

August 2014

NIEHS Spotlight



[East meets west on common ground of environmental public health](#)

On July 11, NIEHS welcomed a special delegation of public health scientists and leaders from Thailand, led by Her Royal Highness Princess Chulabhorn Mahidol.



[Birnbaum highlights tribal health at Salish Kootenai College](#)

Birnbaum visited SKC in late June and met with Native American scientists conducting research to help correct tribal health disparities.



[President's task force considers climate change and children's health](#)

A subcommittee of the President's task force received expert consultation on the impacts of climate change on children's health.



[High school teachers shine as students during NIEHS STaRS Institute](#)

Eleven high school science teachers spent two weeks learning about biomedical research and sharing approaches for teaching science.



[ONES marks eighth year of excellence](#)

Eight years and 42 awards later at the 2014 Outstanding New Environmental Scientist awardee symposium July 1-2 at NIEHS, there was even more reason to celebrate.

Science Notebook



[NIEHS researchers show low doses of arsenic cause cancer in male mice](#)

An NIEHS team found that male mice developed lung cancer when exposed to arsenic in drinking water at levels relevant to human exposure.



[Lead in kids' blood linked with behavioral and emotional problems](#)

As blood lead levels increase in children, so do their emotional and behavioral problems, according to a new NIEHS-funded study published in the journal JAMA Pediatrics.



[Predictive toxicology advances with new paper and data challenge](#)

In July, partners in the Tox21 consortium published a new study on compound library pathway profiling and announced a chemical toxicity data model competition.



[Cerebral palsy may have family ties](#) ▶ Video

Researchers from NIEHS and Norway reported higher risk of cerebral palsy for people born into families in which someone already has CP.

NIEHS Spotlight



[ICCVAM engages interest groups at public meeting](#)

ICCVAM members met with industry, academia, and animal welfare groups in a public forum on alternatives to animal use in safety testing.



[New NIEHS-funded center focuses on urban environmental stressors](#)

The new environmental health center studies how exposure to the urban environment affects human health, in Detroit and beyond.



[Library InfoFest highlights resources for NIEHS scientists](#)

NIEHS scientists enjoyed an opportunity to stop and think about how their data is archived, at the June 23 Library Infotest.



[2014 summer interns build experience in research and presentations](#)

The NIEHS summer interns enriched their experiences with workshops, a poster session, and awards ceremony.



[Two more trainees enter their pathway to independence](#)

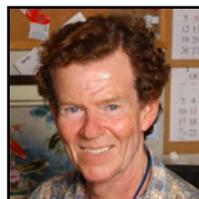
This summer, NIEHS postdoctoral fellows Kin Chan, Ph.D., and Bret Freudenthal, Ph.D., became the latest winners of generous early-career support from NIH.



[Three more trainees make biomedical career moves](#)

This spring and summer three additional trainees transitioned from mentored experiences at the bench to critical next steps in their biomedical careers.

Science Notebook



[Rogan honored for lifetime achievement](#)

NIEHS lead researcher Walter Rogan, M.D., will receive an award this fall for his significant and lasting contributions in maternal and child health epidemiology.



[Study reveals remarkable genetic diversity across Mexico](#)

Extensive genetic diversity found in Native Americans in Mexico and the U.S. may affect clinical standards for disease diagnosis and treatment.



[Keystone seminar highlights multiple chemical exposures](#)

Birgit Claus Henn, S.D., described the statistical models she uses to study multiple metals exposure in children, in a July 15 Keystone lecture.



[Promising Superfund trainees receive K.C. Donnelly award](#)

The 2014 K.C. Donnelly externship award will enrich research in environmental health science for five exceptional NIEHS-funded SRP trainees.



[Biologist uses art to further amphibian limb deformity research](#)

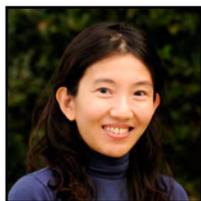
Artist and scientist Brandon Ballengee, Ph.D., furthers his research on amphibian limb deformities using art and participatory science.



[PEPH webinar highlights environmental health literacy](#)

The June 24 event discussed the evolving field of health literacy and improved health outcomes — an NIEHS strategic plan priority.

NIEHS Spotlight



[Former postdoc honored for research](#)

Former NIEHS and NTP trainee Pui-Ling “Melissa” Chan, D.Eng., has been recognized for her research by Southern Illinois University Edwardsville.

