislative aides the opportunity to try pipetting for themselves.

Another demonstration was given by two groups from the Atlanta area.

The first group, led by Dr. Wilbur Lam and Erika Tyburski, presented a smartphone app that predicts anemia, a global health problem that affects more than 2 billion people. The app, which estimates hemoglobin levels by analyzing an image of the fingernail bed, is freely available on both iOS and Android devices and has been downloaded over 1 million times.

The second group, led by Lam and Julie Sullivan, gave an overview of the RADx Tech Test Validation Core, which independently assesses Covid-19 and other infectious disease diagnostic technologies prior to authorization by the Food and Drug Administration (FDA). Sullivan highlighted a variety of different tests that her group has validated and noted that the group is now working with NIBIB to evaluate the validity of multiplex tests, which can detect multiple viruses from a single sample.

A surgical robot, complete with a moving arm, was the focus of a demonstration by Dr. Axel Krieger and his team from Johns Hopkins University. Their experimental system, called STAR (for Smart Tissue Autonomous Robot), was developed to perform soft-tissue surgery, a procedure that represents unique challenges due to unpredictable tissue motions.

In preclinical models of bowel surgery, STAR made fewer mistakes and had more consistent stitches compared with expert surgeons. This device could mitigate potential errors due to physician skill or fatigue, with a goal of making surgical procedures consistent and standardized for everyone.

Dr. He (Helen) Huang and her team from North Carolina State University and the University of North Carolina at Chapel Hill showcased a prosthetic device that seeks to help those with lower-limb amputations improve their balance and stability.

While many lower-limb prosthetics focus on ambulation, Huang's research also aims to prevent falls among amputees. Her team's device takes advantage of a user's residual muscles and their associated electrical impulses to help control the prosthetic.

In addition to videos of their technology in action, the group brought lower-limb prosthetics and invited congressional staff to try out their sensor technology that provides haptic feedback to the user to improve balance.

The fifth demonstration was given by a group of researchers from FDA. They presented technologies that use tissue phantoms, which model human tissues, to aid in the regulatory assessment of medical devices.

FDA has created a phantom library with more than 100 tools for medical device developers to use. The researchers presented phantoms that can be used in the retinal imaging space (using a human eye phantom), tissue phantoms for both cerebral and pulse oximetry (which can be affected by skin tone) and breast tissue phantoms for cancer detection.

"It was a pleasure to welcome back congressional staff to NIBIB to showcase how taxpayer dollars can facilitate the development of pioneering biotechnologies," said Tromberg. "The research showcased here demonstrates how bioengineering and imaging research can improve health care across our country and around the world."

For more information about NIBIB's pandemic response, visit nibib.nih.gov/covid-19.

At left, NIBIB Director Dr. Bruce Tromberg (c) thanks congressional staff for attending the event. At right, Dr. Axel Krieger (r) explains how an autonomous surgical robot can perform soft-tissue surgery.

A participant cheerfully charges toward the finish line, one of more than 900 registrants for this year's hike.

PHOTOS: MARLEEN VAN DEN NESTE

Event helpers (from l) Selwyn Roberts, Sherrell Freeman, Jackie Glass, DATS Director Tammie Edwards and Tim Tosten, acting director of ORS/ORF's Office of Administrative Management, promote the Health & Wellness Expo, which took place on June 29. Watch for coverage in a future issue of the *NIH Record*.

Hike

CONTINUED FROM PAGE 1

Services (ORS) and the Division of Amenities and Transportation Services (DATS), the event drew more than 900 registrants—including runners, walkers and rollers—who came together for a day of physical activity and camaraderie.

