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'POISED AT AN EXCITING MOMENT'

New CC Authority, Grant Disparity, Zika Top ACD Agenda

BY CARLA GARNETT

Crucial topics at home and abroad headlined the most recent meeting of the advisory committee to the NIH director (ACD).

At NIH home base, the Clinical Center's leadership began to undergo some of its first significant restructuring since opening in 1953, in response to recommendations by the ACD-appointed Red Team [see sidebar 1].

In the extramural community, persistent disparities in funding outcomes for African-American grant applicants will be studied further following new analysis by NIH's Office of Scientific Workforce Diversity [see sidebar 2].

At a June 9 meeting of the advisory committee to the NIH director, Dr. Hannah Valantine gives an update on disparity in grant review.

Globally, the Zika outbreak has spread to Puerto Rico with no signs of slowing. Newly confirmed facts about the virus's impact on fetuses, newborns and pregnant women require immediate and comprehensive research, according to updates by leaders of NIAID and NICHD [see sidebar 3].

These issues, reports on the Cancer Moonshot and Big Data to Knowledge and more packed the 1½-day ACD agenda June 9-10.

Hopeful Signs on the Funding Front

As is customary, NIH director Dr. Francis Collins began the meeting with a broad view of current events and what's happened since the group last gathered in December. He welcomed new ACD members Dr. Geoffrey Ginsburg of Duke University and Dr. Linda

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Grantees submit images to online site, p. 12.

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READYING FOR SLINGS, ARROWS

Davidson Lectures on Benefits of Meditation

BY ELLEN O'DONNELL

Dr. Richard Davidson

We undergo many kinds of training in life—career, physical fitness, sports, artistic pursuits. Dr. Richard Davidson asks, why not consider training in a life skill that, the evidence suggests, could benefit our health and well-being, and in turn our wider communities and the world?

Davidson, an NCCIH grantee and an internationally known researcher on

SEE **MEDITATION**, PAGE 8

Much Biomedical Research Is Wasted, Argues Bracken

BY ERIC BOCK

Dr. Michael Bracken

As much as 87.5 percent of biomedical research may be wasteful and inefficient. So argued Dr. Michael Bracken at a recent Wednesday Afternoon Lecture in Masur Auditorium.

"Waste is more than just a waste of money and resources," said Bracken, the Susan Dwight Bliss professor of epidemiology at Yale University School of Public Health. "It can actually be harmful to people's health."

SEE **WASTE**, PAGE 4

July 14

Graduate & Professional School Fair

The NIH Graduate & Professional School Fair will be held on Thursday, July 14 from 8:45 a.m. to 3:30 p.m. at the Natcher Conference Center. The fair provides an opportunity for NIH summer interns and postbacs, as well as other college students in the D.C. area, to prepare for the next step in their careers. More than 150 outstanding colleges and universities from across the U.S. will send representatives from graduate schools, medical and dental schools, schools of public health and other biomedically relevant programs to the fair in the hopes of recruiting NIH trainees. Workshops will be held on getting to graduate and professional school, M.D./Ph.D. programs, interviewing, careers in public health, computational biology/bioinformatics, psychology and dentistry. Exhibits will be open 9:45 a.m.-2:15 p.m. For details, visit https://www.training.nih.gov/gp_fair.

Five Honored in Safety Photo Contest

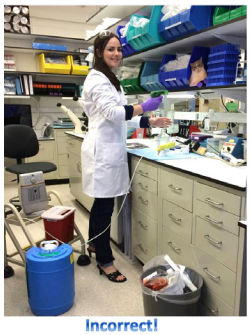
Five NIH'ers—including one who has been honored for each of the 5 years the Office of Research Services' Division of Occupational Health and Safety has held its In-Focus! Safe Workplaces for All photo contest—were recently recognized for creative images that speak safety to viewers.

In spite of a record number of entries this year, first place was shared by ORF industrial chemist Roger Weidner's "Hazmat" (below) and "Find the Difference," (bottom) a collaboration between NCI's Dr. Amanda Vandeveer and NCI retiree Diane Poole that challenged viewers to detect subtle differences between two similar images.

Taking second place was "Carpenter Shop" by Bryan Kercher, an ORF engineering technician at Rocky Mountain Laboratories in Hamilton, Mont.

Finishing third, and in his fifth year as an honoree, was NCI's Dr. Dale Lewis, whose image was titled "Laser Microscope."

ORS director Dr. Alfred Johnson presented the awards recently at the quarterly meeting of the IC safety and health chairpersons' committee.



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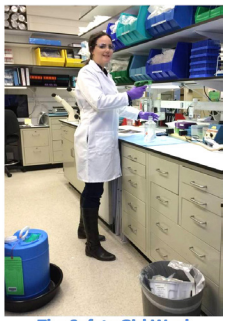


The Safety Girl Way!

"Carpenter Shop" (r) and "Laser Microscope" (below)

NIAID, Saudi Arabia Health Ministry Sign MOU

NIAID director Dr. Anthony Fauci (seated, r) and NIAID Associate Director for International Research Affairs Gray Handley (standing, r) recently met with Dr. Ahmed Alaskar (seated, l), executive director of the King Abdullah International Medical Research Center (KAIMRC), and Dr. Abdelali Haoudi, KAIMRC head of strategy and research development. During the May 13 meeting at NIH, participants signed a memorandum of understanding between NIAID and KAIMRC of the Ministry of National Guard-Health Affairs of the Kingdom of Saudi Arabia to promote research and training in emerging infectious diseases.

Volkow Receives Honorary Doctorate

On June 6, NIDA director Dr. Nora Volkow was presented with an honorary doctorate of science from Concordia University in Montreal. She received the honor in recognition of her accomplishments in the study of drug addiction. At the convocation ceremony, Volkow addressed graduates and their families about the prescription opioid overdose epidemic. Shown above are (from l) Dr. Alan Shepard, president and vice chancellor of Concordia University; Volkow; David Johnston, governor general of Canada, who also received an honorary doctorate; and Jonathan Wener, chancellor of Concordia University.

Much-Anticipated Child Care Center Construction Under Way

The rendering of the NWCCC above depicts the finished result of the construction ongoing in photos below. The long-awaited project is scheduled for completion next spring.

Construction of the long-awaited Northwest Child Care Center (NWCCC) continues to move forward after a fall 2015 groundbreaking. The project is set for completion in spring 2017, when the Office of Research Services child care team, led by Tonya Lee, will start facility operations and receive the first children.