Inside the Institute



[Tilson honored as retiring editor-in-chief of EHP](#)

Staff and colleagues from NIEHS and NTP joined in celebrating the tenure of Hugh Tilson, Ph.D, at Environmental Health Perspectives.



[Volunteers conduct STEM outreach](#)

Delta Sigma Theta sorority sponsored its ninth annual Science and Everyday Experiences summer day camp for Durham-area students.

Science Notebook



[SRP and EPA collaborate on passive sampling devices](#)

NIEHS-funded researchers collaborate with EPA on tools to better measure bioavailability of contaminated sediments at Superfund sites.



[This month in EHP](#)

In August, Environmental Health Perspectives focuses on harmful algal blooms, and communication during environmental crises like the Elk River spill.

Extramural Research

[Extramural papers of the month](#)

- Broccoli sprout beverage helps detoxify air pollutants
- The effects of early-life air pollution exposure on brain development
- Enhancing vesicular packaging may offer new therapeutic target for Parkinson's
- Potential treatment for mustard gas skin exposure

Intramural Research

[Intramural papers of the month](#)

- NTP develops novel testing strategy
- Solvent exposure before first birth may increase breast cancer risk
- GWAS meta-analysis reveals new DNA loci of lung function
- dGTP starvation has detrimental effects on cells
- Nrf2 increases ABC transporter expression at blood-brain barriers

Calendar of Upcoming Events

- **Aug. 5**, in the Executive Conference Room, 11:00 a.m.-noon — Receptor Mechanisms Discussion Group seminar by Carmen Williams, M.D., Ph.D., “Estrogenic Chemical Exposure and Female Reproductive Tract Dysfunction”
- **Aug. 7**, in Rodbell A, 9:00-10:00 a.m. — NTP Biomolecular Screening Branch Seminar Series presentation, “Swimming Upstream: The Pfizer Zebrafish Story,” by Donald Stedman, Ph.D.
- **Aug 12**, in Rodbell Auditorium, 8:30 a.m.-5:00 p.m. — NTP Report on Carcinogens Peer Review Meeting
- **Aug. 15**, in Rodbell Auditorium, 9:00-11:00 a.m. — The Office of Human Research Compliance Practical Applications and Regulatory Considerations in Human Research seminar series, “Certificates of Confidentiality,” by Leslie Wolf, J.D., and Kimberly Gray.
- **Aug. 18**, in Rodbell Auditorium, 8:30 a.m.-5:00 p.m. — Symposium on Assessing Exposures and Health Effects Related to Indoor Biomass Fuel Burning
- **Aug. 22 (offsite event)**, at RTI International in Research Triangle Park, North Carolina, 9:00 a.m.-4:30 p.m. — NIH Eastern Regional Comprehensive Metabolomics Resource Core Symposium
- **Aug 24–28 (offsite event)**, at the University of Washington School of Public Health, Seattle, Washington — 26th Annual International Society for Environmental Epidemiology Conference - From Local to Global: Advancing Science for Policy in Environmental Health
- **Sept. 3-5**, in the William H. Natcher Conference Center on the NIH campus in Bethesda, Maryland, 8:30 a.m.-5:00 p.m. — “Adverse Outcome Pathways: From Research to Regulation,” presented by NICEATM and Physicians Committee for Responsible Medicine
- View More Events: [NIEHS Public Calendar](#)

NIEHS Spotlight

East meets west on common ground of environmental public health

By Eddy Ball

NIEHS welcomed a special delegation of public health scientists and leaders from Thailand July 11, led by Professor Dr. Her Royal Highness Princess Chulabhorn Mahidol, founder and president of the Chulabhorn Research Institute (CRI), the Chulabhorn Graduate Institute, and the Chulabhorn Cancer Center.

The Princess and her colleagues met with NIEHS and NTP Director Linda Birnbaum, Ph.D., and members of the Institute's leadership for discussions about training opportunities and [NIH International Postdoctoral Programs](#).

The meeting included presentations by Birnbaum and Princess Chulabhorn, as well as ones by NIEHS and NTP scientists on a range of environmental public health topics of special interest in Thailand — specifically traffic-related air pollution, hazardous electronic waste, children's health, and clean water.

Birnbaum noted the approximately 100 foreign trainees at NIEHS and pointed to NIH partnerships with several countries to offer postdoctoral training to recent Ph.D. recipients. "We will be happy to explore partnerships with Thailand for future research collaboration and training," she said.

Showcasing NIEHS and its global health initiatives

"This is an exciting opportunity for me and our NIEHS scientists to discuss our research and our support for international scientific collaborations," Birnbaum said as she began her overview of NIEHS and NTP organization and research.

