

DANGEROUS BITES

Researchers Discuss Impact of Climate Change on Mosquito-Borne Diseases

BY DANA TALESNIK

In some parts of the world, mosquito bites are simply a nuisance, leaving itchy welts that disappear in a few days. But in other areas, mosquito bites can transmit serious, sometimes lethal pathogens. The more dangerous species thrive in tropical regions. That begs the question: As the planet heats up in the coming decades, how will climate change affect these mosquito populations and disease spread?

Two NIH-funded investigators recently discussed the mosquito-temperature

connection as it relates to such diseases as malaria, dengue, Zika and chikungunya. They spoke at a virtual NIAID seminar in August to mark World Mosquito Day, which is recognized annually on Aug. 20, the anniversary of the discovery in 1897 that *Anopheles* mosquitoes transmit the parasite that causes malaria.



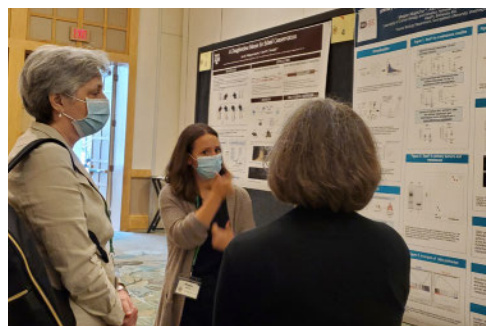
Anopheles gambiae mosquitoes can transmit the parasite that causes malaria.

PHOTO: JAMES GATHANY/SHUTTERSTOCK

Certain temperatures raise the risk for mosquitoes to spread disease; other temperatures are suboptimal. Interestingly though, some conditions are too hot so further warming could drive disease transmission down, said Dr. Matthew Thomas, professor of entomology and nematology at the University of Florida. He focused his talk on mosquitoes that spread malaria, which globally causes 240 million infections and 627,000 deaths annually, according to the World Health Organization.

Looking ahead, rising temperatures reducing transmission is not universally good news. In 30-50 years, based on a heat map accounting for thermal performance and population density, higher temperatures likely will move malaria to higher altitudes, said Dr. Elizabeth McGraw, professor and department head of biology at Penn State University. But mosquitoes that spread

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With support by an NIH interpreting team, NCI fellow wins awards for presentation. See p. 12.

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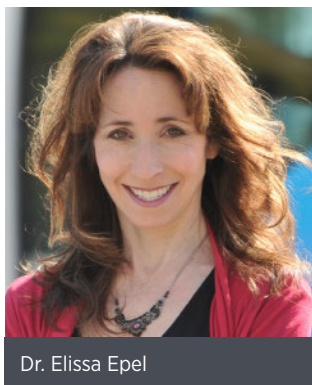
MINDFULNESS & METABOLISM

Epel Expounds on Emotional Well-Being

BY DANA TALESNIK

There's too much to do and too little time. It's a common refrain. Too often, though, wellness gets forsaken in this scenario.

"We always have daily stressors that keep us in active coping mode rather than in a restorative, regenerative mode," said Dr. Elissa Epel, professor and vice chair, department of psychiatry at the University of California, San Francisco,



Dr. Elissa Epel

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Grad student Dontray Crump

SCIENCE SUMMER

SIP Students Wrap Up Season of Learning

BY AMBER SNYDER

A great place for learning and networking. A place that truly cares about its employees.

That's some of the feedback from students in the Summer Internship Program (SIP), who recently wound down their research projects after 12 weeks of immersive

SEE STUDENTS, PAGE 8

NIH 'Big Read' To Feature Author Kendi

Dr. Ibram X. Kendi, the Andrew W. Mellon professor in the humanities and founding director of the Boston University Center for Antiracist Research, will be the featured author and speaker for the NIH Big Read 2022, an annual event that invites the NIH community to read and discuss a timely book.

The book is Kendi's 2019 *New York Times* #1 Best Seller, *How to Be an Antiracist*, in which the author asks people to engage in anti-racist actions towards equitable systemic changes. The event will build upon recent diversity, equity and inclusion-focused town halls and listening sessions.

NIH Big Read 2022 will feature community book discussions throughout September and will culminate with an exclusive videocast event—Kendi in conversation with NIMHD director Dr. Eliseo J.



Dr. Ibram X. Kendi
IMAGE: STEPHEN VOSS

Pérez-Stable—on Tuesday, Sept. 27 from 1 to 2 p.m. ET at <https://videocast.nih.gov/watch=45979>.

Unlimited free access to the eBook and the audiobook is available to NIH staff from the NIH Library's OverDrive platform and Libby app now through Tuesday, Oct. 10. The book is also available to purchase at the Foundation for Advanced Education in the Sciences book store in Bldg. 10.

For details on obtaining the book and about the discussions, see <https://www.nihlibrary.nih.gov/events/bigread22> (NIH only).

For more information or to submit questions for the conversation between Kendi and Pérez-Stable, email NIHBigRead@mail.nih.gov by Sept. 21.

Individuals who need interpreting services or other reasonable accommodation to participate should contact the NIH Library at NIHBigRead@mail.nih.gov, 301-496-1080, at least 5 business days in advance.

The 2022 NIH Big Read is sponsored by the NIH Library, FAES, the Office of the Director, UNITE and NIMHD.

UCLA's Johnson To Deliver NIH Director's Lecture, Sept. 28

Dr. Tracy Johnson of University of California, Los Angeles, will deliver an NIH Director's Lecture, part of the Wednesday Afternoon Lecture Series, on Sept. 28 from 2 to 3 p.m. ET in Lipsett Amphitheater, Bldg. 10.

The talk, "The Secret Life of Introns," will also



Dr. Tracy Johnson of UCLA will give an NIH Director's Lecture on Sept. 28.

be shown live at <https://videocast.nih.gov/watch=45986>. Up to 50 people may attend in person. If you are interested, contact WALSoffice@od.nih.gov.

Johnson is the Keith and Cecilia Terasaki presidential endowed chair in the life sciences professor of molecular, cell and developmental biology at UCLA and a Howard Hughes Medical Institute

(HHMI) professor. Her research program focuses on understanding the mechanisms of gene regulation and how regulation of RNA splicing and other RNA-processing reactions allows the cell to respond to its environment.

She also has developed the UCLA-HHMI Pathways to Success program, a comprehensive strategy to provide students with an authentic research experience early in their academic careers while creating a rigorous but supportive learning community.

The NIH Director's Lectures feature leading researchers from around the globe, nominated by NIH scientists and specifically approved by the NIH director. There are typically three director's lectures per year.

