THE NIH CATALYST

A PUBLICATION ABOUT NIH INTRAMURAL RESEARCH

NATIONAL INSTITUTES OF HEALTH • OFFICE OF THE DIRECTOR | VOLUME 23 ISSUE 6 • NOVEMBER–DECEMBER 2015

Trans-NIH Recruits

Welcome to the New Stadtman Investigators and Lasker Scholars

The Intramural Research Program (IRP) is proud of its trans-NIH recruiting programs that are designed to attract talented early-career scientists to NIH (the institutes do their own recruiting, too). In 2009, the IRP launched the Earl Stadtman Tenure-Track Investigator Program—named for the legendary biochemist who worked at NIH for 50 years—which aims to recruit a diverse group of scientists pursuing interests across the biomedical research spectrum.

In 2010, the IRP announced the Lasker Clinical Research Scholars Program, an "intramural–extramural" NIH program in partnership with the Albert and Mary Lasker Foundation. It funds a small number of exceptional clinical researchers in the early stages of their careers. In the current program, the scholars can work as principal investigators at NIH for five to seven years and then can either remain on the IRP tenure track or move—with three years of research funding—to a university or other research institution.

This issue of the *NIH Catalyst* introduces the 10 Stadtman Investigators from the 2012-2013 recruitment cycle (they join 28 other Stadtmans) and the five newest Laskers (who join five others in the Lasker program). We posed all sorts of interesting questions, only some of which could be included in the print version of this publication. But you can read more online at: http://irp.nih.gov/catalyst/v23i6/trans-nih-recruits.

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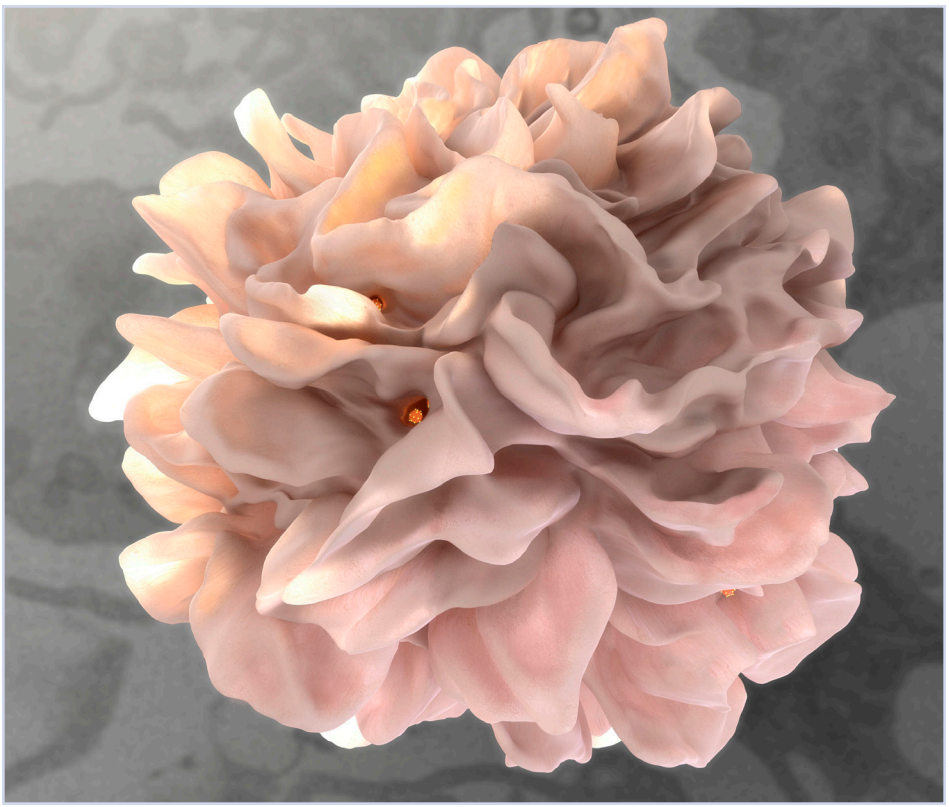
Celebrating Intramural Science

Report from the 2015 NIH Research Festival

BY NIH CATALYST WRITERS



SRIRAM SUBRAMANIAM, NCI

At the Research Festival's plenary session on "Creating NIH Technology Incubators," Sriram Subramaniam described high-resolution electron microscopy and other advanced imaging technologies. Shown: A high-resolution 3D image of a dendritic cell that has captured an HIV virion (center dot) to transfer to a T cell.

The 2015 Research Festival featured all the usual attractions—scientific talks and workshops, poster sessions (including the institute directors' and scientific directors' posters and cooking contest), special exhibits on intramural resources, the Green Labs Fair, the FARE Awards ceremony, the Technical Sales Association exhibit tent show, and more.

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Welcoming Diversity in the NIH Intramural Program

BY HANNAH A. VALANTINE, NHLBI

Recently, I've started using the phrase "Great Minds Think Differently" as a proxy for why diversity is needed and important in the biomedical workforce. Put quite simply: At the heart of diversity is difference, not sameness. Moreover, difference encourages a broad palette of scientific discovery and solutions for the complexity of health challenges before us. Addressing and solving scientific questions and translating discoveries to enhance human health requires all the human capital of this diverse nation to contribute.

In addition to my role as NIH's first chief scientific diversity officer, I am a tenured senior investigator in the Laboratory of Transplantation Genomics in the National Heart, Lung, and Blood Institute's intramural research program (IRP). I know the critical importance of scientific rigor in solving complex problems. My proof-of-concept studies on the role of donor-derived cell-free DNA as a biomarker for organ rejection grew iteratively through hypotheses into a multisite consortium of mid-Atlantic transplant centers. True to form as cardiologists with a love for acronyms, we call our consortium GRAfT (Genomic Research Alliance for Transplantation). We're now testing the clinical utility of noninvasive genomic tools for detecting early signs of heart- and lung-transplant rejection and infection.

Akin to my work in transplant rejection, scientific workforce diversity is an issue that must be addressed through rigorous, evidenced-based approaches. But we face challenges in doing so. NIH Director **Francis Collins** and I addressed them recently in a *PNAS* Perspective (*Proc Natl Acad Sci U S A* **112:**12240–12242, 2015). I encourage you to read it.

Briefly, the challenges include four domains ripe for exploration: more-thorough study of the science of diversity; addressing career-transition gaps; studying the role of psychosocial factors in recruitment, retention, and leadership; and sustaining scientific workforce diversity for the long term.

> Our goal is to make the IRP a place for diversity to thrive via our long-term plans to develop career opportunities.

We are confronting these challenges across the NIH-funded workforce, but we've begun answering some questions about diversity here at NIH in the IRP. Deputy Director for Intramural Research **Michael Gottesman** and many scientific directors have been close allies in these efforts because we all recognize the value of diversity in establishing and maintaining the IRP as a high-performing organization. Our goals are to make our IRP not only the national model for the scientific freedom to explore ideas, but also a place for diversity to thrive via our long-term plans to develop career opportunities. We plan to accomplish these goals using a suite of centrally supported programs that promote independence and confidence in a truly diverse cadre of early-career scientists and to ensure their advancement to leadership roles. Here are a few examples:

- We're developing a recruitment database of highly competitive applicants from diverse backgrounds as well as a formal ambassador program designed for effective outreach to attract scientists to the IRP.
- We're developing a senior sabbatical program with opportunities for established investigators from diverse backgrounds, and their mentees, to experience the resources and culture of the IRP.
- We're providing educational sessions and tools to NIH Stadtman search-committee chairs, scientific directors, branch chiefs, and principal investigators about the role of nonconscious bias in hiring.
- We're identifying and filling programming gaps, especially at the postdoc-to-faculty stages, where attrition is higher for people from underrepresented groups, including women.
- We recently hosted the successful Future Research Leaders Conference, which was embedded within the 2015 NIH Research Festival and brought together past recipients of NIH diversity supplement grants and IRP scientific leadership. (See article on facing page.)

It is clear from research that diversity promotes innovation, and I can say confidently that great minds do think differently. We all stand to gain from having a workforce that looks like America and that delivers excellent science toward improving health and the economy. I am excited to be a part of the NIH community and to continue to partner with the leadership and staff of the IRP—truly an NIH treasure. ●

Focus on Science

NIH's First Future Research Leaders Conference

BY ALISON DAVIS, OD

On September 17, a group of postdocs and early-stage faculty converged on the NIH campus for a day and a half of science during the 2015 NIH Research Festival (http://researchfestival.nih.gov/2015/future_leaders.shtml). The 28 scientists—all of diverse backgrounds—make up the inaugural class of the NIH Future Research Leaders (FRLs). This pilot program was organized and run by NIH's Chief Officer for Scientific Workforce Diversity, **Hannah Valantine**, and her staff.

The FRLs traveled from across the nation and represented the country's top institutions: Duke University (Durham, North Carolina) and Tufts University (Boston), the Johns Hopkins University (Baltimore) and Stanford University (Stanford, California), St. Jude Children's Research Hospital (Memphis, Tennessee), Brown University (Providence, Rhode Island), and many others. They are early-career scientists working in biomedical pursuits ranging from structural biology to women's health. They all come from groups underrepresented in biomedicine, and many had received an NIH Research Supplement to Promote Diversity in the past.

FRL Conference attendees listened to presentations from NIH's senior leadership. NIH Director **Francis Collins** spoke about NIH's long track record of leading scientific discovery, and NIAID Director **Anthony Fauci** gave a riveting account of how a future without the human immunodeficiency virus and AIDS is within our grasp through tangible steps in research and policy. Both scientists conveyed a bright future for the FRLs, who will be tomorrow's scientific leaders and contribute to biomedical innovation through both the diversity of their backgrounds and their excellence in the lab.

"We know that diversity of all kinds promotes innovation in thinking—in approaches, in collaboration, and in the choice of what to study in the first place," said Valantine, a notion underscored by Collins in his lunchtime remarks to the group. Diversity is central to research excellence, he affirmed as he spoke about NIH's strong commitment to change its complexion to one that looks like the rest of America.

CHRISTINE STANFILL, OD

The Future Research Leaders Conference brought early-career scientists of diverse backgrounds to NIH for a day and a half in September. From left, NIH's Chief Officer for Scientific Workforce Diversity, Hannah Valantine, and conference attendees Mark Buckley (University of Rochester) and Willieford Moses (University of California, San Francisco).