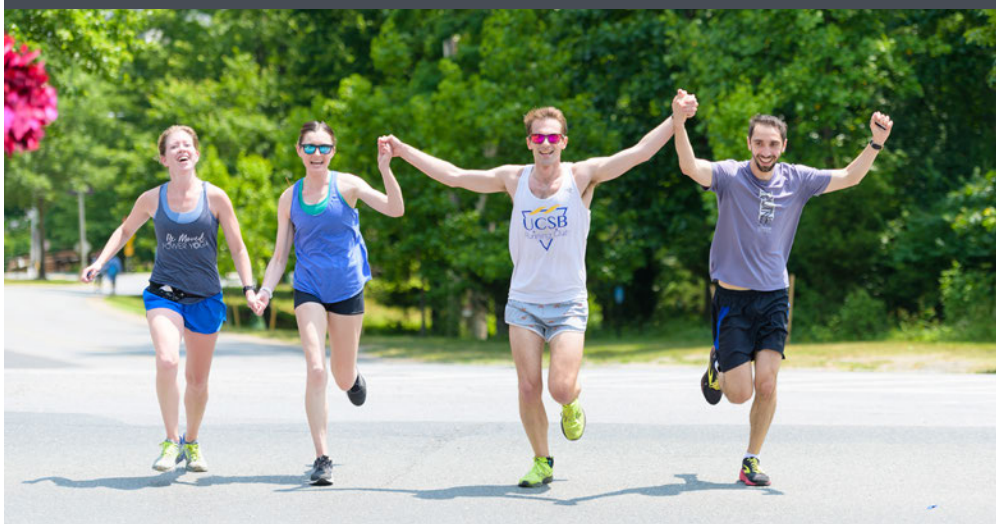
The 3.25-mile trek commenced at Bldg. 1 on the Bethesda campus, with participants proceeding down Wilson Drive and circling the NIH perimeter. The weather was perfect, with clear skies and pleasant temperatures, creating an ideal atmosphere for outdoor activity.

"The event was a resounding success, thanks to enthusiastic participation," said Tim Tosten, acting director of ORS/ORF's Office of Administrative Management. "The hike not only provided an opportunity for exercise and outdoor recreation but also promoted a sense of community and shared purpose among the participants. With its diverse range of locations and wide participation, NIH Take-a-Hike Day exemplified NIH's dedication to fostering a culture of health and wellness."

Tim Tosten welcomes hikers to the event.

All smiles in front of the starting point, hikers stretch before stepping off.

Walkers (above) and runners (below) enjoyed perfect weather for a break outdoors.



Noise-making for a cause. Hike cheerleaders, including Dr. Alfred Johnson (third from r), NIH deputy director for management, used whistles, horns and megaphones to encourage participants up the final hill.

Simoni Named Associate Director for Behavioral, Social Sciences Research

Dr. Jane M. Simoni was appointed as NIH associate director for behavioral and social sciences research and director of the Office of Behavioral and Social Sciences Research (OBSSR). She begins her new position on July 30.

Dr. Jane M. Simoni

A clinical psychologist, Simoni joins NIH from the University of Washington (UW) in Seattle where she was professor and director of clinical training in the department of psychology. She had served on the faculty since 2001, was founding director of UW's Behavioral Research Center for HIV and co-directed the UW/Fred Hutch Center for AIDS Research.

Simoni earned her B.A. at Princeton and her Ph.D. at the University of California, Los Angeles. She also completed postdoctoral fellowships at the University of Southern California and Columbia University. A fellow in four divisions of the American Psychological Association, she has been a frequent grant reviewer and chair for NIH study sections.

Simoni brings more than 25 years of experience in research focused on health disparities and resilience among populations that have been socially marginalized, including persons with HIV and other chronic illnesses, Latinx, LGBT and Indigenous peoples.

Her intervention research has examined behavioral aspects of chronic illness, using mixed methods and clinical trials to evaluate strategies such as peer support, medical record alerts, provider training and counseling and mHealth to promote treatment engagement and health outcomes.

Simoni has led more than two dozen research projects, including NIH-funded studies in New York City, Seattle, the U.S.-Mexico border, Beijing, Shanghai, Haiti and Kenya. She has authored more than 300 publications.