More information about WALS is posted at <https://oir.nih.gov/wals>.

'Feds Feed Families' Closes Sept. 30

"Feds Feed Families," the annual federal government summer food drive, will run through Friday, Sept. 30. More than halfway through the virtual campaign NIH staff reported donating 76,390 pounds of food, as of Aug. 29!

There's still time to participate. Send food via your favorite virtual grocer, designate a food pantry or even volunteer your time. Visit <https://ors.od.nih.gov/FedsFeedFamilies/Pages/default.aspx> for details.

Remember to record your donation, so NIH gets credit. Select "U.S. Department of Health and Human Services" as your department and "National Institutes of Health" as your agency. All donations will be tracked by pounds of food. For monetary donations, the site will use a national conversion rate from dollars to pounds.

If you have any questions about recording your donation, email FedsFeedFamiliesNIH@nih.gov.

NIGMS Launches STEM Teaching Resource

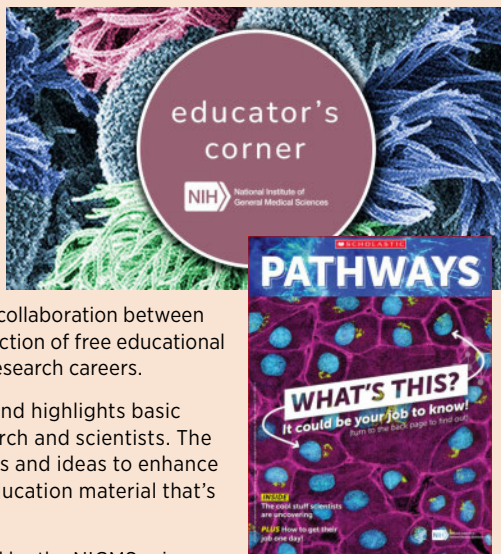
The National Institute of General Medical Sciences has launched the Educator's Corner, a new, free resource for science educators.

The Educator's Corner, <https://biobeat.nigms.nih.gov/educators-corner/>, is a collection of carefully curated Biomedical Beat blog posts designed to align with existing NIGMS science education resources, such as Pathways, for middle and high school students. Pathways is a collaboration between NIGMS and Scholastic, Inc., that provides a collection of free educational resources about basic biomedical science and research careers.

The blog is geared toward the general public and highlights basic biomedical concepts and NIGMS-funded research and scientists. The new collection offers educators additional tools and ideas to enhance lesson plans, building upon existing science education material that's already available at no cost.

In Corner, readers will find blog posts organized by the NIGMS science education resource they align with. Each entry includes a suggested activity for use in classrooms, home schools and other appropriate settings. Student exercises range from pair-and-shares to simple demonstrations, freewrites and more.

As new blog posts are published that feature topics aligned with existing NIGMS teaching resources, they will be added to the Corner and snapshots of their educational connection will appear at the bottom of each post. You can subscribe or update content preferences to receive emails when new posts are added to the collection.



NIEHS Program Lauded for Environmental Justice Efforts

NIEHS's Environmental Career Worker Training Program (ECWTP) was selected by the White House to participate in its new Justice40 Initiative, an effort to promote economic opportunity in underserved communities while advancing environmental justice.

The initiative aims to deliver 40 percent of the benefits of federal investments in climate change, clean energy, clean transportation, affordable housing, water infrastructure, workforce development and pollution remediation to disadvantaged neighborhoods.

For nearly three decades, ECWTP has helped people who are unemployed, underemployed, homeless and formerly incarcerated find jobs and become productive members of society.



ECWTP trainees in Chicago learn how to install solar panels.

PHOTO: OAI, INC.

strengthens the communities where participants live and work.”

A 2015 economic impact report showed that between 1995 and 2013, ECWTP generated \$1.79 billion in value to communities across the country, or about \$100 million each year. Given that the

★ ★ ★

“I make a difference. If it wasn't for the training at ECWTP...I wouldn't be where I've always wanted to be today. I don't have a job—instead I have a career.”

-AN ECWTP GRADUATE

★ ★ ★

Individuals obtain careers in environmental cleanup, construction, hazardous waste removal and emergency response.

To date, more than 13,500 people have been trained by ECWTP grant recipients, which include community colleges, historically Black colleges and universities and apprenticeship programs, among others.

ECWTP has maintained a high job placement rate of 70 percent and is funded through the Department of the Interior, environment, and related agencies appropriations for NIEHS Superfund-related activities.

“I am proud that ECWTP was selected to participate in the new Justice40 Initiative,” said NIEHS Worker Training Program director Sharon Beard, who helped to launch ECWTP in the 1990s.

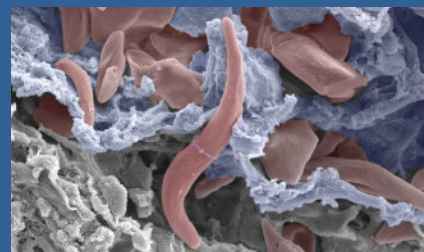
“For the last 27 years, our grantees have done an amazing job at providing hands-on worker training and career opportunities in underserved areas. These efforts give individuals the skills they need to create a better life for themselves and their families and this



“ECWTP has truly transformed communities for the better by offering extensive job training,” said Sharon Beard, shown here at a 2014 NIEHS Worker Training Program meeting. “That has improved the lives of trainees and their families.”

PHOTO: STEVE MCCAUGH/NIEHS

“I am a bricklayer,” said one ECWTP graduate who joined the program as a single mother. “I make a difference. If it wasn't for the training at ECWTP and effort put in by all of the training coordinators, I wouldn't be where I've always wanted to be today. I don't have a job—instead I have a career. I can say I'm certified and experienced to go on a job site and do what I was trained to do. I know safety hazards—chemicals, slips, trips, falls, confined spaces, oxygen levels, air hazards—[as well as] how to lay the perfect brick and how to carry myself as a tradeswoman.” **R**



ON THE COVER: Scanning electron micrograph of a sickled red blood cell (red) inside the circulatory structures of the human spleen, whose function is to filter and remove unhealthy red blood cells, including rigid cells such as sickle-shaped cells. The blue cells indicate the wall of a splenic sinus (small vein where red blood cells are filtered). The gray structures indicate the splenic cords—cellular clusters where the red blood cells are checked by macrophages for the presence of surface alterations or certain antibodies. The image was produced by NHLBI-funded scientist Dr. Pierre Buffet of Inserm-University of Paris, whose research explores the role of the spleen in sickle cell disease. September is Sickle Cell Disease Awareness Month.