Early on, she reminded her listeners of the importance of research to improve the ability to anticipate the impact of the environment on health, which contributes to some 85 percent of all human disease. "Thirteen million deaths could be prevented each year by improving our environment," she said.

In the course of her overview, Birnbaum introduced the themes of the talks by NIEHS and NTP scientists that followed (see [text box](#)). These included presentations about specific global health initiatives



After Princess Chulabhorn, right, and the Thai delegation arrived at NIEHS, she greeted Institute leaders in the receiving line, accompanied by Birnbaum, center. She is shown shaking hands with Suk, who has attended past Princess Chulabhorn International Science Symposia (see [story](#)) as a representative of NIEHS. (Photo courtesy of Steve McCaw)



Birnbaum spoke with pride and enthusiasm about NIEHS and NTP research as she gave her informal presentation for the visitors. (Photo courtesy of Steve McCaw)

and collaborations between NIEHS and such groups as the World Health Organization (WHO); prenatal exposures that shape the development of people everywhere and can trigger adult-onset diseases; research on the health effects of arsenic, which is present in the food and water billions of people consume throughout the world; and environmental causes of the growing epidemic of asthma among children in developing countries with rapidly growing urban centers.

In closing, Birnbaum invited the Princess to return to NIEHS for further discussions.

Noblesse oblige and a passion for science

The [Chulabhorn Research Institute](#), Chulabhorn Graduate Institute, and Chulabhorn Cancer Center have a shared mission of applying science and technology to improve life, which parallels several key aspects of the NIEHS strategic plan. Her Royal Highness has given generously of her personal fortune, time, and influence to promote environmental public health and scientific exchange programs, including a series of seven Princess Chulabhorn International Science Symposia.

A member of the chemistry faculty at Mahidol University, Princess Chulabhorn is the first Asian to be selected as an honorary fellow of the Royal Society of Chemistry in England. In addition to her doctorate, the Princess holds numerous honorary degrees from universities in Thailand, the U.S. and the U.K., Japan, and elsewhere. Among her domestic and international honors, awards, and decorations for her service to global public health, the Princess has received the United Nations Educational, Scientific and Cultural Organization (UNESCO) Einstein Medal, as well as the Environmental Mutagenesis Society Hollaender International Fellow Award.



Prominent among the delegation was Mathuros Ruchirawat, Ph.D., head of the CRI Laboratory of Environmental Toxicology in Bangkok, where she has collaborated with NIEHS-funded researchers in Thailand. (Photo courtesy of Steve McCaw)



Princess Chulabhorn was obviously impressed by the wide range of environmental public health research described by Birnbaum. Along with lead author Mathuros and colleagues at CRI, the Princess co-authored a study on prenatal arsenic exposure and gene expression (see [story](#)) with NIEHS grantees Leona Samson, Ph.D., and Rebecca Fry, Ph.D. (Photo courtesy of Steve McCaw)



Balbus spoke forcefully about the NIEHS commitment to global health research, WHO collaboration, and the NIH Cookstove Initiative. (Photo courtesy of Steve McCaw)



London described her recent work as part of an international consortium studying gene expression and environmental exposure — specifically changes in DNA methylation patterns in offspring linked to maternal smoking. (Photo courtesy of Steve McCaw)



Tokar spoke on a topic of interest throughout southeast Asia — the presence of unsafe levels of arsenic in drinking water and in the rice irrigated by groundwater there. (Photo courtesy of Steve McCaw)



Gray described NIEHS support for research on the mechanisms involved in asthma triggered or worsened by exposure to air pollution in the U.S. and how the findings can be used to inform programs to help clean up the air. (Photo courtesy of Steve McCaw)



At the close of the formal meeting, Birnbaum presented Chulabhorn with a token gift, graciously given by her hosts and gratefully received with royal humility by Her Royal Highness. (Photo courtesy of Steve McCaw)



Escorted by Ambassador Vijavat, Princess Chulabhorn greeted a group of visiting Thai nationals who are living and working in the Triangle. (Photo courtesy of Steve McCaw)



The delegation's caravan of limousines lined up in front of the NIEHS main building in anticipation of the group's departure. (Photo courtesy of Steve McCaw)



With her visitors on their way to their next destination, Birnbaum took time to chat with Thai-born research fellow [Wipawee \(Joy\) Winuthayanon, Ph.D.](#) Winuthayanon is an award-winning member of the NIEHS Receptor Biology Group headed by Kenneth Korach, Ph.D. (Photo courtesy of Steve McCaw)



