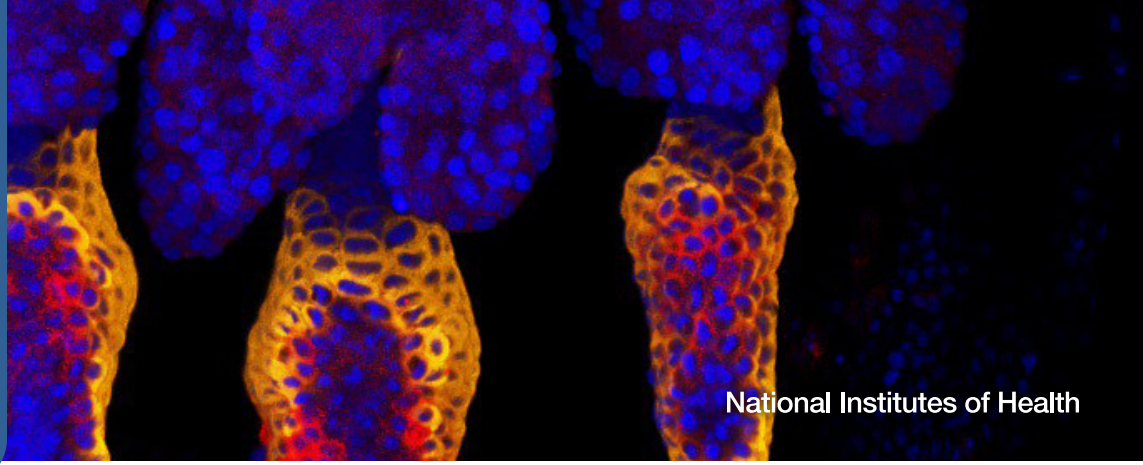
NIH RECORD

March 31, 2023
Vol. LXXV, No. 7



National Institutes of Health

WOMEN'S HISTORY MONTH

Getting to Know Inspiring Women Leaders at NIH

In the third and final installment of this series on NIH women leaders, several share their stories, interests and advice.

Harbison Urges Pursuit of Interesting Questions vs. Publishing Metrics

For as long as she can remember, Dr. Susan Harbison has always been interested in understanding how things work.

When she was a child, a button on her transistor radio got stuck. To fix it, she took the cover off. Harbison saw many small, interesting parts. That experience inspired her to take apart other small household appliances. Her mom wasn't thrilled with her new hobby, so her dad—a fellow tinkerer—brought home old electronics to dismantle.

"Everyone was pretty happy with this arrangement and I've been exploring ever since," recalled Harbison, a senior investigator in the National Heart, Lung and Blood Institute's Laboratory of Systems Genetics.

NHLBI's Dr. Susan Harbison
PHOTO: MEGAN FELDMAN

Harbison studies the "enduring biological puzzle" of sleep. While it appears to lack an adaptive advantage, sleep is needed by all animals. Over the course of a lifetime, sleep deprivation affects the heart, immune system and emotional well-being.

Sleep is an example of a "complex trait," meaning it is influenced by many genes and multiple environmental factors. Harbison is using genomic and molecular technologies to identify gene networks that will illuminate the function of sleep as well as the degree of conservation across species.

When she first started her career as a biomedical researcher, she never heard about the number of papers she needed to publish in a journal to get a position in research. Harbison was free to pursue important questions.

Recently, she met with a group of college students. To get hired in an academic position in a scientific field, the students believed they had to write 10 first-author papers with at least one of those papers getting published in a high-impact journal.

"Surprisingly, they made no mention of an important and intriguing research question—or a vigorous and creative

SEE **WOMEN**, PAGE 6

DISEASE & RACE

Diabetes History Has Present-Day Implications

BY DANA TALESNIK

A century ago, the first human received an insulin injection. Thanks to insulin, type 1 diabetes is survivable and manageable, but a new challenge arose: many now face serious diabetes-related complications. A historian recently discussed these different sides of diabetes and raised some often-overlooked questions that reverberate in today's world.

Dr. Richard Mizelle, Jr.

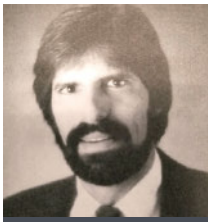
"Broader questions of race, environment

SEE **DIABETES**, PAGE 4

Center for Information Technology Marks 25 Years

BY ROBERT WAXMAN

Way back in the 1990s, when grunge and hip-hop ruled the radio airwaves, and people were wearing a lot of flannel, computer and IT resources at NIH were spread among three main organizations: the Division of Computer Research and Technology, the Office of Information Resources Management and the Telecommunications Branch.



First CIT Director and NIH CIO Alan Graeff, circa 1998

That all changed in March 1998 when NIH leadership combined these groups to form the Center for Information Technology (CIT). Alan S. Graeff was named CIT's first director and NIH's first chief information officer.

SEE **CIT**, PAGE 10

NIH'ers watch final tissue chip experiments blast into space. See p. 12.

ALSO THIS ISSUE

Dr. Myriam Gorospe

Gorospe To Present Next Mahoney Lecture on Aging, Apr. 12

Dr. Myriam Gorospe, a molecular biologist whose research is focused on studying the fundamental mechanisms of growing older, will deliver the next NIH Florence Mahoney Lecture on Aging, Apr. 12 at 2 p.m. ET, as part of the Wednesday Afternoon Lecture Series.

Gorospe's presentation, "Wisdom on Aging from the RNA World: Old Molecules in Young Roles," will take place in Lipsett Amphitheater, Bldg. 10, and online at https://videocast.nih.gov/watch=46073. She will discuss studies on ribonucleic acids (RNAs) to illustrate how these ancient molecules shed light on the biology of aging and guide efforts to delay, reduce and prevent diseases and declines of old age.

Gorospe is chief of the RNA regulation section and the Laboratory of Genetics and Genomics at the National Institute on Aging (NIA). Her research uses a range of cell and animal models to study aging-relevant processes controlling protein production.

Post-transcriptional regulatory events directly influence gene expression programs underlying the normal physiologic declines and the pathologies of aging. Her lab investigates age-associated diseases by testing the impact of RNA-binding proteins and noncoding RNAs on gene regulation in pathologies of aging such as diabetes, obesity, sarcopenia, neurodegeneration and cancer.

A native of Spain, she earned her bachelor's and master's equivalent degrees in molecular biology from the Universidad Complutense de Madrid in 1990. She received her Ph.D. in cell and developmental biology from the State University of New York in Albany in 1993. She then joined NIA for postdoctoral training. She has held many positions at NIA over the years from tenure-track investigator to her current position since 2014, and NIA senior advisor for faculty development in 2022.

Gorospe has been recognized for her research, receiving numerous awards, including the L'Oréal Women in Science Award, NIH Director's Award, NIA Director's Award for Diversity in Aging Research, NIH Honor Award for Tenure-Track and Assistant Clinical Investigator Mentoring Program and a special act award for mentoring tenure-track investigators.

Mahoney lectures are sponsored by NIA and named in honor of Florence Stephenson Mahoney (1899–2002), who devoted much of her life to successfully advocating for the creation of NIA and increased support for NIH.