FRLs were excited to share their science.

"I want to be part of the solution," said FRL Iris Navarro-Millan during an oral presentation of her work on developing patient-centered outcomes in people with rheumatoid arthritis (RA). A Puerto Rico native, she earned an M.D. in Mexico and did fellowship training at the University of Alabama at Birmingham (Birmingham, Alabama), where she now holds a faculty position. She is currently working on reducing cardiovascular risk in people with RA, a risk they often are unaware they have, she noted.

FRL Casey Overby, an assistant professor at the University of Maryland School of Medicine (Baltimore), is interested in translating the results of genomic medicine into clinical and population-based health-care settings. A bioinformaticist by training, she is intrigued by the power—and potential peril—of big data on people's lives and health.

Some FRLs, such as Willieford Moses, maintain a dual focus on basic and applied research. An M.D. by training, Moses is currently doing postdoctoral research to build an artificial kidney in Shuvo Roy's BioDesign lab at the University of California at San Francisco (San Francisco).

In addition to presenting their research, each FRL was paired with two senior investigators (many of them scientific directors or branch chiefs) in face-to-face meetings. The group also shared a poster session with the intramural research program scientific directors at the Research Festival, which also featured the now-popular annual bake-off. Thankfully, that event seemed to confirm that intramural scientists can manage as well in the kitchen as they do in the lab. ●

FROM THE FELLOWS COMMITTEE

New Opportunities to Get Involved With Felcom

BY LUCIE LOW, NCCIH

Here at Felcom we take a break from our monthly meetings over the summer and begin again in the fall when everyone is gearing back up for new semesters. So now is the perfect time to introduce ourselves to those who are new or unfamiliar with Felcom. Felcom is the Fellows Committee here at NIH, and it is dedicated to improving the experience of every fellow on all NIH campuses.

The committee is made up of representatives from each institute or center as well as chairs and members of various subcommittees (Career Development, Service and Outreach, Visiting Fellows' Affairs, Social Events, and others). We also have liaisons to several important NIH-wide committees (such as ethics, animal use, and childcare) and national organizations (such as the National Postdoctoral Association). The liaisons report on the committee activities to Felcom.

We're incredibly lucky to have the support of both the Office of Intramural Training and Education (OITE) and the Foundation for Advanced Education in the Sciences (FAES). OITE offers outstanding career resources and management courses; FAES offers biotechnology workshops as well as more than 100 courses each year through its Graduate School at NIH. We encourage all fellows to check out the websites for OITE (https://www.training.nih.gov) and FAES (https://faes.org) and take advantage of the excellent training opportunities. After all, we can't stay at NIH as postdocs forever.

Now is a great time to get involved in Felcom. We currently have several positions available, including liaisons to the Training Directors' Committee and to the Childcare Board as well as an exciting new Outreach Officer position. All of these are leadership positions, and as every prudent postdoc knows, it's important for our CVs and résumés to get nonbench experience, regardless of what we think our next career moves might be. Plus it's fun and a great opportunity to serve the NIH fellows community.

Get involved. Felcom meetings are the first Thursday of every month, 4:00 p.m., in Wilson Hall (Building 1). All fellows are welcome to attend or call in!

For more information, you can check out the Felcom website at https://www.training.nih.gov/felcom or contact the Felcom co-chairs: basic science co-chair **Lucie Low** (Lucie.low@nih.gov) or clinical co-chair **Agnes Mwakingwe** (agnes.mwakingwe@nih.gov).

Have a great holiday season! ●

Meet the Felcom Co-Chairs

Felcom Basic-Science Co-chair Lucie Low (left) and Clinical Co-chair Agnes Mwakingwe invite all NIH fellows to get involved with Felcom meetings and activities.

Felcom Basic Science Co-chair **Lucie Low**, who has been at NIH since 2012, does research on the effects of pain on brain structure and function in Catherine Bushnell's lab at the National Center for Complementary and Integrative Health. After completing her Ph.D. at the University College London (London), Low did postdoctoral training at McGill University in Montreal. When not drinking vast amounts of British tea (shipped from her homeland), she's still working out how to become an astronaut, wondering where her socks disappear to in the laundry, and teaching new skydivers how to fall out of perfectly good airplanes.

Felcom Clinical Co-chair **Agnes Mwakingwe**, who came to NIH in 2013, is an infectious-disease clinical fellow in the National Institute of Allergy and Infectious Diseases and does research on malaria vaccines in the Laboratory of Malaria, Immunology, and Vaccinology. She earned both her M.D. and Ph.D. (in microbiology and immunology) at the Albert Einstein College of Medicine (New York) and did a residency in internal medicine at Johns Hopkins Bayview Medical Center (Baltimore). Outside of work, she loves to hang out with her family and friends, read, dance, and try new recipes from all over the world. ●

Intramural Research Postdocs Sponsored by NIGMS

PRAT Fellows Showcase Their Research at Annual Symposium

BY RUCHI SHAH, NIGMS

Topics ranging from energy homeostasis and the development of fluorescent probes to immune disorders, the life cycle of the human immunodeficiency virus (HIV), and nerve-cell communication drew a crowd to the Natcher Conference Center (Building 45) on June 10 for the 47th annual National Institute of General Medical Sciences (NIGMS) Postdoctoral Research Associate (PRAT) program symposium.

The symposium featured capstone presentations from five graduating PRAT fellows and two keynote speakers. **Katrina Kelner**, a 1982 PRAT alum who worked in the National Institute of Diabetes and Digestive and Kidney Disorders (NIDDK) and is now an editor at *Science Translational Medicine*, talked about peer review, reproducibility, and validity challenges in scientific publishing. **Leslie Leinwand**, an NIGMS and National Heart, Lung, and Blood Institute grantee and a professor at the University of Colorado at Boulder (Boulder, Colorado), discussed her research on python organs and their connection to mammalian hearts.

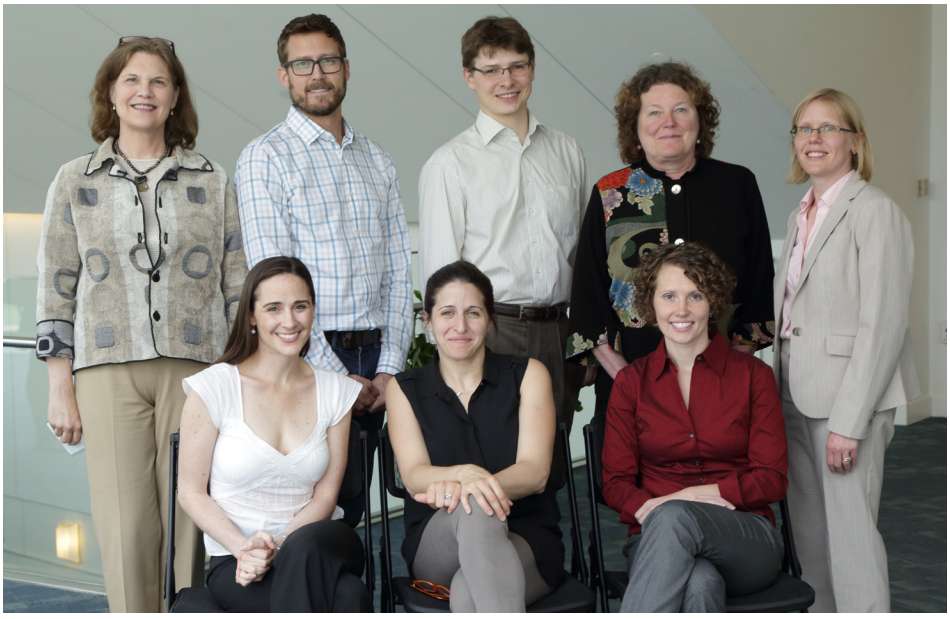
PRAT is a three-year-long postdoctoral training program that provides research experience in intramural labs, career development, and networking.

"In addition to offering opportunities for formal scientific presentations and discussions with peers who have a broad spectrum of expertise, the PRAT program has been instrumental in providing me with opportunities to participate in national and international conferences, learn more about grant mechanisms and applications, practice job interview skills, and network with scientists, editors, grant management experts, and PRAT alumni," said **Carrie Lucas**, a third-year fellow in the National Institute of Allergy and Infectious Diseases (NIAID). "These opportunities have been really instrumental in my postdoctoral experience and undoubtedly have helped me establish a solid foundation for launching my own lab in the near future."

When NIGMS established the program in 1965, the letter "P" in PRAT stood for "pharmacology," but in 2012 it was changed to "postdoctoral" to reflect the broadening of the scientific areas that the program supports.

As the first cohort of fellows who entered under the new name, the graduating class of 2015 is representative of the expanding scope of the program. The fellows worked in four different institutes in the fields of chemistry, neurobiology, immunology, molecular biophysics, and molecular toxicology.

"The PRAT program brings together fellows from a diverse array of scientific disciplines to learn from each other," said program director **Jessica Faupel-Badger**. "It's truly a multidisciplinary activity." ●



BILL BRANSON

On hand at the PRAT symposium were (seated, from left) Megan Wyeth, Nadine Samara, and Carrie Lucas, and (standing, from left) Katrina Kelner, Chad Brocker, Evgeny Kiselev, Leslie Leinwand, and Jessica Faupel-Badger.

PRAT 50TH ANNIVERSARY SYMPOSIUM
Friday, Nov. 6, 2015, 8:30 a.m.–4:30 p.m.
Ruth L. Kirschstein Auditorium
Natcher Conference Center (Building 45)
For more information: https://meetings.nigms.nih.gov/Home/Index/19247

The symposium recognized the research contributions of PRAT alumni, highlighted the role of the PRAT program in the careers of alumni, and provided an opportunity for PRAT alumni to network with each other and current fellows. This NIGMS event is available on videocast at http://videocast.nih.gov/launch.asp?19309.