IMAGE: PIERRE BUFFET/INSERM-UNIVERSITY OF PARIS

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Mosquito

CONTINUED FROM PAGE 1

dengue are more heat tolerant, so the virus is expected to continue spreading in sub-Saharan Africa.

Understanding the biology and movement of different mosquito species and their adaptive potential can help predict and inform responses to environmental change. “Surveillance is a really important part of informing control practices,” said McGraw.

The risk of disease transmission depends on a range of factors. For malaria, the region must contain the specific mosquito species and malaria parasites. How efficiently and fast those parasites incubate the mosquitoes, and mosquito density, lifespan and biting rate are also factors.

“All of those life history traits are strongly temperature-dependent” and the potential impact is stark, said Thomas.

A recent *Lancet Planetary Health* paper, looking at control capacity under multiple warming scenarios, estimated the at-risk population for malaria and dengue may increase by 4 billion to 7 billion people by 2070.

While current and future climate will affect mosquito and parasite biology, “temperature is not the only driver of change,” Thomas said. Other environmental factors include rainfall, humidity, land use and human population density.

Some places have better control measures—access to medicines, housing with air conditioning and window screens. But many areas where malaria prevails are poverty-stricken, lacking the capacity to mitigate transmission.

“Urbanization, socio-economic growth and control interventions are all important factors,” Thomas said.

One more immediate effect on transmission is occurring among mosquito species that tend to feed and rest indoors, given the transition from thatched to modern, metal-roofed houses, which get much hotter during the day.

“This is significant because you can change the internal temperature of your house overnight,” said Thomas, “and this is happening in Africa now.”

Thomas’s lab simulated heat ranges between thatched and metal-roofed houses and compared two infected mosquito species: *Anopheles gambiae*, a key African malaria vector in rural areas, and *Anopheles stephensi*, a mainly urban species that has recently invaded Africa from Asia.

The warming temperatures decreased disease transmission for both mosquito species. At the highest temperature, 33

degrees Celsius, his lab demonstrated potential for *Anopheles stephensi* to transmit malaria, but not *Anopheles gambiae*.

“*Anopheles stephensi* has higher thermal tolerance and a capacity to transmit at higher temperatures than *Anopheles gambiae*,” said Thomas, “and that’s important when we’re thinking about climate change and also thinking about the invasion of this species into Africa. Now, we might have an interaction between invasive species and climate change, changing the dynamics and distribution of malaria.”

Thomas and McGraw have been collaborating on experiments to test thermal performance and the mosquitoes’ ability to adapt in different conditions. They looked at two species of *Aedes* mosquitoes, which can carry dengue, chikungunya, Zika and yellow fever.

Taking *Aedes aegypti* from Mexico and *Aedes albopictus* from multiple U.S. locations, they put the mosquitoes in glass vials in an incubator at different temperatures. They found significant variation in thermal tolerance among populations of the two species. The mosquitoes from environments with higher maximum temperatures were more thermally tolerant.

“This provides some of the first evidence for local thermal adaptation,” said Thomas, “and an impact in mosquito phenotype associated with local temperatures” for both *Aedes* species.

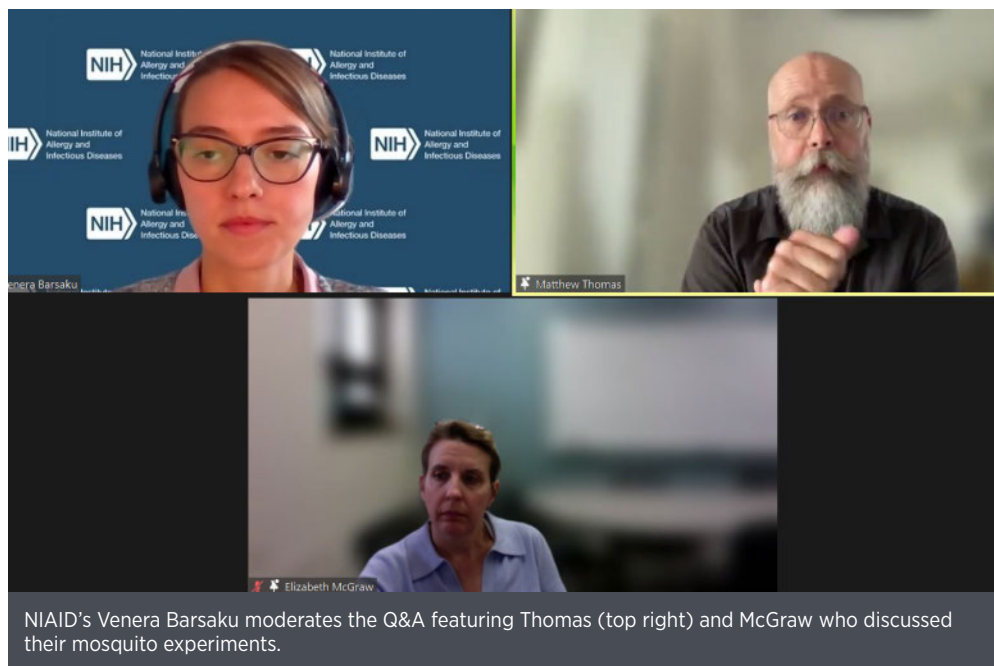
The team also conducted a similar experiment on mosquitoes infected with *Wolbachia*—bacteria that reduce the ability of arboviruses to replicate inside mosquitoes, released as part of large global mosquito-control programs.

Using *Wolbachia*, “you can really change the local mosquito population,” said McGraw, “and these mosquitoes should be largely resistant to transmitting pathogens... But it is a biological organism just like the virus, and just like the mosquito, so it has its own thermal tolerance ranges.”

The experiments showed *Wolbachia* loads



Dr. Matthew Thomas





Dr. Elizabeth McGraw

decline at very high temperatures, as does maternal transmission. “There is concern that in regions of extreme temperatures, you might have *Wolbachia* disappear out of populations,” thereby impeding mosquito control efforts, said McGraw.

In another experiment, her lab took dengue and grew it for many generations in mosquito cells at 25 and 37 degrees Celsius—temperatures commonly experienced by this virus. Early data showed that after passaging at 37 degrees, the virus grew more quickly but lost the capacity to grow well at 25 degrees. The genetic changes in virus that occurred during the passaging, interestingly, left it less able to infect mosquitoes.

“What this suggests,” she said, “is that there might be trade-offs in terms of thermal tolerance and infectivity that could hugely affect the landscape of transmission in the field.”