The team currently operates 3 other centers, both on and off campus. The new facility will replace the smallest of these centers while also increasing overall capacity by approximately 125 children. Upon completion, the NWCCC will house 170 children between the ages of 6 weeks to 5 years, as well as 40 staff members.

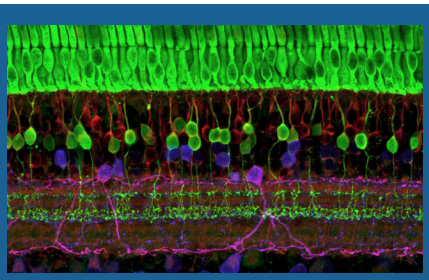
The project has been in the works since 2008. During a long planning period, the building was slated for several different lots on campus before the current site was chosen at the corner of Center and Convent Drives. This location provides convenient access to parents who work in the Clinical Center and is adjacent to both the NIH Fire Station and the Children's Inn.

Design elements include a parking lot with pervious pavement, a green roof, LED lighting fixtures and water-efficient toilets and sinks. It is tracking for a LEED certification from the U.S. Green Building Council. The playground will have many natural play structures and products designed to encourage creative play while being sensitive to ecological concerns.

The most prominent exterior design feature is a tall bell tower, whose operable bell can be rung by children on special days like birthdays. There will also be a wide sidewalk with benches and landscaping features in front of the facility that will allow space for outdoor play as well as additional outdoor seating for the NIH community.

Early construction efforts have focused on earthwork, stormwater structures and a large retaining wall. Workers are currently completing the building foundation in preparation for steel erection and the installation of the exterior "skin"—brick, windows and roof. Over the summer, construction will transition to interior work.

Another project in support of the NWCCC has also started—construction of a utility tunnel to serve this part of campus. The effort will restrict the roadway at the intersection of Center Dr. and Convent Dr. to two bi-directional lanes for several months.



ON THE COVER: *Layers of nerve cells in the retina. Top (green) layer is made up of cells called photoreceptors that convert light into electrical signals to relay to the brain.*

IMAGE: WEI LI, NATIONAL EYE INSTITUTE

The NIH Record

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Editor: Rich McManus
Rich.McManus@nih.gov

Associate Editor: Carla Garnett
Carla.Garnett@nih.gov

Staff Writers:
Eric Bock • *Eric.Bock@nih.gov*
Dana Talesnik • *Dana.Talesnik@nih.gov*

Subscribe via email: **listserv@list.nih.gov**
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Waste

CONTINUED FROM PAGE 1

For every 100 research projects, only half lead to published findings. Of those 50, half have significant design flaws, making their results unreliable. And of those 25, half are redundant or unnecessary because of previous work. "That's how you get to 12.5 percent," he said.

Researchers who publish novel findings are more likely to have produced exaggerated results or drawn incorrect conclusions. Many times, these early or "first" studies are based on limited evidence from small studies. When the experiments are reproduced in larger studies, Bracken said, the predictive value of the finding may decrease up to 90 percent of the time.

While replicating studies is necessary, there is sometimes waste in unnecessarily repeating studies. Repeating studies when there is already evidence suggesting a treatment is effective, for example, "means patients are being submitted to placebo when they can receive active therapy," he noted.

Once several large-scale studies show a treatment is effective, he said, "you need an incredible amount of evidence to switch an estimated treatment effect from being protective to being even neutral, let alone a risk."

To reduce wasteful duplication, Bracken suggested researchers conduct systematic reviews for their research protocols. This is a type of literature review that involves systematically collecting and analyzing all of the relevant research papers. The goal is to summarize all the best currently available evidence. He advised scientists to conduct the reviews concurrently as research accumulates. Then, they would see if new studies are necessary in real-time. In human studies, he said, there are presently only some 408 systematic reviews published for every 10,000 publications.

Preclinical research, particularly in animal studies, is especially inefficient. Bracken said, for example, one of the cornerstones in clinical research—blinding investigators—is widely ignored in animal studies. Existing systematic reviews of animal studies show that very few studies are blinded or randomized. He believes animal study methodology is 40 years behind human clinical study design.

To reduce wasteful duplication, Bracken suggested researchers conduct systematic reviews.

PHOTOS: BILL BRANSON

"There is never any justification for the use of animals or humans in poorly designed studies," he said.

Bracken said there are strategies researchers can use to reduce the element of chance when designing studies. They can, for example, design larger studies based on more stringent statistical tests of the hypothesis. He says that the traditional 0.05 "p-value" has lost its ability to discriminate important research findings, especially when numerous comparisons are being made, and can produce results that are irreproducible and in some examples actually harmful to the public's health.

P-values are used to determine the strength of an association. The smaller the p-value, the stronger the evidence, while the larger the p-value, the weaker the evidence. However, a p-value less than 5 percent "does not by any means indicate that the association is not a chance finding."

Researchers should also be aware that many sources of bias are being underestimated in drawing conclusions from biomedical research in both preclinical and clinical research. Bracken believes scientists can substantially reduce bias if they are aware of it. "Reducing bias is usually not an issue of cost. It's an issue of understanding where bias may come from," he said.

Bracken applauded NIH for increasing its efforts to train young scientists on how to design and conduct experiments based on best practices.

Bracken believes many scientists are incorporating these kinds of changes into their research, but thinks there is still room for considerable improvement.

NIH Mentoree Directs Brain Imaging Center in Wales

Dr. Derek Jones, a scientist mentored at NIH, recently became director of the Cardiff University Brain Research Imaging Centre (CUBRIC) in Wales.

The centre, located in the capital of Wales, opened in March and was formally dedicated on June 7 by the Queen of England, and her husband, Prince Philip, the Duke of Edinburgh. NICHD scientists Dr. Carlo Pierpaoli and Dr. Peter Basser were invited to attend the opening and give inaugural seminars to help mark the occasion.

Said Basser, "This was particularly satisfying for me because Derek received his postdoctoral training in my laboratory almost 15 years ago and has succeeded spectacularly in his scientific career."

Besides containing state-of-the-art instruments for performing magnetoencephalography, electroencephalography, transcranial magnetic stimulation, as well as clinical MRI scanners, CUBRIC's crown jewel is its new human "connectome" MRI scanner, the only other one of which is housed at Massachusetts General Hospital's Martinos Center in Boston.

The "connectome," developed as part of NIH's Human Connectome Project, is designed to perform "microstructure imaging" studies, which

Dr. Derek Jones (c) is flanked by his former postdoctoral mentor Dr. Peter Basser (l) and Dr. Carlo Pierpaoli, both of NICHD.

are intended to measure useful histological features that cannot be obtained with conventional clinical MRI scanners.