NCATS Seeks New Intramural Research Collaborations

An Array of Programs to Speed Up the Process for Translating Discoveries into New Drugs

BY NCATS STAFF

Intramural scientists at the National Center for Advancing Translational Sciences (NCATS) develop, demonstrate, and disseminate new technologies that aim to speed up the process for translating discoveries into approved new drugs. (Typically, a novel intervention can take about 14 years and $2 billion to develop, with a failure rate exceeding 95 percent.) NCATS offers an array of funding programs and in-kind support services designed to help researchers translate basic scientific knowledge into interventions that improve human health. There are many ways that intramural researchers can take advantage of NCATS's expertise and tools.

Through the NCATS Chemical Genomics Center, NIH intramural researchers can access large-scale screening capabilities and medicinal chemistry and informatics expertise to develop chemical-probe molecules that can become potential therapeutic candidates in the drug-development pipeline (https://ncats.nih.gov/ncgc). NCATS and National Institute of Diabetes and Digestive and Kidney Diseases researchers recently collaborated to repurpose an allergy drug for the treatment of hepatitis C and are now testing the drug in patients at the NIH Clinical Center (https://ncats.nih.gov/pubs/features/probe-hepatitis-c).

COURTESY OF NCATS

NCATS experts use automated robots to perform quantitative high-throughput screening, a process in which each compound of a large chemical library is tested at multiple concentrations.

The Therapeutics for Rare and Neglected Diseases (TRND) program (https://ncats.nih.gov/trnd) provides collaborators with access to preclinical and clinical resources and expertise to develop new therapies for rare and neglected diseases. Researchers from NCATS and the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) have advanced advanced a treatment for Niemann-Pick disease type C and other lysosomal- or lipid-storage disorders. In these disorders, which usually affect children and are often fatal, fatty materials accumulate in the body's cells and tissues and can result in damage to the brain, peripheral nervous system, liver, and other organs and tissues.

The Niemann-Pick project is a collaboration among government, academic, and industry scientists who worked with community and patient groups. NICHD investigators are conducting a phase 1 clinical trial at the NIH Clinical Center to test the Niemann-Pick treatment in patients.

Another TRND project involves National Human Genome Research Institute scientists who evaluated a treatment for the rare degenerative muscle disease inclusion body myopathy 2, which is caused by a mutation in the gene *GNE* (http://www.nih.gov/news/health/sep2012/ncats-24.htm). A phase 1 clinical trial was launched at the NIH Clinical Center in 2012; a phase 2 trial is currently underway.

As part of the NIH RNAi initiative, NCATS operates a state-of-the-art RNA interference (RNAi) screening facility, which is available to intramural investigators (https://ncats.nih.gov/rnai). NCATS researchers and collaborators conduct high-throughput RNAi genome-wide screens in human- and mouse-model systems. National Institute of Neurological Disorders and Stroke collaborators used RNAi screening to reveal dozens of genes that may represent new therapeutic targets for treating Parkinson disease (http://www.nih.gov/news/health/nov2013/ninds-24.htm).

Other NCATS programs include Bridging Interventional Development Gaps, in which researchers collaborate to advance promising therapeutic agents through late-stage preclinical development toward an Investigational New Drug application and clinical testing (https://ncats.nih.gov/bridgs).

NCATS also facilitates Pfizer's Centers for Therapeutic Innovation at NIH, which pairs intramural researchers and clinicians with Pfizer resources to jointly pursue scientific and medical advances through therapeutic development of biologic compounds (https://ncats.nih.gov/cti). In addition, the Toxicology in the 21st Century (Tox21) program is testing 10,000 chemicals for their ability to disrupt biological pathways and potentially cause negative health effects. Tox21 accepts proposals for assays from any intramural researcher (https://ncats.nih.gov/tox21).

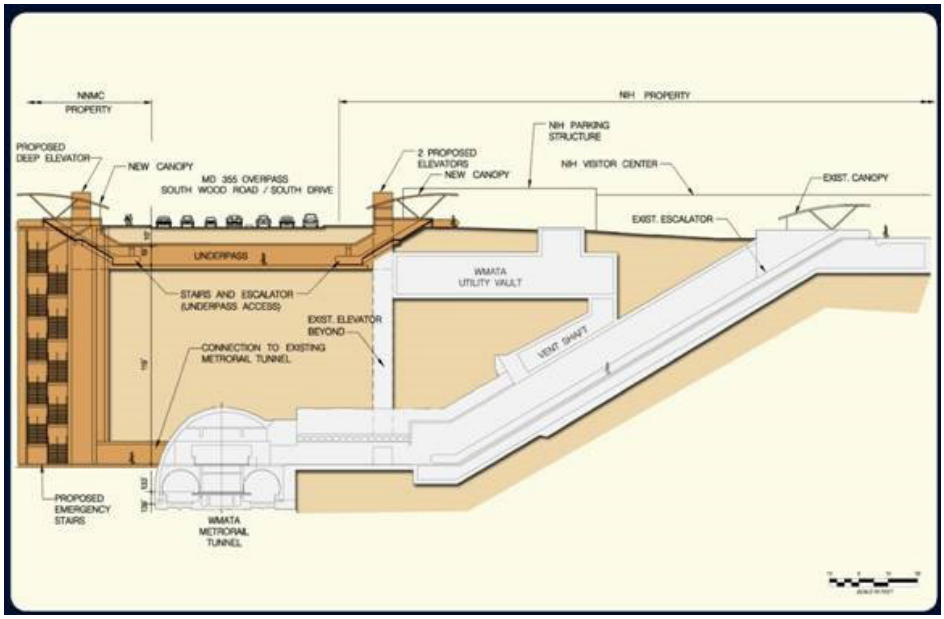
Last year, NCATS investigators collaborated with more than 180 other NIH intramural researchers. Learn more about how you can work with NCATS at https://ncats.nih.gov/workwithus. ●

Take a video tour of the NCATS labs at https://bit.ly/1J6uUyh and see firsthand how NCATS researchers work to get more treatments to more patients more quickly.

Pedestrian Tunnel Under Rockville Pike

Construction Expected to Affect Commuting

BY BRAD MOSS, OD



A pedestrian tunnel under Rockville Pike near the South Drive intersection would allow for safer pedestrian access between Walter Reed National Military Medical Center and NIH. The Medical Center Metro Crossing Project also includes a new high-speed elevator from the Metro station to the east side of the roadway and an emergency egress stairwell.

This winter, construction will commence on the Medical Center Metro Crossing Project. Expected to be completed in 2018, the project adds a shallow, underground east-west pedestrian crosswalk that will connect the Medical Center Metro Station and the NIH side of Rockville Pike to the opposite side, where Walter Reed Medical Center and the rest of the Naval Support Activity–Bethesda campus (NSAB) are located. High-speed elevators and emergency stairwells will also be added to the Metro station.

The underpass should allow for safer passage of pedestrians and bicyclists crossing MD 355/Rockville Pike and improve traffic flow at the busy South Drive and Rockville Pike intersection. Additional work should improve traffic flow at the MD 355/Rockville Pike and Jones Bridge Road/Center Drive intersections.

Along with several other simultaneous road-improvement projects, the Metro Crossing Project construction is expected to have a major impact on NIH staff and visitors for a long time. To help avoid the associated gridlock and other commuting challenges, the Office of Research Services, the Office of Research Facilities, and the Office of Human Resources have relaunched a revised traffic website that will keep employess informed about the tunnel and road improvement projects and offer alternative commuting options and work schedule flexibilities (http://traffic.nih.gov).

The traffic website makes it easy for NIH employees to find information on Transhare benefits, commuter shuttles, car and van pools, and more. Employees can explore the possibilities of regular or ad hoc telework and other options to avoid traffic congestion and delays. The NIH realizes that life in the lab makes some of these options difficult, but this website should still help to reduce traffic frustrations on your way here or home. ●

NIH ABBREVIATIONS

CBER: Center for Biologics Evaluation and Research, FDA
CC: NIH Clinical Center
CCR: Center for Cancer Research, NCI
CDC: Centers for Disease Control and Prevention
CIT: Center for Information Technology
DCEG: Division of Cancer Epidemiology and Genetics, NCI
FAES: Foundation for Advanced Education in the Sciences
FARE: Fellows Award for Research Excellence
FelCom: Fellows Committee
FDA: Food and Drug Administration
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
NIEHS: 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

Research Festival

CONTINUED FROM PAGE 1

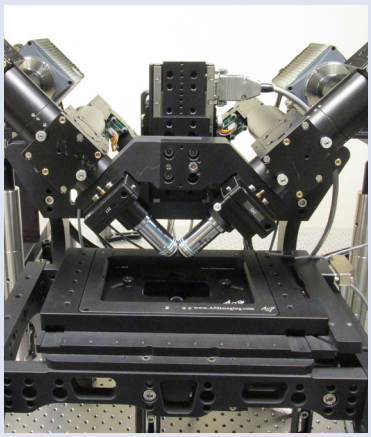
But this year the festival, which was held on September 16–18 and chaired by the Deputy Director for Intramural Research **Michael Gottesman**, kicked off the initiatives outlined in the intramural long-term plan. Following are descriptions of the three plenary sessions (in years past, there's been just one) and highlights of some of the concurrent workshops. Read more online at http://irp.nih.gov/v23i6/celebrating-intramural-science.

PLENARY SESSIONS

TECHNOLOGY INCUBATORS AT THE NIH: BRINGING IDEAS TO LIGHT (PLENARY I)

BY LESLEY EARL, NCI

Maybe you don't think of NIH as a hot startup, but there it's been at the forefront of technology development that intertwines with and supports broader basic- and translational-research efforts. The opening Plenary Session of the 2015 NIH Research Festival brought several innovators—researchers who develop cutting-edge technologies—to the podium, delving into some of the newest frontiers in imaging.



M. GUO, A. KUMAR, AND Y. WU, NIBIB

Hari Shroff has developed this light-sheet microscope to image living organisms very quickly at high resolution as well as in three dimensions (3D) for long durations with multiple colors. The point of all these features is to map, in real time, the growth of individual neurons in the developing brain of the *Caenorhabditis elegans* worm embryo.

The session, said Deputy Director for Intramural Research **Michael Gottesman** in his opening remarks, "illustrates the critical role that the intramural research program has played over the years, and will play in the future, in developing new technology and innovating."

