

FAES: 60 Years and Counting

New Initiatives

BY MOHOR SENGUPTA, NEI

THE FOUNDATION FOR ADVANCED Education in the Sciences (FAES), which was established in 1959 to create a university-type environment at NIH, is offering new kinds of biomedical courses—onsite and online credit-bearing courses, non-credit workshops, and new opportunities for networking. The nonprofit organization also continues to provide trainee services such as offering health insurance, running a bookstore and a gift shop, and sponsoring music and cultural programs (including concerts by the Manchester String Quartet). The FAES is guided by an elected Board of 24 members and an executive committee of five; its current president is **Susan F. Leitman**.

FAES offers a wide variety of academic programs including “Immunology and Microbiology,” “Biology, Genetics, and Medicine,” “Bioinformatics and Data Science,” “Public Health,” and “Technology Transfer, Business, and Industry.” Newer focus areas include a cutting-edge teaching lab with an emphasis on bioinformatics and computational biology, as well as a partnership with the NIH Library for courses on 3-D imaging and printing.

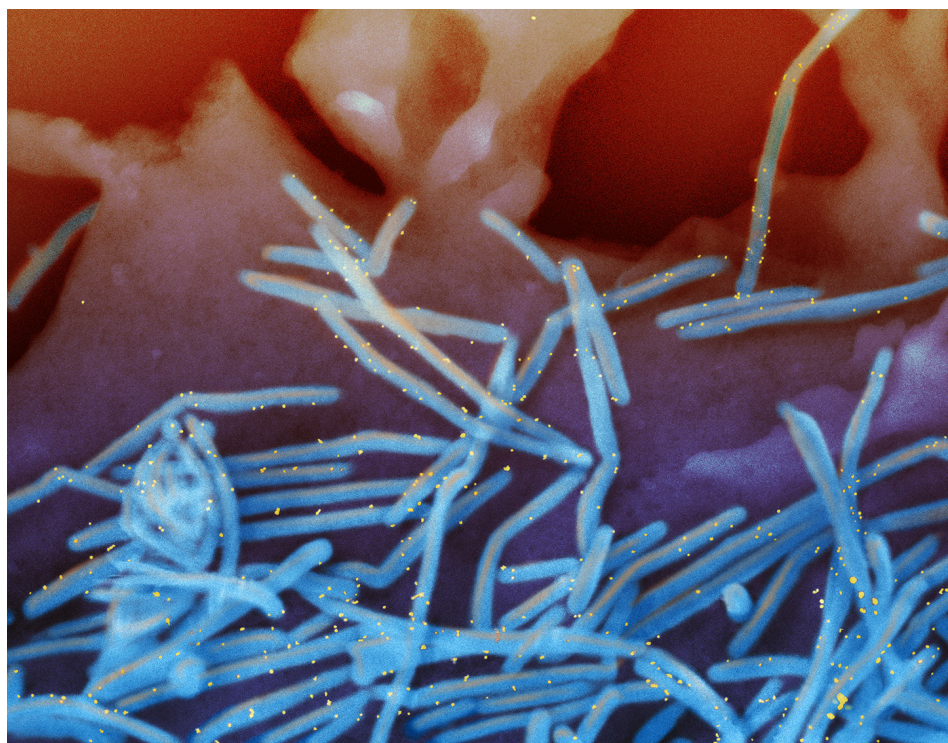
“We are a quasi-university because we do everything that a university does except grant degrees,” said FAES Chief Executive Officer and Executive Director **Christina Farias**. “We try to provide adaptable resources to fill any of the gaps between

CONTINUED ON PAGE 10 ➤

Building a Better RSV Vaccine

Experimental Vaccine Shows Early Promise in a Clinical Trial

FROM “RESEARCH BRIEFS” SECTION (SEE PAGE 8)



Scanning electron micrograph of human respiratory syncytial virus (RSV) virions (colorized blue) and labeled with anti-RSV F protein/gold antibodies (colorized yellow) shedding from the surface of human lung epithelial cells.

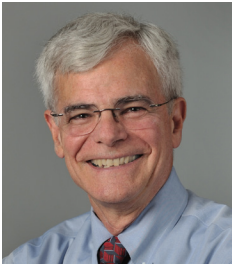
A NOVEL EXPERIMENTAL VACCINE AGAINST RESPIRATORY SYNCYTIAL VIRUS (RSV), a leading cause of severe respiratory illness in the very young and the old, has shown early promise in a phase 1 clinical trial. Researchers from the Vaccine Research Center in the National Institute of Allergy and Infectious Diseases developed a vaccine candidate called DS-Cav1. One dose prompted large increases in RSV-neutralizing antibodies that were sustained for several months.

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Pay It Forward

BY MICHAEL GOTTESMAN, DDIR

NIH IS WELL KNOWN FOR SOLVING complex scientific problems often considered unsolvable. Yet one of the most critical and perplexing problems we face is how to convince our scientists to use resources available to them to maximize their well-being and scientific success. I am referring to times in which life events—such as childbirth, adoption, child care, personal or family illness, elder care, and emotional or intellectual burnout affecting you or people who work for you—conspire to undermine career aspirations.

Over the years, NIH has developed several Work-Life services and programs to alleviate the stresses that may be associated with these life events and promote a flexible, responsive work environment. (For lists of these resources, go to <https://hr.nih.gov/working-nih/work-life>.) More such work flexibilities are under consideration by a joint committee drawn from the NIH Equity Committee and the NIH Intramural Subcommittee on Women in Science in partnership with the NIH Office of Human Resources and the Office of Research Services.

Despite the existence of these options, many of our staff do not take advantage of these flexibilities. Why don't we use these resources? What can be done to address this seemingly intractable problem?

The answer to the first question is fairly straightforward: Our scientific staff believes that they will be judged negatively if they take time off or ask for

help when trying to balance work with life events. This reflects a perception of an expectation for constant work and dogged determination, creating a standard to which no one can or wants to adhere. The reality, of course, is that while the work we do is demanding, no one can succeed without help from colleagues, supervisors, and the NIH.

In my own career, there have been many times in which forbearance and tangible help from colleagues and supervisors have enhanced my ability to

Over the years, NIH has developed several Work-Life services and programs to promote a flexible, responsive work environment.

succeed in my research and administrative career. Every senior scientist with whom I have spoken has a similar story of someone coming to their aid when they faced difficult choices or unexpected circumstances. Ask other successful scientists you know for examples of how they have been rescued from a difficult situation by a generous colleague, a supervisor, or the policies of an enlightened institution.

Those of us who have benefitted from such assistance are willing and enthusiastic about offering similar aid to our colleagues, both junior and senior, when they need a boost to get over a bump in their scientific

careers. We want to “pay it forward” in recognition of all of the help we have received and support others who are facing difficult situations.

So if you are feeling guilty about asking for help, remember that everyone around you has benefitted from similar assistance. Do what you need to do to preserve your emotional equanimity and scientific productivity in the long run. If you still feel a bit guilty, remember that if you accept help, there's a greater likelihood that later you'll be able to “pay it forward” and help someone else.

Let me also take this opportunity to remind supervisors of some additional considerations. If supervisors notice that staff (whether they are employees or trainees) are struggling with balancing work and life obligations, it is appropriate to ask whether they want to talk about the NIH resources that might be available. Supervisors should be aware of the broad range of flexibilities that NIH offers. If, however, immediate supervisors are not willing or able to provide information, staff should feel comfortable asking other scientists, training directors, administrators, or the Office of Intramural Training and Education (OITE) for guidance.

Of course, such discussions should always be undertaken with mutual respect, understanding, and civility. And importantly, don't forget that employees and trainees often adopt the behavior modeled by their supervisors. Are you openly acknowledging these stresses and strains in your own life and asking for help

Dermatology Branch: Maria Turner

To the Editor:

THE ARTICLE ON THE “DERMATOLOGY Branch at NIH” (*NIH Catalyst* May–June 2019) was a fantastic summary of the clinical and research advances made by the broad and diverse staff in dermatology at NIH over the last few decades. I was surprised, however, that there was no mention of the talented clinician–scientist **Maria Turner**. She was recruited in 1991 by her mentor, the late **Stephen Katz**,

when you need it? Trainees and supervisors who are not comfortable with a situation are encouraged to avail themselves of the many resources that NIH has to support our staff.