Simoni trains a diverse and interdisciplinary group of students and early-career investigators. She has been a mentor on more than 50 training awards, including as a sponsor for individual trainees and as part of the leadership or mentoring faculty for NIH-funded research education programs.

Fogarty

CONTINUED FROM PAGE 1

origins can be traced back to as early as 1948 when the United States implemented the European Recovery Program—popularly known as the "Marshall Plan"—to provide financial and material assistance to participating countries in Western Europe to aid them in rebuilding after the war.

A decade later, NIH launched its version of the Marshall Plan to help strengthen European capacity to conduct biomedical research through the International Research Fellowship (IRF). The fellowship supported foreign investigators who trained at NIH and American academic institutions and returned to Europe's leading universities and research centers.

Established in 1968, Fogarty took over management of IRF and, during the succeeding three decades, trained more than 2,500 scientists from 55 countries.

A year later, Fogarty introduced the Scholars in Residence program, bringing renowned scientists from around the world to NIH for extended periods.

Mentored by leading American scientists and Nobel laureates like Drs. Christian Anfinson, Julius Axelrod, David Baltimore, Baruj Benacerraf, Arthur Kornberg and Severo Ochoa, the scholars held seminars and workshops, conducted research and collaborated with NIH colleagues, fostering a stimulating environment for scientific exchange and innovation. Notable trainees from this era include Dr. Albert Sabin, who developed the first oral polio vaccine, and Sir George Godber, the architect of the British National Health Service.

At left, Dr. Milo Leavitt Jr. was the first director of FIC. At right, former FIC Director Dr. Roger Glass (l) with FIC Acting Director Dr. Peter Kilmarx at Glass's retirement gathering earlier this year.

In the late 1980s, the AIDS epidemic shifted the focus of the center toward low- and middle-income countries (LMICs). The center played a significant role in building research capacity to combat HIV/AIDS, contributing to the transformation of an HIV diagnosis from a death sentence to a manageable condition. The shift led FIC to reprioritize toward research training programs in areas such as bioethics, genetics, informatics, stigma and health and economic development. These programs aimed to build core foundational capacity in LMICs and empower local researchers to tackle health challenges in their communities.

Such programs were the catalysts for Fogarty's current mission: to support and facilitate global health research conducted by U.S. and international investigators, build partnerships between health research institutions in the U.S. and abroad, and train the next generation of scientists to address global health needs.

Today, through programs like Launching Future Leaders in Global Health Research Training Program and Global Infectious Disease Research Training Awards, among many others, Fogarty supports scholars from the U.S. and LMICs with a footprint on almost every continent. These trainees, like their notable predecessors, continue to find themselves at the forefront of groundbreaking discoveries in global health.

Dr. Jessica Manning, one of the first to sequence the Covid-19 genome in southeast Asia in 2020, and Dr. Sikhulile Moyo, who was recognized by *TIME* magazine in 2022 for his discovery of the Omicron variant, are two examples of the continued impact of Fogarty's training programs on global health discoveries.

As the center enters its 56th year, searching for a new director and with a renewed focus on equity, innovation and sustainability, FIC remains dedicated to addressing the most pressing health challenges around the globe through collaboration, research and capacity-building.

With support and collaboration from other NIH institutes, centers and offices and its extensive network of intellectual partnerships and research communities built over the last five decades, Fogarty will undoubtedly continue to play a pivotal role in shaping the future of global health research.

The Lawton Chiles International House (l), also known as the Stone House, was purchased by NIH in 1949 and is home to the Fogarty International Center. While the Stone House was formally home to Fogarty's scholars-in-residence program, today Fogarty uses the house for offices, seminars, conferences and meeting space for visiting heads of state and other dignitaries such as Dr. Tedros Adhanom Ghebreysus (center photo, second from l), then-director-general of the World Health Organization, shown in 2018. **PHOTO: CHIA-CHI CHARLIE CHANG** At right, fellows gather inside Stone House for a reception in 2019.