The first presentation began with a clinical problem: How to biopsy for prostate cancer in a way that targets the right place? Although the standard of care is ultrasound-guided biopsy, this method can't visualize tumors, just the gland itself. **Peter Choyke,** the director of the National Cancer Institute's (NCI's) Molecular Imaging Program, told a story of how he, along with many intramural collaborators, devised new ways to pair previously taken magnetic resonance imaging (MRI) information with ultrasound in real time. This technique lets clinicians see where potential tumors are during a biopsy, increasing the chances of hitting the right spot and thus getting a more accurate diagnosis. "We're on the road at least for improving the diagnostic capabilities for prostate cancer," said Choyke.

Next up was **Hari Shroff** (National Institute of Biomedical Imaging and Bioengineering), who has been designing new ways to image living organisms with light microscopy very quickly at high resolution as well as in three dimensions (3D) for long durations with multiple colors, and all at the same time.

Using the *Caenorhabditis elegans* worm embryo as a model system, Shroff's light-sheet microscope maps neuronal cells as they grow along the length of the embryo, even keeping track of them after the worm's muscle cells develop and the embryo starts to twitch and spin. "But all of this technology is useless if it's siloed in my lab," he said. Shroff is currently creating a shared advanced-imaging facility where such pre-commercial custom-built machines can be made available to the rest of the NIH.

Sriram Subramaniam (NCI) rounded out the presentations by discussing technologies for imaging at the smallest end of the scale, such as electron microscopic 3D imaging of cells, viruses, and proteins. The focus, said Subramaniam, is on how the technologies can get you closer to understanding biological mechanisms. Although his group has developed a variety of electron microscopy-based technologies, the most exciting recent advances have been in cryo-electron microscopy in which the newest generation of cameras has revolutionized the field. The collected information can lead to structures that reveal the placement of amino acid side chains, ions, and even individual water molecules.

But the biggest issue is that there is a gap between people who first try out a technology and those who make it a productive addition to the scientist's toolkit. "How do we enhance the bandwidth of these technologies at the NIH?" Subramaniam asked.

To answer that question–or at least to delve more deeply into it–the three speakers were joined by **Adriaan Bax** (National Institute of Diabetes and Digestive and Kidney Disorders), who works with the latest generation of nuclear magnetic resonance technologies; **Jennifer Lippincott-Schwartz** (National Institute of Child Health and Human Development), who develops super-resolution light-microscopy methods; and **Jodi Black** (National Heart, Lung, and Blood Institute, NHLBI), deputy director for NHLBI's Division of Extramural Research Activities, who supports the adoption of new technologies by industry. The difficulty, the panelists agreed, is that although some innovators have been highly successful, the organization of the NIH

doesn't necessarily always support the collaborative, interdisciplinary work required for technology development.

"If we really want to develop something for public-health benefit," said Black, "you've got to be rewarded for moving into something that's commercially relevant."

"The recognition of people who are innovators, inventors, toolmakers, at the same or higher level of credit as we give to our scientists who are studying biological processes" is a part of the long-term goal of the intramural program, said Gottesman. "We need to recognize that they are really essential parts of teams that are solving important problems."

LISA HELFERT

A panel discussion followed each of the plenary sessions. Here, the "Responding to Public Health Emergencies" panel featured (from left) David Lipman (NCBI), Pamela Collins (NIMH), Cliff Lane (NIAID), NIAID Director Anthony Fauci, and NIEHS Director Linda Birnbaum.

EBOLA EPIDEMIC AND BEYOND: AN OVERVIEW OF NIH'S HEALTH EMERGENCY RESPONSE (PLENARY II)

BY SOMA CHOWDHURY, NIGMS

When the Ebola epidemic in West Africa became a global health emergency in 2014, NIH stepped in to help develop a clinical-research program in the region. In addition, the NIH Clinical Center's Special Clinical Studies Unit treated several health-care workers who were exposed to or infected by Ebola virus either in West Africa or in the United States.

But this occasion was "not the only time NIH has played a central role in responding to an outbreak," NIH Director **Francis Collins** said in his opening remarks during the Research Festival's plenary session on "Responding to Public Health Emergencies."

NIH routinely responds to emergencies whether in the United States or elsewhere, from the Fukushima nuclear disaster in Japan (2011) to Hurricane Katrina in New Orleans (2005).

"The NIH intramural community as a group has come together to try to deal with things of global importance, the way that they have in the setting of Ebola," said **Cliff Lane**, deputy director for Clinical Research at the National Institute of Allergy and Infectious Diseases (NIAID). NIAID took the lead role in helping NIH's effort to battle Ebola. Lane has taken over a dozen trips to West Africa since the epidemic started; more than 100 staff from the intramural research program (IRP) from 14 different institutes have traveled there as well.

NIH brought together experts from the NIH intramural and extramural communities and paired them with experts in Liberia to establish a clinical-research infrastructure to tackle Ebola. It will study future public-health challenges as well. NIH has been conducting clinical trials on several Ebola vaccine candidates and experimental therapeutic interventions such as the monoclonal-antibody cocktail ZMapp. Currently studies are active in Liberia, Sierra Leone, and Guinea.

But not all epidemics are as obvious as Ebola. One silent epidemic is mental illness, which "is the leading cause of disability around the world," said **Pamela Collins** (National Institute of Mental Health, NIMH). Unfortunately, "very little has been done to remedy it," she said. There is a gap between the number of people in need of mental-health care and the number who receive it, even in the United States. To reduce the gap, which is due in part to shortages in mental-health providers, NIMH has established collaborative hubs in different parts of the world that are testing "task-shifting" approaches in which less-specialized care providers deliver evidence-based mental-health interventions.

David Lipman, scientific director of the National Center for Biotechnology Information (NCBI), discussed NIH's role in developing a national genomics network for food safety. Although the mortality rate from foodborne illnesses is low, the associated health-care costs exceed $20 billion. NCBI analyzes and manages the publicly accessible data for the collaboration among CDC, FDA, and state public-health laboratories—the first such network to use whole-genome sequencing for identifying outbreaks of foodborne pathogens. In the future, the full genome sequence for both viral and bacterial pathogens can help detect foodborne outbreaks earlier, according to Lipman.

The panel discussion that followed the presentations included remarks by National Institute of Environmental Health Sciences (NIEHS) Director **Linda Birnbaum** and NIAID Director **Anthony Fauci**. Birnbaum described NIEHS's disaster research-response program and its response to public-health emergencies related to environmental

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Research Festival

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pollution, climate change, and electronic waste.

Fauci asked about the IRP's role in building a sustainable infrastructure in Africa. Lane explained that the NIH goal is to build a program that can eventually be led and maintained by the West African investigators and their institutions.

NIH's long-term plan is to "think about ways in which the NIH could more effectively harness the enormous talent" from the intramural community to deal with public-health emergencies, said Deputy Director for Intramural Research **Michael Gottesman**.

CHRONIC INFLAMMATION (PLENARY III)

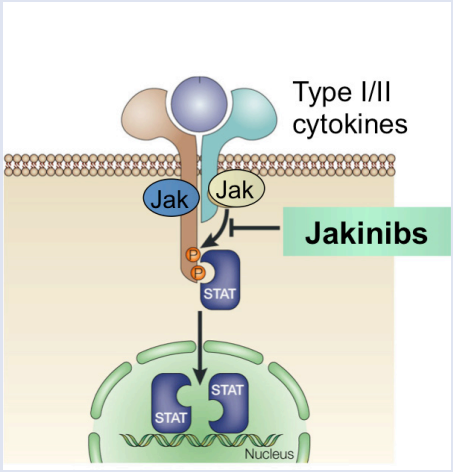
BY NERMI PARROW, NIDDK

In the plenary session on "Chronic Inflammation," intramural researchers discussed the identification and therapeutic targeting of a central immune-signaling pathway, advanced-imaging techniques in multiple sclerosis (MS), and the development of the Center for Human Immunology, Inflammation, and Autoimmunity (CHI). The session culminated in a panel discussion of how the NIH can promote collaborative investigations of chronic inflammation.

John O'Shea (National Institute of Arthritis and Musculoskeletal and Skin Diseases, NIAMS) described the mechanisms of cytokine signaling and associated clinical applications. He discovered the tyrosine kinase Janus kinase 3 (JAK3) and contributed to work showing that JAK3 associates with the common gamma chain, a receptor component used by several cytokines, and that immunodeficiencies arise from mutations in this signaling pathway. Three JAK kinase inhibitors are currently approved for therapeutic use, including the JAK inhibitor tofacitinib for rheumatoid arthritis, which was developed in partnership with Pfizer. O'Shea's current research is focused on how cytokines regulate lineage-specific gene expression and epigenome through which these factors determine T-cell identity.

Daniel Reich (National Institute of Neurological Disorders and Stroke) discussed advanced imaging for MS. MS is characterized by autoimmune T cells that attack myelin, the insulating layer of nerve cells, leading to specific zones of demyelination, called lesions, in the brain. Recent advances allow mapping of the formation and repair of these lesions in patients. These advances are able to discriminate differences in lesion-formation patterns, which may offer clues about the early stages of lesion repair. One pattern in particular is characterized by chronically activated, pro-inflammatory macrophages around the edge of the lesion, which may arrest the wound-healing process, resulting in more extensive tissue damage. In addition to classifying lesions, these new imaging modalities provide a means to identify therapeutic interventions that favor the healing and remyelination of lesions.

In the final talk, CHI Director **Neal Young** described how the center uses advanced-technology platforms, as well as data integration and computational modeling, to work with diverse collaborators across the NIH intramural program to study the human immune system in health and disease. **Angélique Biancotto** discussed the technical platforms available at CHI. Integration of these platforms with clinical data may expedite the identification of novel correlates and biomarkers of disease. **John Tsang** discussed systems immunology and the importance of assessing the immune system for precision medicine. One of the first major CHI studies used a vaccine as a model for assessing immune responsiveness after challenge. Ultimately, these approaches may reveal signatures common to several diseases and immune reactions.