Most of the scientific staff here have been in training and have had their careers supported by the NIH for many, many years. This support reflects a substantial investment of time and resources. It is unacceptable to see careers derailed by those inevitable life events that can be ameliorated by supervisory and institutional help. Our stewardship of public resources requires that we use all the tools we have to help our scientific staff through difficult times. In the long term, these tools provide a substantial return on whatever investment is needed to keep our scientific staff working effectively.

Let me know if you have other ideas about how to address this problem and remember to use all of the tools that NIH makes available to you. ●



Maria Turner, M.D. (1997) is the former chief of the NIH Dermatology Consult Service.

to become chief of the Dermatology Consult Service. (Katz was the chief of the Dermatology Branch in the National Cancer Institute from 1980 to 2002 and director of the National Institute of Arthritis and Musculoskeletal and Skin Diseases from 1995 until his death in 2018.)

For 20 years, Maria Turner was the “face” of the Dermatology Branch in the NIH Clinical Center. She was responsible for diagnosing and caring for the dermatologic problems of NIH protocol patients, and she collaborated with many

investigators in defining the dermatologic manifestations of new and old diseases that were not primarily dermatology syndromes.

She is also a fervent educator. Her astute clinical acumen and gift for teaching have been recognized with teaching awards from the NIH (Distinguished Clinical Teacher by the NIH Clinical Fellows) as well as from the American Academy of Dermatology and the Dermatology Foundation. Since her retirement in 2009, she continues to be active in the Dermatology Branch as a scientist emeritus and a senior clinician emeritus and regularly attends Dermatology Grand Rounds and Clinical Journal Club meetings, at which she continues to teach and inspire.

PAMELA STRATTON, M.D.,
SPECIAL VOLUNTEER,
NATIONAL INSTITUTE OF NEUROLOGICAL
DISORDERS AND STROKE

Pamela Stratton retired in 2017 as the chief of the Gynecology Consult Service, NIH Clinical Center

Recent NIH Catalyst articles on resources:

- “Aging and Adult Dependent-Care Resources” in this issue of the *NIH Catalyst* (page 6)
- “The Jugglers: Balancing a Scientific Career with Raising a Family” (May–June 2018): <https://irp.nih.gov/catalyst/v26i3/the-jugglers>
- “Parenting Resources” (May–June 2018): <https://irp.nih.gov/catalyst/v26i3/parenting-resources>
- “Caregiving, NIH Can Help” (July–August 2019): <https://irp.nih.gov/catalyst/v27i4/announcements>

Letters and Comments Welcome

The *NIH Catalyst* welcomes “letters to the editor” for publication and your reaction to anything on our pages.

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Special to the Training Page

Summertime, and the Interns Aren't Taking It Easy

BY EMILY PETRUS, NINDS

EVERY SUMMER NIH LABS GET A BREATH of fresh air, vigor, and youthful enthusiasm as summer students from across the country get hands-on experience working alongside intramural researchers. It's a mutually beneficial endeavor: The budding young scientists get exposed to the discovery process, and their graduate student or postdoc supervisors gain mentoring experience.

As an example, the National Institute of Neurological Diseases and Stroke (NINDS) hosted 71 students in summer 2019, 6 of whom were high school students. Here's the story of three of the NINDS summer interns.

In **Alan Koretsky's** lab, **Rebeca Amaya Escobar**, a student in NIH's Community College Summer Enrichment Program, worked with postdoc **Patrick Wright**. They used magnetic-resonance imaging to detect altered brain connectivity after changes in whisker activity of mice (*Mus musculus*). Escobar was born in El Salvador and moved to Gaithersburg, Maryland, at age 9. When she was a student at Montgomery College (Rockville, Maryland), she developed an interest in medicine and science. She decided to try a summer at NIH to gain research experience and see if she has what it takes to pursue an M.D.–Ph.D. in pediatric neurology. “This is my first time doing research,” she said. “It's turned on a green light for me to look for more opportunities to do research at school or here again next summer.”

Other students, such as **Brianna DiSanza** and **Deionna Vigil**, started as undergraduate summer students a few years ago and came back to NIH to continue their research as postbacs.

DiSanza worked with postdoc **Tara Doucet-O'Hare**, in **Avindra Nath's** lab, on cancer-related human endogenous retroviruses. “I was lucky to be put with an amazing lab, and the first summer I learned so much more than expected,” DiSanza said. Becoming “valuable to the lab is a feeling I didn't think I'd get to experience.” DiSanza was homeschooled on her family farm in rural Virginia before graduating from Germanna Community College (Locust Grove, Virginia) at age 18

The interns get exposed to the discovery process and their graduate student or postdoc supervisors gain mentoring experience.

and finishing her B.S. in human biology at the University of Virginia (Charlottesville, Virginia) two years later. Although she planned to return home to a life of agriculture, her parents encouraged her to expand her horizons. After spending two years as a postbac at NIH, she's now confident enough to pursue a Ph.D. in biomedical research.

Vigil, a Native American from the Nanbé Owingeh (also known as Nambe Pueblo) tribe in northern New Mexico, is working in **Barbara Karp's** lab, exploring ways to make NIH intramural clinical studies more accessible for Native Americans. NIH-funded clinical trials are approved by institutional review boards (IRBs) run by the NIH, but tribal IRBs must also review studies conducted within their tribal nations.

Vigil grew up speaking a mix of Spanish, English, and Tewa, the language of Nambé Pueblo, and was able to afford her undergraduate education at Fort Lewis College (Durango, Colorado) because qualified Native Americans can attend tuition free. As an undergrad, she met NINDS summer-research-program coordinator **Rita Devine** at a national conference for the Society for Advancement of Chicanos/Hispanics and Native Americans in Science. The

encouragement and support of people she met at the conference as well as NINDS staff such as Devine and **Angel de la Cruz Landrau** (NINDS's Summer, Diversity, and Postbac Program Coordinator) gave her the confidence to come to NIH to do research. Next, she plans to pursue a Ph.D. in health policy and bioethics or medical anthropology.

Some current NINDS investigators—Senior Investigator **Daniel Reich** and Stadtman Investigator **Ariel Levine**—got their starts as summer students at NIH. Reich did his summer research fellowship in NINDS in 1990.

“I worked with **Gigi Storz** [in the National Institute of Child Health and Human Development] in the summer of 1997,” said Levine. “When I started my lab at NIH, Gigi even brought over my old lab notebook!” ●

For information about the NIH-wide summer-internship programs, coordinated by the Office of Intramural Training and Education (OITE), go to OITE's “Summer Internship Program in Biomedical Research” webpage at <https://www.training.nih.gov/programs/sip>.

A Simpler Way to Make a Conjugate Vaccine for Cholera

NIDDK Researchers Have Patented Their Invention

BY LAURA STEPHENSON CARTER, OD

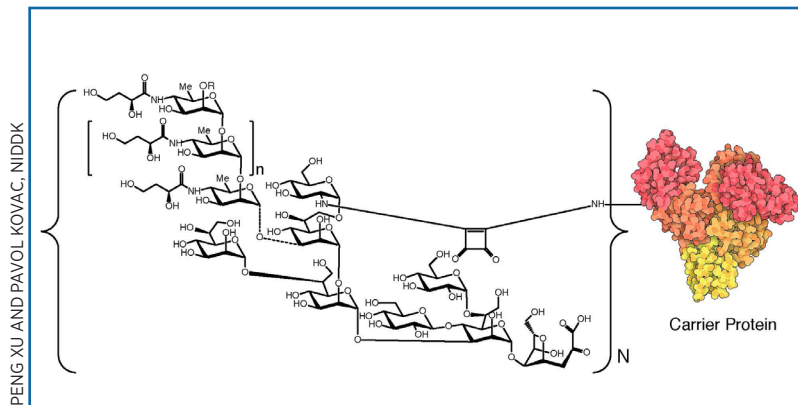


Diagram showing the general molecular structure of *V.cholerae* O1/protein conjugates: structural formula of the polysaccharide (left); depiction of the carrier protein (right).

RESEARCHERS AT THE NATIONAL Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) have developed an easier, less expensive way to produce a conjugate cholera vaccine against *Vibrio cholerae* serogroup O1, the globally dominant cause of cholera.