Inaugural Piatigorsky Lecture Highlights Basic Science, Evolution in Animal Eyes

The Foundation for the National Institutes of Health and the National Eye Institute (NEI) announce that Dr. Dan-Eric Nilsson of Lund University in Sweden will deliver the inaugural talk in the Joram Piatigorsky Basic Science Lecture and Award Series. The lecture takes place (in-person only) on Tuesday, Apr. 11 from 3 to 4:30 p.m. ET in Lipsett Amphitheater, Bldg. 10.

Made possible by the generous philanthropic support of Lona and NIH scientist emeritus Dr. Joram Piatigorsky—founder of NEI's Laboratory of Molecular and Development Biology—this endowed series brings special consideration for basic eye and vision scientists who take risks exploring little-studied species and imaginative ideas.

Nilsson's lecture promotes and communicates basic discoveries in eye and vision research that result in far-reaching observations that may inform widespread areas of science—from the eye to the world as it were—rather than the other way around. The talk will be followed by a light reception. Trainees and scientists from all NIH institutes and centers are encouraged to attend. Read more at https://bit.ly/403Z8gN.

Nominations Open for EDI Awards

The NIH Office of Equity, Diversity and Inclusion (EDI) is accepting nominations for employees who have made significant contributions toward furthering NIH's diversity, equity, inclusion and accessibility (DEIA) efforts.

There are four awards that recognize staff who demonstrate a commitment to DEIA:

- The **Harvey J. Bullock Jr. Award** honors a non-supervisory employee or group of employees at the grade-12 level and below, or equivalent.
- The **Yvonne Thompson Maddox Award** honors a non-supervisory employee or group of employees at the grade-13 level and above, or equivalent.
- The **Equity, Diversity and Inclusion Award** of the Year honors an executive, manager or supervisor.
- This year, a new award will recognize efforts in promoting accessibility. All employees are eligible for the **Accessibility Award** regardless of grade or position. Efforts must fall outside the employee's primary job duties.

Honorees will be recognized during the 2023 NIH Director's Awards Ceremony. Nominations must be submitted to EDI by Wednesday, Apr. 12.

For details and how to nominate an employee, visit https://bit.ly/3lqGl07. If you have questions, contact your institute/center awards coordinator or Allyson Browne by phone (301) 827-1332 or by email: allyson.browne@nih.gov.

Food Trucks, Community Market Return

The NIH community now has a variety of rotating food trucks on the Bethesda campus in the 10H parking lot.

Weather permitting, trucks will operate on Tuesdays, Wednesdays and Thursdays from 11 a.m. to 2 p.m., or until food sells out. In summer, operations will expand to include Mondays and Fridays. Continued operation will depend on community demand.

Find a full list of trucks and menus at https://bit.ly/3JwkL29

Food trucks return to serve staff in the 10H parking lot.

PHOTO: ERIC BOCK

On Tuesday, Apr. 11, the NIH Community Market will return and will continue every Tuesday between 10 a.m. and 2 p.m., also at Lot 10H, on the south lawn of Bldg. 10. See the list of market vendors at https://bit.ly/3zegbB3.

Blood Test Identifies AML Patients at Greater Risk for Relapse After Transplant

Researchers at NIH showed the benefits of screening adult patients in remission from acute myeloid leukemia (AML) for residual disease before receiving a bone marrow transplant.

The findings, published in *JAMA*, support ongoing research aimed at developing precision medicine and personalized post-transplant care for these patients.

NHLBI's Dr. Chris Hourigan (l) and Radm. Richard Childs

About 20,000 adults in the U.S. are diagnosed annually with AML, a deadly blood cancer, and about one in three live past five years. A bone marrow transplant, which replaces unhealthy blood-forming cells with healthy cells from a donor, often improves these chances. However, research has shown that lingering traces of leukemia can make a transplant less effective.

In the current study, researchers wanted to show that screening patients in remission for evidence of low levels of leukemia using standardized genetic testing could better predict three-year risks for relapse and survival.

To do that, they used ultra-deep DNA sequencing technology to screen blood samples from 1,075 adults in remission from AML. All were preparing to have a bone marrow transplant. The study samples were provided through donations to the Center for International Blood and Marrow Transplant Research.

After screening adults with variants commonly associated with AML, researchers showed that the two most common mutations in AML could be used to track residual leukemia. Among 822 adults with these variants detectable at initial diagnosis, 142 adults—about one in six—were found to have residual traces of these mutations after therapy despite being classified as in remission.

The researchers found the outcomes for these patients striking. Nearly 70% of patients with the lingering mutations relapsed and just 39% survived after three years. In comparison, only 21% of adults without this evidence of trace leukemia relapsed after three years and 63% survived.

"If I'm one of six people waiting in a doctor's office and we're all being told we're going in for a transplant and we've got the same risk, I want to know if I'm actually one of those five who has a 20% chance of relapse or if I am the one with a 70% chance of relapse," said study lead Dr. Christopher Hourigan, senior investigator and chief of NHLBI's Laboratory of Myeloid Malignancies.

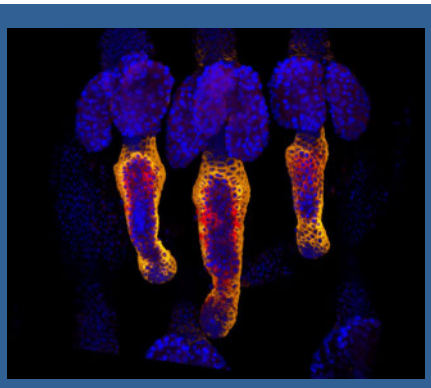
"Having this increased risk for relapse may not impact a person's decision about having a bone marrow transplant, but it could influence their next steps in care," Hourigan said. "For that one person out of six, the transplant often isn't going to be enough. Other options might include also enrolling in a clinical research trial or considering additional or different therapies."

NCI's Dr. James Doroshow

"This study confirms prior research and provides new important data showing why testing for residual disease before a transplant is critical," said Rear Admiral Dr. Richard Childs, NHLBI clinical director and acting scientific director. "This information can also empower physicians to tailor transplant strategies...to reduce an AML patient's risk for relapse and improve their long-term chance for survival."

"Finding bold and innovative approaches, including precision therapy for AML, is essential to the Biden Administration's goal to cut the death rate from cancer in half within the next 25 years," said Dr. James Doroshow, NCI deputy director for clinical and translational research.

The study was funded by NHLBI, NCI, NIAID, the Health Resources and Services Administration, the Office of Naval Research and the NIH Director's Challenge Innovation Award.



ON THE COVER: *Wound healing requires the action of stem cells. In mice that lack the Sept2/ARTS gene, stem cells involved in wound healing live longer and wounds heal faster and more thoroughly than in normal mice. This confocal microscopy image from a mouse lacking the Sept2/ARTS gene shows a tail wound in the process of healing. Cell nuclei are in blue. Red and orange mark hair follicle stem cells, which activate to cause hair regrowth, an indication of healing.*

IMAGE: YARON FUCHS AND SAMARA BROWN, NIH

The NIH Record

Since 1949, the *NIH Record* has been published biweekly by the Editorial Operations Branch, Office of Communications and Public Liaison, National Institutes of Health, Department of Health and Human Services. For editorial policies, email nihrecord@nih.gov.