In a gesture of solidarity that underscored their commitment to productive future collaborations, Princess Chulabhorn and Birnbaum, center, gathered with their respective delegations. (Photo courtesy of Steve McCaw)

Taking a place at the table

The Thai delegation included Princess Chulabhorn, who presented a talk about the activities of the institutes and centers supported by the Chulabhorn Foundation, as well as the following dignitaries:

- His Excellency Ambassador Vijavat
- His Excellency Doctor Thakur
- Science Advisor Associate Professor Doctor Mathuros
- Professor Doctor Somsak
- Associate Professor Doctor Supanna
- Doctor Anucha
- The entire royal entourage

In turn, the visitors had an opportunity to meet and discuss interests and concerns they have in common with Birnbaum and the Institute's leadership:

- Rick Woychik, Ph.D., deputy director
- William Suk, Ph.D., head of the Division of Extramural Research and Training Hazardous Substances Research Branch
- Joellen Austin, associate director for management
- John Bucher, Ph.D., NTP associate director
- Darryl Zeldin, M.D., scientific director
- Gwen Collman, Ph.D., director of the Division of Extramural Research and Training
- Mark Miller, Ph.D., chief of staff

Along with Birnbaum's opening overview of NIEHS and NTP public health initiatives, "Our Environment, Our Health, Our Future," the visitors heard presentations by four Institute scientists:

- Senior Advisor for Public Health John Balbus, M.D. – "Climate Change and WHO Collaborating Center"
- Lead researcher Stephanie London, M.D., Dr.P.H. – "International Consortium on Prenatal Exposures"
- NTP Laboratories biologist Erik Tokar, Ph.D. – "Arsenic in Drinking Water, Rice, and Cancer End Points"
- Health Scientist Administrator Kimberly Gray, Ph.D. – "Children's Environmental Health: Asthma"

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Birnbaum highlights tribal health at Salish Kootenai College

By Symma Finn

NIEHS and NTP Director Linda Birnbaum, Ph.D., paid a visit June 23 to Salish Kootenai College (SKC) in Pablo, Montana. Driving toward Pablo, her car rounded a bend and entered a wide plain, ringed by snowcapped mountains, with lakes gleaming in the distance. However, in Montana, as in other Western states, the pristine lakes and rivers contain fish contaminated with troubling levels of mercury. Their waters are often despoiled by arsenic, uranium, and other byproducts of resource extraction, such as mining.

Tribal communities in the region face what Birnbaum described as some of the most egregious environmental health disparities (EHDs) in the nation. Birnbaum met with students, faculty, and leadership of [SKC](#), as well as researchers working to address these health concerns (see related [story](#)).

Native American scientists share research

A Tribal Environmental Health Summit was held during the visit, which brought together Native American scientists and NIEHS-funded collaborators, who shared how they have addressed EHDs on tribal lands. Organizers included Douglas Stevens, Ph.D., SKC Life Science Department director; and Tribal Program coordinator Caren Robinson of the Environmental Protection Agency (EPA) Office of Chemical Safety and Pollution Prevention (OCSPP).

Scientists from more than a dozen tribes participated in the summit, including Aamjiwnaang, Akwesasne Mohawk, Blackfeet, Chippewa, Cherokee, Crow, Mandan and Hidatsa, Micmac, Navajo, Nez Perce, Passamaquoddy, Penobscot, Swinomish, and Umatilla. They discussed research into their own local environmental health disparities. However, common themes emerged around the types of contaminants affecting tribal communities nationwide, the need for community engagement in research, and the importance of locally developed and delivered communication of findings.

[Stevens](#) and his network of Native American researchers explore ways to characterize and address tribal environmental health disparities related to contamination of groundwater and traditional foods. He is also working with EPA to develop a center of expertise to assist tribes in dealing with environmental health issues. Stevens recently received a Native American Research Center for Health award ([NARCH](#)) from the National Institutes of Health (NIH) and Indian Health Service (IHS). According to Stevens, SKC is the first tribal college to be awarded a NARCH.

An opportunity for lively exchange

The participation of leadership from NIH, EPA, and IHS allowed for lively discussion and direct interaction between tribal and federal representatives, something many participants appreciated. Joining Birnbaum were Oscar Morales, associate assistant administrator for management at EPA OCSPP; Mose Herne, director of the IHS Division of Planning, Evaluation, and Research; and Patti Tyler, Region 8 science liaison to the EPA Office of Research and Development.