NIH DIVISION OF MEDICAL ARTS

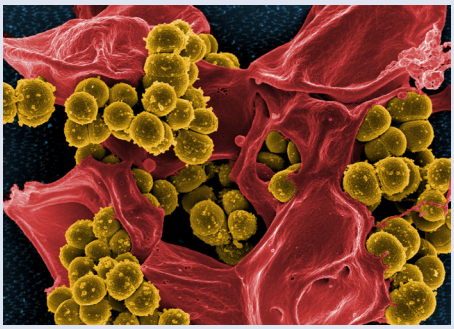
In the "Chronic Inflammation" plenary, John O'Shea described the Jak-STAT pathway as a simple and rapid membrane-to-nucleus mechanism for transmitting extracellular signals. JAK kinase inhibitors are currently approved for therapeutic use, including tofacitinib for rheumatoid arthritis.

In the panel discussion, led by **Michael Gottesman**, O'Shea, Reich, and Young, **Rachel Caspi** (National Eye Institute), NIAMS Director **Stephen Katz**, and **Thomas Wynn** (NIAID) discussed the enhancement of resources for chronic-inflammation research including improved access to central-core facilities; the creation or expansion of facilities such as a germ-free mouse facility; and the advantages and disadvantages of grouping researchers of like interests together. Several leadership initiatives were put forth including the need for resources to support interested fellows; possible mechanisms of joint appointment for investigators wishing to work in more than one institute; and the potential benefits of earlier collaborations with consortium companies.

NIH's collaborative approach to research aims to elucidate global principles of chronic inflammation that underlie many disease processes. It is hoped that the discovery of these principles will translate into more precise therapies for patients. ●

RESEARCH FESTIVAL—CONCURRENT WORKSHOPS

Read the full stories online at http://1.usa.gov/1jSj9IZ



FRANK DELEO, NIAID

Scanning electron micrograph of methicillin-resistant *Staphylococcus aureus* and a dead human neutrophil.

BATTLING THE BUGS: BUT MAYBE NOT WITH ANTIBIOTICS

BY SOMA CHOWDHURY, NIGMS

Each of us carries around 10 times as many microbes as we have human cells. Together, these microbes form our very own microbiome that is intricately linked to our personal health. The growing problem of drug resistance, however, is among the greatest threats to public health facing us today. The "Microbiome and Drug Resistance" workshop explored how the IRP can advance the study of these interconnected realms of microbiome and drug resistance by building on the program's complementary strengths across immunology, immunotherapy, microbial and human genomics, cohort studies, animal model systems, and access to well-defined patient populations in the Clinical Center.

VACCINES WORKSHOP: CHALLENGES AND SOLUTIONS IN VACCINE DESIGN

BY LESLEY EARL, NCI

Although vaccines are one of the most effective preventative measures to control infectious diseases, there are still many pathogens we don't yet know how to tackle. The "Vaccines" workshop addressed the development of an effective vaccine or other immune modulator for prevention and treatment of diseases such as HIV/AIDS and other high-burden diseases, such as respiratory syncytial virus, dengue, malaria, and tuberculosis, as well as biodefense threats and emerging and re-emerging infectious diseases including influenza.

HITTING THE BRAKES ON COMPULSIVE BEHAVIORS

BY BRANDON LEVY, NIMH

Like a car rolling downhill, activities such as eating ice cream or playing roulette can be hard to stop once they get started. When this inability to hit the brakes begins to have negative consequences, even everyday actions can be reclassified as compulsions. NIH researchers are eager to discover the brain systems that give rise to compulsive behaviors such as binge eating, substance abuse, and gambling addiction. The IRP's goal is to develop a detailed understanding of the pathway and molecular participants in these behaviors, and target therapies to exploit this improved understanding of behaviors with substantial morbidity and mortality. At the "Neuroscience and Compulsive Behavior," researchers discussed neuroscience tools including advanced PET and MRI imaging, big data analysis, animal model systems, and neurochemistry and neuroanatomy.

NATURAL PRODUCTS: THE FUTURE THERAPEUTICS

BY MANJU BHASKAR, NINDS

NIH scientists are discovering how natural products produced by bacteria, fungi, marine organisms, and plants can be used as powerful therapeutics. At the "Natural Products" workshop, speakers discussed how the IRP can contribute to a national program facilitating natural products discovery for new molecules that target biological processes central to human disease.

POSTERS AND BAKE-OFF

BY LYNN MIRIGIAN, NIDCR

The collaborative spirit was in full swing at the Research Festival's poster sessions, one of which featured the work—and culinary skills—of scientific directors and institute directors. Two directors tied as first-place poster winners: NINDS Scientific Director **Alan Koretsky** in the basic-science category and NEI Director **Paul Sieving** in the clinical sciences category. First-place cooking contest winner was National Institute of Nursing Research's Scientific Director **Ann Cashion** for her savory pesto spread. ●

Descriptions of all the posters are at http://researchfestival.nih.gov/2015/posters.cgi.

ERNIE BRANSON

Catherine Bushnell, scientific director of the National Center for Complementary and Integrative Health, joined in the fun with NIH Institute Directors and Scientific Directors who exhibited posters and showed off their baking skills. Just behind her, facing the camera, is NINR Scientific Director Ann Cashion who took first place in the cooking contest.

Trans-NIH Recruits

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(more online: http://irp.nih.gov/catalyst/v23i6/trans-nih-recruits)

STADTMAN INVESTIGATORS

GRÉGOIRE ALTAN-BONNET, PH.D.

Earl Stadtman Investigator, Cancer and Inflammation Program, National Cancer Institute–Center for Cancer Research

Education: École Normale Supérieure, Paris (B.S. in physics, 1994; M.S. in physics, 1995); Rockefeller University, New York (Ph.D. in physics, 2000)
Training: Postdoctoral fellow, Laboratory of Immunology, NIAID (2000–2005)
Previous positions: Departments of Computational Biology and Immunology, Memorial Sloan-Kettering Cancer Center, New York (2005–2015)
Came to NIH: In 2015

Research Focus: Systems immunology: The interplay between the robustness and variability of self-nonself discrimination in the immune system.

What is most exciting about your work?
The field of immunology is experiencing a massive explosion with more and more of the immune system being explored in its intimate details.

Have you made any significant findings?
The main contributions for my group were analyzing how cells of the immune system display large phenotypic variability; demonstrating that cell-cell communications and feedback regulations could correct such unreliability at the individual cell level; and documenting how self-nonself discrimination by T cells can be tuned at the collective level, in particular through a tug of war for shared cytokines.

What's hot in your field right now?
Single-cell methodologies.

What's the hardest lesson you've ever had to learn?
No matter how novel our results and conceptual insights are, their impact will be limited by our ability to communicate and validate our methods.

ALEXANDER CHESLER, PH.D.

Earl Stadtman Investigator, National Center for Complementary and Integrative Health

Education: Bard College, Annandale-On-Hudson, N.Y. (B.A. in biology); Columbia University, N.Y. (Ph.D. in biology)
Training: Postdoctoral fellow, Columbia University (2005–2007); postdoctoral fellow, Department of Physiology, University of California at San Francisco (2007–2013)
Came to NIH: In 2013

Research focus: The neurons and circuits of the somatosensory system and the changes that they undergo during injury and inflammation.

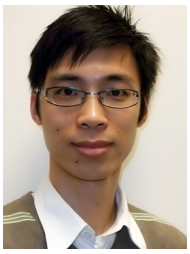
What attracted you to the NIH IRP?
There's nowhere in the world with better resources. I'm surrounding by hundreds of scientists and doctors, state-of-the-art of equipment, and the freedom to pursue my research without the pressure of hunting for funding. One of the unexpected joys has been my ability to interact with patients and to feel, for the first time, directly connected to the health problems I seek to affect.

What's hot in your field right now?
Everything! This feels like a golden age of neuroscience research.

What about you might be surprising?
At one point I was seriously considering dropping out of graduate school to tour with my band.

KELVIN CHOI, PH.D., M.P.H.

Earl Stadtman Investigator and Acting Head, Social and Behavioral Group, National Institute on Minority Health and Health Disparities



Education: The Hong Kong Polytechnic University, Hong Kong (B.Sc. in physiotherapy, 2001); University of Minnesota, Minneapolis (M.P.H., 2007; Ph.D. in epidemiology, 2010)
Previous positions: Various positions, including assistant professor (2013), at the University of Minnesota School of Public Health, Division of Epidemiology and Community Health (2006–2013); clinic manager and physiotherapist, Cosmo Physiotherapy Center, Hong Kong (2001–2005)
Came to NIH: In 2013

Research Focus: How tobacco companies use marketing strategies to cultivate and foster tobacco use among adolescents and adults and how the effects differ by demographics and socioeconomic status.

How did you become interested in science?
My mother died from lung cancer without smoking a single cigarette, but she was surrounded by smokers when she was younger. Later on, I worked with marginalized teenagers who often smoked, and I would have liked to help them quit

smoking, but I didn't know how. During my graduate education, I became interested in conducting research in tobacco-use epidemiology, its disparities, and tobacco control.

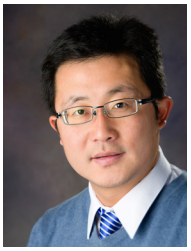
What is most exciting about your work?
Finding ways to help individuals and communities, particularly disadvantaged populations, to reduce the burden of tobacco use and other health-risk behaviors.

What's hot in your field right now?
Electronic cigarettes; how to reduce tobacco-use disparities by socioeconomic status.

What's the hardest lesson you've ever had to learn?
It's important to spend quality time with the family. I lost too many family members before I could enjoy life with them.

SHUO GU, PH.D.

Earl Stadtman Investigator, Gene Regulation and Chromosome Biology, National Cancer Institute-Frederick



Education: Tsinghua University, Beijing (B.S. in biology, 1998); City of Hope Graduate School of Biological Sciences, Duarte, Calif. (Ph.D. in molecular biology, 2005)
Training: Postdoctoral fellow, Beckman Research Institute, City of Hope (2005–2006); postdoctoral scholar, Departments of Pediatrics and Genetics, Stanford University, Palo Alto, Calif. (2006–2011)
Previous position: Basic Life Sciences Research Associate, Departments of Pediatrics and Genetics, Stanford University (2011–2013)
Came to NIH: In 2013

Research Focus: Unveiling the roles of noncoding RNAs in gene regulation and developing new therapeutic approaches for cancer treatment.

How did you become interested in science?
As a kid, "why" was one of my favorite words. I guess curiosity drove me to the science field.