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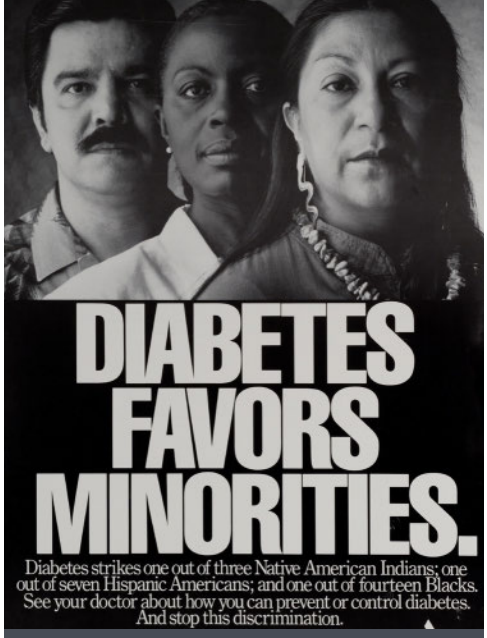


IMAGE: AMERICAN DIABETES ASSOCIATION, NATIONAL LIBRARY OF MEDICINE

Mizelle participates in Q&A with Dr. Jeffrey Reznick, chief of NLM's History of Medicine Division.

Diabetes

CONTINUED FROM PAGE 1

and technology help inform how we might understand the complications of diabetes," said Dr. Richard Mizelle, Jr., associate professor of history at the University of Houston, who recently delivered the 14th annual James Cassedy Memorial Lecture in the History of Medicine at the National Library of Medicine (NLM).

"Much of my work deals with physicians, but also with other health professionals who have largely been ignored by historians, including nurses, dietitians and nutritionists," said Mizelle. "Black people, particularly in rural parts of the country, were much more likely to come into contact with a nurse rather than a physician."

An estimated 37 million people in the U.S. are living with diabetes. Some 500,000 are on dialysis and more than 8 million require insulin to live. A major cause of kidney failure, heart attacks, stroke, blindness, neuropathy and limb amputation, diabetes still disproportionately affects people experiencing poverty, African Americans and other minorities.

Race, Health & Environment

A focus of Mizelle's research, and the subject of a teaching module he developed for NLM, is the intersection of disease with environment and policy.

People with low socioeconomic status and seniors are particularly vulnerable to extreme temperatures, natural disasters, contamination from toxic dumping and other environmental exposures.

Last year was the 40th anniversary of the Warren County, N.C., protests, in which a small, predominantly Black community objected to becoming a landfill site for toxic waste. It was the first large-scale environmental protest in U.S. history.

Other examples Mizelle cited were more recent. The 1995 heat wave in Chicago highlighted vulnerabilities of those with a lower or fixed income. On the South Side, dealing with extreme temperatures, the elderly were encumbered by the elements, such as uneven, cracked sidewalks. Many stayed in and died in their apartments, unable to afford air conditioning.

In 2005, Hurricane Katrina tore through Gulf states calling attention to the difficulties of evacuating patients from hospitals, particularly those on dialysis, and moving people with amputated legs or serious health conditions to safety.

Even a seemingly harmless skin break could be dangerous in such a disaster. "People had to wade through toxin-filled waters to the Superdome or other shelters," Mizelle said. "Complications from skin breaks could turn deadly if not treated in a timely way."

Diseases such as diabetes and asthma adversely affect people who are poor and those without insurance, who frequently die from these otherwise manageable conditions.

Consider diabetes not only as a chronic disease, he said, but also as being interconnected with "where people live, what policies are at play and how we as a society are thinking about this vulnerability that people are dealing with."

The Stroke Belt

Since the 1940s, some southern states have had much higher incidence of diabetes, kidney failure and heart disease. This "stroke belt" sheds light on the urban-rural divide.

Out of more than 1,200 dialysis clinics in Alabama, Georgia, Louisiana, Mississippi and the Carolinas, only 104 are not-for-profit, or hospital-based, which tend to provide better care and resources. Most of these not-for-profit clinics are in White, urban, affluent areas, noted Mizelle, which means the for-profit industry largely targets poor Black and minority areas.

"It becomes difficult in many ways for individuals located in these deep south states to access dialysis and [other] resources required to manage their illness," he said.

Routine check-up for a person with diabetes in 1971

A.S. KOCHAR, WORLD HEALTH ORGANIZATION, NATIONAL LIBRARY OF MEDICINE

Amputations

About 140,000 people in the U.S. have diabetes-related amputations each year. Black people are three to four times more likely to endure them.

"By the time someone needs an amputation," Mizelle said, "the body has been ravaged to a point that there are likely other health issues going on related to diabetes, including heart failure."

And yet, Black people also have much lower rates of angiogram screening, which could help prevent heart failure. One strategy that can prevent amputation is revascularization surgery, which can open blocked vessels going down to the legs.

"But the medical system in many ways bends toward amputations first," he said, "and that is a problem we as a society must face and take on."

In low-income communities, amputations are twice as likely, due to the high cost

of insulin, lack of health insurance and lack of access to specialists. Many areas even lack hospitals, and small clinics usually are not equipped to do revascularization surgery.

Amputees face unique hurdles, often contending with limited employment options and reduced self-sufficiency. A distinct stigma though comes with having an amputated limb and being Black, said Mizelle. Non-White people, for example, have a tough time finding an artificial limb that matches their skin color.

"And a chronic invisibility comes with dialysis," Mizelle noted. People disappear for hours, several times a week for treatment. "But we don't talk about dialysis the way we talk about other forms of chronic disability and those questions are important and connected to a much longer history."

When Disasters Collide

"From the beginning, those of us who work within the realm of public health and the history of medicine understood that Black people and minorities and socio-economically depressed groups would suffer disproportionately from the Covid-19 pandemic," Mizelle said.

"Even during the height of the shutdown, people on dialysis had to go to their dialysis clinic [multiple] times a week, no matter how far, regardless of how many buses they had to take...because this was life or death."

In fact, many diabetes clinics were shut down during the pandemic, which has led to more long-term damage and heightened amputations, particularly among certain groups.

"We see this narrative, a moment in which disasters collide, in a number of ways over the last century," he said.

A Matter of Access

Mizelle urged historians and researchers to put on their policy hats and work with public officials to help more people better manage, and potentially prevent, diabetes and its complications.

For one, revamp neighborhoods and public spaces—parks, walking paths, free exercise equipment, trees, fresh air.

"All of these things [not only] make for a healthy environment," he said, "but also help people deal with disease and, importantly, help to prevent disease."

Book Event Inspires Kids at the Children's Inn

BY DANA TALESNIK

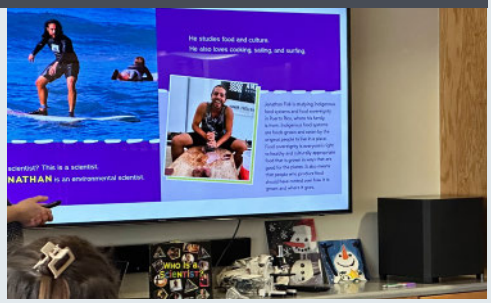
Jagmeet is a neuroscientist. He also enjoys painting and taking photos of nature. He is one of 14 scientists featured in the children's book, *Who is a Scientist?*, by Laura Gehl, who visited the Children's Inn at NIH on Mar. 2.