Birnbaum noted that support for research to correct environmental health disparities is one of the themes of the NIEHS 2012-2017 Strategic Plan. (Photo courtesy Steve McCaw)



Pablo, Montana, a place of incredible natural beauty, has new scientific training opportunities thanks to SKC. (Photo courtesy of Linda Birnbaum)

During the summit, Birnbaum highlighted the strategic commitment of NIEHS to addressing environmental health disparities among tribal communities. “The SKC programs are excellent examples of transdisciplinary research and sustaining active partnerships between academic researchers and tribal communities, to better understand and communicate preventative measures for environmentally induced diseases,” she said.

The visit to Montana concluded with a stop in Missoula to meet with NIEHS-funded researchers at the University of Montana (see related [story](#)), most of whom conduct basic scientific research to analyze pathways and processes by which environmental pollutants affect human health.

(Symma Finn, Ph.D., is a health scientist administrator in the NIEHS Population Health Branch. She accompanied Birnbaum on the trip to Montana and was the NIEHS lead in organizing the Tribal Environmental Health Summit.)



Birnbaum, center in tan, met with students, faculty, and leadership at SKC, where addressing tribal health disparities is a major focus of research. (Photo courtesy of Doug Stevens)

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President’s task force considers climate change and children’s health

By Pamela Kidron

NIEHS played a key role at a July 10 event in Washington, D.C., convened by the subcommittee on climate change of the President’s Task Force on Children’s Environmental Health Risks and Safety Risks to Children.

Speakers at the meeting, “Expert Consultation on the Effects of Climate Change on Children’s Health,” included NIEHS and NTP Director Linda Birnbaum, Ph.D.; NIEHS Senior Advisor for Public Health John Balbus, M.D.; and several NIEHS grantees. Kimberly Thigpen Tart, J.D., NIEHS policy analyst in the Office of Policy, Planning, and Evaluation and co-chair of the subcommittee, organized the event.

“The subcommittee was formed out of a recognition by the President’s Task Force that the special vulnerability of children to climate change effects deserves focused attention,” Thigpen Tart said. “This expert consultation is the first step toward that goal.” Participants presented research on children’s unique vulnerability to the health impacts of climate change and helped identify areas needing further research.

Children are especially vulnerable to heat stress, the mental and physical consequences of extreme weather events, respiratory effects of impaired air quality, changes in food quality and availability, and many waterborne, vectorborne, and zoonotic diseases. For example, children’s small size makes them more susceptible to dehydration from heat or illness, while their smaller airways predispose them to greater respiratory distress from infections and asthma.

“Children’s vulnerability also includes their living into a future of more severe impacts from the inertia built into the climate system,” said Balbus, who is a convening lead author on the Populations of Concern chapter in the upcoming U.S. Global Change Research Program (GCRP) report, “Interagency Special Report on the Impacts of Climate Change on Human Health.”

Assessing the research

“The information our speakers bring forward will help inform ongoing federal, state, local, and tribal efforts to understand health vulnerabilities to climate change impacts, to prepare communities to better cope with climate change stressors, and to improve our nation’s long-term health resiliency,” Balbus told the assembled experts.

Scientists presented research on dangers to developing fetuses and young children from increases in air pollution that result from warmer temperatures. Such dangers include asthma, which is aggravated by increases in ground-level ozone and in the amount and allergenicity of pollen.

Other researchers linked higher temperatures to increases in pre-term births and the spread of carriers of diseases such as Lyme disease, yellow fever, and West Nile virus. Links between flooding and low birth weight, spontaneous abortions, and the susceptibility of children to certain gastrointestinal diseases were also reported.

Taking action

Several priority research needs were raised, including the need to better understand interactions between climate change, nutritional value of foods, and children’s health; and more knowledge of the mechanisms by which high temperatures and flooding can lead to adverse reproductive outcomes.

According to Birnbaum, the health of the planet and the health of the people who live on it are inextricably intertwined. “There has never been a greater need to support investigation into climate change and to disseminate credible, understandable, and indisputable information on its potential to affect children,” Birnbaum said.

(Pamela Kidron is a contract writer with the NIEHS office in Bethesda, Maryland.)



Thigpen Tart serves as the NIEHS contact for the National Climate Assessment (NCA), released in May 2014 (see [story](#)). (Photo courtesy of Steve McCaw)



Balbus was a lead author of the NCA health chapter; serves as the U.S. Department of Health and Human Services principal to GCRP, and co-chairs the GCRP interagency Climate Change and Human Health group. (Photo courtesy of Steve McCaw)

High school teachers shine as students during NIEHS STaRS Institute

By Kelly Lenox

For two weeks in July, eleven high school teachers turned the tables and became students, as part of the expanded NIEHS Science, Teachers, and Research Summer Institute (STaRS).