Researchers Show How Tumor's Location, Environment Affect Its Identity

Using 3-D models of ovarian cancer tumors, scientists found differences in gene activity based on where a cell is in a tumor, demonstrating how a cell's location and environment in a cancerous tumor can influence which genes are active and the cell's role in the cancer's biology. The team, co-led by NCATS researchers, showed that gene activity in cells at or near a tumor's surface differed from that of cells closer to the tumor center.

This research could yield new clues about how the same diseases can vary in people and progress differently. This work also could help clinicians identify treatment strategies focused on specific areas in tumors, which could lead to better therapies for cancers and other diseases. The team reported its results in *Cell Systems*.

Researchers used three types of 3-D laboratory models—spheroids, organoids and mouse models—created from human ovarian cancer cells.

The new system, called Segmentation by Exogenous Perfusion, or SEEP, takes advantage of a dye that diffuses into cells throughout a tumor at a definable rate. Measuring how much dye gets into individual tumor cells provides information on the cell's location and, specifically, its access to the outside environment. Using computational methods, the researchers linked this information to cells' gene activity, allowing the scientists to connect the cells' identities with their location.

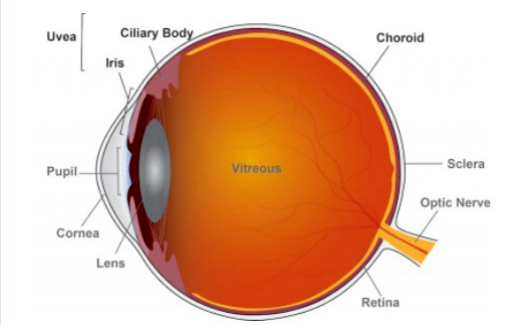
"It's critical to understand that not every cell in a tumor will be exposed to a drug in the same way," said co-author Dr. Tuomas Knowles of the University of Cambridge. "A cancer drug might kill the cells on the surface of a tumor, but the cells in the middle are different and affected differently. That's likely contributing to why some therapies fail."

First author and Harvard University medical student Dr. David Morse said, "Certain tumor cell types are susceptible to certain therapies. Knowing where cells are located and their levels of accessibility in the tumor could help us decide how to use drugs in combination, how long to give a drug and when to move on to other therapies."

Improving Vision in People with Chronic Inflammatory Eye Condition

Repeat treatment with corticosteroid injections improved vision in people with persistent or recurrent uveitis-related macular edema better than two other therapies, according to results from an NEI-funded clinical trial.

Compared with methotrexate or ranibizumab intravitreal (in-the-eye) injections, the corticosteroid treatment achieved greater reductions in retinal swelling and was the only therapy in the study that improved vision. The report was published in *Ophthalmology*.



Uveitis is inflammation of the eye originating in the uvea, which includes the iris, ciliary body and choroid.

IMAGE: NEI

Uveitis is a collection of inflammatory conditions that affect the internal tissues of the eye. Inflammation in the eye can lead to fluid buildup in the central part of the eye's light-sensing retina, known as the macula, and decrease vision. This fluid buildup, called macular edema, is a complication of uveitis that often persists or recurs over time, despite uveitis treatment.

In this study, researchers compared three treatments for uveitis-related macular edema. Earlier, small pilot studies suggested that ranibizumab injections and the anti-inflammatory effects of methotrexate might help reduce uveitis-related macular edema.

The clinical trial enrolled 194 participants with well-controlled uveitis but persistent or recurrent macular edema at clinical centers in the U.S., U.K., Australia and India. Sixty-five participants received a dexamethasone corticosteroid, 65 received methotrexate and 64 received ranibizumab.

After 12 weeks, all three groups showed reductions in retinal swelling. Reduction was greatest in the dexamethasone group compared to the other. In addition, only the corticosteroid group showed improvement in vision, nearly five letters—about one row on an eye chart.