“The invention has been [recently] patented and is also being applied to making conjugate vaccines for other infectious diseases,” said NIDDK scientist emeritus **Pavol “Paul” Kovac**, who retired earlier this year. He and NIDDK Staff Scientist **Peng Xu** collaborated with researchers from Harvard Medical School (Boston) and the International Centre for Diarrhoeal Disease Research (Dhaka, Bangladesh).

Cholera is a severe diarrheal illness caused by the ingestion of food or water that has been contaminated by *V. cholerae* bacteria—usually by fecal matter from infected people. Cholera epidemics have occurred all over the world, especially in areas where there is violent conflict, drought, famine, and displaced populations. In 2017, according to the World Health Organization, there were 1.2 million reported cases in 34 countries—including Yemen, the Democratic Republic of the

Congo, and Haiti—with 5,654 deaths; in the United States there were 11 cases and no deaths.

Injectable cholera vaccines were first developed in the late 1800s; oral versions were introduced in the 1980s. The oral cholera vaccines available today provide only 65% to 85% protection for six months to five years, depending on the vaccine.

Bacterial carbohydrate antigens—such as O-antigens from *V. cholerae*—do not elicit a strong-enough immune response. A conjugate vaccine, however, triggers a stronger immune response because it chemically combines a weak antigen (usually a polysaccharide) to a strong protein antigen.

Conjugate vaccines were first tested in 1927 against *Streptococcus pneumoniae* in rabbits. The first one to be used in people was the *Haemophilus influenzae* type b conjugate vaccine (developed by NIH scientists **Rachel Schneerson** and **John Robbins**), which protects against meningitis. It became available in 1987 and was soon included in the infant immunization schedule in the United States. The first conjugate vaccines against cholera were developed and tested in the 1990s.

The trouble with the existing conjugate

cholera vaccines is that making them is a complex, multistep process that involves adding chemical linkers to enable the two components to be joined to each other. Then the resulting linker-equipped intermediates have to be purified, which adds to the cost.

Kovac and Xu’s method, however, is more direct and involves fewer steps. The invention is based on the ability of squaric acid (so-named because its four carbon atoms resemble a square) chemistry to join the polysaccharide directly to the protein component. The purification of the antigen intermediate and the resulting glycoconjugate vaccine is also a simpler process than the one used conventionally.

The approach “produces conjugates that are fully and specifically recognized by immune responses in humans,” the authors wrote in their 2011 paper describing the method. (*Bioconjugate Chem* **22**:2179–2185, 2011; DOI:10.1021/bc2001984)

“Nobody ever tried to conjugate bacterial polysaccharides to proteins to make vaccines without using linkers,” said Kovac. “We’ve developed a simpler, [more] efficient method.”

The squaric acid chemistry method was first developed in Germany in 1992 by L.F. Tietze (*Bioconjugate Chem* **2**:148–153, 1991; DOI:10.1021/bc00009a003). “The method was never tried to conjugate bacterial polysaccharides,” said Kovac. “We improved it and optimized reaction conditions.”

An outside biotech company has verified that the chemistry works and that the process is scalable to an industrial level. The vaccine has not yet gone into clinical trials. ●

Some background material is from Harris, Jason B., “Cholera: Immunity and prospects in vaccine development,” *J Infect Dis* (Suppl **3**):S141–S146, 2018; DOI:10.1093/infdis/jiy414.

Aging and Adult Dependent-Care Resources

Help is Available

BY MARTINA LAVRISHA, CC

NIH OFFICE OF RESEARCH SERVICES RESOURCE & REFERRAL SERVICES

1-800-777-1720



ADULT & ELDER CARE SERVICES

I'm the primary caregiver of an adult child with special needs and an aging parent who lives with me. The Resource and Referral Service provided me with a list of adult day care centers, local transportation services and caregiver services for my son and mother.



CHILD CARE SERVICES

I'm a new mom who is looking for information on child care options close to work. The Resource and Referral Service connected me to local centers and gave me resources on what to look for and what questions to ask.



FINANCIAL PLANNING SERVICES



Managing my finances as well as my parents' finances is extremely stressful. The Resource and Referral Service connected me to a financial professional, who provided a free 30-minute consultation. They also continued to assist me with my needs at a discounted rate.

IDENTITY THEFT SERVICES

I recently had my identity stolen. The Resource and Referral Service connected me with a highly-trained fraud resolution specialist. They also provided me with a free ID Theft Emergency Response Kit.



LEGAL CONSULTATION SERVICES



My aging parents live in another state and I want to be prepared in the event anything happens to them. The Resource and Referral Service gave me information on how my parents could grant me Power of Attorney.

NIH offers many resources to assist you in all phases of your life. Visit www.ors.nih.gov to gain information on Child and Family Programs, Back-up Care, Lunch and Learn Webinars, Employee Assistance Program (EAP), Wellness Initiatives, Listservs, and more!

APPROXIMATELY HALF OF NIH employees are over the age of 50, and a considerable number of them are caring for aging parents, spouses, or adult children with special needs. Did you know that NIH's Office of Research Services (ORS) can help employees, trainees, and contractors navigate aging and adult dependent-care resources. According to the Office of Personnel Management, NIH is leading the way in easing the burden of caregiving stressors by providing community-support programs. Yet most NIHers don't realize that such help is close at hand.

One of the ways that ORS helps is by offering a toll-free number for Resource and Referral Services. Just call 1-800-777-1720 between 8:00 a.m. and 5:00 p.m. EST, Monday through Friday, and an intake specialist will ask you to identify your needs. A resource specialist will call you back within 24 hours during the workweek, conduct a confidential discussion with you, and provide you with referrals and resources via email within two business days.

The beauty of this service is that it will help you identify comprehensive resources available in communities nationwide without your having to engage in this time-consuming process on your own. Resource and Referral Services can also assist you if you need information on child care, legal and financial issues, and identity theft.

In addition, ORS offers:

Adult-Care Support LISTSERV newsletter: Provides notices of campus and community events, webinars, and other pertinent information related to aging and adult-dependent care issues. To

subscribe, go to the NIH LISTSERV page at <https://list.nih.gov>. Look for "Adult Care Support."

NIH Employee Assistance Program (<https://www.ors.od.nih.gov/sr/dohs/HealthAndWellness/EAP/Pages/index.aspx>): A free, voluntary, confidential program to assist all employees with personal concerns about caregiving or other issues. Call 301-496-3164 to schedule an appointment.

Other Adult Dependent-Care Resources: <https://www.ors.od.nih.gov/pes/dats/childcare/Pages/Aging-and-Adult-Dependent-Care-Resources.aspx>.

Fitness and Wellbeing: Information on lectures, activities, nutrition, and more (<https://www.ors.od.nih.gov/pes/dats/wellness/Pages/index.aspx>). ●

To learn more about aging and adult dependent-care programs, visit the NIH Child and Family Programs website at <https://www.childfamilycare.ors.nih.gov>. See also the DDIR essay on page 2.



COURTESY OF DEBORAH HENKEN, NICHD

At the 2019 Safety, Health and Wellness Day, Linda Kiefer (left) and Deborah Henken, members of ORS's Aging and Adult Dependent-Care Committee, polled NIH staff about their awareness of NIH aging and adult dependent-care resources.



New Director at NIDCD: Debara Tucci



Debara L. Tucci.

NIH WELCOMES DEBARA L. TUCCI AS the new director of the National Institute on Deafness and Other Communication Disorders (NIDCD). Tucci, who joined NIH in September 2019, was previously a professor of surgery and the director of the cochlear-implant program in the Division of Head and Neck Surgery and Communication Sciences at Duke University (Durham, North Carolina).

Her primary research interests are addressing barriers to hearing health care for older adults and establishing a network of academic and community-based research sites to conduct clinical research in hearing and balance disorders. While at the NIH, and as co-chair of the Lancet Commission on Global Hearing Loss, she will continue her work addressing hearing loss as a global public-health problem.

“Dr. Tucci’s rich experience melds basic and clinical research in communication disorders with an impressive clinical and surgical practice in otology and neurotology,” said NIH Director **Francis S. Collins** in May 2019, when he announced her selection as director. “This experience, combined with

her leadership roles for numerous scientific and professional organizations, as well as serving previously as an advisor at NIH, makes her ideally suited to lead the NIDCD into the future.”