The program is designed to broaden teachers' understanding of basic biomedical research and, thereby, strengthen the biomedical research community — a focus of the NIEHS [strategic plan](#). STaRS participants will be able to go back to their schools with the knowledge they've gained, and help build student knowledge of, and enthusiasm for, environmental health sciences, including up-to-date laboratory technology and diverse career possibilities.

Collaboration increases impact

Offered in collaboration with North Carolina New Schools, ([NCNS](#)) the program evolved from an earlier externship (see [story](#)) to the present STaRS Institute, in order to enable more teachers to participate. According to Ericka Reid, Ph.D., director of the NIEHS Office of Science Education and Diversity ([OSED](#)), a two-week design best combined depth of the experience with ability of teachers to participate. "We wanted an extended experience for as many teachers as possible," she said.

Eleven teachers were selected from the pool of applicants.

- Tonya Adams — Union County Early College High School
- Yolanda Blakeney — Cabarrus-Kannapolis Early College High School
- Barbara Bohacova, Pharm.D. — Warren Early College High School
- Amy Jessup, D.V.M. — East Surry High School
- Charles Patton — Rowan County Early College High School
- Travis Seese — Athens Drive High School
- Brandi Simonof — Nash-Rocky Mount Early College High School
- Linda Sutton — Polk County Early College High School
- Sula Teachey — Wayne School of Engineering at Goldsboro High School
- Thomas Venetta — Vance County Early College High School
- Justin Wheelles — Yadkin Valley Regional Career Academy

The syllabus was developed by Huei-Chen Lao of OSED; Robert Petrovich, Ph.D., head of the Protein Expression Core Facility in the Laboratory of Structural Biology; Ronald Cannon, Ph.D., staff scientist in the Laboratory of Toxicology and Pharmacology; and George Fromm, Ph.D., postdoctoral fellow in the Laboratory of Molecular Carcinogenesis. A number of other NIEHS and NTP scientists volunteered as well (see [text box](#)).



"This experience helps us find more ways to hook [students] in and interest them in the sciences," said Blakeney, center, shown in lab with Cannon, left. (Photo courtesy of Steve McCaw)



Jessup and the other teachers learned a variety of basic biomedical research techniques in lab sessions during the first week. (Photo courtesy of Steve McCaw)

Based on teachers' interests and curriculum needs, the program engaged participants in learning basic biomedical research techniques; touring the labs and Clinical Research Unit; receiving an overview on environmental health from NEIHS and NTP Director Linda Birnbaum, Ph.D.; and hearing lectures by NIEHS postdocs, on everything from epigenetics to bioinformatics.

Creativity and enthusiasm in abundance

In the hallway outside the confocal microscopy lab, Lao observed, "Teachers are some of the most creative people I know." Teachey validated Lao's observation when she presented her classroom session on toxicology, which called for students to set up a dose-response experiment. "I'd ask the teacher who runs the community garden if we could have some seedlings, which would make the experiment go a lot faster [than starting from seeds]," Teachey said.

Sutton was enthusiastic about discussing bioethics and recombinant DNA. "I feel a lot better about addressing students' concerns about animal research and bioethics, after seeing the NIEHS animal facility," she said.

Enthusiasm reigned even as the program drew to an end. "You all were so dedicated," said Lao, at the closing session, in which the teachers presented the classroom projects they'd created. Sutton replied, "In the labs, we never got tired, because we were so excited about what we were doing." Simonof summed it up by saying, "It's been a priceless experience for all of us."



"Coming here and seeing new applications of what the students are studying, and being able to take that back to the classroom, is really important," said Simonof, right, shown in the lab with Cannon. (Photo courtesy of Steve McCaw)



"Like a lot of us, I'm really turned on by epigenetics and how far the field has gotten. It's exciting and adds a lot to biology," said Venetta. "We've had some discussion of great ways to introduce epigenetics in the classroom." (Photo courtesy of Steve McCaw)



Patton, like all the teachers, proved versatile, moving from tour to lecture to lab to instructional design over the course of the varied program. (Photo courtesy of Steve McCaw)



NCABR Rx for Science Literacy workshops at NIEHS

In another teacher-focused program, NIEHS offered two continuing education workshops this spring through the North Carolina Association for Biomedical Research (NCABR).