Lead study author Dr. Nisha Acharya of UC-San Francisco said, "Intraocular corticosteroid treatment remains the most effective therapy for uveitis-related macular edema."

Researchers Study New Contributor to Tooth Decay

Tooth decay can cause pain, infection and tooth loss. Bacteria that convert sugar to acid—and that can thrive in an acidic environment—are a major driver of tooth decay.

Severe tooth decay affects around 600 million kids worldwide.

PHOTO: TY LIM/SHUTTERSTOCK

An NIH-funded research team identified oral bacteria species found in the mouths of more than 400 children. Their study appeared in *Nature Communications*.

Using DNA and RNA sequencing of the microbial communities, the team found that 16 species of bacteria were more abundant among children with cavities. Using various techniques to study biofilms—communities of microbes that live together in a protective, sticky matrix—the investigators then teased out how these oral bacteria might cause cavities.

Based on their initial findings, the researchers selected four species for further study, including *Streptococcus mutans*, which was already known to be a major driver of tooth decay. The roles in tooth decay of the other three potential culprits hadn't been explored. These were *S. sputigena*, *Prevotella salivae* and L*eptotrichia wadei.*

All four bacterial species could produce acid from sugar and survive in an acidic environment. The combination of *S. mutans* and *S. sputigena* produced the most acid, at higher rates than either species alone. This suggested they may have a cooperative relationship.

S. sputigena have appendages called flagella that normally let them move freely. But when grown with *S. mutans*, *S. sputigena* gets trapped in place by sticky compounds produced by *S. mutans* and form a honeycomb-like structure around clusters of *S. mutans*.

The structure created by the trapped *S. sputigena* provides a scaffold for further biofilm growth and acid production. When the researchers prevented *S. mutans* from producing the compound that traps *S. sputigena*, the bacterial duo could no longer produce biofilms or tooth-damaging acid.

Further research showed *S. sputigena* and *S. mutans* together caused substantially more tooth decay than *S. mutans* alone. This suggests that disrupting the interaction between these two bacteria may be a way to prevent cavities.—adapted from *NIH Research Matters*

BRAIN

CONTINUED FROM PAGE 1

funded by NIH, other government agencies and private organizations to revolutionize understanding of the human brain. A major goal is to encourage researchers and organizations from diverse disciplines to work together in their development and application of innovative technologies for brain research. The annual meetings are an important part of this effort.