The event was the third installment in a new series, "Authors and Illustrators Share at the Inn," a project of volunteers for the Family Program of the inn. Each interactive program includes a book reading and a kid-friendly discussion.

Gehl, a scientist-turned science writer-turned children's author, opened the event with a lively discussion of hobbies and favorite things to introduce the book to the rapt children in attendance. A live Zoom link allowed others, not feeling up to venturing out of their rooms and children not in-residence at the time, to watch remotely.

Children's Inn family programming intern Haja Kumalah (r) introduces Laura Gehl. Below, pages from Gehl's book are projected on screen.

PHOTOS: ELIZABETH GOULDMAN



As Gehl then read aloud from the book—which features scientists across different disciplines and cultures—she sought to illustrate that people with all kinds of interests and pastimes are scientists. She also discussed the people and things scientists study and where they might work—from the lab to the ocean—in a way that sparked imagination and creativity and got the kids talking about their own future careers.

"The authors in this series have become—as we all do—extremely enchanted by the inn and its mission," said Dr. Marin Allen, former NIH deputy associate director of communications and public liaison, who helped launch the program with Karen Jaffe, former director of the Young Readers Center at the Library of Congress.

Later in spring, author Naaz Khan is scheduled to share her book, *Room for Everyone*. For each book in the series, publishers or authors donate copies to the Children's Inn for current and future inn residents to enjoy.

Gehl holds up her book, copies of which were donated to the Children's Inn.

PHOTO: DANA TALESNIK

Summer intern Joseph (second from l), shown with Dr. Mary Engler (r) in an NINR lab, circa 2012

Women

CONTINUED FROM PAGE 1

research program," she said. "This disturbing viewpoint is one that needs to be addressed."

Researchers can rectify the problem by teaching students about and supporting such edicts as the San Francisco Declaration on Research Assessment, which intends to halt the practice of connecting the journal impact factor to the merits of a specific scientist's contributions.

One of the biggest concerns Harbison's female trainees have is whether they will be able to juggle the demands of an academic career and the care of their family. The issue influences whether they apply for other academic positions and how long they stay in these posts.

"Flexible work and teleworking policies have been a positive development, though the issue is complex and needs additional study," she noted.

She encourages the trainees in her lab to read scientific papers beyond their field or organism of choice and to train in more than one field. For example, computational biologists should be familiar with the field of molecular biology and vice versa.

"Creativity comes from reading more broadly and understanding every aspect of your particular project," Harbison concluded. **—Eric Bock**

Be a 'Visible Contributor'

One of Dr. Paule Joseph's mentors once told her, "You cannot inspire the next generation if you are an invisible contributor (i.e., hidden figure) in the biomedical research enterprise."

As a woman in science who identifies as Black and Latina, Joseph found those words inspiring. "If other women who paved the way before me hadn't been highlighted, I might not have taken the same career path in my life," she said.

NIAAA's Dr. Paule Joseph

Joseph is currently a Lasker clinical research tenure-track investigator, NIH distinguished scholar, and chief of the section of sensory medicine and metabolism (SenSMet) at the National Institute on Alcohol Abuse and Alcoholism (NIAAA) with a joint appointment at the National Institute of Nursing Research (NINR). Her lab seeks to understand how taste and smell (chemosensation) vary across diseases such as substance use disorders and obesity; the group recently added Covid to the list. She first came to NIH in 2012 as a NINR summer intern, subsequently serving as a special volunteer and postdoc before being appointed assistant clinical investigator of SenSMet in 2017. She became lab chief in 2019.

Joseph has "always loved the idea of discovery." She enjoys asking questions and delving into previously unexplored areas, which ties in well to her second-favorite piece of advice: "Don't be afraid of following your passion and of doing something that doesn't fit into a mold."

In her nursing Ph.D. program at the University of Pennsylvania, Joseph studied the genetics of taste. Studying genetics as a nurse was uncommon and chemosensation was an understudied field to begin with. Early on she was questioned often by many people about her line of inquiry, but she persevered with the support of her mentors.

Joseph remains the only nurse from the Monell Chemical Studies Center who is trained in chemosensation and its psychophysical measures. Her boldness paid off when more people began looking at taste and smell in response to the Covid-19 pandemic. She was prepared to ask and answer questions surrounding these emergent problems.

"When you do what you love and ask questions that are important to you, your contributions then become priceless," she said.

Joseph is deeply committed to mentoring, and especially to creating new opportunities for girls and women in science. She is the director of career development and mentorship for the African Research Academies for Women, an organization that seeks to increase the representation of women in STEM positions around the world. Joseph also mentors in her own lab, receiving an NIAAA Mentoring Award in 2022. She calls that her proudest achievement to date.

When you are a good mentor and encourage others to pay it forward, "the contribution you have as a scientist can last generations," she said.**—Amber Snyder**

Making Her Mark in the World

Dr. Rachel Sturke once contemplated going to medical school. Somewhere along the way, though, she became intrigued by medical anthropology and changed course.

"I always had a travel bug and was always interested in global health, particularly the social and cultural determinants of health," said Sturke, acting deputy director of NIH's Fogarty International Center. "I had this vision of living abroad and doing on-the-ground public health work."

During college, Sturke spent time in eastern Africa and later worked in a family planning clinic in Ecuador for more than a year, experiences that fed her interest in travel and global health.

Fogarty's Dr. Rachel Sturke

Sturke first arrived at Fogarty in 1999 as an analyst. She left two years later to pursue her Ph.D. in population, reproductive and women's health.

In 2006, as a newly minted Ph.D., Sturke began working at Fogarty full time in the Division of International Science Policy, Planning and Evaluation. In her current leadership role, she continues to oversee a range of global projects mostly focused on implementation science based in low- and middle-income countries.

"Fogarty gave me really broad exposure to different global health challenges in different

regions of the world," Sturke said. "As I gained more expertise in implementation science, [I found] that's a space that really resonates with my passion and my interest in bringing research evidence to bear on global health programs and policies."

During the pandemic, Sturke missed traveling internationally. She looks forward to her first in-person, international work trip to Zambia this spring.

Reflecting on her career thus far, Sturke highlighted the Adolescent HIV Implementation Science Alliance—a collaborative effort to overcome barriers to HIV screening and treatment among adolescents in sub-Saharan Africa—an effort that Sturke conceptualized and leads.

"This alliance feels emblematic of what I'm hoping to catalyze in the worlds of science and global health in my career," she said. "I'm proud of the fact that, through the collective expertise of the network, we've been able to elevate the possibilities and the potential of implementation science to address important global health challenges" in these countries. And through the toughest times of the pandemic, "it was striking to see the humanity and humility that our teams demonstrated."

Sturke also reflected on being a woman in science. Challenges remain, from work-life balance to the dearth of younger women in leadership positions. But she's glad to see "normalizing girls and women in STEM is something we're investing in [as a society] because it's important to keep moving the dial there." A mom to two kids, she hopes her career inspires them.

To aspiring young scientists, she would say, "Explore your interests fully across the field before attaching to one area of focus. Often, the way training is set up, you end up thinking you have to do a narrow and deep dive and then you're attached to that [one area]. I think there's a lot more flexibility to explore and find your passion. And I think there are a lot of ways to do science that go beyond doing the research itself." **—Dana Talesnik**

In Engineering, Logic Rules

In her freshman year of high school, Malee Kaolawanich decided to become an engineer. Many of her classmates talked about medical school, but Kaolawanich did her research and decided on engineering.