On April 24, NIEHS scientists and staff presented a workshop on The What, Where, How, and Why of Health Science Research. A second workshop, on Cell Biology and Cancer, was held on June 20. Both workshops are part of the NCABR Rx for Science Literacy series.

Regina Williams, director of programs at NCABR, visited the STaRS group July 15, to inform them of upcoming opportunities offered by NCABR and their network of funders. Of particular interest is the upcoming fall NCABR conference, Bridging the Gap.

“What makes our conference unique among science, technology, engineering, and mathematics teachers is that we have a big focus on helping you make connections with museums and nearby institutions,” Williams said.

“I learned a lot about bioinformatics here, and I haven’t talked with the kids about that in the past,” said Adams. “Epigenetics and gene therapy will also really interest them and I’ll fit in as much as I can about those topics.” (Photo courtesy of Steve McCaw)



Bohacova captured a common sentiment when she described the value of sharing the experiences with her students. “Whether it’s doing things in the lab or learning more about bioinformatics, technology, or biostatistics, it’s really important for students to understand the breadth of what it means to be a scientist,” she said. (Photo courtesy of Steve McCaw)



Biomedical engineer Jeff Tucker demonstrated confocal microscopy to the teachers. Shown, from left, Tucker; Adams, Bohacova, and Jessup. (Photo courtesy of Steve McCaw)

The STaRS Institute program would not have been possible without the following instructors and volunteers:

Linda Birnbaum, Ph.D.	Page Myers
Terry Blankenship-Paris, D.V.M.	Simone Otto, Ph.D.
Christopher Campos, Ph.D.	Robert Petrovich, Ph.D.
Ronald Cannon, Ph.D.	Bart Phillips, Ph.D.
Molly Cook	Gary Powell, Ph.D.
Joanne Damborsky, Ph.D.	Charles Romeo, Ph.D.
Matthew Edin Ph.D.	Shepherd Schurman, M.D.
Lori Edwards	Jeff Tucker
Neal Englert, Ph.D.	Mitzie Walker
Jennifer Fostel, Ph.D.	Shannon Whirledge, Ph.D.
George Fromm, Ph.D.	Kimberly Wiggins, Ph.D.
Juhee Haam, Ph.D.	Belinda Wilson
Michael Humble, Ph.D.	



Participants and some of the instructors gathered for a photo at the end of the program. From left, back row, Ondrea Austin, NCNS STEM field coordinator, Petrovich, Venetta, Blakeney, Jessup, Humble; second row, Sutton, Patton, Simonof, Teachey, Bohacova, Lao; front row, Cannon, Adams, Wheelles, Reid, Seese. See text box for complete list of instructors and volunteers. (Photo courtesy of Steve McCaw)

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ONES marks eighth year of excellence

By Eddy Ball

With its first awardee meeting in 2006, NIEHS program directors knew they had a winner with the Outstanding New Environmental Scientist (ONES) program. Eight years and 42 awards later at the 2014 ONES awardee symposium July 1-2 at NIEHS, there was even more reason to celebrate the success of this innovative effort to provide an unprecedented level of support for extraordinary early stage investigators with exciting ideas in the field of environmental health sciences (see [text box](#)).

The ONES program is well on its way to being heralded as a best practice for NIH institutes and centers (ICs), as the program looks forward to making new awards this year. In her opening remarks, NIEHS and NTP Director Linda Birnbaum, Ph.D., pointed to the sincerest form of flattery by a sister IC, the National Institute of Mental Health, which in 2009 modeled its own very successful Biobehavioral Research Awards for Innovative New Scientists ([BRAINS](#)) program directly after the ONES.

Birnbaum also acknowledged the accomplishments of the awardees in terms of promotions, hundreds of publications, and an impressive number of other grants, including some 38 NIEHS grants over and above their ONES support.

Meeting featured 24 talks by ONES awardees

During the day and a half of [science talks](#) by ONES awardees, Birnbaum lived up to her promise to attend as much of the meeting as possible. “I get to learn about some of the latest discoveries and new ideas for research from you, who are really the future of our environmental health sciences community,” she said.

The two dozen talks ranged across the NIEHS Division of Extramural Research and Training (DERT) grants portfolio, with speakers from each of the annual award groups. Topics ranged from basic mechanistic research, epidemiological studies, and clinical and translational research, to advances in understanding nanomaterials, stem cells, and biomarkers for predictive toxicology.