As the new director, Tucci will oversee NIDCD’s annual budget of approximately \$459 million and lead the institute’s research and training programs in hearing, balance, taste, smell, voice, speech, and language.

Tucci earned her M.D. from the University of Virginia School of Medicine (Charlottesville, Virginia); completed residencies in general surgery at St. Joseph Mercy Hospital (Ann Arbor, Michigan) and otolaryngology in head and neck surgery at the University of Virginia; and did a fellowship in the Department of Otolaryngology Head and Neck Surgery at the University of Michigan (Ann Arbor, Michigan). She had been on the faculty of the Duke University Medical Center since 1993, where she co-founded the Duke Hearing Center. She has received continuous NIH funding since beginning her academic career. Tucci also leads NIDCD grants to train and mentor the next generation of clinician investigators in otolaryngology and communication sciences.

Tucci is the recipient of the Distinguished Service Award from the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS). She has served on the AAO-HNS Research Advisory Board, Board of Directors, Executive Committee, and several subcommittees. She was president of the Association for Research in Otolaryngology, the American Otological Society, and the American Neurotology Society and is active in many other professional societies. She also served on the NIDCD Scientific Advisory Council from 2013 to 2017.

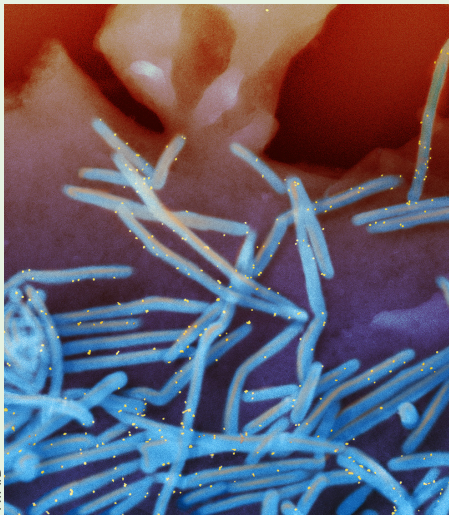
Collins also extended his appreciation and gratitude to NIDCD Deputy Director **Judith Cooper**, who served as the acting director after long-time NIDCD director **James F. Battey Jr.** retired in May 2018. ●

NIH ABBREVIATIONS

CBER: Center for Biologics Evaluation and Research, FDA
CC: NIH Clinical Center
CCR: Center for Cancer Research, NCI
CIT: Center for Information Technology
DCEG: Division of Cancer Epidemiology and Genetics, NCI
DIPHR: Division of Intramural Population Health Research, NICHD
FAES: Foundation for Advanced Education in the Sciences
FARE: Fellows Award for Research Excellence
FelCom: Fellows Committee
FDA: Food and Drug Administration
FNIH: Foundation for the NIH
FNL: Frederick National Laboratory
IRP: Intramural Research Program
HHS: U.S. Department of Health and Human Services
NCATS: National Center for Advancing Translational Sciences
NCBI: National Center for Biotechnology Information
NCCIH: National Center for Complementary and Integrative Health
NCI: National Cancer Institute
NEI: National Eye Institute
NHGRI: National Human Genome Research Institute
NHLBI: National Heart, Lung, and Blood Institute
NIA: National Institute on Aging
NIAAA: National Institute on Alcohol Abuse and Alcoholism
NIAID: National Institute of Allergy and Infectious Diseases
NIAMS: National Institute of Arthritis and Musculoskeletal and Skin Diseases
NIBIB: National Institute of Biomedical Imaging and Bioengineering
NICHD: Eunice Kennedy Shriver National Institute of Child Health and Human Development
NIDA: National Institute on Drug Abuse
NIDCD: National Institute on Deafness and Other Communication Disorders
NIDCR: National Institute of Dental and Craniofacial Research
NIDDK: National Institute of Diabetes and Digestive and Kidney Diseases
NIHES: National Institute of Environmental Health Sciences
NIGMS: National Institute of General Medical Sciences
NIMH: National Institute of Mental Health
NIMHD: National Institute on Minority Health and Health Disparities
NINDS: National Institute of Neurological Disorders and Stroke
NINR: National Institute of Nursing Research
NLM: National Library of Medicine
OD: Office of the Director
OITE: Office of Intramural Training and Education
OIR: Office of Intramural Research
ORS: Office of Research Services
ORWH: Office of Research on Women’s Health
OTT: Office of Technology Transfer



Intramural Research Briefs



NIAID

NIAID: Scanning electron micrograph of human respiratory syncytial virus (blue) shedding from the surface of human lung epithelial cells.

NIAID: EXPERIMENTAL RESPIRATORY SYNCYTIAL VIRUS VACCINE PROMPTS ANTIBODY SURGE

A novel experimental vaccine against respiratory syncytial virus (RSV), a leading cause of severe respiratory illness in the very young and the old, has shown early promise in a phase 1 clinical trial. The candidate, DS-Cav1, was engineered and developed by researchers at NIAID's Vaccine Research Center who were guided by their atomic-level understanding of the shape of an RSV protein. An interim analysis of study data showed that one dose of the investigational vaccine prompted large increases in RSV-neutralizing antibodies that were sustained for several months. (NIH authors: M.C. Crank plus 30-some authors including B.S. Graham, and former postdoc Jason McLellan who is now at the University of Texas at Austin, *Science* 365:505-509, 2019; DOI:10.1126/science.aav9033)

NIDDK, NCI, NIAID, NIAMS: "WILDLING" MICE COULD HELP TRANSLATE RESULTS IN ANIMAL MODELS TO RESULTS IN HUMANS

NIH researchers and others, led by scientists from NIDDK, developed a new mouse model that could improve the translation of research in mice into advances in human health. The

mouse model, which the scientists called "wildling," acquired the microbes and pathogens of wild mice while maintaining the laboratory mice's genetics, which make them more useful for research. In two preclinical studies, wildlings mirrored human immune responses, whereas lab mice failed to do so. (NIH authors: 19 including lead author S.P. Rosshart and senior author Barbara Rehermann; *Science* 365:eaaw4361, 2019; DOI:10.1126/science.aaw4361)

NIDA: FEMALE REPRODUCTIVE CYCLE AFFECTS COCAINE CRAVING

Scientists are interested in how drug-seeking behavior increases during abstinence (a.k.a. "incubation of craving"). NIDA researchers wanted to determine whether the incubation of craving would be different in male and female rats that were exposed to cocaine and whether the effect is stronger after binge cocaine intake, compared with continuous use. In this study, the rats self-administered cocaine either continuously or intermittently (modeling binge-use patterns seen in people) over an 8-hour period. This administration schedule was followed for 12 days. Then, after either 2 or 29 days without access to cocaine, the animals were once again placed in the same environment where they previously self-administered cocaine, and the researchers measured the response for cocaine-associated cues.

In the rats, cocaine seeking was higher after intermittent drug access than continuous access, suggesting that binge use might prompt stronger cravings. Interestingly, cocaine seeking was higher in female rats than in male rats in both models. In fact, in female rats, incubation of craving after either intermittent or continuous drug access was significantly higher during estrus, the sexually receptive period in their reproductive cycle. (NIH authors: C. Nicolas, T.I. Russell, A.F. Pierce, S. Maldera, Z-B You, Y. Shaham, and S. Ikemoto, *Biol Psychiatry*, 85:915-924, 2019; DOI:10.1016/j.biopsych.2019.01.015)

NICHD: AIR POLLUTION LINKED TO INCREASE IN NEWBORN INTENSIVE CARE UNIT ADMISSIONS

Infants born to women exposed to high amounts of air pollution in the week before delivery are more likely to be admitted to a newborn intensive care unit (NICU), suggests an analysis by NICHD researchers. Depending on the type of pollution, chances for NICU admission increased from about 4% to as much as 147%, compared with rates for infants whose mothers did not encounter high amounts of air pollution during the week before delivery. If the findings are confirmed, the study suggest that pregnant women may want to consider limiting their time outdoors when air-quality advisories indicate unhealthy conditions. (NIH authors: I. Seeni, A. Williams, C. Nobles, Z. Chen, and P. Mendola, *Ann of Epidemiol*, 2019; DOI:10.1016/j.annepidem.2019.07.008)

NCBI: THE ROLE OF REPETITIVE DNA AND PROTEIN SEQUENCES IN TUMOR EVOLUTION

Researchers from NCBI (in NLM) and other institutions developed a method to measure a type of gene mutation called "repeat instability," that may be useful in early cancer diagnosis. They developed a computational methodology to analyze genetic-sequence data from 325 patients with a variety of cancers as well as individual patients with metastases. The study showed that repetitive sequences, which are hotspots of DNA evolution, emerge early in tumor evolution but fade away in later phases. The findings suggests the potential for using repeat sequences in the early diagnosis of cancer." (NIH authors: E. Persi, Y.I. Wolf, and E.V. Koonin, *Proc Nat Acad Sci USA* 116:16987-16996; 2019; DOI:10.1073/pnas.1908790116)

Read more at: <https://irp.nih.gov/catalyst/v27i5/research-briefs>.