"I loved math, science, anything logical," she recalled. She chose to study mechanical engineering because it is hands-on ("I can see it, so it makes sense to me," she joked).

Kaolawanich and a colleague inspect a pressure booster pump for a domestic water system.

These days, she is a senior mechanical engineer with the facilities compliance and inspection section (FCIS) in the Office of Research Facilities (ORF).

Kaolawanich helps support NIH's aseptic processing facilities (APF), which prepare therapeutic and diagnostic biologic and pharmaceutical products for human use. The products may include those required to follow cGMP (Good Manufacturing Practices) regulations and for use in phase I and II clinical trials.

Kaolawanich and her team review much of the work, processes and documentation that originate from the Division of Facilities Operations and Maintenance under APF groups. Kaolawanich's role largely involves overseeing the functionality and documentation of heating, ventilation and air conditioning. She and the FCIS team oversee quality assurance throughout the life cycle of each APF to ensure compliance with regulation, including cGMP.

Last fall, Kaolawanich earned a Silent Hero award. "I'm proud that people see me as a good team player," she said. But, she also takes pride in phases of her career, rather than in achievements.

ORF's Malee Kaolawanich

She's gratified "to be going through a path of growth" in her career, she said. Big projects are fun, but "even the little things can bring you excitement," she added.

Another point of pride for Kaolawanich is that she has been the first female mechanical engineer in every position she has held. Engineering is still a very male-dominated field, but she doesn't want women to be deterred by that.

"We are lucky that most engineering-interested people are logical and use logic to drive their lives," she observed. She has encountered some differences in gender roles across cultures (such as in her native Thailand) but has found that gender bias does not line up well with logical thinking.

"We all have differences," she said. "Just look at a person as a person."**—Amber Snyder**

Patience and Persistence Are Key

Patience and persistence are two traits that those thinking about a career in research must have, said Dr. Gisela Storz, head of NICHD's section on environmental gene regulation.

When she first started as an independent investigator, her lab studied redox-sensitive transcription factors and how bacteria and fungi respond to oxidative stress. Recently their attention shifted to the identification and characterization of small, noncoding RNAs and small open reading frames, also known as small ORFs. While the importance of noncoding RNAs has been recognized for some time, accumulating evidence suggests small proteins encoded by the small ORFs act as important regulators in all organisms. Knowledge about the existence and function of these genes that were "missed" because of challenges in their identification has the potential to explain regulatory mysteries and lead to new therapeutic approaches.

NICHD's Dr. Gisela Storz

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"Patience is a virtue," she said. "Sometimes you have to be patient in science."

As a child, Storz gravitated towards STEM courses. For instance, she enjoyed observing how long it took water and household solutions to evaporate in the sun. And she participated in science fairs. In addition, she had a "science box" where she kept items from nature, such as a snake's skin.

In college, she worked in a lab through a work-study program. She prepared solutions for a cell biology lab course.

"I first got into a lab because I needed money to pay for college," Storz said.

She initially came to NIH in 1989 to carry out postdoctoral research in Dr. Sankar Adhya's lab at NCI. She returned two years later as a tenure-track investigator in NICHD's Cell Biology and Metabolism Branch.

Storz believes that getting established in a scientific career is harder now than it was when she first started. To be considered qualified for a position, students must publish more research. "The expectations have just gone up and up and up," she noted.

Seeing her trainees succeed in such a tough environment are some of the proudest moments in her career.

She encourages others to pursue hobbies and interests outside of their work. Storz tries to make sure she doesn't lose perspective and pays attention to other parts of her life.

Women scientists have pushed for changes in representation for many years without seeing "tremendous change." Over time, that burden accumulates. When she graduated, women made up half of her class.

"We were always told 'oh, the representation of women will change,'" she said. "And here we are 40 years later, graduate programs are still 50% women, but the demographics haven't changed very much."

Although things have not changed as fast as she hoped, Storz is continuing to push for change and is encouraged by the increased awareness about underrepresentation and bias in science and by the many individuals working hard to collect data and propose policies that make a substantive difference.

"I feel that I've been very privileged to have this career, to be able to observe and think about biological systems and mentor people from all kinds of backgrounds," Storz concluded.—**Eric Bock**

NIDCR's Ten Hagen Works to Create a Safer, Inclusive Workplace for All

Dr. Kelly Ten Hagen has made important scientific discoveries at the National Institute of Dental and Craniofacial Research (NIDCR). But she believes her greatest accomplishment has come from her involvement in NIH's efforts to address workplace harassment in all its forms.

"The anti-harassment initiatives here at NIH and extramurally will hopefully create safer, more inclusive, diverse and equitable environments for everyone," said Ten Hagen, associate scientific director and head of NIDCR's developmental glycobiology section.

NIDCR's Dr. Kelly Ten Hagen

Her lab studies the enzyme family and factors that regulate protein O-glycosylation and how this conserved protein modification influences organ development and function. Her team was the first to demonstrate that a conserved protein modification called O-glycosylation is essential for viability.

"I've been blessed with so many amazing, talented, brilliant people over the years who have made this possible," she said.

She came to NIH after Dr. Lawrence Tabak, who is now performing the duties of NIH director, became NIDCR director. Ten Hagen had been working as a research assistant professor at the University of Rochester. Once at NIH, she pursued her own research and competed for a tenure-track position.

In 2012, Ten Hagen began serving as NIDCR's representative on the NIH women scientists advisors (WSA) committee. Formed in 1993, the group raises awareness of issues facing women scientists and works towards improving women's representation in the NIH faculty at all levels. The WSA is celebrating its 30th anniversary this year.

"A major barrier was the inappropriate behavior and harassment that I and other women had to endure," she said. "There was no mechanism at the time to report it anonymously and have it investigated centrally, to avoid any conflicts of interest within institutes and centers."

That's changed. Today, the Civil program receives allegations of inappropriate conduct, including all forms of harassment, and oversees the appropriate administrative review or inquiry in an objective and consistent manner. Civil's goal is to stop any inappropriate or harassing behaviors immediately and to ensure that timely corrective action is taken.

Ten Hagen also served on the advisory committee to the NIH director working group on changing the culture to end sexual harassment. The group made suggestions to address harassment at NIH-funded institutions.

While the workplace has become more diverse, women are still underrepresented as "they move up the ladder." For example, women make up only 27% of senior investigator positions. Balancing childcare and work is one of the biggest challenges. The Covid-19 pandemic illustrated that women carry a heavier domestic workload.

Inherent biases are another challenge for women in scientific careers, Ten Hagen said. For example, the John vs. Jennifer study found that implicit gender bias disadvantaged women who were pursuing STEM careers. Researchers asked scientists to review identical resumes with only one difference—the name at the top.

"Compared to Jennifer, John was rated more competent, more hirable and offered a higher starting salary," she said. "These biases put women at significant disadvantages. They must be addressed."