"Microstructure imaging provides new information about axon size, shape and orientation within white matter pathways, which are of interest to neuroradiologists, neuropathologists and neuroscientists alike, but is obtained using noninvasive MRI methods," said Basser.

Since about 2002, Basser and his lab have been instrumental in developing the field of microstructure imaging. He said it is particularly gratifying for him to see this research activity flourishing and the new MRI scanner in the hands of such a capable investigator.

A Dozen 'Green Champions' at NIH

NIH took 12 citations at the recent 2015 HHS Green Champion Awards. NIH nominated a total of 13 projects and a dozen were recognized by HHS, including 7 group awards, 1 individual award and 4 honorable mentions. Winners were celebrated June 30 at a ceremony in Wilson Hall, Bldg. 1.

In the environmental stewardship category:

• The NIH Central Utility Team was honored for realizing annual savings of more than $23.7 million in energy, water, oil and chilled water usage, electrical consumption and Nox emissions.

• The Burden's Creek Site Cleanup team at NIEHS was recognized for recycling 65 tons of metal, 120 tons of concrete, 200 tons of construction and demolition debris, 720 fluorescent light bulbs, 12 mercury thermostats, 12 smoke detectors and recapturing 63 pounds of Freon.

• Capt. Edward Pfister, the department's chief environmental officer, won an individual award for developing the HHS Go Green Guide and fostering the establishment of green teams throughout the agency. In addition, he coordinated greening efforts in the Hubert H. Humphrey Bldg.

• The Office of the Director Green Team working group was cited for publishing a guide for green event planning. It focuses on environmentally friendly practices to implement while planning meetings, conferences and other events.

In the sustainable acquisitions category, the NIH Supply Center's "NIH Go Green Supplies" efforts were recognized. They include provision of organic, non-toxic products and replacing more than 120 offerings with greener alternatives.

In the corporate responsibility category, the NIH Division of Environmental Protection's solid waste team and ecology services were honored for the "Go Green, Go Clean" initiative, which reduces contamination and raises awareness about waste disposal procedures.

In the water use efficiency category, the NIH blue water commission was cited for investigating sources of chilled water loss on campus. Many leaks and wasteful practices were discovered, repaired and discontinued. This resulted in an average savings of 1,472,000 gallons of water per month.

In the energy and fleet category, the Office of Research Facilities' Facilities Management Branch completed two projects on the NIEHS campus that resulted in a net energy savings of some 300,000 kwh and $18,000 annually as well as the recycling of approximately 300 tons of construction debris.

Winning honorable mention awards were: NIH Battery Recycling Program; RML Incinerator Upgrade Project; annual lab chemical waste management inspection team; and the personal property section and its electronic document repository.

'MOONSHOT'

Genomic Data Commons To Facilitate Data, Clinical Information Sharing

The Genomic Data Commons (GDC), a unified data system that promotes sharing of genomic and clinical data between researchers, launched June 6. An initiative of the National Cancer Institute, the GDC will be a core component of the National Cancer Moonshot and the President's Precision Medicine Initiative. It benefits from $70 million allocated to NCI to lead efforts in cancer genomics as part of PMI for Oncology. The GDC will centralize, standardize and make accessible data from large-scale NCI programs such as the Cancer Genome Atlas and its pediatric equivalent, Therapeutically Applicable Research to Generate Effective Treatments (TARGET).

Together, TCGA and TARGET represent some of the largest and most comprehensive cancer genomics datasets in the world, consisting of more than 2 petabytes of data (1 petabyte is equivalent to 223,000 DVDs filled to capacity with data). In addition, the GDC will accept submissions of cancer genomic and clinical data from researchers around the world who wish to share their data broadly. In so doing, researchers will be able to use the state-of-the-art analytic methods of the GDC, allowing them to compare their findings with other data in the GDC.

The NCI Genomic Data Commons is housed at the University of Chicago Kenwood Data Center.

PHOTO: UNIVERSITY OF CHICAGO

Data in the GDC, representing thousands of cancer patients and tumors, will be harmonized using standardized software algorithms so that they are accessible and broadly useful to any cancer researcher. The storage of raw genomic data in the GDC will also allow it to be reanalyzed as computational methods and genome annotations improve.

"With the GDC, NCI has made a major commitment to maintaining long-term storage of cancer genomic data and providing researchers with free access to these data," said NCI acting director Dr. Douglas Lowy. "Importantly, the explanatory power of data in the GDC will grow over time as data from more patients are included, and ultimately the GDC will accelerate our efforts in precision medicine."

The GDC is being built and managed by the University of Chicago Center for Data Intensive Science, in collaboration with the Ontario Institute for Cancer Research, all under an NCI contract with Leidos Biomedical Research, Frederick, Md.

"Of particular significance, the GDC will also house data from a number of newer NCI programs that will sequence the DNA of patients enrolled in NCI clinical trials," said Dr. Louis Staudt, co-chief of NCI's Lymphoid Malignancies Branch. "These datasets will lead to a much deeper understanding of which therapies are most effective for individual cancer patients. With each new addition, the GDC will evolve into a smarter, more comprehensive knowledge system that will foster important discoveries in cancer research and increase the success of cancer treatment for patients."

The hope is that the GDC will form the basis for a comprehensive knowledge system for cancer. GDC researchers will be able to integrate genetic and clinical data, such as cancer imaging and histological data, with information on the molecular profiles of tumors as well as treatment response.

Enjoying a light moment at the most recent ACD meeting are (from l) NIH principal deputy director Dr. Lawrence Tabak, NIH director Dr. Francis Collins and ACD members Dr. Russ Altman of Stanford University and Dr. Cori Bargmann of Rockefeller University.

PHOTOS: ERNIE BRANSON

ACD Meeting

CONTINUED FROM PAGE 1

Griffith of MIT. Collins also talked about recent NIH senior staff appointments and searches under way.

Representatives from NIH legislative and budget offices gave updates and forecasts as well. Attendees were encouraged to hear that another $2 billion increase in the NIH appropriation has been proposed—for the second year in a row—by the Senate for fiscal year 2017. Collins praised success of bipartisan efforts on NIH's behalf by Sen. Roy Blunt (R-MO) and Sen. Patty Murray (D-WA). The House of Representatives version was expected by the next week. A $1.9 billion emergency supplemental request for Zika is still pending.