Smoldering Spots in the Brains May Signal Severe MS

Study Provides Hope for Diagnosing and Testing New MS Treatments

BY CHRISTOPHER THOMAS, NINDS

AIDED BY A HIGH-POWERED BRAIN scanner and a 3-D printer, NIH researchers peered inside the brains of hundreds of multiple sclerosis (MS) patients and found that dark-rimmed spots that represent ongoing, “smoldering” inflammation, called chronic active lesions, may be a hallmark of more aggressive and disabling forms of the disease.

“The more chronic active lesions a patient has the greater the chances they will experience this type of MS,” said **Daniel S. Reich**, senior investigator in the National Institute of Neurological Disorders and Stroke (NINDS) and the senior author of the paper published in *JAMA Neurology*. He hopes the results “will help test the effectiveness of new therapies for this form of MS and reduce the suffering patients experience.”

Affecting more than 2 million people worldwide, MS is a disease for which there is no cure. It starts when the immune system attacks myelin—a protective coating that forms around nerve cells in a person’s brain and spinal cord—and produces a variety of initial symptoms including blurred or double vision; problems with muscle strength, balance, and coordination; and abnormal sensations. Treatment with anti-inflammatory medications has helped some patients recover. Nevertheless, a significant subset of patients will eventually suffer from a longer lasting, progressive form of the disease that can cause paralysis, loss of bladder control, and problems with attention, thinking, and memory.

Doctors often use magnetic resonance imaging (MRI) to diagnose the disease because the immune system’s attack produces lesions that appear as spots on scans of patients’ brains. While some of the lesions heal, completely or partially, other lesions remain and rimmed ones appear to

actively expand, or “smolder,” for many years. Until recently, researchers did not fully understand the role chronic active lesions play in the disease, in part, because it was difficult to find the ones that remain chronically inflamed.

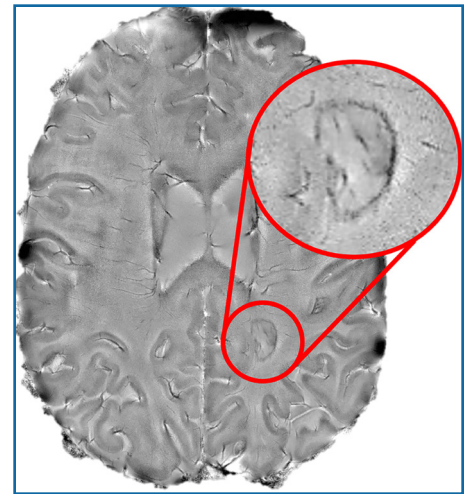
Starting in 2013, Reich’s team showed that by using a high-powered, 7-tesla MRI scanner, they could accurately identify damaging, chronic active lesions by their darkened outer rims, in agreement with previous studies. (*J Clin Invest* 126:2597–2609, 2016; DOI:10.1172/JCI86198)

In scanning the brains of 192 MS patients, the researchers found that, regardless of the treatment being received, 56% of the patients had at least one rimmed lesion. Further analysis showed that 44% of patients had only rimless lesions; 34% had one to three rimmed lesions; and 22% had four or more rimmed lesions.

The researchers then compared the brain scans to neurological examinations. Patients who had four or more rimmed lesions were 1.6 times as likely to be diagnosed with progressive MS as those without rimmed lesions. Moreover, these patients developed motor and cognitive disabilities at a younger age than the patients who had no rimmed lesions. When the researchers analyzed key parts of the patients’ brains, they found that patients who had four or more rimmed lesions had less white matter and smaller basal ganglia than those who had no rimmed lesions.

The team then analyzed a subset of patients whose brains had been scanned once every year for 10 years or longer. Their results suggested that, although the rimless lesions generally shrank, the rimmed lesions either generally grew or stayed the same size and were particularly damaged.

Finally, the team used a 3-D printer to



DANIEL REICH LAB, NINDS

NIH researchers found that dark-rimmed spots representing ongoing, “smoldering” inflammation, may be a hallmark of more disabling forms of multiple sclerosis.

compare the spots they had seen on scans with the lesions they observed in brain-tissue samples autopsied from a patient who had passed away during the trial. They found that all expanding rimmed spots seen on the scans had the telltale features of chronic active lesions when examined under a microscope.

“We need to attack these lesions as early as possible,” said Reich. “The fact that these lesions are present in patients who are receiving anti-inflammatory drugs that quiet the body’s immune system also suggests that the field of MS research may want to focus on new treatments that target the brain’s unique immune system. At the NIH, we are actively seeking patients who want to participate in studies like these.” ●

(NIH authors: M. Absinta, P. Sati, F. Masuzzo, G. Nair, V. Sethi, H. Kolb, J. Ohayon, T. Wu, I.C.M. Cortese, and D.S. Reich, *JAMA Neurol*, August 12, 2019; DOI:10.1001/jamaneurol.2019.2399)

Read more online at <https://irp.nih.gov/catalyst/v27i5/smoldering-spots-in-the-brains-may-signal-severe-ms>.

FAES

CONTINUED FROM PAGE 1



MOHOP SENGUPTA, NEI

FAES Executive Dean of Academic Programs Lynn Johnson Langer (left), who joined FAES in January 2019, is working with FAES Chief Executive Officer and Executive Director Christina Farias (right) to offer new kinds of biomedical courses.

traditional or conventional education and anything and everything NIH needs.” Farias, who was previously the Director of Business Services at Georgetown University Law Center in Washington, D.C. (2007–2012), joined FAES in 2012. Since then she has worked with the FAES Board and Executive Committee and longtime FAES Graduate School Dean **Constance Noguchi** to implement solutions to address specific needs of NIH trainees and employees. She also works with the Deputy Director for Intramural Research **Michael Gottesman**, Office of Intramural Research Liaison to FAES **Richard Wyatt**, and representatives from the Fellows Committee to make sure that FAES can fulfill the evolving needs of the NIH community.

Executive Dean of Academic Programs **Lynn Johnson Langer** joined FAES in January 2019 to merge the FAES educational programs including graduate courses, noncredit workshops, and conferences, and to ensure quality and innovation in all programming. Langer—who has also been on the FAES board of directors for three years and FAES’s education committee for the last five years—was previously Interim

Associate Dean for Advanced Academic Programs at Johns Hopkins (JHU) and a faculty member and director in the JHU Center for Biotechnology. She has brought several new technologies, staff, and instructors to NIH.

One of these new people is Assistant Dean **Melinda Maris**, who specializes in adult education. And to ensure that FAES’s academic programs reach a wider audience, she is developing online courses, which will be interactive and small (16–18 students). Many of the existing onsite courses will now have an online component so they can be available to people at all NIH campuses as well as to much of the world.

Maris is also developing a two-part course on the foundations of biomedical sciences for administrative employees and others who don’t have a biomedical background but support NIH activities. This course will help them better understand scientific information that they regularly come across in their jobs.

Other new offerings include a tech transfer course on licensing your science and even an online class on how to teach online. In addition, FAES will partner with

the Office of Intramural Training and Education to help trainees who want to move away from the bench and perhaps learn how to teach or to land a job in industry. The partnership aims to promote cohort-based, all-scientist study groups in which courses are designed and administered by scientists.