She advised those thinking about pursuing a career in science to look into an institution's culture before considering a position. Many places are doing "really interesting work but if they aren't supporting their people or if the environment is toxic, it will take a toll."—**Eric Bock**

Tackling 'Pernicious Challenges' for Women

Lucy Forrest initially aspired to be a linguist—until she realized that she could learn languages on her own. "I realized that what I actually needed to do was study something that I couldn't learn on my own," she said. "So, I took chemistry classes."

She added a computing major to her chemistry studies and went on to receive her Ph.D. in biochemistry at the University of Oxford. She conducted postdoctoral research at Johns Hopkins and Columbia universities, and the Medical Research Council Mitochondrial Biology Unit in Cambridge. Forrest then took a position at the Max Planck Institute for Biophysics in Frankfurt, Germany, before settling at NINDS in 2013. She now leads the computational structural biology section.

Forrest (c) with the members of the computational structural biology section

Her research seeks to understand cell membrane proteins by asking questions about a wide range of topics from specific mechanisms of individual proteins to general biophysical principles.

These proteins are difficult to study, Forrest said, and researchers often need to make predictions about the proteins' structures. Her research seeks to understand "what [they] tend to look like, what the rules are that define what they look like and how we can use those rules to make predictions." Her work has implications for studying proteins involved in conditions such as depression, Parkinson's and cancer.

NINDS's Dr. Lucy Forrest

Forrest is also a dedicated mentor and advocate for women in science, both within her own lab and the larger NIH community. She is NINDS's representative on the WSA committee.

"I'm [also] very proud of the young people who have come through my lab and the places they've ended up," she said.

Forrest is especially conscious of the challenges women face in science. Much of the casual sexism she encountered in the beginning of her career is gone, she said, but implicit bias is a "much more pernicious challenge." She describes it as "a slight devaluation of what [women] do...that creates many little molehills that add an extra level of struggle."

She encourages women to "see their community as a resource." She would like for women to turn to each other more often for support and "[think] about how to reach out to allies and work together to solve problems."—**Amber Snyder**

Based on encouraging feedback and thoughtful suggestions the *Record* received, this will not be the last series of profiles we publish. Keep following for future short takes with staff.

VOLUNTEERS

EBV Vaccine Trial Enrolling Volunteers

NIAID researchers are enrolling healthy volunteers ages 18-29 living in D.C., Maryland and Virginia in an Epstein-Barr virus (EBV) vaccine clinical trial. Consider joining research to stop the spread of EBV—the most common cause of infectious mononucleosis (mono) and associated with some cancers. For more information, contact the Clinical Center Office of Patient Recruitment at (866) 444-2214 (TTY users dial 711) or ccopr@nih.gov. Refer to study #21-I-0005 Online: https://go.usa.gov/xsYK5.

Schmidt Named Director of NCCIH Extramural Activities Division

BY ELLEN O'DONNELL

Dr. Martina Schmidt recently became the new director of NCCIH's Division of Extramural Activities (DEA). In that capacity, she plans, leads and directs the activities of DEA scientists and technical support personnel to ensure quality, objectivity and accountability in the peer-review and grants-management processes for NCCIH grants and contracts. She also directs and coordinates activities to evaluate the overall performance of the center's grant-review and grants-management processes, and the allocation of resources. The DEA director also serves as executive secretary of NCCIH's national advisory council. Schmidt succeeds Dr. Partap Khalsa, who retired in December 2022.

Dr. Martina Schmidt

Schmidt was director of the NCCIH Office of Scientific Review (OSR) from 2016 to 2022, having joined the center in 2005 as a scientific review officer (SRO). She holds a Ph.D. in microbiology from the University of Wuerzburg, Germany, and completed a postdoctoral fellowship in the laboratory of Dr. Linda Wolff, NCI. Schmidt's focus as a fellow was on the proto-oncogene c-Myb and its involvement in myeloid leukemogenesis. She also served as an SRO intern in the oncology internal review group of CSR.

"I am thrilled to announce Dr. Schmidt's appointment," said NCCIH Director Dr. Helene Langevin. "She is an excellent choice for the role of DEA director, with 20 years' experience in virtually all aspects of the division's work and deep knowledge of research in complementary and integrative health."

The new acting director of OSR is Dr. Jessica McKlveen, who joined NCCIH in 2018 as an SRO and, in 2022, was promoted to OSR deputy director and subsequently named acting director.

At left, an early look at NIH supercomputing—the Biowulf cluster, circa 2000; at right, cooling units for Biowulf in 2018

COOLING UNITS PHOTO: BEN CHAMBERS

CIT

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CIT's original mission was to provide, coordinate and manage information technology, and to advance computational science, and since its founding, CIT has played a key role in developing information technology solutions for NIH.

In addition to developing web pages, conference registration systems and databases, CIT was responsible for key NIH enterprise systems like the Integrated Time and Attendance System (ITAS); the NIH Enterprise Common Services, including NIH Login and NIH Portal; the Contractor Performance System; the Human Resources Database; and the NIH Enterprise Ethics System.

CIT has continued to provide solutions that support both NIH business and administrative operations as well as scientific discovery. CIT-developed systems like nVision, ServiceNow, the NIH Enterprise Directory (NED) and FOIAXpress all support important aspects of the agency's business and administrative operations.

Over the years, CIT dramatically improved the capacity and robustness of the NIH network—a fundamental utility for transmitting and sharing data—that serves more than 45,000 people in over 200 NIH facilities across Washington, D.C., Maryland, Arizona, Montana and North Carolina.

CIT also increased the capacity of Biowulf, NIH's High Performance Computing resource, allowing researchers to pursue lines of inquiry that previously weren't possible. Early in the pandemic, Biowulf prioritized Covid-19 research to accelerate discovery. Biowulf also played an integral role in achieving the first truly complete human genome sequence with no gaps as reported by the Telomere-to-Telomere (T2T) Consortium in April 2022.

Additionally, by forging relationships with industry leading service providers like Amazon Web Services, Google Cloud and Microsoft Azure, CIT has made cloud computing more accessible and affordable to the NIH community.

CIT's Science and Technology Research Infrastructure for Discovery, Experimentation and Sustainability (STRIDES) initiative accelerates biomedical research by simplifying access, reducing costs and lowering technological barriers to cloud computing tools for NIH researchers.

When NIH moved to maximum telework at the beginning of the Covid-19 pandemic, CIT provided the collaboration tools and resources that allowed the bulk of NIH's 45,000-person workforce to quickly transition to remote work and remain productive and in-touch with colleagues within NIH and external partners.

These are just some of the important ways that CIT has supported NIH over the years and made it possible for the agency to operate and conduct world-class research.

To view more notable events in CIT history, including events before 1998, see the center's entry in the NIH Almanac at https://bit.ly/40quEFn. For more about CIT services, see the website at www.cit.nih.gov/.

MILESTONES

Scientist Emeritus Cabib Is Mourned

Dr. Enrico Cabib, retired NIH principal investigator and valued colleague and friend, died Feb. 24. His scientific mind and sense of humor enriched NIH since 1967, when he joined NIDDK as a principal investigator.

While training many of the best people in his field, Cabib also shared a passion for the bench, and continued his lab work throughout his career.

As a postdoc in Buenos Aires, Argentina, in the early 1950s, Cabib discovered the second and third sugar nucleotides, the sugar donor function of sugar nucleotides and the first sugar transfer reaction. With these revelations, Cabib helped his professor, Dr. Luis Leloir, win the Nobel Prize in Chemistry in 1970 for uncovering sugar nucleotides that synthesize carbohydrates in mammals.