Collins also summarized NIH's "shared efforts in global health research" with the Bill and Melinda Gates Foundation. Bill Gates visited NIH in April at the annual day-long meeting to discuss the joint enterprise. Among topics covered were the human papillomavirus vaccine efficacy trial, collaboration on HIV vaccines, cookstoves and environmental toxin reduction and vector-based interventions for malaria containment.

"If you look at the sources of funds, when you add NIH and the Gates Foundation together you have more than 50 percent of the total world investment in global health research," Collins noted.

PMI Proceeds Apace

Acknowledging the unprecedented speed with which the Precision Medicine Initiative Cohort Program is moving toward its first ambitious goals, Collins reiterated the program's core values: Cohort "participants are partners" not patients; the group "needs to reflect the rich diversity of America"; data sharing "has to be swift both to the researchers and to the participants, according to what they wish to know about themselves"; and privacy and security are being "built into every component and taken with the utmost seriousness."

★ ★ ★

"It's like the Athenian model of democracy, where there are no representatives," we're all at the table together.

–DR. RUSS ALTMAN

★ ★ ★

Hearing the guiding principles re-emphasized, ACD member Dr. Russ Altman enthused, "That's incredibly exciting. It's like the Athenian model of democracy, where there are no representatives," we're all at the table together.

"This notion of having the participants as partners means that when you're thinking about what the science is that you're going to do, that it has to be both kick-ass science and it has to build the relationship with the participants—and we're sort of more used to doing the kick-ass science," explained NIH deputy director for science, outreach and policy Dr. Kathy Hudson. "These two things are going to have

Recommendations by 'Red Team' Set in Motion

The Red Team, a working group assembled by the ACD to evaluate the hospital following a problem last year in the CC pharmaceutical development section, reported findings at a special ACD meeting in April.

"Our current structure—the way that we currently attempt to manage the Clinical Center—makes it very difficult to achieve our end result," said NIH principal deputy director Dr. Lawrence Tabak, giving context for the first major realignment of CC governance since the largest research hospital in the world opened.

Outlining three guiding themes—all with the overarching principle to "fortify a culture and practice of safety"—Tabak gave an update on progress NIH has made on the report's recommendations:

Dr. Richard Marchase, vice president for research at the University of Alabama at Birmingham, worked on the Red Team.

- A central Office of Research Support and Compliance was formed to set policy and standards and assure quality; Dr. Kathryn Zoon was appointed as its interim director.
- A CEO position was established with authority over all NIH staff using the hospital; a search committee to fill the post will be co-chaired by NIAID director Dr. Anthony Fauci and NIAMS director Dr. Stephen Katz.
- A clinical practice committee composed of senior clinical and lab experts is forming, to provide real-time input to leadership on patient care and safety.
- A new external hospital board will hold its first meeting in July.

"Science and safety must go hand in hand," Tabak emphasized. "There can't ever be tradeoffs between innovation and safety and compliance. Our collective goal will be to exceed—not just meet—all safety and compliance standards and become a leader in the discipline of safety science."

See the Red Team implementation slides at http://acd.od.nih.gov/presentations/062016_RedTeam.pdf.

New ACD members Dr. Linda Griffith of MIT and Dr. Geoffrey Ginsburg of Duke University engage in their first meeting.

to go hand in hand from the beginning, which in some cases means that the really satisfying science might come a little bit later, in order to make sure we're building the relationship, figuring out what people's preferences are, making sure that we don't do anything that threatens the trust that we so desperately hope to build."

The PMI cohort's first big component—the biobank—was launched, with $142 million over 5 years awarded to the Mayo Clinic to collect and store biospecimens. A PMI advisory panel and a central institutional review board with expertise in mHealth, bioinformatics, health disparities, epidemiology, genomics and other areas have also been established.

"We are trying to make PMI not just a great research project but also a motivator to fix a problem across the country in terms of electronic health records that are not as usable as people wish they were," Collins said.

By July all the pieces will be decided; the goal, by year's end, is to have 79,000 individuals enrolled.

"We are poised at an exciting moment," he said.

Video of ACD proceedings is online at https://videocast.nih.gov/summary.asp?Live=19275&bhcp=1.

NIBIB director Dr. Roderic Pettigrew (l) and CSR director Dr. Richard Nakamura (r) offer insights on the NIH grant review report.

Drilling Down on Grant Disparity

Diversity in the scientific workforce became a concern several years ago and rose on the ACD's agenda after release in 2011 of the NIH-commissioned Ginther study, which found that African-American/black (AA/B) applicants were less likely than whites to be awarded R01 grants from NIH during fiscal years 2000 to 2006.

An ACD-assigned working group on AA/B funding disparities followed up on Ginther, analyzing data from fiscal years 2010 to 2015.

AA/B submit fewer applications, fewer applications per AA/B applicant are submitted and fewer of their applications get discussed, AA/B applications are scored lower and fewer resubmissions come from that community. Cumulatively, the odds of an AA/B scientist being funded are 35 percent less than for a white scientist.

Summarizing key findings by a core team from that group, NIH chief officer for scientific workforce diversity Dr. Hannah Valantine said, "There is a disparity in every stage of the application from submissions to funding...This work needs to continue to be done and NIH needs to continue a vigilant eye on the issue."

Valantine's working group recommended several interventions to narrow the gap, including targeted mentoring/coaching on submissions. Also, the group initiated with the Center for Scientific Review an anonymized application study—a randomized controlled trial—to determine potential bias in peer review.

Collins said NIH has funded many programs over many decades to recruit more underrepresented minorities into science, and that success of past efforts has been difficult to gauge because "they were often not conducted in a rigorous way where you can tell what happened.

"We're not going to do it that way any more," he stressed. "We're determined...We will expand the things that are working and we will kill the ones that are not."

Valantine's ACD slides are online at http://acd.od.nih.gov/presentations/062016_Valantine.pdf.

On day 2 of ACD, NICHD acting director Dr. Catherine Spong teams with NIAID director Dr. Anthony Fauci to provide an update on the Zika outbreak.

Zika Virus Threat Grows

The Zika outbreak continues to spread—and its effects worsen—since the virus re-emerged last year in Latin America and the Caribbean, according to NIAID director Dr. Anthony Fauci, who teamed with NICHD acting director Dr. Catherine Spong to update day 2 of ACD on NIH's efforts to address the outbreak.