What is most exciting about your work?
We study the function of RNA, the origin of life (according to the RNA world hypothesis). People used to believe RNA is merely a messenger that conveys genetic information. Recent studies indicate RNA, especially noncoding RNA, plays a critical role in the regulation of gene expression. I am excited to see that more people agree that "RNA rules!"

Have you made any significant findings?
I established a "loop-counting" rule governing the preciseness of how various small hairpin RNAs (shRNAs) and endogenous pre-miRNAs are processed, which is critical for miRNA biogenesis and function.

What's hot in your field right now?
RNA modifications and their functions in normal development and disease.

Complete this sentence: If I had more time I would …
Pursue two additional Ph.D. degrees in mathematics and physics. I guess my childhood dream of being Einstein never completely died out.

What about you might be surprising?
I used to be a very serious personal computer (PC) game player. The first publication I had in college was not for science but a strategy guide for a PC game.

MARKUS HAFNER, PH.D.

Earl Stadtman Investigator, National Institute of Arthritis and Musculoskeletal and Skin Disease

Education: U. of Bonn, Bonn, Germany (M.Sc. in chemistry, 2002; Ph.D. in biochemistry, 2007)
Training: Postdoctoral fellow, Rockefeller University, New York (2007–2014)
Came to NIH: In 2014

Research focus: The dissection of the composition of ribonucleoproteins (RNPs) that are involved in cellular RNA transport and control of RNA stability.

How did you become interested in science?
I am a chemist by training, and during the work for my graduate thesis I used synthetic RNA to set up screening assays to identify small-molecule inhibitors of extracellular signaling pathways. I got fascinated by the versatility of RNA and decided to join Thomas Tuschl's laboratory at Rockefeller University to learn how the cell uses RNAs of different lengths.

What is most exciting about your work?
Understanding the exquisite specificity and the robustness with which cells regulate their gene-expression program.

Have you made any significant findings?
In my doctoral thesis I used chemical biology to show that proteins of the cytohesin family of small guanosine exchange factors are regulators of the insulin-signaling pathway. During my postdoc, I developed a method (called PAR-CLIP) to identify binding sites of RNA-binding proteins.

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Trans-NIH Recruits

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(more online: http://irp.nih.gov/catalyst/v23i6/trans-nih-recruits)

What's hot in your field right now?
Identifying the function of noncoding RNAs is one of the big challenges in the field of RNA molecular biology.

What's the hardest lesson you've ever had to learn?
That, in some rare cases, trust in collaborators can be misplaced. But at the same time, I am making sure that my positive attitude toward open collaborations does not change.

LISA MIRABELLO, PH.D., M.S.

Earl Stadtman Investigator, Genetic Epidemiology Branch, National Cancer Institute

Education: Cornell University, Ithaca, N.Y. (B.S. in pre-medicine and animal science, 1999); New York Medical College, Valhalla, N.Y. (M.S. in experimental pathology, 2003); State University of New York at Albany, School of Public Health, Albany, N.Y. (Ph.D. in infectious disease and molecular population genetics, 2007)
Training: Postdoctoral fellow, Clinical Genetics Branch, Division of Cancer Epidemiology and Genetics, NCI (2007–2010)
Previous positions: Research fellow, Clinical Genetics Branch, Division of Cancer Epidemiology and Genetics, NCI (2010–2013)
Became Stadtman Investigator: In 2013

Research Focus: Understanding the contribution of genomic and epigenomic alterations to cancer etiology, in particular osteosarcoma, the most important bone tumor in children and adolescents.

What is most exciting about your work?
Finding something new that may help explain disease risk or outcome.

Have you made any significant findings?
I led a study to sequence the tumor suppressor gene *TP53* and showed that inherited variations in it among children and adolescents with osteosarcoma are more common than previously thought. In an osteosarcoma genome-wide association study, we identified a novel genetic locus (NFIB) strongly associated with metastasis.

What's hot in your field right now?
"Omics" in general is hot right now.

What about you might be surprising?
I've been a vegetarian since I was 6 years old. As a child I thought I was making a difference, helping the animals, reducing some suffering. I think it's this same compassion that drives my passion for my research, the hope to make a difference by improving human health.

STEVEN C. MOORE, PH.D., M.P.H.

Earl Stadtman Investigator, Nutritional Epidemiology Branch, National Cancer Institute–Division of Cancer Epidemiology and Genetics

Education: Williams College, Williamstown, Mass. (B.A. in psychology, 2000); Yale University School of Public Health, New Haven, Conn. (M.P.H., 2004; Ph.D. in cancer epidemiology, 2007)
Training: Predoctoral fellow, NCI-DCEG (2005–2007); postdoctoral fellow, NCI-DCEG (2007–2009)
Previous position: Research fellow, NCI-DCEG (2009–2013)
Came to NIH: In 2007 for training; became Stadtman Investigator in 2013

Research focus: The role of physical activity and obesity in cancer risk; the use of metabolomics—to analyze thousands of metabolites in blood samples—to study human populations.

How did you become interested in science?
I got my start as a kid with board games, Dungeons and Dragons, polyhedral dice, and back-of-the-envelope probability calculations. In high school, I started running competitively and became a health nut. Eventually, my science and computer interests and health interests converged.

What is most exciting about your work?
Making new discoveries.

Have you made any significant findings?
In my physical activity research, I and co-investigators identified the exact dose-response relationship between physical activity and life expectancy gained. In metabolomics, we have been evaluating how key health habits and personal characteristics are related to more than 1,000 different metabolites in blood. So far, we've identified up to 50 biomarkers related to diet, including new biomarkers of nuts, fish, coffee, and tea. We've also identified new biological pathways affected by body weight that may also be relevant to cancer risk.

What's the hardest lesson you've ever had to learn?
That I was not going to make it as a professional runner. Not even close.

What about you might be surprising?
I seriously considered becoming a professional photographer. I talked to a newspaper staff photographer before leaving college, and he explained to me how the Internet was undercutting the profession. He suggested that I consider an alternate career path.

KEISUKE (CHRIS) NAGAO, M.D. PH.D.

Earl Stadtman Investigator, Dermatology Branch, National Cancer Institute–Center for Cancer Research

Education: Keio University School of Medicine, Tokyo (M.D., 1994; Ph.D. in microbiology and medical mycology, 2005)
Training: Residency in dermatology, Keio University School of Medicine, and residency in anesthesiology, Tokyo Dental College Hospital, Toyko (1994–1996); visiting fellow, Dermatology Branch, NCI-CCR (2005–2008)
Previous positions: Department of Dermatology, Keio University School of Medicine (instructor, assistant professor, then senior assistant professor, 2008–2014)
Came to NIH: In 2005–2008 as visiting fellow; returned in 2014

Research focus: Elucidating fundamental principles of skin inflammation and immunology; exploring the crosstalk between skin-resident leukocytes and skin-colonizing microbiota.

How did you become interested in science?
I am a dermatologist with a longstanding interest in immunological skin diseases. Having encountered severe and fatal cases of infectious diseases led me to recognize the importance of skin immunity.

Have you made any significant findings?
We developed a mouse model of atopic dermatitis (AD) that recapitulates not only the phenotype but also the loss of microbial diversity seen in human AD. Using this model, we showed that *Staphylococcus aureus*, which colonizes AD skin, is a critical component for eczema formation.

What's hot in your field right now?
Microbiota-host interactions.

What's the hardest lesson you've ever had to learn?
During my early training as a physician, it was difficult for me to learn and accept that lives of patients sometimes just cannot be saved.

BRÍD M. RYAN, PH.D., M.P.H.

Earl Stadtman Investigator, Laboratory of Human Carcinogenesis, National Cancer Institute–Center for Cancer Research

Education: University College Cork, Cork, Ireland (B.Sc. in biochemistry, 2001); St. Vincent's University Hospital and School of Medicine and Medical Sciences, University College Dublin, Dublin, Ireland (Ph.D. in biochemistry, 2005); School of Public Health and Population Sciences, University College Dublin (M.P.H., 2007)
Training: Postdoctoral researcher, Breast Cancer Research Group, St. Vincent's University Hospital (2005–2006); Cancer Prevention Fellow (2006–2010), postdoctoral research fellow (2010–2013), Laboratory of Human Carcinogenesis, NCI
Came to NIH: In 2007 for training; became Stadtman Investigator in 2013

Research Focus: Using integrative and translational molecular epidemiology approaches to understand the causes and consequences of health disparities in lung cancer among African-Americans; looking at the role of inflammation in the initiation and progression of lung cancer.

How did you become interested in science?
I was always interested in science. In my teens I decided to be a cancer researcher. My initial training was in biochemistry, but as part of the NCI Cancer Prevention Fellowship, I received training in public health. As a postdoc at NCI, I was involved in research that bridged both basic science and translational molecular epidemiology.

What's hot in your field right now?
Methods and technology. Many of our core research questions have not fundamentally changed during the past few decades, but advances in genomics and basic science have completely transformed how we ask them.

What's the hardest lesson you've ever had to learn?
As a Ph.D. student I quickly learned that most experiments are not perfect the first time you try them.

What about you might be surprising?
I have five sisters and grew up on a farm, so I am quite accustomed to milking cows and herding cattle. When I visit my family in Ireland, I swap the lab coat for overalls and wellies and do a bit on the farm.

PETER SCHUCK, PH.D.

Earl Stadtman Investigator, National Institute of Biomedical Imaging and Bioengineering

Education: Johann Wolfgang Goethe-Universität Frankfurt am Main, Frankfurt, Germany (B.S. in physics, 1991; Ph.D. in biophysics, 1994)
Training: Postdoctoral, NIDDK (1994–1997)
Previous positions: Chief, Dynamics of Macromolecular Assembly Section, Laboratory of Cellular Imaging and Macromolecular Biophysics, NIBIB (2007–present); staff scientist (1999–2013)
Came to NIH: In 1994 for training; became Stadtman Investigator in 2014

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Trans-NIH Recruits

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Research focus: Developing biophysical methods for studying protein interactions and the assembly of multiprotein complexes.

How did you become interested in science?
I always enjoyed science and astronomy growing up and after high school enrolled in physics classes. I was introduced to biophysics and realized that it was a field that connected math, biology, and physics and offered many fascinating and important questions.

What is most exciting about your work?
To be able to determine how molecules interact with each other, what their structures look like, and to put that knowledge in the context of the inner workings of a cell.