McGraw and Thomas emphasized that more work is needed to test different mosquito species in a broad range of conditions that incorporate mosquito biology, human behavior and natural environment variation.

“There’s a lot more work to do,” said McGraw, “to understand the basic landscape of transmission and vector fitness across these complex and changeable environments.” [R](#)

FORMER NIH GRANTEE ON BOARD

NIA Welcomes Kelley as Deputy Director

Dr. Amy S. Kelley joined NIA as its new deputy director on Sept. 11.

“Dr. Kelley is a visionary scientist, educator and leader,” said NIA director Dr. Richard Hodes. “She has dedicated her career to improving the lives of older people and those living with serious illness. Her contributions to the fields of geriatrics and palliative care make her extraordinarily qualified to help guide the future of NIA.”

In her new role, Kelley will work closely with Hodes, providing strategic leadership, supervising daily operations and serving as an ambassador and spokesperson for the institute. Additionally, she will oversee NIA’s diversity, equity, inclusion and accessibility (DEIA) initiatives.



Dr. Amy S. Kelley

“I am thrilled to be joining NIA at this critical time,” said Kelley. “The breadth of research supported by the institute and the speed of scientific discovery offer unprecedented opportunities to advance NIA’s core mission. I am committed to supporting this work and integrating DEIA in all aspects to ensure the advances achieved will benefit all older adults.”

Kelley joins NIH from the Icahn School of Medicine at Mount Sinai, where she was a professor and vice chair for health policy and faculty development, Hermann Merkin professor in palliative care in the Brookdale department of geriatrics and palliative medicine and senior associate dean for gender equity in research affairs.

Her meritorious research—which bridged geriatrics and palliative medicine by focusing on the needs of seriously ill older adults and their families—was supported by NIA through multiple grants, including a Paul B. Beeson Emerging Leaders Career Development Award in Aging. Her research has examined factors associated with treatment intensity in people with dementia and other serious illnesses. She

also has been closely involved with the NIA IMPACT Collaboratory, a national resource to improve the care and health outcomes of people living with dementia and their care partners in partnership with various health care systems.

Kelley earned her M.D. from Weill Medical College of Cornell University and a master of science degree in health services from the UCLA School of Public Health.

She has been recognized broadly for her exemplary work, including by the American Geriatrics Society with the 2022 Thomas and Catherine Yoshikawa Award for Outstanding Scientific Achievement in Clinical Investigation. She is also a two-time Icahn School of Medicine at Mount Sinai “Palliative Care Clinician of the Year” honoree.

Kelley succeeds Dr. Marie Bernard, who assumed the role of NIH chief officer for scientific workforce diversity in June 2021. Since then, Dr. Melinda Kelley has served as NIA’s acting deputy director. (Drs. Amy Kelley and Melinda Kelley are not related.)

“I want to recognize and thank Marie Bernard for her outstanding and many contributions to the institute, scientific community and broader public during her tenure, and Melinda Kelley for her exceptional leadership as NIA acting deputy director over the past year,” said Hodes. “I am grateful for what we have achieved so far and am looking forward to working closely with Amy Kelley to continue our efforts to fulfill NIA’s mission in the years to come.”

Epel

CONTINUED FROM PAGE 1

speaking virtually at an NCCIH Integrative Medicine Research lecture.

Now added to the daily grind of individual responsibilities and pressures is a communal burden. “We now have a prominent forefront of societal and global stressors,” said Epel. Pandemic. Climate change. Systemic racism. “There is a stronger sense of existential stress that is new and it’s leading us to view the future as highly uncertain.”

With burnout, anxiety and depression on the rise, the inclination is to treat such conditions with medication and therapy. While treatment is important, Epel urged a focus on prevention—by bolstering wellness.

Need for Communal Healing

Communal stress needs communal healing, said Epel, who with colleagues at UCSF, UC-Berkeley and Harvard formed an NIH-funded multidisciplinary group—the Network for Emotional Well-Being (NEW-B)—to develop mind-body interventions that improve emotional and consequently overall health.

In their efforts to understand and measure emotional well-being, the set of NIH national networks on emotional well-being (EWB) first drafted a working definition. Emotional well-being encompasses how a person feels generally and about life, everyday experiences and reflections. As the definition inevitably evolves, Epel and colleagues seek to gauge whether such fundamental components as optimism and social connections are predictors, mediators or outcomes of EWB.

“My view of emotional well-being is that, while it has such important direct effects on mental and physical health and healthy aging,” said Epel, “a big part of how it works is interacting with stress, both as a buffer to stress responses over the lifespan, but also as a resource that grows with exposure to adversity.” Confronting adversity and trauma boosts resilience and can deepen appreciation for life, social connections and other aspects of emotional well-being.

Restorative Pathways

Studies have shown that positive emotional well-being creates restorative and catabolic stress-related processes. “We believe that together, throughout the



lifespan, there are cumulative effects on both health and disease pathways,” said Epel.

NEW-B investigators pose it’s possible to promote deep-rest states—normally achieved during sleep—while awake, through breathing, meditation and other contemplative practices.

“By promoting deep-rest states,” said Epel, “we’re spending less time in survival

offset their emotional distress.

“No one is eating carrots under stress,” said Epel, “unless they are very consciously disciplined to make that their habit.”

Junk food compounded by chronic stress can be particularly harmful, changing the way people store fat, expanding the waistline and increasing the risk for diabetes.

In response, Epel’s lab has been

developing wellness interventions to help break the cycle.

First, working with former FDA commissioner Dr. David Kessler, they created a reward-based eating drive scale to measure preoccupation with food, perceived lack of control and the lack of satiety.

She and colleagues have since launched several clinical trials that combine nutrition with behavioral interventions. Mindfulness, for example, offers “the ability to ride out cravings,” said Epel,

mode and more time in this restorative biological mode.” The benefits are many—from regenerating mitochondria to improving energy and mood to reducing inflammatory activity in the body.

Stress & Metabolism

Emotional binge-eating is a longtime common phenomenon that has been on the rise during the Covid pandemic. Research shows people who were already overweight gained an average of 15 pounds that first year alone. Growing food insecurity has further fueled compulsive eating with less nutritious foods.

“Stress impacts how we eat and how we metabolize food,” Epel said. A reward imbalance develops under stress in which people crave foods that offer immediate gratification to



Too much added sugar from **soda and sports drinks** can overload critical organs over time, leading to **serious diseases.**



Epel says sugary drinks are even worse than sugary food. Her efforts with SugarScience, a collaborative at UCSF, helped ban the sales of soft drinks at UCSF and more than 100 hospitals.