Subsequently, Cabib discovered glycogen synthesis in yeast and demonstrated the enzymatic synthesis of mannan—one of the major polysaccharides in the yeast cell wall—before coming to NIH.

At NIH, Cabib studied carbohydrate polymers in the cell wall of the yeast *Saccharomyces cerevisiae* and their role in morphogenesis, the biological process that causes a cell, tissue or organism to develop its shape. The result was a series of important findings.

In his first experiment at NIH, he discovered chitin synthetase, a polymer of N-acetylglucosamine that comprises the skeleton of insects and is a minor but crucial component of the yeast cell wall.

Dr. Enrico Cabib

Cabib's work had an important impact on clinical medicine as well.

In 1988, he pointed out that some of the yeast cell wall components are not found in people, but are common among fungi, making them apt targets for anti-fungal agents. Other laboratories have now discovered specific inhibitors of an enzyme studied by Cabib that are currently used to treat fungal infections in people.

According to his daughters, Cabib's greatest discovery was that he and Leloir's administrative secretary, Amalia Aribe, were eminently compatible. They were married for 62 years and had three children: Claudia, Leila and Cintia.

Cabib remained a leader in his field and discovered most of what is known about the biochemistry and genetics of the yeast cell wall. Despite incredible achievement, he stayed humble until, after 45 years at NIDDK, he retired in 2012 at age 87 as senior investigator in the morphogenesis section of the Laboratory of Biochemistry and Genetics.

"I am not terribly smart, but I am persistent, and any success I've had has been a product of that persistence," he said in an interview at the time.

To read more about Cabib's life, check out his autobiography, "Climbing the yeast cell wall," online at https://bit.ly/3TC99zo.

AI Tool May Speed Screening of Epilepsy Drugs

By using state-of-the-art technology to analyze patterns of behavior in mice with epilepsy, researchers may be able to better study the disorder and identify potential treatments. NIH-funded researchers used the artificial intelligence (AI) technology to determine behavioral "fingerprints" in mice not evident by the human eye. Such automated behavioral phenotyping needed only one hour of video recording and did not require researchers to wait for the rare event of a seizure.

The study, supported by NINDS, is published in *Neuron*.

Scientists found that this machine learning-assisted 3D video analysis outperformed the traditional approach, in which analyses rely on human observation to label the behavioral signs of epilepsy in animal models during seizures. The labor-intensive process requires constant video monitoring of the mice over many days or weeks while recording their brain wave activity with electroencephalography (EEG).

The team led by Stanford researchers studied mice with acquired and genetic epilepsies. They found that machine analysis was better able to distinguish epileptic versus non-epileptic mice than trained human observers. The AI program also identified distinct behavioral phenotypes at different points in the development of epilepsy.

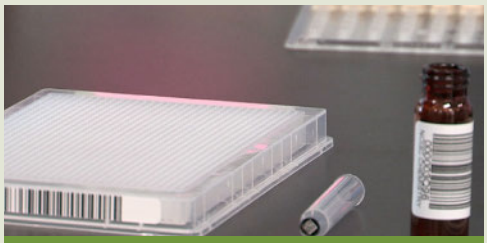
The machine-learning technology used in the study—called "MoSeq" for motion sequencing—locates, tracks and quantifies the behavior of freely moving mice in each frame of the video. The information is used to train the unsupervised machine learning model to identify repeated motifs of behavior (called "syllables"–e.g., a right turn or head bob to the left). MoSeq predicts the order (or "grammar") in which syllables occur, allowing fast and objective characterization of mouse behavior.

Notably, researchers were able to use the AI program to distinguish different patterns of behavior in mice after they were given one of three anti-epileptic drugs. This demonstrates that the tool could be used for rapid, automated anti-epileptic drug testing.

Ultimately, the use of automated phenotyping for animal studies of the epilepsies could revolutionize how research is done, speeding discovery and reducing costs.

Scientists Reveal Potential New Approach to Treating Liver Cancer

Scientists at NIH and Massachusetts General Hospital (MGH) have uncovered a potential new approach against liver cancer that could lead to the development of a new class of anti-cancer drugs. In a series of experiments in cells and mice, researchers found that an enzyme produced in liver cancer cells could convert a group of compounds into anti-cancer drugs, killing cells and reducing disease in animals.



NCATS scientists used drug-screening plates, like those shown here, to identify a molecule that was effective in killing liver cancer cells.

PHOTO: NCATS

Researchers suggest this enzyme could become a potential target for developing new drugs against liver cancers and perhaps other cancers and diseases as well.

"We found a molecule that kills cells in a rare liver cancer in a unique way," said Dr. Matthew Hall, a leader of the work at the National Center for Advancing Translational Sciences (NCATS). "It emerged from a screening to find molecules that selectively kill human liver cancer cells. It took a lot of work to figure out that the molecule is converted by an enzyme in these liver cancer cells, creating a toxic, anti-cancer drug."

Hall, MGH liver cancer specialist Dr. Nabeel Bardeesy and their colleagues reported their results in *Nature Cancer*.

Bardeesy was originally studying cholangiocarcinoma, a type of liver cancer that affects the bile duct. The cancer is characterized by mutations in the IDH1 enzyme. Bardeesy's team wanted to find compounds and drugs that might be effective against the IDH1 mutation.

Through a collaboration with NCATS, Hall and other NCATS scientists rapidly tested thousands of approved drugs and experimental cancer agents for effectiveness in killing cholangiocarcinoma cells, with IDH1 as a target.

They found several molecules, including one called YC-1, could kill the cancer cells. Yet, when they looked to see how YC-1 was working, they discovered the compound wasn't affecting the IDH1 mutation.

The MGH researchers showed the liver cancer cells made an enzyme, SULT1A1. The enzyme activated the YC-1 compound, making it toxic to tumor cells in cancer cell cultures and mouse models of liver cancers. In the animal models treated with YC-1, the liver tumors either had reduced growth or shrank. Conversely, they found no changes in tumors treated with YC-1 in animals with cancer cells lacking the enzyme.

Researchers examined other databases of drug screening results in compound and drug libraries to match drug activity with SULT1A1 activity. They also looked at a large NCI database of anti-cancer compounds.

They identified several classes of compounds that relied on SULT1A1 for their tumor-killing activity.

"We think these molecules have the potential to be an untapped class of anti-cancer drugs," Bardeesy said. "Our results suggest there could be other SULT1A1-dependent compounds with ranges of different targets. Identifying such compounds and targets on cells could have potential implications for developing other types of small molecules and drugs, not just limited to these cancers."

Temperature-Stable TB Vaccine Found Safe

A clinical trial testing a freeze-dried, temperature-stable experimental tuberculosis (TB) vaccine in healthy adults found that it was safe and stimulated both antibodies and responses from the cellular arm of the immune system. Results from the phase 1 trial, supported by NIAID, were published in *Nature Communications*.

Scanning electron micrograph of *Mycobacterium tuberculosis* bacteria, which cause TB.

PHOTO: NIAID

This was the first clinical trial of any sub-unit TB vaccine candidate in a thermostable form. The experimental vaccine, ID93+GLA-SE, was developed by scientists at the Access to Advanced Health Institute in Seattle. It is a recombinant sub-unit vaccine made from four proteins of *Mycobacterium tuberculosis* bacteria combined with GLA-SE, an immune-stimulating adjuvant.