What attracted you to the NIH IRP?
NIH is the perfect place to develop new techniques. There are many groups on campus with technical expertise; there's a huge potential for collaborations to apply new tools to important biological problems.

Have you made any significant findings?
We developed a method to deconvolute diffusion out of sedimentation velocity data to gain more information about how molecules interact.

What's hot in your field right now?
Nanoparticles and photo-switchable molecules.

Complete this sentence: If I had more time I would…
Finish some overdue projects, write a book, and travel more.

What about you might be surprising?
A long time ago I used to play the tuba.

LASKER CLINICAL RESEARCH SCHOLARS

REBECCA J. BROWN, M.D., M.H.SC.

Lasker Clinical Research Scholar, Diabetes, Endocrinology, and Obesity Branch, National Institute of Diabetes, Digestive, and Kidney Diseases

Education: Rice University, Houston, Texas (B.A. in chemistry, 1997); Mayo Medical School, Rochester, Minn. (M.D., 2002); Duke University, (M.H.S., 2010)

Training: Medical student, Laboratory of Brain and Cognition, NIMH (1999–2000); residency in pediatrics, Rainbow Babies and Children's Hospital, Cleveland, Ohio (2002–2005); clinical fellow in pediatric endocrinology, NICHD (2005–2008); senior fellow in clinical research, NIDDK (2008–2012)

Previous position: Assistant clinical investigator, NIDDK (2012–2015)

Research focus: Physiologic mechanisms by which leptin alters insulin resistance and energy metabolism both dependent on and independent of its effects on food intake.

What is most exciting about your work?
Being able to research important questions about physiology; making a difference in the lives of patients with rare disorders of extreme insulin resistance.

Have you made any significant findings?
That treatment with the hormone leptin, which regulates appetite, helps improve metabolic disease in patients with lipodystrophy and/or mutations of the insulin receptor.

What's the hardest lesson you've ever had to learn?
Clinical research is only possible if you can recruit and retain patients.

CHRISTIAN HINRICHS, M.D.

Lasker Clinical Research Scholar, Experimental Transplantation and Immunology Branch, National Cancer Institute

Education: University of Missouri–Kansas City, Kansas City, Mo. (combined 6-Year B.A./M.D. program, B.A. in biology, M.D. in 1996)

Training: Residency in general surgery, University of Missouri–Kansas City School of Medicine (1996–2001); fellowship in surgical oncology, Roswell Park Cancer Institute, Buffalo, N.Y. (2001–2003); fellowship in surgical oncology, NCI–Surgery Branch (2003–2005); fellowship in immunotherapy and tumor immunology, NCI–Surgery Branch (2005–2009); residency in internal medicine, The George Washington University School of Medicine and Health, Washington, D.C. (2009–2010); fellowship in medical oncology, NCI–Medical Oncology Branch (2010–2014)

Previous position: Assistant clinical investigator, NCI–Surgery Branch (2012–2015)

Research focus: Basic and clinical research to develop novel T-cell therapies to treat patients with cancer, including cancers caused by the human papillomavirus.

How did you get interested in your field?
I was impressed with adoptive T-cell therapy, but concerned with its side effects when the target antigen was shared by healthy tissues. So I became interested in cancers that express viral antigens that are ideal targets for T cells and absent from healthy tissue.

What is most exciting about your work?
In some patients we have seen complete regression of widespread metastatic cervical cancers after a single treatment with adoptive T-cell therapy.

(more online: http://irp.nih.gov/catalyst/v23i6/trans-nih-recruits)

BETH KOZEL, M.D., PH.D.

Lasker Clinical Research Scholar, National Heart, Lung, and Blood Institute

Education: Washington University in St. Louis (B.A. in biochemistry, 1996); Washington U. School of Med. (M.D., 2004; Ph.D. in cell biology and physiology, 2004)
Training: Residency in pediatrics, St. Louis Children's Hospital, St. Louis (2004–2007); fellowship in medical genetics, Washington University School of Medicine–St. Louis Children's Hospital (2007–2009)
Previous positions: Fellow-instructor, instructor, and assistant professor of pediatrics, Genetics and Genomic Medicine, Washington University (2009–2015)

Research focus: Understanding person-to-person variability in rare cardiovascular disorders such as Williams syndrome (WS).

How did you get interested in your field?
I got into my current field during my M.D. training when I took care of patients with alterations in the genes I studied.

Have you made any significant findings?
Thanks to the large database we compiled, we have made many observations about features of WS that had only been hinted at in case studies.

What's hot in your field right now?
The assessment of gene-by-gene and gene-by-environment interactions.

What's the hardest lesson you've ever had to learn?
Patience. Sometimes when you are pushing so hard, you can miss interesting details.

ARMIN RAZNAHAN, M.D., PH.D.

Lasker Clinical Research Scholar and Chief of the Developmental Neurogenomics Unit, Child Psychiatry Branch, National Institute of Mental Health

Education: King's College, University of London, London (M.D., 1997); Institute of Psychiatry, King's College, University of London (Ph.D., 2011)
Training: Several residencies and fellowships at hospitals in London (1997–2008); clinical research training fellow at NIMH and Institute of Psychiatry, King's College London (2008–2010); senior research fellow, NIMH (2010–2012)
Previous positions: Visiting scholar, Neurogenetics Program, University of California at Los Angeles (2012–2013); staff scientist (2012–2014) and assistant clinical investigator (2014–2015), Child Psychiatry Branch, NIMH

Research Focus: Using large-scale longitudinal neuroimaging datasets and genetics to understand the biology of childhood-onset neuropsychiatric disorders.

How did you become interested in science?
I've been fascinated by the brain since high school and connected with neurology and psychiatry during medical school.

What's hot in your field right now?
Using induced pluripotent stem cells to model brain diseases in vitro.

Complete this sentence: If I had more time I would …
Get a Ph.D. in computational biology.

What about you might be surprising?
I carry a deep love of electronic music from early 1990s Detroit, especially the works of Jeff Mills.

NATALIE D. SHAW, M.D.

Lasker Clinical Research Scholar, National Institute of Environmental Health Sciences

Education: Cornell University, Ithaca, N.Y. (B.S. in biological sciences, 2000); State University of New York at Buffalo School of Medicine, Buffalo, N.Y. (M.D., 2004); Harvard Medical School, Boston (M.M.Sc., 2011)
Training: Residency in pediatrics, Children's Hospital Pittsburgh, Pittsburgh (2004–2007); clinical fellowship in pediatric endocrinology, Children's Hospital Boston, Boston (2007–2010); research fellowship in reproductive endocrinology, Massachusetts General Hospital, Boston (2008–2015)
Previous positions: Assistant professor in pediatrics, Harvard Medical School (2013–2015); attending in pediatric endocrinology, Children's Hospital Boston (2010–2015); endocrine consultant, Newborn Medicine, Brigham and Women's Hospital, Boston (2010–2015)

Research Focus: Determining the physiologic and pathophysiologic underpinnings of irregular menstrual cycles in adolescent girls and identify those at risk for future hormonal and metabolic complications.

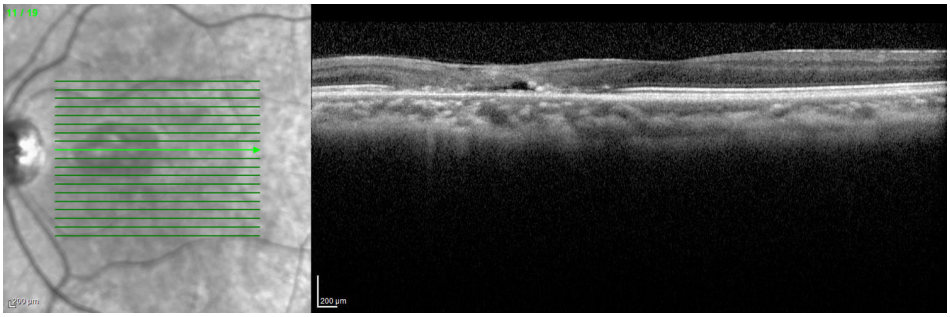
Have you made any significant findings?
We found that during puberty, hormone pulses that occur during the night are most likely to occur during deep sleep, suggesting that there may be crosstalk between the sleep and reproductive centers of the brain.

What's hot in your field right now?
The genetic contributions to reproductive milestones (menarche, menopause).

Ebola's Ocular Impact

NEI Team in Liberia Investigates

BY KATHRYN DEMOTT, NEI



RACHEL BISHOP, NEI

Researchers can get a much closer look at an image of potential retinal abnormality taken by slit lamp (left) by zooming in to look at the retinal layers with optical coherence tomography. These detailed images will help document changes to the eye over time.

After the 2014 Ebola outbreak in West Africa that took the lives of more than 11,200 people in the region, the National Eye Institute (NEI) deployed a team of clinicians and technical experts to Monrovia, Liberia, to investigate the long-term effects of the Ebola virus on the eye.

NEI's investigation is part of a larger study called PREVAIL III (Partnership for Research on Ebola Virus in Liberia) aimed at understanding the long-term health implications of Ebola virus disease among people who survived acute infection with the virus. Many of the survivors report a variety of ailments from headaches and tinnitus to joint and muscle pain, eye fatigue, and blurry vision.

Although physicians have some understanding about how to manage the infection during the acute phase, their strategies are experimental, and much is still unknown about the natural history of Ebola virus, including how it behaves in the eye and its long-term effects on ocular health and vision, said **Rachel Bishop**, chief of NEI's Consult Services Section and part of the NIH team working in Liberia. She recently coauthored a Viewpoint essay on Ebola and the eye that was published online first in *JAMA Ophthalmology* (*JAMA Ophthalmol* DOI:10.1001/jamaophthalmol.2015.2400).

Ebola virus lingers in the eye after a person has recovered from the acute illness and the blood is virus-free, a fact that Bishop emphasizes does not put other people at risk of becoming infected because the virus is inside the eye, not on the surface. Nor is there any evidence that live virus is present in survivors' tears. But transmission associated with the eye could be a potential concern in the future if eye surgery should be needed.