IMAGE: SUGARSCIENCE / UCSF

“to observe the thoughts and sensations, to reduce impulsive eating.”

In the SHINE (supporting health by integrating nutrition and exercise) study, all participants lost weight 6 and 12 months out. However, the mindfulness group also had better glucose control. “The mechanism toward better weight loss and glucose control in the mindfulness group was reducing the reward drive,” she said.

Using the ORBIT (obesity-related behavioral intervention trials) model, Epel’s collaborative group developed a nutrition and mindfulness intervention for low-income pregnant women. “They didn’t want to come and hear about stress and obesity,” she said. “They wanted to hear about wellness.”

Working with 200 women, the intervention reduced stress and depression immediately and reduced glucose intolerance within 4 weeks. What’s more, Epel’s colleague Dr. Nicole Bush followed these women for 10 years and found they consistently had lower depression, even during the pandemic.

Another way to reduce cravings and unhealthy habits is to go after the products themselves. “We removed the sale of soda and other sugary drinks at UCSF and, so far, that simple act has helped the most vulnerable—low-income employees—lose weight and become healthier,” Epel said. A related information kit, available at sugarscience.ucsf.edu, has also inspired 100 hospitals to get rid of soft drinks.

Mission: Joy

How do individual interventions—social


connection, gratitude, kindness—influence emotional well-being? A large citizen science project on joy seeks to find out.

The idea for the Big Joy study came from the new documentary *Mission: Joy—Finding Happiness in Troubled Times* that explores the friendship between Archbishop Desmond Tutu and His Holiness the Dalai Lama. The film’s producer approached Epel about a large-scale study, sparking a collaboration with UCSF and UC-Berkeley that has already inspired nearly 50,000 daily practices for well-being among 11,000 participants in 120 countries. Anyone can sign up at <https://ggja.berkeley.edu/bigjoy>.

“Just by these micro-interventions, one week later, people report increases in aspects of well-being,” said Epel. “What we hope to find out is: What works best for who?”

As a society, people collectively must strive to mitigate stress and become more resilient, Epel said. “Pandemics will come and go. We’ll be with the climate crisis for the rest of our lives.” What will promote resilience to cope well and mitigate [the effects]?

Epel is working on a pilot study that explores moving toward deeper emotional well-being through common purpose with interventions that promote emotional regulation and activism. Together, future generations will need to shift toward social connection and collective efficacy, she said.

“Rather than think we have too many serious problems to focus on wellness,” she said, “[instead think] we cannot afford to ignore emotional well-being in this world, especially today.” 

Greenberg Early Career Investigator Lecture Set, Sept. 28

Dr. César de la Fuente, a presidential assistant professor at the University of Pennsylvania, will present the Judith H. Greenberg Early Career Investigator Lecture on Wednesday, Sept. 28 at 1 p.m. ET via Zoom and NIH videocast. The lecture is open to everyone in the scientific community.



UPenn’s Dr. César de la Fuente will present the 2022 Greenberg early career lecture.

PHOTO: MARTÍ E. BERENGUER

During his talk, “Artificial Intelligence Approaches for Antibiotic Discovery,” de la Fuente will describe

his research developing computational approaches for antibiotic design and discovery. He believes that innovations in artificial intelligence may help replenish our arsenal of effective drugs, such as those used to treat antibiotic-resistant bacterial infections.

After a 30-minute lecture, de la Fuente will answer questions from participants on Zoom about his research and career path.

This annual series highlights the achievements of NIGMS’s early career grantees. It is designed to introduce students and other early career scientists to cutting-edge research and inspire them to pursue careers in the biomedical sciences.

Established in 2016 and originally called the NIGMS Director’s Early Career Investigator Lecture, the series was renamed in 2021 to honor former NIGMS deputy director Greenberg, who retired in 2020 after 45 years of service to NIH.

Anyone can attend via NIH videocast. Students and trainees are encouraged to register in Zoom so they can participate in the live Q&A.

For details, visit <https://nigms.nih.gov/News/meetings/Pages/2022-nigms-directors-early-career-investigator-lecture.aspx>.

Students

CONTINUED FROM PAGE 1

lab experience. SIP, run by the Office of Intramural Training and Education, is open to college, graduate and professional school students. There are also several SIP subprograms for high school students.

NIH typically hires about 1,200 SIP students every summer, although this number has fluctuated in the past 2 years due to the ongoing Covid-19 pandemic. SIP couldn't onboard any students in 2020 and could only offer a virtual program in 2021.

For the first time in 2 years, though, many students were able to attend in person. Some restrictions were still in place, such as social distancing and optional masking, and students occasionally completed work from home when their duties allowed it. Some students were still fully virtual, but most needed to attend in person to run experiments and learn lab skills.

"There's definitely something to be said about being in the physical lab environment," said Noah Pinson, a high school SIP student in the HiSTEP 2.0 subprogram. He interned in the Clinical Center's radiology and imaging sciences department (RISD), collecting patient data to better understand the clinical outcomes and characteristics of bilateral multifocal renal oncocytoma. He also had 5 years of volunteer experience with the Children's Inn prior to this summer.



Shown in Dr. Claire Le Pichon's NICHD lab are (from l) Josette Wlaschin, Zoe Piccus, Magdalena Macias, Le Pichon, Austin Gable, Peyton Lee and Mor Alkaslasi.

Grigori Rudakov, a student in the Graduate Summer Opportunities to Advance Research (G-SOAR) program and a self-described extrovert, was also pleased to be working in person. He interned in the Laboratory of Single Molecule Biophysics within the National Heart, Lung and Blood Institute, using "magnetic tweezers" to study supercoiled DNA and the effects of the topoisomerase IV enzyme.

"I prefer to work in person," he said. He

lung-cancer risk, controlling for lung-cancer risk factors and self-reported race/ethnicity, using the PLCO (prostate, lung, colorectal and ovarian) cancer screening trial.

Crump expected the summer to be fast-paced and competitive, but he quickly found that "there is a lot of contribution and collaboration," regardless of physical work status.

"There is always help when you need it!" he added.

◆ ◆ ◆
"The summer internship program has been one of my best experiences all summer. NIH helps you grow as a person."

- JANAYLIN CARELA

◆ ◆ ◆
is a passionate researcher and hard worker who pulls long hours in the lab, so in-person work was ideal for his work habits.

A subset of interns still worked virtually this summer. One is Dontray Crump, a grad student in the Graduate Data Science Summer Program (GDSSP) with the National Cancer Institute. He uses R-Studio, a computer program for statistical computing and graphics. He worked in the Biostatistics Branch of the Division of Cancer Epidemiology and Genetics, examining the association of genetic ancestry with

Positive learning experiences were a common theme across the board.