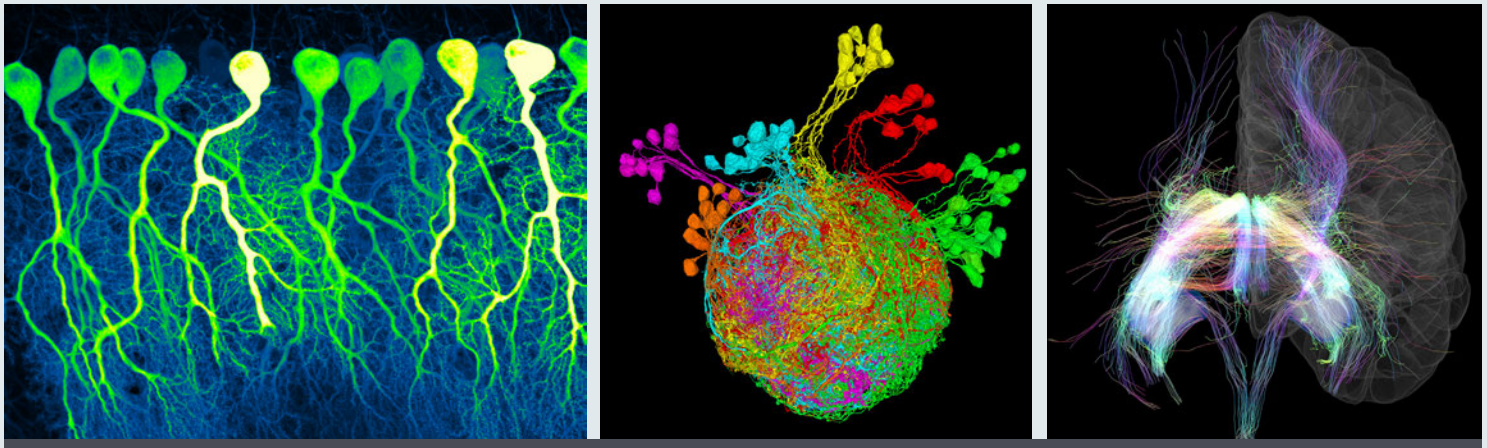
Dr. Vanessa Ruta

The 2023 meeting kicked off with a plenary talk, "The Battle for Your Brain," which explored legal and ethical issues surrounding neurotechnology and artificial intelligence. Featured speaker Dr. Nita Farahany of Duke University discussed the concept of cognitive liberty, which she defined as the right to self-determination over our brains and mental experiences. She addressed both the right to gain access to information about our own brains and the ability to modify them if we choose—but also a right to mental privacy and freedom of thought.

In one session at the 2023 BRAIN Initiative meeting, presenters shared the latest research on the octopus brain.

"I believe cognitive liberty will be most powerful if it guides scientific research rather than serving solely as a rights-based mechanism that might in some ways curtail or limit innovation," Farahany said.

The meeting also included a lecture by Dr. Vanessa Ruta of the Rockefeller University on the neural circuitry in fruit flies that is used to understand how neural circuits are adapted over time to drive behavior, and a talk by Dr. Anil Sheth of Baylor College of Medicine on development of new technologies to personalize treatments of neuropsychiatric disorders.



Winners in the photo category of 'Show Us Your BRAINS!' 2023 are shown (from l) in first, second and third places.

'Show Us Your BRAINS' Winners Named

Winners of the 2023 Show Us Your BRAINS! Photo and Video Contest were announced June 12 by NIH BRAIN Initiative Director Dr. John Ngai. The popular annual contest showcases artistic, eye-catching images and videos of the brain—many using technologies that were developed with initiative support.

Winning photos are:

First Place: "Dark Commute at 4 a.m." by Silas Busch, University of Chicago. A confocal image of sparse GCaMP6f-expressing Purkinje cells in mouse cerebellum resembles the industrious contours of pre-dawn commuters.

Second Place: "Premotor Neurons Controlling the Fruit Fly Leg" by Andrew Cook, Jasper Phelps, Anthony Azevedo, Ellen Lesser, Leila Elabbady, Brandon Pratt, Wei-Chung Allen Lee and John Tuthill, University of Washington and Harvard Medical School. Reconstruction of premotor neurons from a serial-section electron microscopy dataset of the Drosophila female adult nerve cord.

Third Place: "Memory Lanes" by Tyler Ard, University of Southern California Stevens Neuroimaging and Informatics Institute. A rendering of MRI data—combining cortical surface and hippocampal segmentations from a T1 weighted scan and diffusion tractography.

Winning videos are:

First Place: "Simian symphony: ripple assembles during rest" by Kari Hoffman, Tyler Sloan and Saman Abbaspoor, Vanderbilt University. Related CA1 unit ensembles from macaque wireless Deep Array recordings, sonified by unit and visualized by layer and functional cell type.

Second Place: "Functional Ultrasound Localization Microscopy" by Alexandre Dizeux, Physics for Medicine Paris. Functional ultrasound localization microscopy reveals whole brain vascular changes during neuronal activation up to the micron scale.

Third Place: "Synaptic Balance" by scalable minds (Germany). Reconstruction of inhibitory and excitatory neurons in human cortex from SBEM.

To view all the images and videos, visit: https://go.nih.gov/0VV11NZ.

The "Introduction to the NIH and BRAIN Ecosystem for Translation" session highlighted programs that support translation of technologies and success stories from scientists who have received NIH funding.