Based on reports from the 1990s, scientists anticipated that people who survived the latest Ebola epidemic would develop uveitis, an inflammatory eye disease. However, "at this point we don't know the extent of the effect of Ebola on the eye," said Bishop. "We've seen changes to nearly every part of the eye, and some survivors are having vision problems such as difficulty focusing and eye fatigue, the causes of which remain elusive." Some Ebola survivors show signs of cognitive changes after the infection, which could also contribute to vision difficulties, she added.

The National Institute of Allergy and Infectious Diseases sponsors PREVAIL III in partnership with the Liberian Ministry of Health. The study will be conducted at multiple sites in Liberia. The plan is to enroll up to 7,500 people: 1,500 survivors and up to 6,000 of their close contacts to serve as a control group. The study will help determine whether survivors develop immunity from future Ebola infections, and it will assess the risk of transmitting the virus to close contacts and sexual partners. In addition to the eye, the virus persists in the testes, and semen can carry live virus months after recovery and clearance of the infection from the blood.

A floor of the John F. Kennedy Medical Center in Monrovia was renovated to establish medical facilities for PREVAIL III. Along with Allen Eghrari, from the Johns Hopkins University Wilmer Eye Institute (Baltimore), the NEI team oversaw the design of an eye clinic, which is outfitted with state-of-the-art diagnostic equipment that allows the investigators to document changes in the eye. The team will travel back to Liberia periodically and is assisted by a local eye-care team that includes nurses, technicians, and administrative support staff. Liberian ophthalmologists provide follow-up care for participants needing treatment.

"Despite the tragedy that the Liberians have endured, you get a sense of positive energy and liveliness, so it's actually a happy place to work," said Bishop. "It's a true collaboration." ●

See more photos online at http://irp.nih.gov/catalyst/v23i6/catalyst/v23i6/ebola-s-ocular-impact.

FEDERAL BENEFITS OPEN SEASON 2016

Monday, Nov. 9 to Monday, Dec. 14, 2015
NIH Federal Benefits Open Season Fair: Thurs., Nov. 19; 10:00 a.m.–2:00 p.m.
Natcher Conference Center (Building 45), Atrium Level

In the 2016 Federal Benefits Open Season, the following programs will be participating: 1) Federal Employees Health Benefits (FEHB); 2) Flexible Spending Accounts (FSAs); and 3) Federal Employees Dental and Vision Insurance Program (FEDVIP). For more information including details about the new enrollment type Self Plus One, visit https://hr.od.nih.gov/benefits/change/openseason/. At the fair, representatives from the various benefit programs will be participating. For additional information or for questions, e-mail AskBPLB@od.nih.gov or call the Benefits Office at 301-496-2404.

MURRAY TO PRESENT LATEST GLOBAL BURDEN OF DISEASE FINDINGS

Wednesday, November 18; 11:00 a.m.
Masur Auditorium (Building 10)
For more information, visit: http://bit.ly/MurrayLecture2015

The Fogarty International Center will host a presentation by Christopher J.L. Murray, who leads the Global Burden of Disease research project, the largest and most comprehensive effort to date to measure and visualize health trends worldwide. In his talk, "New Insights from the Global Burden of Disease 2013 Study," Murray will discuss the latest findings from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), focusing on four papers recently published in *The Lancet*. Key points are related to child and adult mortality; causes of death; communicable, maternal, neonatal, and nutritional disorders; noncommunicable diseases; injuries and risk factors.

Read more announcements online at http://irp.nih.gov/catalyst/v23i6/announcements.

OFFICE OF DIETARY SUPPLEMENTS (ODS) RESEARCH SCHOLARS SYMPOSIUM

Monday, Nov. 30, 2015; 8:30 a.m.–1:00 p.m.
Room 640, Porter Building (Building 35)

Don't miss the first annual ODS Research Scholars Symposium featuring research presentations from the first cohort of scholars. For information about the scholars program and how to apply, visit https://ods.od.nih.gov/Research/Scholars.aspx.

DEMYSTIFYING MEDICINE 2016

Tuesdays, Jan. 5–May 10; 4:00–6:00 p.m.
Ground floor auditorium, Building 50
To sign up and for more information, go to https://demystifyingmedicine.od.nih.gov

The NIH- and FAES-sponsored course entitled "Demystifying Medicine," in its 12th year, is designed to excite the interest of Ph.D. and M.D. students, fellows, researchers, and others in bridging the gap between amazing advances in basic science and the challenges of clinical disease. There are no formal requirements to attend as many of the weekly sessions as desired. The format involves a translational physician, a basic scientist, and usually a live patient who puts a human face on the disease.

January 5: "The Age of Insight: The Quest to Understand the Unconscious in Art, Mind and Brain from Vienna 1900 to the Present" (Eric R. Kandel, Columbia University)

January 12: "Ebola, MERS and Likelihood of More Epidemics" (Anthony Fauci, NIAID); "Evolutionary Dynamics and Zoonotic and Cross-species Transmission of Emerging Viruses" (Vincent Munster, NIAID)

January 19: "The Future of Medicine: Personalized, Precision and Other" (Eric Green, NHGRI); "The Future of Medicine: Intramural Research Plans" (Michael Gottesman, OD)

January 26: How Long Can and Should We Live?" (Luigi Ferruci, NIA); "What Centenarians Teach Us about Aging" (Nir Barzilai, Albert Einstein College of Medicine)

For the full schedule, check the course website or the Announcements section of the the *NIH Catalyst* online.

THE INFLAMMATORY DISEASE INTEREST GROUP (IDIG) SEMINAR SERIES

Every other Tuesday, 12:00–1:30 p.m.
Lipsett Amphitheater (Building 10)
To join the LISTSERV (INFLAM-DIS-L), visit https://list.nih.gov/cgi-bin/wa.exe?SUBED1=INFLAM-DIS-L&A=1
For more information: contact Thomas A. Wynn at twynn@niaid.nih.gov

November 10: "Innate Lymphoid Cells in Smoking-induced Lung Inflammation" (Alison Humble, MedImmune)

November 24: "Inflammation of Small Blood Vessels: Emerging Concepts from the Studies of Rare Genetic Diseases" (Manfred Boehm, NHLBI)

December 8: "Small Molecules in the Resolution of Acute Inflammation" (Charles Serhan, Harvard)

January 5: "Myeloid Cells in Virus-Induced Neuroinflammation" (Dorian McGavern, NINDS)

January 19: "Periodontitis: A Microbial-Driven Inflammatory Disease" (Niki Moutsopoulos, NIDCR)

February 2: "Role of Inflammation in Cardiovascular and Metabolic Diseases" (Nehal Mehta, NHLBI)

February 16: "Low Density Lipoproteins, DCs, and Treatment of Allergic Airway Inflammation" (Stew Levine, NHLBI)

March 1: "Immune Mechanisms of Synapse Loss in Health and Disease" (Beth Stevens, Harvard)

March 22: "Chemokines and Chemokine Receptors in IL-17A Mediated Inflammation" (Josh Farber, NIAID)

Save the date for the first IDIG mini symposium on May 2, 2016, in Lipsett Auditorium.

WALS

Most Wednesdays, 3:00–4:00 p.m.
For schedule, visit: https://oir.nih.gov/wals

The popular Wednesday Afternoon Lecture Series (WALS) features presentations from internationally prominent scientists. Check the website for details or watch for the NIH-wide messages that are sent weekly. ●

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CATALYTIC REACTIONS?

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: 301-402-4303; or mail: *The NIH Catalyst*, Building 1, Room 333.

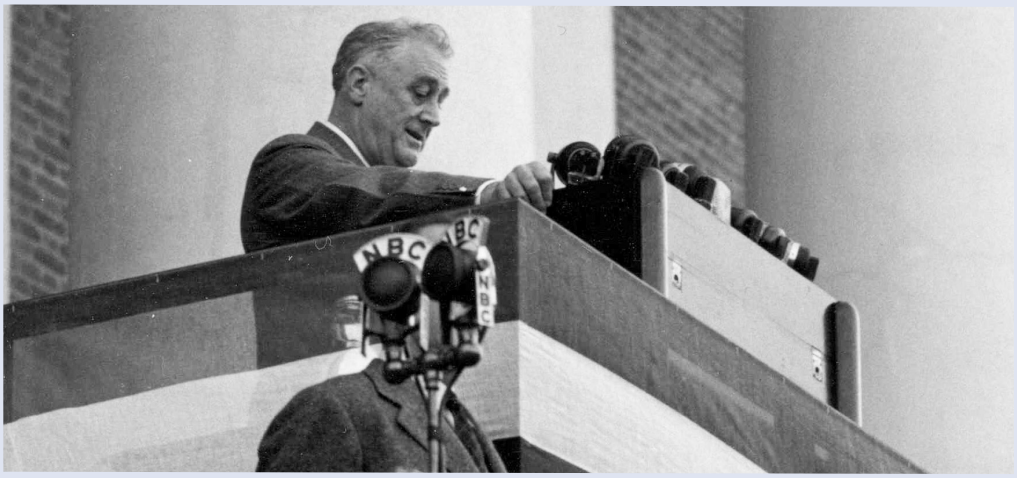
Also, we welcome "letters to the editor" for publication and your reactions to anything on the *Catalyst* pages.

READ THE COLOR EDITION OF THIS ISSUE (WITH MORE ARTICLES, AND EXPANDED VERSIONS OF THE ONES IN THIS ISSUE) ONLINE AT

http://irp.nih.gov/catalyst/v23i6

FROM THE ANNALS OF NIH HISTORY

75 Years Ago: President Franklin Roosevelt at NIH



COURTESY OF THE NATIONAL LIBRARY OF MEDICINE

The first president to visit NIH in Bethesda was the one responsible for its construction there—Franklin D. Roosevelt. On October 31, 1940—75 years ago this fall—he dedicated the campus, speaking on the patio of Building 1. In anticipation of the war to come, he said, "We cannot be a strong nation unless we are a healthy nation. And so we must recruit not only men and materials but also knowledge and science in the service of national strength. That is what we are doing here." But he also made the point that the highest calling of NIH staff and volunteers is to "save life and not destroy it." —*Michele Lyons, Office of NIH History*

Links to Roosevelt's speech (transcript, audio, and video): http://1.usa.gov/1GNxQAI.

The NIH Catalyst is published bimonthly for and by the intramural scientists at NIH.

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