"I don't want to leave," Magdalena "Mags" Macias laughed. She was an Amgen scholar, part of an international program that hosts undergraduate students at 24 research institutions (including NIH). A research background is not a requirement for the program and Macias landed a position in a neuroscience lab in the Eunice Kennedy Shriver National Institute of Child Health and Human Development with no prior neuroscience experience.

In her research project, she studied the role of the integrated stress response (ISR) in traumatic brain injury (TBI), and how ISR inhibitors may serve as a therapeutic target that will lead to cell survival after a mild TBI.

Macias offered encouragement for students who think they might not be cut out for research: "If you don't try, you'll never know!"

Another student who is familiar with trying is Janaylin Carela. A recent high school graduate in the HiSTEP 2.0 program, she initially applied to HiSTEP in her junior year and was not accepted. She credited her mother with encouraging her to apply again, and Carela's second application was rewarded with success.

To anyone who has experienced a similar setback, she said, "Please keep trying. You never want to be [left] wondering 'What if I had...?'"

NIH and other institutions are looking to



Grigori Rudakov

improve minority health and decrease health disparities, and this summer's SIP interns expressed interest in addressing these issues in their current and future research.

Carela's research with the National Institute of Dental and Craniofacial Research focused on periodontitis, an invasive and inflammatory gum disease that disproportionately affects disadvantaged communities that may be unable to access regular dental care.

Crump expressed his desire to "[use] statistics in a governmental sector focusing on minority health and health disparities...to improve and save lives from both a population and individual level." His summer research on lung cancer risk factors was also on par with his career goal.

And Macias explained how the "interdisciplinary aspect of medicine is where you can make the most change."

As NIH's students head off to their respective colleges and universities, they take with them invaluable research and interpersonal skills.

Some students, like Carela, are already considering how they can return to NIH in the future.

"[SIP] has been one of my best experiences all summer," she explained. "NIH helps you grow as a person." **R**

NIHFD Acting Fire Chief Burch Is Mourned

Israel L. Burch, acting fire chief of the NIH Fire Department, died on July 19 after battling melanoma that had been diagnosed in April. He was 49 years old.

Burch was a 20-year veteran of NIH Fire and Rescue Services, working his way up from firefighter to master firefighter to captain and finally to assistant chief. He continued to serve admirably as leader during treatment for his illness.

"Israel was a steady influence in the firehouse during a difficult period of transition," said ORS director Colleen McGowan, in a note to staff. "I've gotten to know him very well over the past year, and he was a truth teller and fierce advocate of his staff. We have lost a true hero in my mind."

The local NIH firefighters union also paid tribute:

"Our local [union] is extremely grateful to have had Chief Burch for the leader that he was. The strides and improvements he has made with our department in such a short time are unmatched. He is the epitome of a 'Fireman's Chief.' Chief Israel Burch put the needs of others before his own until his last breath. Chief, you will be missed but your legacy and teachings will live on far into the future. We will take it from here!"

Burch was inspired in 1988 by his grandfather, the late chief Thomas Cain, to join the fire service brotherhood with the Cobb Island Volunteer Fire Department. Burch served in several ranking capacities there, receiving "Firefighter of the Year" honors in 2000.

In 2001, after he and his family relocated, he joined the La Plata Volunteer Fire Department. That same year, he was hired by NIHFD.

In August 2007, Burch was 1 of 6 NIHFD firefighters honored for their "extraordinary efforts" in the successful rescue of 5 children from a burning home in Kensington earlier that year. At the recognition ceremony, Montgomery County Fire Chief Thomas W. Carr, Jr., presented the group with a unit citation.

Burch's survivors include his wife, Sheri Burch; four children; Kayla Watters, Wynter Burch, Dustin Burch and Hunter Burch. He is also survived by his parents and sister, Sarah LaRoque.

Memorial contributions may be made to the family at <https://gofund.me/b9137efa>.



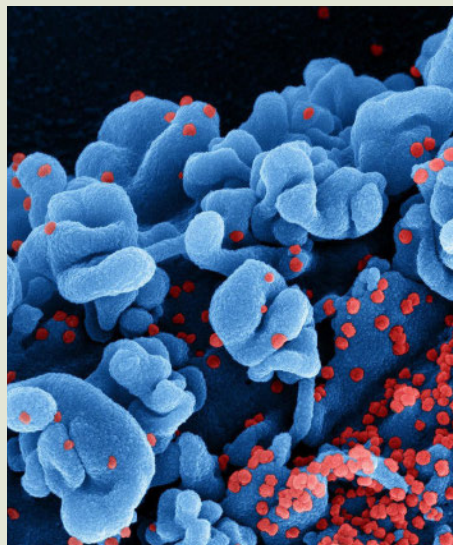
Acting fire chief Israel L. Burch



In 2007, Burch (third from r) was among six NIHFD firefighters honored with a unit citation by Montgomery County Fire Chief Thomas W. Carr, Jr. (third from l).

SARS-CoV-2 Antigen Levels Linked to Patient Outcomes

In a new study, NIAID researchers analyzed levels of SARS-CoV-2 antigen in blood samples taken from study participants and assessed the association of those levels with disease progression.



Colorized scanning electron micrograph of a cell infected with the Omicron strain of SARS-CoV-2 virus particles (red), isolated from a patient sample

IMAGE: NIAID

Following the ACTIV-3 trial of Covid-19 therapeutics in people hospitalized with the virus, researchers found the amount of SARS-CoV-2 antigen measured in their blood was associated with illness severity and other clinical outcomes. The results were published in the *Annals of Internal Medicine*.

Higher levels of viral antigen in the blood, which could indicate ongoing SARS-CoV-2 replication, correlated with more severe disease. The authors suggest that SARS-CoV-2 antigen levels hold promise as a biomarker, or a measurable substance, to predict which patients hospitalized with Covid-19 have a higher risk of worse outcomes.

The ACTIV-3 trial enrolled people hospitalized with Covid-19 between August 2020 and November 2021. Participants

contributed a baseline blood sample and were then randomized to receive either an experimental Covid-19 therapeutic or a placebo. All participants received the antiviral remdesivir unless contraindicated. In this follow-up analysis, the researchers examined 2,540 participant baseline blood samples for SARS-CoV-2 antigen levels.

Researchers assessed the relationship between each participant's SARS-CoV-2 blood antigen levels and their time to discharge from the hospital, as well as their pulmonary symptoms at day 5 of the trial.