The freeze-dried formulation does not require refrigeration and is mixed with sterile water just prior to injection. Thermostable vaccines are desirable in settings where maintaining cold or frozen vaccines for long periods can be costly and difficult. A single-vial presentation of a thermostable vaccine would have clear advantages in ease of storage, transport and administration, investigators pointed out.

While noting some limitations in this small trial, investigators nevertheless concluded that results demonstrate "a proof-of-concept that adjuvant-containing vaccines can be formulated in a freeze-dried single-vial presentation without detrimentally impacting clinical immunogenicity or safety characteristics."

NCATS-Supported Tissue Chips Head to Space Once More

Tissue chips are small devices that contain human cells. Scientists use the chips to test how the cells respond to different stresses, drugs and genetic changes.

On Mar. 14, the Tissue Chips in Space program, supported by the National Center for Advancing Translational Sciences (NCATS) and the International Space Station (ISS) National Laboratory, sent chips that mimic functions of the human heart into space.

The SpaceX Dragon spacecraft was launched to the ISS by a Falcon 9 rocket at 8:30 p.m. ET from NASA's Kennedy Space Center in Florida. The cargo spacecraft was scheduled to autonomously dock with the station at 7:52 a.m. ET on Mar. 16 and remain at there for about 30 days.

Two heart tissue chip studies—Cardinal Heart 2.0 and Engineered Heart Tissues 2—were sent to spend time at the ISS so researchers on Earth can see how microgravity affects these tissues, which can help them better understand cardiac conditions like heart disease.

Since 2016, NCATS has partnered with the ISS National Lab to collaborate on refining tissue chip technology for biomedical research use on the space station.

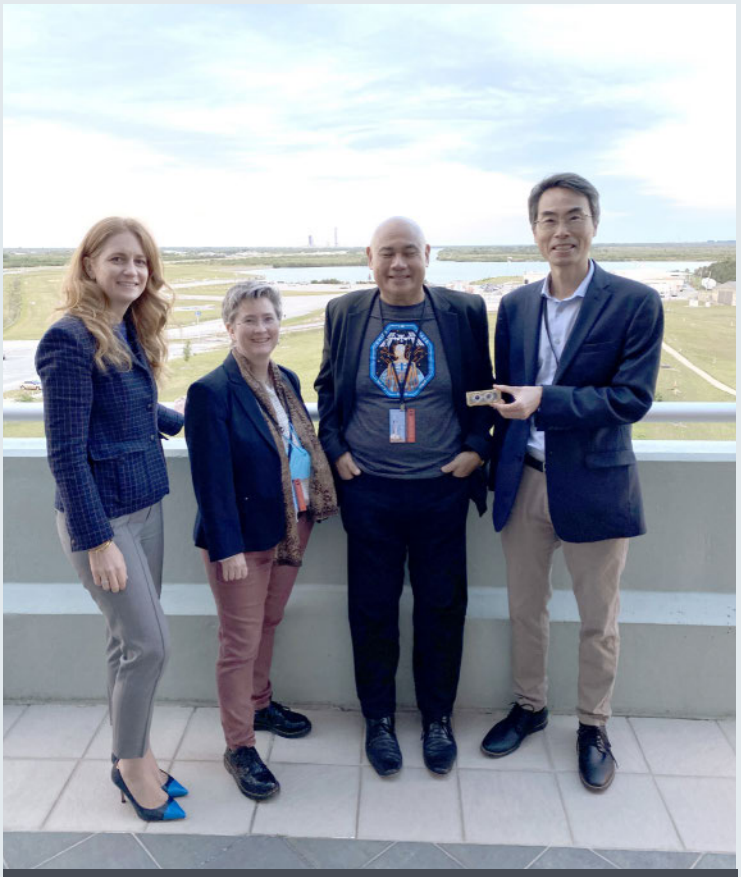
Previous launches contained chips mimicking lung infection and bone marrow response, bone and cartilage, the kidney and the blood-brain barrier that protects our brain from infections and toxins in the blood.

Other chips involved earlier in the space project include studies on the aging of the immune system (immunosenescence), muscle wasting (sarcopenia) and gut inflammation due to changes in the microbiome.

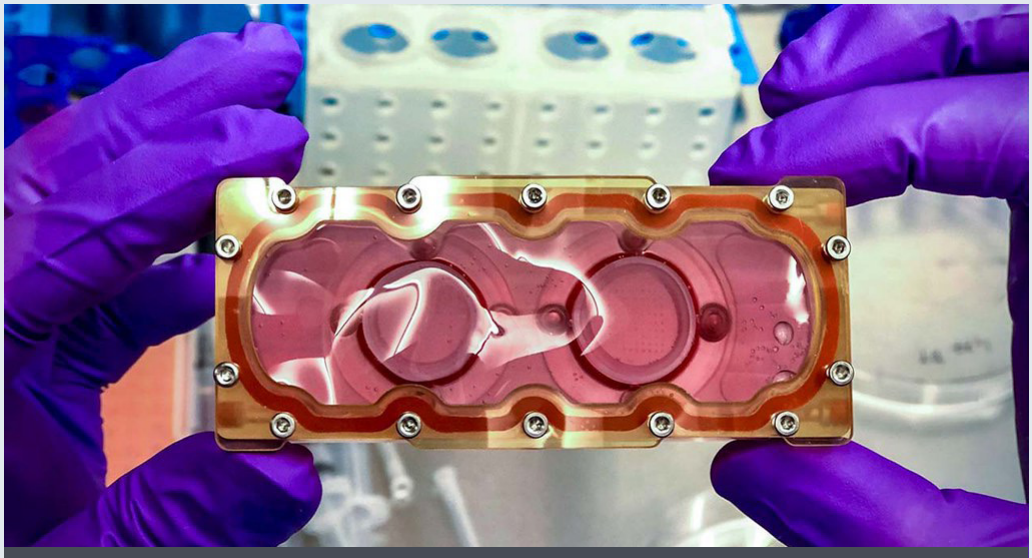
Translational research at the ISS National Lab provides unprecedented opportunities to study the effects of a microgravity environment on the human body.

Cardinal Heart 2.0 and Engineered Heart Tissues-2 are the final two experiments of the NIH-ISS Tissue Chips in Space initiative.

Read more about the projects from Stanford Cardiovascular Institute and Johns Hopkins Biomedical Engineering: https://bit.ly/3JvNMfw.



At Kennedy Space Center in Florida (from l) Dr. Tara Schwetz, NIH acting principal deputy director; Dr. Joni Rutter, NCATS director; and Dr. Danilo Tagle, director of the NCATS Office of Special Initiatives join NIH grantee Dr. Joseph Wu, a chip researcher from Stanford Cardiovascular Institute, at the launch of SpaceX Dragon, the cargo spacecraft carrying NIH-funded tissue chip experiments to the ISS.



Tissue chips are small devices that contain human cells. Scientists use the chips to test how the cells respond to different stresses, drugs and genetic changes.

IMAGE: JOSEPH WU, DILIP THOMAS & XU CAO/STANFORD CARDIOVASCULAR INSTITUTE