As of June, 48 countries/territories—39 in the Americas/Caribbean—have active Zika virus transmission. The virus itself is considered relatively mild and most infected individuals recover from it within days, Fauci explained. However, devastating Zika-associated birth defects, a potential link to Guillain-Barré syndrome, Zika's capability of being transmitted sexually and other as yet unknown health effects due to the infectious disease have escalated it as a top global research priority and health threat.

"The impact on pregnancy goes far beyond what we're seeing with microcephaly," Spong said. "Many gaps exist about what to expect in pregnancy. We need more data."

Several vaccine development trials are in various stages of being launched by NIAID with collaborating institutions. In addition, NIAID, NICHD and NIEHS have partnered on a Zika in Infants and Pregnancy (ZIP) trial of up to 10,000 participants to identify and document the virus's effects on pregnant women and their fetuses and infants.

Zika update slides are online at http://acd.od.nih.gov/presentations/062016_Fauci.pdf and http://acd.od.nih.gov/presentations/062016_Spong.pdf.

Meditation

CONTINUED FROM PAGE 1

meditation and other contemplative practices, reported findings from his laboratory at the 2016 Stephen E. Straus Distinguished Lecture in the Science of Complementary Therapies, "Change Your Brain by Transforming Your Mind." At the University of Wisconsin, he is the William James and Vilas professor of psychology and psychiatry, director of the Waisman Laboratory for Brain Imaging and Behavior and founder of the Center for Healthy Minds. NCCIH's annual lecture honors Straus, its founding director.

While most meditation practices originated in ancient religious and spiritual traditions, Davidson said, the reasons that people use them today have often changed: "People feel like they're overwhelmed and very stressed. They may have chronic pain. [They want] to quiet the soul, produce some modicum of equanimity. They may feel like their lives are not working and want some kind of other strategy to help them cope with life's slings and arrows."

Davidson recalled that in 1992, he was a faculty neuroscientist at Wisconsin and had established the university's first lab on emotion and the brain when he had a career- and life-changing encounter: he met the 14th Dalai Lama of Tibet; the two remain friends and colleagues to this day.

The Dalai Lama challenged Davidson, asking, "Why have you been using the tools of modern neuroscience just to study anxiety, stress, fear and depression? Why can't you use them to study kindness and compassion?" That question, Davidson said, was "a total wake-up call" and caused him to refocus his research, to do everything he could "to help place these positive qualities on the scientific map."

In the Straus Lecture poster session, NCCIH grantee Dr. Ather Ali (l) of Yale School of Medicine discusses his study on mindfulness interventions and chronic widespread pain in adolescents with Davidson and NCCIH director Dr. Josephine Briggs.

PHOTOS: LISA HELFERT

In his lecture, Davidson identified "four constituents of well-being" that have been neuroscientifically investigated, have shown plasticity (i.e., they can change) and appear to be affected by meditation training. The first is resilience, "the reactivity and rapidity of recovery following negative events." The second is positive outlook, "the capacity to savor positive emotion and have it endure." The third is the ability to focus and sustain attention, which is the opposite of "mind wandering," and the fourth is generosity: "There's now a growing neuroscientific literature suggesting that acts of generosity promote well-being and activate the circuitry in the brain that has been associated with well-being."

In one pioneering study, Davidson and the Dalai Lama recruited a group of monks and other long-term practitioners in the Tibetan Buddhist tradition from India and Nepal who had practiced compassion meditation for thousands of hours. They were flown to Davidson's lab in Wisconsin and studied, both in meditation and resting states, with scalp electroencephalography (EEG), and later fMRI. EEG showed, in meditation only, sustained, high-amplitude gamma oscillations and phase-synchrony in their brains—phenomena not seen in controls (people who had just learned meditation a week before). These oscillations could be induced and increased by meditation, Davidson's team concluded, and are a key marker of the brain's ability to undergo short-term and long-term changes.

Another study, in healthy adults, found that 8 weeks of training in mindfulness-based stress reduction appeared to have positive effects on immune function (seen as higher levels of antibody to a flu vaccine) and to have measurable brain effects. A third study found that, after viewing pictures of human suffering, the brains of long-term meditators recovered better than those of participants who were new to meditation or were non-meditators.

It's not necessary to become a monk, or even practice meditation for a long time, to see benefits, Davidson said. For example, his team recruited a group of healthy college students who were instructed to recite a compassion meditation silently for 2 weeks, 30 minutes per day—"May you be free from

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"Why have you been using the tools of modern neuroscience just to study anxiety, stress, fear and depression? Why can't you use them to study kindness and compassion?"

–THE DALAI LAMA

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Davidson said evidence also shows other benefits from meditation, such as regulation of emotion, better-focused attention, more "pro-social" skills like empathy, help in managing pain and changes in peripheral biology.

suffering. May you have joy and ease." Every time they did this, they were to think of a series of people—first a loved one, then themselves, then someone they saw regularly but didn't know well, a "difficult" person and finally all beings. The control group was assigned cognitive reappraisal (a technique for interpreting upsetting stimuli differently). Participants were randomly assigned to either group.

When tested in an economic game involving redistribution of funds, the meditation group showed more altruistic behavior than the controls and, via fMRI, showed more changes in brain activity when viewing images of suffering.

The evidence also shows other benefits from meditation, Davidson said, such as regulation of emotion, better-focused attention, more "pro-social" skills like empathy, help in managing pain and changes in peripheral biology (biology below the neck)—e.g., down-regulation of genes implicated in inflammation. He also discussed methodology in meditation research, including the importance of rigor, use of adequate comparison groups and employing behavioral measures when appropriate rather than self-reporting alone.

If people pursue this kind of mental training, more happiness and an inner transformation are entirely possible, Davidson said, thanks to the adaptability of our brains.

The lecture is available at https://videocast.nih.gov/Summary.asp?Live=18700&bhcp=1.

Dr. Emily Chew of the National Eye Institute examines a patient's eyes.

PHOTO: NEI

Eye Study Underscores Long-Term Benefits of Diabetes Control

People with type 2 diabetes who intensively controlled their blood sugar level during the landmark Action to Control Cardiovascular Risk in Diabetes (ACCORD) Trial Eye Study were found to have cut their risk of diabetic retinopathy in half in a follow-up analysis conducted 4 years after stopping intensive therapy. Investigators who led the ACCORD Follow-on Eye Study (ACCORDION) announced the results June 13 at the American Diabetes Association annual meeting. The study was supported by NEI.

"This study sends a powerful message to people with type 2 diabetes who worry about losing vision," said Dr. Emily Chew, deputy director of NEI's Division of Epidemiology and Clinical Applications and lead author of the study report, published online in *Diabetes Care*. "Well-controlled glycemia, or blood sugar level, has a positive, measurable and lasting effect on eye health."