The analysis revealed a strong correlation between higher SARS-CoV-2 antigen levels (≥ 1000 nanograms per liter) and worse pulmonary function at the time of enrollment. Importantly, participants with higher SARS-CoV-2 antigen levels in the blood at enrollment generally had decreased pulmonary function at day 5, regardless of the severity of their illness at the time of study entry and took longer to be released from the hospital.

Three additional participant characteristics were found to correlate with lower antigen levels: the presence of SARS-CoV-2 antibodies, exposure to remdesivir prior to enrollment and longer time in hospital prior to enrollment. Finally, participants infected with the delta variant had higher antigen levels than those infected with prior circulating strains.

The researchers concluded that measuring antigen levels in the blood could be useful for predicting a patient's disease progression and likely outcomes once they are admitted to the hospital.

NIH Study Suggests Health Benefits for Black Tea

A prospective study of a half-million tea drinkers in the United Kingdom has shown that higher tea intake was associated with a modestly lowered risk of death. The study, led by NCI researchers, is a large and comprehensive analysis of the potential mortality benefits of drinking black tea, the most commonly consumed type of tea in the U.K.

Past studies finding a modest association between higher tea intake and lower risk of



Can black tea increase longevity?

MIMAGEPHOTOGRAPHY/SHUTTERSTOCK

death have mainly focused on Asian populations, who commonly drink green tea. Studies on black tea have yielded mixed results.

In the new study, researchers found that people who consumed 2 or more cups of tea per day had a 9 to 13 percent lower risk of death from any cause than people who did not drink tea. Higher tea consumption was also associated with a lower risk of death from cardiovascular disease, ischemic heart disease and stroke. The association was seen regardless of preferred tea temperature, the addition of milk or sugar and genetic variations affecting the rate at which people metabolize caffeine.

The findings, which appeared in the *Annals of Internal Medicine*, suggest that black tea, even at higher levels of intake, can be part of a healthy diet.

The study involved 498,043 men and women between ages 40 and 69 who participated in a large cohort study called UK Biobank. The participants were followed for about 11 years, and death information came from a linked database from the U.K. National Health Service.



Computed tomography 3D surface rendering of the lungs and heart from a patient with PAH

IMAGE: DR. MARCUS CHEN/NHLBI

Novel Blood Test Evaluates Severity in Rare Lung Disease

NIH researchers have found that a novel blood test can easily evaluate disease severity in patients with pulmonary arterial hypertension (PAH) and predict survivability. PAH is a rare, life-threatening condition that causes unexplained high blood pressure in the lungs. Results of the study, which was funded by NHLBI and the Clinical Center, will appear online in the journal *Circulation*, a publication of the American Heart Association.

The new blood test measures DNA fragments shed by damaged cells. Researchers found that these fragments, called cell-free DNA, were elevated in the blood of patients with PAH and increase with disease severity.

If future studies confirm the findings, this first-of-its-kind blood test for PAH patients could allow doctors to intervene faster to prevent or delay progression of the disease and possibly save lives.

Cell-free DNA is a relatively new analytical technique that is growing in its potential medical uses, which include the early detection of heart- and lung-transplant rejection as well as early detection of cancer.

PAH is a rare form of pulmonary hypertension that can cause difficulty breathing, chest pain and fatigue. The disease is estimated to affect less than 50,000 people in the U.S. The cause remains unknown and there currently is no cure.

Patients with PAH have a high death rate; the condition mostly affects women.

Current tests used to monitor PAH severity rely on the use of an invasive catheter to measure pressure in the lungs. Other diagnostic tools to measure PAH tend to lack reliability and sensitivity.

In the current study, the research team analyzed cell-free DNA from blood samples taken from 209 adult patients, predominantly women, diagnosed with PAH at 2 large U.S. medical centers. The researchers compared the results to cell-free DNA measured from a control group of 48 healthy volunteers without PAH at the Clinical Center.

They found that cell-free DNA was elevated in patients with PAH and cell-free DNA concentrations increased in proportion to the severity of the disease. Patients with the highest level of cell-free DNA had a 3.8 times greater risk of either death or a need for lung transplantation compared to those with the lowest level of cell-free DNA.

Further analyses of cell-free DNA samples revealed that multiple tissue types—including the heart, blood vessels, fat tissue and inflammatory cells circulating in the blood—were affected by PAH.

The new blood test will allow researchers to better pinpoint the specific tissues involved in the PAH disease process, which may lead to new drug interventions.

“Here, we’re proposing a one-time test where you collect a vial of blood from a patient and use that to predict survival,” said Dr. Sean Agbor-Enoh, study co-author and chief of NHLBI’s Laboratory of Applied Precision Omics. “We’re very encouraged by the early results.”

Alcohol Study Seeks Participants

NIAAA invites volunteers ages 21-60 to participate in a study researching whether a nicotine receptor gene affects drinking. Volunteers should be healthy, drug-free and not seeking treatment for alcohol-related problems. Research participation includes three outpatient visits that consist of alcohol consumption, brain scans (MRI), blood draws and filling out questionnaires. There is no cost to participate and compensation up to \$480 may be provided. To learn more, contact the Clinical Center Office of Patient Recruitment at (866) 444-2214 (TTY users dial 711) or ccopr@nih.gov. Refer to study #17-AA-0171. Online: <https://go.usa.gov/xp3zV>.

Volunteers Needed for Microbiome Study

Healthy volunteers 18-60 years old are needed for a new study investigating how changes in our diet can affect our intestinal microorganisms. The CLEAN-MED diet intervention study of the gut microbiome is a new study that wants to see the changes in the environment in the intestine. Participants will keep detailed food logs, and provide stool, urine and blood samples throughout the study. Options include a 9-week study or a year-long study. Contact the Office of Patient Recruitment at (866) 444-2214 (TTY users dial 711) or ccopr@nih.gov. Refer to study #000871-CC. Online: <https://go.usa.gov/xJmwY>.

Universal Flu Vaccine Study Wants Healthy Volunteers

NIAID researchers seek healthy volunteers 18 to 50 years old to participate in a universal influenza (flu) vaccine study. Scientists are testing an investigational flu vaccine (Flu-Mos v1) to determine safety and tolerability. There is no risk of infection from participation, as the investigational product does not contain any flu virus. Financial compensation is provided. Contact the Office of Patient Recruitment at (866) 444-2214 (TTY users dial 711) or ccopr@nih.gov. Refer to study #000410-I. Online: <https://bit.ly/3QflqWf>.