FAES is also partnering with regional academic institutions, such as JHU and the University of Maryland at Baltimore County in Baltimore (UMBC). Students who complete the FAES Advanced Studies in Technology Transfer courses are eligible to receive advanced standing toward the JHU masters in Biotechnology Enterprise and Entrepreneurship. FAES recently partnered with UMBC to allow students to include as many as five FAES courses in bioinformatics toward the 10 courses required for a master’s degree in data analytics with a concentration in bioinformatics. FAES students also have the option to count two courses toward the UMBC masters in biotechnology.

In addition, FAES fosters other networking opportunities that bring in professionals to advise trainees on the soft skills—leadership, management, supervision, and communication—that are important for becoming a good professional in any field. These interactions are made possible by a unique “Lunch and Learn Leadership” series that Farias has been piloting for almost a year.

“We are open and grateful for feedback from fellows because we want to be in tune with what the trainees want,” she said. The FAES executive committee and members of the board also welcome discussion and suggestions. ●

For more information on FAES, go to <https://faes.org>. For the 2019–2020 FAES Academic Programs and Student Handbook, go to https://faes.org/sites/default/files/FAESWeb-Catalog_2019-2020_clickable.pdf.

Extraordinary Neural Circuits

NIH Big Read Author Helen Thomson

BY SUSAN CHACKO, CIT

IMAGINE HAVING A BRAIN THAT enabled you to recall every event of every day in your past. Or a brain that caused you to constantly hear sounds or music, made you feel as if you were dead, or empowered you to feel others' every sensation and emotion as if they were your own. These are but a few of the startlingly unusual brains that Helen Thomson writes about in her book, *Unthinkable: An Extraordinary Journey through the World's Strangest Brains* (2018).

Thomson, a science journalist, was at NIH on June 7, 2019, for a conversation with NIH Director **Francis Collins** in a packed Masur Auditorium (Building 10) with a simultaneous live Facebook feed. The event was the culmination of the NIH Library's 2019 NIH Big Read. In its third year, the program is designed to bring together NIH staff for discussions on a book of scientific interest. The Library arranged unlimited access to the eBook and audiobook versions and organized several hour-long discussion sessions on the main and outlying campuses.

As a writer at *New Scientist* magazine,



LISA HELFERT

Author Helen Thomson, the featured guest at NIH's Big Read in June, wrote about startling unusual brains in her book, *Unthinkable: An Extraordinary Journey through the World's Strangest Brains*.

Thomson had always been intrigued by brain research and admired books by Oliver Sacks that described patients with unusual neurological syndromes. Thomson's discussions of case studies with neurologists led to a growing pile of interesting stories. One neurologist suggested she meet a particularly unusual patient—Tommy McHugh—whose story eventually became the genesis of her book. Tommy was an aggressive ex-con whose personality changed dramatically after a stroke damaged his brain. He became a painter and a poet and “felt emotions he had never experienced before, saw numbers in trees, spoke mostly in rhyme, and would not hurt a fly,” as Thomson describes it.

Besides describing extraordinary cases, Thomson wanted to write about them from a nonclinical perspective—to meet patients in their own environments and know more about how their unusual brains affected their lives and personalities on a day-to-day basis. She was also interested in exploring how the developments in neuroscience in the past 40 years have changed the diagnosis, treatment, and social perceptions of such cases.

Sometimes her research put her in dangerous situations such as when she was interviewing a patient (named Matar) who suffered from a rare psychiatric disorder called clinical lycanthropy, a condition in which a person has the delusion of turning into an animal. Matar, who was being treated for schizophrenia, had—unbeknownst to his doctors—stopped taking his medication. During Thomson's interview with him, he began to growl menacingly, clench his hands into claws, and talk about attacking the people because he perceived them as threatening lions. It was a disturbing experience for everyone. Luckily, he didn't actually attack anyone.

Most patients, said Thomson, feel a huge sense of relief when their syndrome is identified and named, despite finding out that their brains are “different.” They were enthusiastic participants in the scientific research process and Thomson's interviews and were excited to have their syndromes better known. Collins pointed out that many of the syndromes described in her book were, in milder forms, familiar to most people, such as the phenomenon of getting lost. The more severe form is a condition called “developmental topographical disorientation disorder,” an inability to make and use a mental map of one's surroundings. Thomson agreed that there was no clear dividing line between extraordinary and normal brains: The people in the book “had extreme versions of traits we all possess,” she said. “We all sit on the spectrum.”

Thomson mentioned some tricks for navigation and memory training that could be useful to everyone. To avoid getting lost, for example, she suggested looking behind you when you are walking around a new city to help memorize the environment from a different perspective, as animals do naturally in new environments.

Her advice for aspiring science journalists and anyone interested in science communication is to ask three questions when framing a story: Is this new? How is it relevant to people's lives? And would you want to tell your friends about it?

Many extraordinary brains are described in *Unthinkable*, but as Thomson read from the ending of the book, “We all possess a remarkable feat of neural engineering that produces an unpredictable life that is utterly unique.” ●

To watch a videocast of Thomson's June 7, 2019, NIH Big Read presentation, go to <https://videocast.nih.gov/launch.asp?27602>.

Neuroimaging Connects Genetic Mutations to Behavioral Traits

Karen Berman Delivers Anita Roberts Lecture

BY MEGAN ROEGNER, NIDDK

“YOU CAN’T GO TO MEDICAL SCHOOL; you’re a woman,” someone told **Karen Berman** in 1969 when she was an undergrad majoring in biology at the University of Rochester (Rochester, New York).

The warning only made Berman more determined to become a doctor and pursue her dream of helping people suffering from neuropsychiatric diseases.

Today, she is a physician, senior investigator, and chief of the Clinical and Translational Neuroscience Branch in the National Institute of Mental Health (NIMH). She pioneered the use of neuroimaging to map brain structure, function, and neurochemical mechanisms associated with schizophrenia, Williams syndrome, and aging. She’s won several awards in recognition of her work and is an elected member of the National Academy of Medicine. And she cares deeply about helping her patients.

Berman described her work on May 30 in Lipsett Amphitheater (Building 10) for the annual Anita B. Roberts lecture, which honors distinguished women scientists and mentors. Berman exudes a calm and steady confidence when she steps up to the podium to speak or invites you into her office. She is warm and friendly but leaves no doubt about her intelligence and drive when it comes to her work.

Berman’s primary interest has always been schizophrenia, but much of her work has centered on Williams syndrome, a developmental disorder caused by deletions of a subset of genes on chromosome 7. Because the genetic mutations and their dramatic effects are known, Williams syndrome is an excellent model for studying the associations among genetic factors, brain structure and function, and behavioral characteristics. These studies

are Berman’s bread and butter and have driven her career forward for nearly 40 years.

Williams syndrome is characterized by a pattern of cognitive strengths and weaknesses. People with the syndrome excel in verbal abilities and facial expression recognition, but their visuospatial construction abilities (writing, drawing, and pattern construction) are weak. For example, when trying to draw a bicycle, children with Williams syndrome draw odd, disjointed shapes that are barely recognizable when compared with drawings of other children their age. People with Williams syndrome tend to be very social, friendly, and endearing, and children with the syndrome lack normal shyness around strangers. On the other hand, they have medical problems such as cardiac disease and an increase in phobias and anxieties related to non-social situations.