A complication of diabetes, diabetic retinopathy can damage tiny blood vessels in the retina—the light-sensitive tissue in the back of the eye.

Results from ACCORDION suggest that lowering blood glucose can reduce progression of retinal disease relatively late in the course of type 2 diabetes and that even short-term changes in glucose have an effect.

Proper maternal folate levels during pregnancy may protect children from future obesity, an NIH-funded study finds.

Proper Maternal Folate Level May Reduce Child Obesity Risk

Proper maternal folate levels during pregnancy may protect children from a future risk of obesity, especially those born to obese mothers, according to a study led by researchers funded by NICHD. The study was published online in *JAMA Pediatrics*.

"Maternal nutrition during pregnancy can have long-lasting effects on child health, as well as the health of a mother after pregnancy," said the study's principal investigator, Dr. Xiaobin Wang of Johns Hopkins University. "Our results suggest that adequate maternal folate may mitigate the effect of a mother's obesity on her child's health."

Obesity in children and adults is a serious health issue in the United States, contributing to such conditions as heart disease, stroke and type 2 diabetes. During pregnancy, maternal obesity also increases the risk for a range of pregnancy complications such as stillbirth, birth defects and preterm birth. Furthermore, babies born to obese mothers have long-term health risks, including a higher risk of obesity in childhood.

Folate, an essential B vitamin, reduces the fetus' risk for neural tube defects, which are malformations affecting the brain, spine and spinal cord. The Centers for Disease Control and Prevention recommends that women of childbearing age take 400 micrograms of folic acid (a synthetic form of folate) daily to reduce their children's risk for neural tube defects.

"Folate is well-known for preventing brain and spinal cord defects in a developing fetus, but its effects on metabolic disorders, such as diabetes and obesity, is less understood," said Dr. Cuilin Zhang, NICHD senior investigator and a study co-author. "This study uncovers what may be an additional benefit of folate and identifies a possible strategy for reducing childhood obesity."

Endocannabinoids May Play Key Role in Habit Formation

Daily activities involve frequent transitions between habitual behaviors, such as driving home, and goal-directed behaviors, such as driving to a new destination on unfamiliar roads. An inability to shift between habitual and non-habitual behaviors has been implicated in obsessive-compulsive disorder, addiction and other disorders characterized by impaired decision-making. In a new NIAAA-funded study conducted with mice, scientists report that endocannabinoids, natural messengers in the body that are chemically similar to the active compound in marijuana, play an important role in how the brain controls this fundamental process.

"The new findings point to a previously unknown mechanism in the brain that regulates the transition between goal-directed and habitual behaviors," said Dr. George Koob, NIAAA director. "As we learn more about this mechanism, it could reveal how the brain forms habits and, more specifically, how both endocannabinoids and cannabinoid abuse can influence habitual behavior pathophysiology."

A report of the findings is now online in the journal *Neuron*.

Holland Named NIAID Scientific Director

Dr. Steven M. Holland has been appointed director of the NIAID Division of Intramural Research, succeeding Dr. Kathy Zoon. Holland has served NIAID as chief of the Laboratory of Clinical Infectious Diseases since 2004 and as NIH deputy director for intramural clinical research since 2011. His research areas of special interest have included Job's syndrome (autosomal dominant STAT3 deficiency) and the genetic conditions predisposing people to mycobacterial infections.

More recently, Holland has been interested in genetic conditions associated with severe coccidioidomycosis and acquired forms of anticytokine autoimmunity predisposing to opportunistic infections. He is the author of more than 500 publications and has been named an NIH distinguished investigator.

Holland has received the American College of Physicians Award for Science, the Boyle Scientific Achievement Award of the Immune Deficiency Foundation, the American Society for Microbiology Abbott Award, the Erwin Neter Award of the Association of Medical Laboratory Immunologists and the NIH Distinguished Clinical Teacher Award, among other honors.

Holland received his B.A. from St. John's College in Annapolis in 1979 and his M.D. from Johns Hopkins University School of Medicine in 1983. He remained at Johns Hopkins for his internal medicine residency, chief residency and fellowship in infectious diseases. During that time he worked with Dr. Thomas Quinn on chlamydia diagnosis and pathogenesis. Holland came to NIAID in 1989 as a National Research Council fellow in Dr. Sundararajan Venkatesan's section in the Laboratory of Molecular Microbiology, working on rev-mediated transcriptional regulation of HIV.

Dr. Steven Holland

Dr. Lawrence Boerboom and Dr. Rochelle Long

Shifting his research to the host side, with a focus on phagocyte defects and their associated infections, Holland joined Dr. John Gallin's section in the Laboratory of Host Defenses (LHD) in 1991. Holland's work in LHD centered on the pathogenesis and management of chronic granulomatous disease, as well as other congenital immune defects affecting phagocytes. He was tenured in 2000 and became chief of the immunopathogenesis section, which now resides within LCID.

"Dr. Holland is a highly skilled and dedicated physician-scientist and administrator, and I am very pleased that he has agreed to take on this vitally important role within the institute," said NIAID director Dr. Anthony Fauci, announcing the appointment. "I would also like to express my appreciation to NIAID principal deputy director Dr. Hugh Auchincloss, who has served so capably as acting director of DIR since Dr. Zoon stepped down last year."

Dr. Robert Munford will serve as acting chief of the LCID, pending recruitment of a permanent successor to Holland, who will continue to serve as chief of the immunopathogenesis section within the LCID.

Boerboom Heads CSR Division

Dr. Lawrence Boerboom is the new director of the Division of Physiological and Pathological Sciences at the Center for Scientific Review. He has been chief of CSR's cardiovascular and respiratory sciences integrated review group since 2009.

"We are pleased that Dr. Boerboom has agreed to step into this important position," said CSR director Dr. Richard Nakamura. "He has excelled as a leader in academia, business and CSR, and he will bring a wealth of management and scientific expertise to the job...Throughout his career, Dr. Boerboom has successfully built bridges between basic and clinical researchers and cultivated a deep appreciation for multidisciplinary research."

The Division of Physiological and Pathological Sciences coordinates reviews of NIH grant applications in four integrated review groups—digestive, kidney and urological systems; endocrinology, metabolism, nutrition and reproductive sciences; infectious diseases and microbiology; and immunology—that include 44 standing review panels managed by an equal number of scientific review officers.