Other presentations covered a diverse range of topics, such as:

- Cellular atlasing and analysis in human and non-human primate brains
- Genomic and developmental mechanisms of the octopus brain
- Functional manipulation of the central nervous system
- Bioluminescent optogenetics

Both days featured three-minute "flash" talks by trainee award finalists selected from competitive abstract submissions.

During these quick presentations, the awardees gave overviews of their specific contributions to broader BRAIN projects. Participants included scientists at all levels, from high school, undergraduate and graduate programs to medical and other professional schools and postdoctoral fellows and residents.

Numerous networking opportunities were also an important component of the meeting. A special session, "BRAIN, Neuroscience and Beyond: Building Our Early Career Community," involved peer-mentor matching and information sharing about BRAIN funding opportunities for all career stages. In an "Introduction to the NIH and BRAIN Ecosystem for Translation" workshop, scientists shared success stories of receiving NIH funding for their research.

Throughout the meeting, participants were able to interact in person and virtually with speakers, connect with one another, explore posters and chat with presenters about their BRAIN projects and visit exhibits to learn about BRAIN-related organizations.

Posters, exhibit materials, broadcasts and other resources are online through June 2024 at https://eventmobi.com/brainmeeting2023.

Retired NCI Nurse, Communicator Bright Is Remembered

Mary Anne Bright, who served for decades in many roles at the National Cancer Institute (NCI), died on Apr. 16 at age 67.

Mary Anne Bright

Bright grew up in Cleveland, Ohio. She graduated from Duquesne University in 1976 with a bachelor of science degree in nursing. She completed graduate work at UCLA, earning her master of nursing degree in oncology nursing in 1986.

That same year, Bright started her NIH career as an oncology clinical nurse specialist at the Clinical Center. In 1989, she moved to NCI's Office of Communications and Public Liaison (OCPL), where she saw an opportunity to use her clinical background to help even more people with cancer and their families by meeting their information needs.

Beginning in the public inquiries office, Bright then moved to NCI's Cancer Information Service, ultimately becoming its director, a role she held until her retirement in 2018 following 32 years in the federal government.

"Personally, I first knew Mary Anne over 20 years ago," noted OCPL Director Peter Garrett, "and I was immediately impressed by her kindness and ability to marshal people. She understood how to bring people together, get things done and always approached her work with integrity, caring, kindness and empathy. She was a true leader in NCI communications, and I know Mary Anne was also a trusted friend and mentor to very many of her colleagues over the years."

Throughout her time at NIH, Bright contributed to and led many high-level priorities and programs. She was detailed to the Office of Vice President Dan Quayle in 1992.

From 2000 to 2005, she served as acting deputy director of the NCI Office of Communications under Nelvis Castro. In 2010, Bright served as associate director of the Office of Public Information and Resource Management in the NCI Office of Communications and Education.

It was Bright's work with NCI's Cancer Information Service, however, and the direct connection with cancer patients, that she was proudest of. She was instrumental in establishing the International Cancer Information Service Group in 1996 and served as a member of its governing board for 28 years. She was also the NCI lead of the Federal Implementation Team for Health and Human Services Secretary Tommy Thompson's Tobacco Cessation Quitline Initiative (1-800-QUIT-NOW) in 2004.

In 2006, Bright received a DHHS Group Award, an NCI Director's Award and the NCI Director's Gold Star for her efforts in supporting tobacco cessation.

VOLUNTEERS

Study Seeks Pregnant Women

An NHLBI research study seeks pregnant women between ages 18 and 45 with sickle cell disease who are at risk of having an infant with sickle cell disease to donate their baby's cord blood. Procedures provided at no cost. Contact the Office of Patient Recruitment at (866) 444-2214 (TTY users dial 711) or ccopr@nih.gov. Refer to study #01-H-0122. Online: https://go.usa.gov/xSQqW.