Volunteer for an MRI Study

Researchers at NIH seek healthy volunteers for an outpatient research study. The study aims to develop improved MRI techniques for studying brain function. The study will also look at new methods for monitoring blood flow to brain regions to understand normal and abnormal brain behaviors. Compensation is provided. For more information, contact the Office of Patient Recruitment at (866) 444-2214 or email us at ccopr@nih.gov. TTY users dial 711. Refer to study 00-N-0082. Online: <https://go.usa.gov/xe7a2>.

SUPPORTED BY NIH INTERPRETERS Deaf NCI Fellow Wins Awards for Research Presentation

Megan Majocho, a Ph.D. student in tumor biology in the NIH-Georgetown Partnership Program, received a travel scholarship to present her findings at the International Mammalian Genome Society Conference (IMGC) in Vancouver. She works in Dr. Kent Hunter's Laboratory of Cancer Biology and Genetics at NCI, where they use integrated genetic and genomic technologies to better understand the heredity factors that contribute to the metastatic progression of breast cancer.

Majocho, who is deaf, requested that her team of scientific interpreters who are familiar with her research and signing style, accompany her to the IMGC. A partnership between the Office of Research Services and NCI made it possible for her to present her findings at the conference with her team of NIH interpreters. She won the Lorraine Flaherty Award for outstanding presentations at the Trainee Symposium. This award, given to the top three presenters, provides the opportunity to present at the plenary session. Her presentation there won her a second award for most outstanding talk.

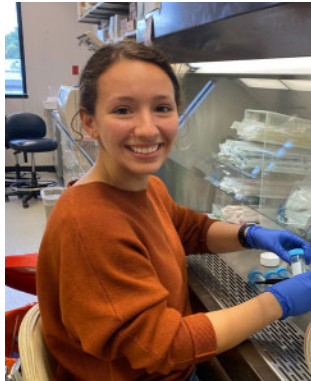
"My thesis focuses on one understudied gene RESF1 and its role in suppressing tumors in ER-negative metastatic breast cancer—a less common type of breast cancer that's more challenging to treat and has poor treatment outcomes," explained Majocho in a recent chat with Linda Kiefer, manager of ORS's interpreting services program. "Understanding this gene could lead to better treatment outcomes for these patients."

In 2018, Majocho began as a post-baccalaureate fellow for 1 year in NCI's Laboratory of Cancer Biology and Genetics. Afterwards, she completed a few other training rotations before returning to Hunter's lab as a Ph.D. fellow. IMGC was her first in-person conference as a graduate student and the first time she presented her work in front of fellow researchers.



At the awards banquet are (from l) NCI PI Dr. Kent Hunter, lab staff scientist Dr. Christina Ross, Majocho and her NIH interpreting team Sheryl Jacobs, Chris McQuaid and Helen Avner.

"It provided me with the opportunity to network with others in my field," Majocho said. "Having my interpreters there allowed me to listen to other presentations, participate in discussions and contribute to the daily conversations... which was the highlight of the conference experience for me!"



Megan Majocho

Interested in science communication, Majocho eventually hopes to find ways to share her research with the public, making it accessible and easy for anyone to understand.

"The Deaf community gets most of its information through ASL [American Sign Language]," she said, "and we need to communicate science in English and ASL in ways everyone can understand and receive equal access to information. We need more ways to share information through social media, and I want to help make those connections. At the same time, I want to pursue my cancer research where it leads."

That's one reason having her NIH interpreting team at IMGC with her was crucial.

"I have been working with my interpreting team for several years," she said. "They know my signing style and understand my research conceptually. Even an experienced STEM interpreter might not

be able to grasp what I want to say without being thoroughly briefed and/or having spent time with me in the lab.

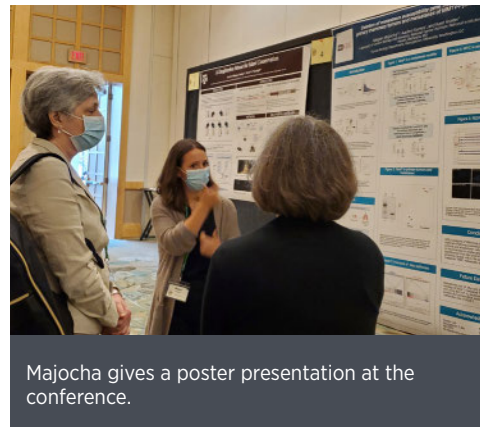
"It's different with ASL, which has standard signs making it easier for them to interpret even for someone they don't know well," she continued. "But scientific and technical terms don't have standardized signs. Sometimes we make them up as we go, specific to our lab. Having to worry about how well the interpreter is interpreting what I am

saying is a huge distraction from my presentation; that's why I prefer to bring my own. I've spoken to other deaf scientists who say they've had to lower their expectations and settle for what they can get. Others have given up the struggle and avoid conferences altogether. I don't think we should settle and encourage them to advocate for themselves and all of us in the Deaf community."

Early in her science career, Majocho experienced what it's like not to have the same access as her hearing peers.

"As a freshman, during my first summer research internship, I wrote notes back and forth to communicate with others until I learned how to advocate for myself," she recalled. "Many of my graduate courses were audio-taped and shared with the class, which wasn't useful to me as a deaf student. So, I started asking my professors for transcripts of the audio, which they were willing to provide. The turning point for me was when I had to practice my oral presentation with slides in front

of my professor, without an interpreter. I had arranged for one, but he was too busy to wait for the interpreter to show up. So, I signed my entire presentation to someone who didn't understand ASL. That was one of the most awkward and humiliating experiences I have ever had, and it was of no benefit to him or me—except I learned that advocacy was key to improving access."



Majocho gives a poster presentation at the conference.

Majocho said other science-minded organizations can learn a lot about accessibility from her workplace.

"The interpreting program at NIH is among the best programs anywhere," she said. "NIH provides top quality STEM interpreters that are easy to access on demand. My NIH interpreters understand NIH culture and Deaf culture. They have enabled me to be me, and because of that I've been able to get accepted into top graduate programs. This is one of the primary reasons I came back to NIH to do my Ph.D. program. Here, I don't have to fight to be heard."

NIH's interpreting services program has been serving the community for more than a decade. It provides centrally funded, reliable and easy-to-access services for patients, visitors and the NIH workforce.

"Overall, the interpreting services NIH provides is top quality," Majocho concluded. "One ask would be to provide more STEM interpreters so there are enough to go around. Even at Georgetown, there aren't enough. It would be great too if scientific interpreters could get some formal STEM training to establish some standard signs." **R**