Boerboom came to CSR in 2004 as an SRO for a study section that reviews cardiac- and vascular-related small business grant applications.

Prior to joining CSR, he was director of research at LifeCell Corp. in Branchburg, N.J., where he led a team developing tissue-engineered medical devices. He earlier had a 20-year career on the faculty of the Medical College of Wisconsin, holding a primary appointment in cardiothoracic surgery and a secondary appointment in physiology.

Boerboom also served as director of cardiovascular surgical research. His research focused on factors influencing myocardial blood flow, cardiac function and vascular bypass graft atherosclerosis. He earned his Ph.D. in physiology from the University of North Dakota.

Long Appointed Director of NIGMS Division

BY ALISA Z. MACHALEK

Dr. Rochelle Long is the new director of the NIGMS Division of Pharmacology, Physiology, and Biological Chemistry (PPBC). A pharmacologist, she has played leading roles in fostering research in

pharmacogenomics through national and international collaborations.

The division is broad in scope, funding research from basic studies in synthetic chemistry, enzymology, biotechnology, chemical biology and the glycosciences to clinical areas that include pharmacology, anesthesia, sepsis, traumatic injury and wound healing.

"Dr. Long's skills are ideal for directing this wide-ranging division," said NIGMS director Dr. Jon Lorsch. "She not only has a true passion for the science, she is also a proven leader who excels at promoting collaborations, facilitating communication and inspiring people."

Long joined NIGMS in 1990 as a program director in PPBC and became chief of the division's Pharmacological and Physiological Sciences Branch in 1998. She has served as acting director of PPBC since May 2015.

Long was instrumental in establishing and overseeing the trans-NIH Pharmacogenomics Research Network (PGRN), a nationwide team of scientists focused on understanding genetic contributions to individual drug response. She was also a catalyst for forming multiple PGRN partnerships, including the Global Alliance for Pharmacogenomics, a collaboration with the RIKEN Center for Genomic Medicine in Japan, and the Clinical Pharmacogenetics Implementation Consortium, an authority on using genetic information in medicine.

Her honors include awards from the Office of the NIH Director for creating and leading the PGRN, organizing an NIH-FDA workshop on adverse drug reactions and coordinating a meeting and report on oral drug bioavailability with NIH, FDA and pharmaceutical industry participants.

Long received a B.S. in chemistry from Bucknell University then worked at the Chemical Industry Institute of Toxicology (now called the Hamner Institutes for Health Sciences) in Research Triangle Park, N.C. She returned to school to earn a Ph.D. in pharmacology from the Uniformed Services University of the Health Sciences.

She conducted postdoctoral research in NHLBI's Laboratory of Chemical Pharmacology through what was then the NIGMS Pharmacology Research Associate program, which she later co-directed. Prior to joining NIGMS, she served as a faculty member at the University of Maryland, Baltimore's School of Pharmacy.

"I care deeply about NIGMS and look forward to leading the PPBC division," said Long. "There are tremendous opportunities to build bridges across the scientific disciplines at the institute and NIH, and I want to work with colleagues and the broader scientific community to strengthen emerging fields and promote the cross-disciplinary research of the future."

NIH'ers are among PHS Commissioned Corps officers who supported the annual service honoring fallen law enforcement officials.

PHOTO: MARC GLUCKSMAN

NIH'ers Support Peace Officers' Memorial Service

May 15th marked the 35th annual National Peace Officers' Memorial Service, which occurs during Police Week. The service commemorates law enforcement officials who have died in the line of duty the previous year.

As is customary, police officers and the fallen officers' family members from throughout the U.S. and internationally came to pay their respects. The keynote speaker this year was Sally Quillian Yates, deputy U.S. attorney general.

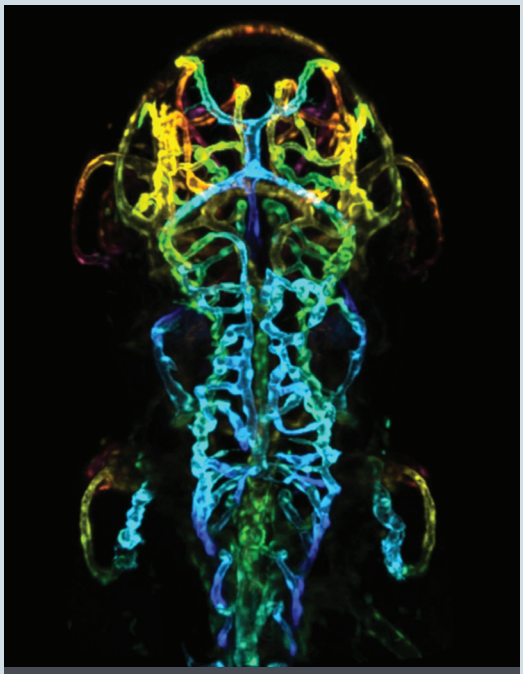
For a majority of those at the service, it's a time of reflection and honoring heroes. During the event, however, a few guests sought medical care for injuries ranging from mild to severe. Anticipating this need, the Office of the Attending Physician to Congress and the U.S. Capitol Police had requested that the Department of Health and Human Services provide health care support.

To prepare for an event of this size and scope, the officers volunteered for 2 days to train for emergencies large or small. Those deployed for the service included National Disaster Medical System personnel and Commissioned Corps officers, including several from NIH. Multiple medical support teams provided health care and medical and logistical assistance.

Dr. Patrick Brown

Brown Joins NIGMS as Program Director

Dr. Patrick Brown recently joined NIGMS as a program director in the Undergraduate and Predoctoral Training Branch in the Division of Training, Workforce Development, and Diversity. In this position, he administers diversity-focused institutional research training grants, individual fellowships and administrative supplements. Before joining NIGMS, Brown was a chemistry teacher at Watkins Mill High School. He has prior NIH experience, having served as chief of the quantitative methods for macromolecular interactions unit and also as a research fellow in the Laboratory of Biomedical Engineering and Physical Science, both at NIBIB. Brown earned a Ph.D. in biochemistry from the University of Maryland and was a postdoctoral research fellow at the former University of Maryland Biotechnology Institute. He also served in the U.S. Army as a mortar gunner at Ft. Lewis, Wash., and later in the Army National Guard as a light infantry squad leader in Greenfield, Mass.