Cytopenia Study Recruits Participants

The road to recovery after a bone marrow transplant can be complicated by cytopenia(s) (when one or more of your blood cell types is lower than normal). Sometimes this is "immune-mediated," meaning your red cells or platelets are being targeted and destroyed by the body's immune system. NHLBI researchers are testing the drug fostamatinib in adults with immune-mediated cytopenia(s) to see whether it will help. The study enrolls adults who are ≥ 60 days post-transplant, experiencing hard-to-treat cytopenia(s) and are transfusion dependent. If interested, contact the Office of Patient Recruitment at (866) 444-2214 (TTY users dial 711), ccopr@nih.gov. Ask for study #000758-H. Online: https://go.nih.gov/ASCoxKs.

At left, Dave Smith (l) and Aaron Andrews (second from l), both of Special Love, Inc., share information and t-shirts for Camp Fantastic and Special Love, the 501(c)(3) organization that runs the camp and a dozen other programs for children with cancer and their families. Special Love also provides community and financial support in the form of emergency payments and post-secondary scholarships to camp families. At right, NIH's own ARRA Band gives a concert at the cookout.

PHOTOS: CHIA-CHI CHARLIE CHANG

Folks ARRA Rockin' at Camp Fantastic BBQ

NIH hosted the annual Camp Fantastic Barbecue on June 13. As has become customary in recent years, the featured entertainment was a concert by the Affordable Rock 'n' Roll Act (ARRA) Band, which is led by former NIH Director Dr. Francis Collins and a number of his scientist colleagues.

Held on the Clinical Center's south lawn, this year's event had all the elements of a classic outdoor rock concert, including a swarm of groupies waving printed fans and cheering their support. The BBQ—with cookout fare for sale and a silent auction—raised more than $4,000, according to David Browne of the NIH Recreation & Welfare Association, which coordinates the fun.

Camp Fantastic, a week-long summer getaway sponsored by Special Love Inc., in Front Royal, Va., for kids with cancer, will return on site for the first time since the Covid-19 pandemic.

At this year's BBQ, Browne said, "Favorite auction prizes included a tour and wine tasting at Elk Run Vineyard in Mount Airy, two domestic round-trip airline tickets and four tickets for three-hour admission to the Adventure Park at Sandy Spring—that one was our most-bid-on item."

This year is Special Love's and Camp Fantastic's 40th anniversary, noted Dave Smith, Special Love senior director of outreach and programs, "and we're celebrating all year long. Camp…will have a multi-colored theme and commemorative clothing. Activities will range from traditional—horseback riding, canoeing, swimming—to unique, with special guests like [celebrity event planner and TV show host] David Tutera, and hybrid activities that can be enjoyed in person or via Zoom.

"Our sibling week, BRASS Camp, is commemorating the return to in-person camp with the theme 'BRASS Camp Gets Real.' Each day will have a different reality show theme, including *Survivor*, *American Ninja*, the *Masked Singer*, and a cooking competition. Because BRASS takes place on the shore of Breton Bay (part of the Chesapeake Bay system), crabbing and fishing will be highlights."

For more information, visit https://specialove.org/.

The ARRA Band included (seated, from l) Allison Mandich of OD, S. Amara Ogbonnaya of NIAMS, Quino Maduro of NHGRI, Subhashini Chandrasekharan of OD, Dipa Mitra of NCI, Glorielly Gonzalez of NIAMS, Mike Pazin of NHGRI; and (standing, from l) Scott Durum of NCI, Mike Lenardo of NIAID, Richard Droghini of NIAID, John O'Shea of NIAMS, Robert Walker of NIAMS, Cecelia Tamburro of NICHD, John Tisdale of NHLBI, Francis Collins of NHGRI, Ronnie Gladney of NIAMS and Will Sears of NIAID.

Above and below, just a portion of ARRA's faithful (pun alert—sorry!) "fan" base, attendees enjoy the concert.