Berman’s use of functional neuroimaging of the brain has enabled her to trace the patterns of brain structure and activity in these patients as they perform complex cognitive activities. From the visual cortex of the brain, there are two primary streams, or pathways, of information processing—ventral and dorsal. The brains of Williams syndrome patients have a loss of gray-matter volume in the dorsal stream and show reduced activity in that area when asked to perform certain tasks, such as drawing a bicycle. Through combining the neuroimaging studies with studies of genetic deletions and single nucleotide polymorphisms (SNPs), Berman and her colleagues have illuminated the specific



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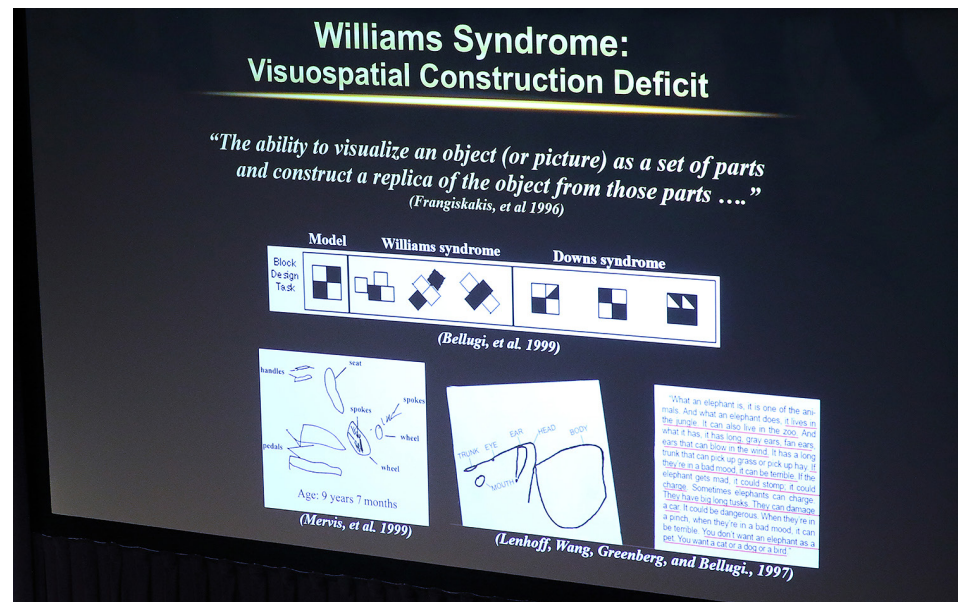
At the Anita Roberts lecture in May, NIMH Senior Investigator Karen Berman talked about her research on Williams syndrome, a developmental disorder caused by deletions of a subset of genes on chromosome 7.

genes and SNPs that, at least in part, drive the behavioral symptoms.

In 96% of the patients, the syndrome is caused by the same hemideletion (when only one of two paired chromosomes is deleted) of 26 to 28 genes on chromosome 7. In all of these cases, two particular genes are always deleted, the gene that codes for elastin (*ELN*) and the gene for serine-threonine kinase (*LIMK1*). Hemideletion of *LIMK1* by itself is enough to cause the visuospatial problems of Williams syndrome. Even in the general population, certain SNPs in *LIMK1* affect the volume of gray matter and activity in the dorsal visual-processing stream.

Additional SNP studies in the same chromosomal region revealed another important gene—the gene for general transcription factor Iii (*GTF2I*). Deletion of *GTF2I* is also involved in the hypersociability of people with Williams syndrome. Berman hopes that being able to connect these genetic mutations to brain structure and function and behavioral traits will help scientists identify pathways for other neuropsychiatric diseases and disorders.

When asked where the work goes from here, Berman's answer is that it's all about the patients. It's about developing therapies and improving the patients' lives, she said. Although she hopes that her study techniques can be applied to more complex diseases such as schizophrenia, she acknowledges the additional complications of that condition. Unlike Williams syndrome, schizophrenia has many known associated genes, each with relatively



Because the genetic mutations and their dramatic effects are known, Williams syndrome is an excellent model for studying the associations among genetic factors, brain structure and function, and behavioral characteristics. The syndrome is characterized by a pattern of cognitive strengths and weaknesses. People with the syndrome excel in verbal abilities and facial expression recognition, but their visuospatial construction abilities (writing, drawing, and pattern construction) are weak.

small effects, making it incredibly difficult to pinpoint any one cause or target for treatment. Actual treatments may be a while off, but the work Berman and her colleagues are doing is providing a strong knowledge base and set of techniques that will continue to be applied.

Inside and outside of the lab, Berman is eager to share her knowledge with new and future trainees. She serves as a leader, a role model, and an example of a woman pushing the boundaries of science. Although she believes that there is still progress to be made in the representation of women in research, she acknowledges that things are much improved since the 1970s.

After receiving her M.D. from the St. Louis University School of Medicine (St. Louis, Missouri), she completed residencies in psychiatry—at

the Washington University School of Medicine in St. Louis (St. Louis, Missouri), University of California San Diego School of Medicine (La Jolla, California), and NIH—and a fellowship in nuclear medicine at NIH. She is board certified in both psychiatry and nuclear medicine. She's gone on to have a successful career, is happily married to an accomplished NIH scientist and has raised two wonderful sons.

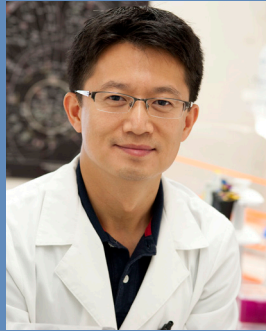
Her secret? Dedication and mental toughness, she said. "You *can* have it all." ●

The "Anita B. Roberts Lecture Series: Distinguished Women Scientists at NIH" honors the research contributions Roberts and other female scientists have made. Roberts, who spent 30 years at NCI before her death in 2006, was known for her groundbreaking work on transforming growth factor-beta.

Recently Tenured



DANIEL LARSON, NCI-CCR



JI LUO, NCI-CCR



JOSEPH ZIEGELBAUER, NCI-CCR

DANIEL R. LARSON, PH.D., NCI-CCR

Senior Investigator and Head, Systems Biology of Gene Expression Section, Laboratory of Receptor Biology and Gene Expression, Center for Cancer Research, National Cancer Institute

Education: Ohio State University, Columbus, Ohio (B.S. in physics); Cornell University, Ithaca, New York (M.S. and Ph.D. in biophysics)

Training: Postdoctoral fellow, Department of Anatomy and Structural Biology, Albert Einstein College of Medicine (New York)

Outside interests: Hiking; gardening; swimming

Website: <https://irp.nih.gov/pi/daniel-larson>

Research interests: For more than 20 years, I have been using single-molecule analysis to solve biological problems in living cells. The primary goal of my laboratory is to understand gene expression in eukaryotic cells, starting from the mechanistic behavior of individual macromolecules and proceeding to their regulation in cells and tissue. I apply a biophysical approach to eukaryotic transcriptional regulation. The view that has emerged from these studies is that gene regulation is a dynamic process resulting in stochastic (random) variation within populations. It is now well known that gene-expression heterogeneity arises in large part through the fluctuations in transcriptional activity.

My lab is also developing the tools to explore both the mechanisms of RNA splicing and the consequences of stochastic RNA processing for phenotype selection and disease progression. This work on splicing factor mutations in leukemia revealed a novel pathway of translational regulation and represents a new direction for the lab but one that is a natural evolution of my overarching focus on gene expression in single cells. Ongoing work in the lab now focuses on understanding the dynamic interplay among transcription, splicing, and translation during the formation of blood cells.

JI LUO, PH.D., NCI-CCR

Senior Investigator, Laboratory of Cancer Biology and Genetics, Center for Cancer Research, National Cancer Institute

Education: University of Cambridge, Cambridge, United Kingdom (B.A. in natural sciences); Harvard University, Cambridge, Massachusetts (Ph.D. in cellular and developmental biology)

Training: Postdoctoral fellow, Department of Genetics, Harvard Medical School, Brigham and Women's Hospital (Boston)

Came to NIH: In 2010

Outside interests: Cycling; hiking; photography; painting

Website: <https://irp.nih.gov/pi/ji-luo>

Research interests: My long-term research goal is to understand the biology of the *RAS* oncogene and identify new therapeutic strategies for *RAS* mutant cancers such as lung, colorectal, and pancreatic adenocarcinomas that harbor mutations in one specific member of the *RAS* family: *KRAS*. The *KRAS* gene encodes a small GTPase protein that plays a key role in mitogenic signaling pathways that control cell growth, cell division, cell differentiation, and cell death. Currently, there are no effective targeted therapies for *KRAS* mutant cancers.

During my postdoctoral training, I helped discover several vulnerabilities in *KRAS* mutant cancer cells and develop the concept of “non-oncogene addiction” (the dependency of cancer cells on non-cancer pathways such as metabolic adaptation, DNA repair, and protein homeostasis). We proposed that non-oncogene addiction presents new therapeutic opportunities.

Today, my lab is interested in understanding how oncogenic stress (cellular damage associated with malignant transformation) gives rise to non-oncogene addiction and synthetic lethality (a combination of alterations in two or more genes that lead to cell death) in *KRAS* mutant cancer cells, and how we could exploit this phenomenon to discover novel treatment. Recently, we found that *KRAS* mutant cells are critically dependent on the autophagy pathway for survival when mitogenic signaling is inhibited. The resulting new target-combination strategy is being evaluated in clinical trials.