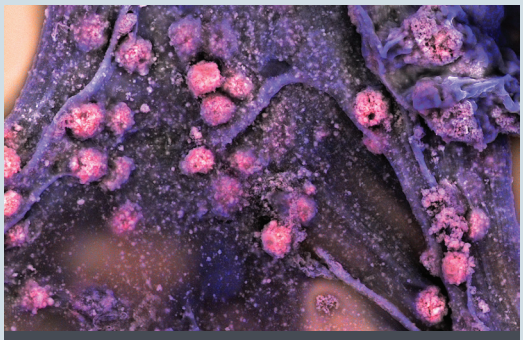
"Rainbow brain vasculature" by Jessica Plavicki, Peterson Lab, University of Wisconsin

Grantees Submit Research Photos To NIH Image Gallery

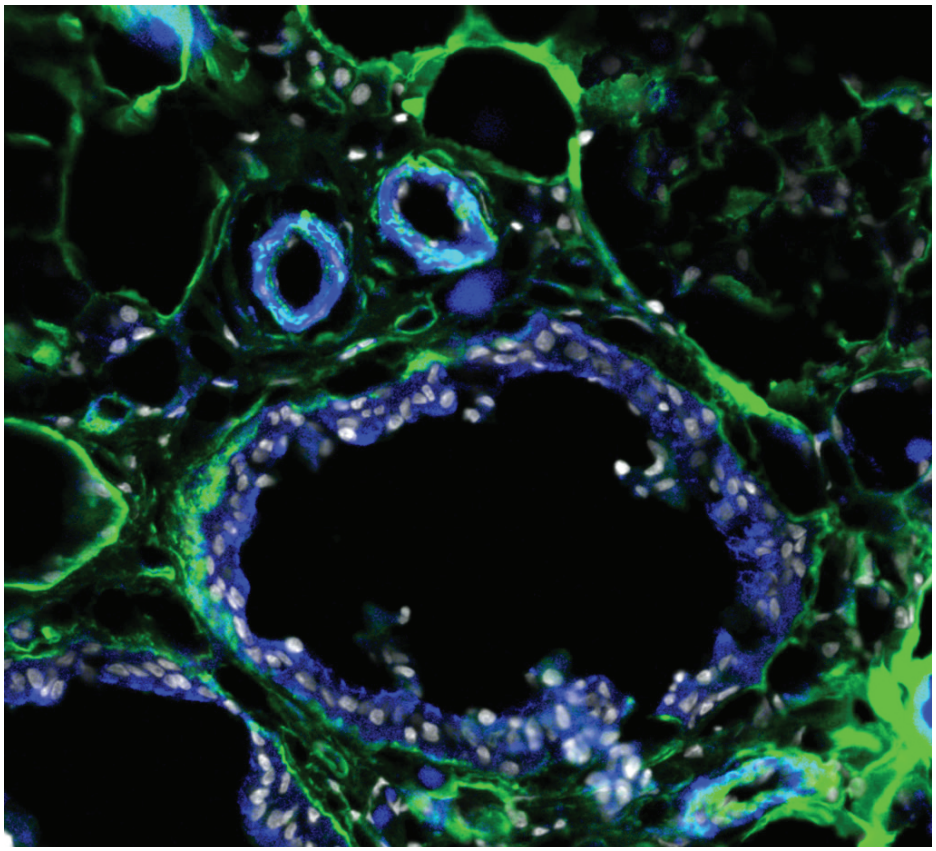
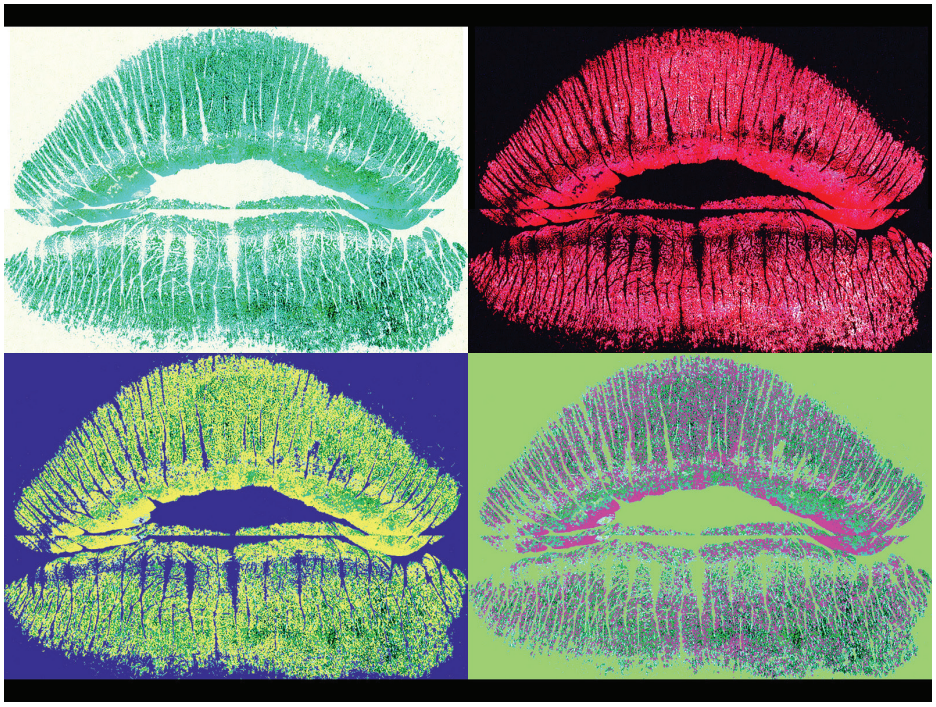
In April, the NIH Public Information Officers (PIO) Network asked NIH-funded institutions to submit scientific images for display in the NIH Image Gallery on Flickr. Members of NIH's Office of Communications and Public Liaison then selected the best photos and posted them to the gallery.

The gallery was launched last fall to share free-to-use images with the public, educational institutions and the media. The gallery features scientific, biomedical and disease-related images as well as photos of NIH leadership, labs, buildings and major historical events, infographics and B-roll [video of general interest].

Twenty-four institutions submitted more than 50 images to the PIO Network. The entries can be found at https://www.flickr.com/photos/nihgov/sets/72157666897233564.



"Stem cells delivered by biomaterials" by Luo Gu, James Weaver and David J. Mooney, School of Engineering and Applied Sciences and Wyss Institute for Biologically Inspired Engineering, Harvard University



ABOVE: "Peekaboo" by Danielle Wu, Farach-Carson Lab, Rice University
BELOW: "Lip Print Patterns" by Mary L. Marazita and Seth Weinberg, Center for Craniofacial and Dental Genetics, University of Pittsburgh