In parallel, we have developed CRISPR gene-editing and pharmacological platforms to identify target and drug combinations for the effective elimination of *KRAS* mutant cells. We are also working closely with the NCI RAS Initiative to translate our discoveries into therapies.



JOSEPH M. ZIEGELBAUER, PH.D., NCI-CCR
Senior Investigator, HIV and AIDS Malignancy Branch, Center for Cancer Research, National Cancer Institute
Education: Cornell University, Ithaca, New York (B.S. in biology and biochemistry); University of California at Berkeley, Berkeley, California (Ph.D.)
Training: Postdoctoral fellow, Department of Microbiology, University of California at San Francisco (San Francisco, California)
Came to NIH: In 2008
Outside interests: Biking; swimming with his two children; astrophotography
Website: <https://irp.nih.gov/pi/joseph-ziegelbauer>

Research interests: Kaposi's sarcoma-associated herpesvirus (KSHV) causes Kaposi's sarcoma, the most common form of which develops in people living with HIV. My primary focus is elucidating the functions of microRNAs (miRNAs) expressed by KSHV, a human-cancer virus that expresses multiple viral miRNAs. These viral miRNAs are more abundant than human miRNAs in KSHV-infected patient-derived cell lines. I was one of the first scientists to publish a screen for viral miRNA targets using gene-expression analysis. In addition, my group published the first proteomic screen for viral miRNA targets in primary human cells, found that a human protein could cleave miRNA precursors of KSHV and Epstein-Barr virus (which causes mononucleosis), and published that a form of cholesterol can repress KSHV infection. By developing modified methods to identify dozens of miRNA target genes that are missed using standard approaches, we contributed to new insights into miRNA target discovery. We also identified the first human circular RNA that can inhibit KSHV infection, discovered viral circular RNAs, and found that some viral circular RNAs can regulate cell proliferation. ●



NEWS FROM AND ABOUT THE SCIENTIFIC INTEREST GROUPS

New SIG: Head and Neck Cancer Interest Group

THE HEAD AND NECK CANCER Interest Group (HNIG) is a voluntary organization of investigators and trainees who are members of the NIH intramural research program (IRP) and affiliated research and teaching organizations that promote the development of preclinical and clinical research to improve the care of patients with head and neck cancer.

The HNIG aims to foster collaboration between IRP basic scientists and clinical investigators who have an interest in head and neck cancer. The HNIG also serves as the organizational structure for the conceptual design and promotion of NIH-led head and neck cancer clinical trials to our academic and community clinical partners. The HNIG has quarterly meetings in which intramural and invited extramural investigators gather to share head and neck cancer clinical-trial results and preclinical research data.

For more information as well as instructions on how to join the LISTSERV list (referred to as a mailing list on the website), go to <https://oir.nih.gov/sigs/head-neck-cancer-interest-group>. You can also contact the group's co-chairs: **Scott Norberg** (NCI-CCR) at scott.norberg@nih.gov, **Clint Allen** (NIDCD) at clint.allen@nih.gov, or **Christian Hinrichs** (NCI-CCR) at hinrichs@mail.nih.gov.

New SIG: Genomics and Health Disparities Interest Group

AS THE PACE OF GENOMIC RESEARCH accelerates, it's important to understand the role of genomics in disease risk and how genomics can be integrated into clinical care. And we must critically examine how new genomic knowledge will benefit all populations.

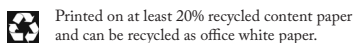
The Genomics and Health Disparities Interest Group provides a forum to connect individuals from many scientific disciplines—across the NIH as well as the Washington, D.C., metropolitan area—who are engaged in genomics and health-disparities research. The interest group also provides opportunities for professional development, networking, and community engagement. The group has an online newsletter for announcements and information sharing. The interest group holds regular meetings on the Bethesda campus featuring invited speakers and interest-group members who present and discuss their research.

The objective is to provide a space in which these important, timely topics can be explored and to provide an opportunity for members to both learn and teach. The target audience includes people from all career stages at NIH (postbacs, postdocs, staff, investigators, and others), as well as from the external academic community. To sign up for the online newsletter, go to <https://mailchi.mp/1cc43c8305e5/ghdsig>.

For more information, go to <https://oir.nih.gov/sigs/genomics-health-disparities-interest-group> or contact one of the co-chairs: **Paule Joseph** (NINR) at paule.joseph@nih.gov or **Vence Bonham Jr.** (NHGRI) at bonhamv@nih.gov. ●

SIGs are assemblies of scientists with common research interests. These groups engage with their members via LISTSERVs; sponsor symposia, poster sessions, and lectures; offer mentoring and career guidance for junior scientists; help researchers share the latest techniques and information; act as informal advisors to the Deputy Director of Intramural Research; provide advice for the annual NIH Research Festival; and serve as hosts for the Wednesday Afternoon Lecture Series. For more information and a list of SIGS, go to <https://oir.nih.gov/sigs>.

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IF YOU HAVE A PHOTO OR other graphic that reflects an aspect of life at NIH (including laboratory life) or a quotation or confession that scientists might appreciate and that would be fit to print in the space to the right, why not send it via e-mail: catalyst@nih.gov; fax: 301-402-1434; or mail: *The NIH Catalyst*, Building 60, Room 232.

Also, we welcome “letters to the editor” for publication and your reactions to anything on the *Catalyst* pages.

READ MORE ARTICLES, AND EXPANDED VERSIONS OF THE ONES IN THIS ISSUE, ONLINE AT <https://irp.nih.gov/catalyst/v27i5>.

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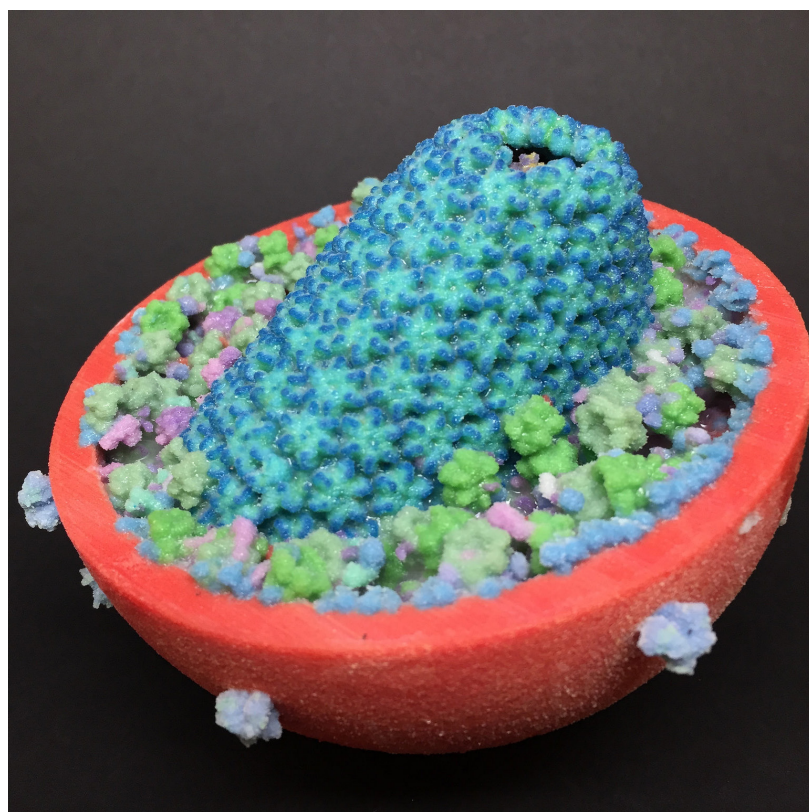
SCIENTIFIC MOMENT



HIV in 3-D

This 3-D model of HIV has been cut in half, and a few subunits removed, to expose the interior of the virion. Want to make your own models? The NIH 3-D Print Exchange can help by sharing and providing biomedical models in formats that are readily compatible with 3-D printers.

For further information, go to <https://3dprint.nih.gov>.



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ANDY SINGLETON, NIA
GISELA STORZ, NICH
RONALD SUMMERS, CC
WEI YANG, NIDDK