As a result of their leading-edge research, just over half of the ONES awardees have received tenure or promotion to associate professor, and one, [Gokhan Mutlu, M.D.](#), has advanced to full professor of medicine and director of the Section of Pulmonary and Critical Care Medicine at the University of Chicago. Several have gained appointments as journal editors, and nearly all can boast of professional awards and honors, including 2006 awardee [Sven-Eric Jordt, Ph.D.](#), who in 2007 became the first NIEHS grantee to win a prestigious Presidential Early Career Award for Scientists and Engineers (see [story](#)).



Birnbaum clearly enjoyed hearing the many examples of collegial spirit the program nurtures. “There is so much that we can learn from one another and the many collaborative ventures that come out of this program,” she said in her opening remarks. (Photo courtesy of Steve McCaw)



The talks opened with a discussion by University of Utah epidemiologist [Christina Porucznik, Ph.D.](#), of her ongoing prospective study of periconceptual exposures that may influence fertility. Of the hair, urine, and saliva samples collected, she said, “We want these specimens to be used, so we’re really looking for collaborators.” (Photo courtesy of Steve McCaw)

Insights into academic careers

In addition to an invitation to attend the scientific talks, NIEHS trainees were invited to a special session that concluded the meeting, highlighting “Career Insights From ONES and Discussions With NIEHS Program Directors (and NIEHS Postdocs),” moderated by DERT Director Gwen Collman, Ph.D.

As the first speaker in the career segment, University of Pittsburgh geneticist Patricia Opreko, Ph.D., presented a list of “Lessons Learned” that helped structure the discussion of positive things awardees have done to advance their careers and, equally important, the things they wish they had done. The speakers each had suggestions about collaborations, mentor relationships, risk-taking, and negotiating with department heads and colleagues, but they also offered almost as many caveats.

“There’s not a formula,” cautioned Duke University mitochondrial DNA specialist Joel Meyer, Ph.D. “If there were, we’d all follow it.”

As the conversation turned to funding, Collman offered awardees and postdocs a number of suggestions for keeping abreast of new developments — and potential new funding opportunities — at NIEHS and NIH. They included watching webcasts of the [National Advisory Environmental Health Sciences Council](#) meetings at NIEHS, reading the weekly [NIH Guide for Grants and Contracts](#), and following the “[Rock Talk](#)” blog created by NIH Deputy Director for Extramural Research Sally Rockey, Ph.D.

Communicating with ONES program officer Carol Shreffler, Ph.D., and other NIEHS program officers is also extremely helpful, Collman added. After all, she said, “Your success is our success.”



Harvard University systems toxicologist [Vishal Vaidya, Ph.D.](#), gestured enthusiastically as he explained his project, “Modernizing Toxicology: Biomarkers and Cell-based Approaches to the Rescue.” In recognition of his work, Vaidya received a 2013 Burroughs Wellcome Fund Innovation in Regulatory Science Award. (Photo courtesy of Steve McCaw)



For several of the awardees trained with NIEHS funding, such as University of Chicago cancer biologist and former NIEHS postdoc [Yu-Ying He, Ph.D.](#), the ONES meetings are a sort of family reunion, as well as a chance to hear about exciting new scientific discoveries. (Photo courtesy of Steve McCaw)



Michigan State University environmental toxicologist [James Luyendyk, Ph.D.](#), described surprising findings about the counterintuitive protective role of fibrinogen in some kinds of liver injury. “We were completely wrong in our [initial hypothesis],” he said. (Photo courtesy of Steve McCaw)



University of Nebraska Director of Allergy Services *Jill Poole, M.D.*, reported on the results of studies about lung and systemic effects among agricultural workers exposed to organic dust in concentrated animal feeding operations. Poole was selected to present a prestigious memorial lecture on her findings at the 2014 annual meeting of the American Academy of Allergy, Asthma, and Immunology. (Photo courtesy of Steve McCaw)



After moderating the final session of scientific talks on neurotoxic mechanisms, program officer Jonathan Hollander, Ph.D., joined his DERT colleagues for the careers discussion. (Photo courtesy of Steve McCaw)



Collman, right, joined Mutlu, as he discussed his experience with a grant application to fund risky science. “Wildly innovative grants are received differently at different stages of your career,” she told the audience. (Photo courtesy of Steve McCaw)

ONES – helping to build career infrastructure

By Shannon Whirlledge, Ph.D.

The ONES program (2014 Funding Opportunity Announcement [RFA-ES-13-014](#)) is designed to support the career promotion of the next generation of outstanding scientists. This highly competitive program will add five new awardees to its ranks in fiscal year 2015. The key to success is an innovative project and the potential for an applicant to advance the field, according to Shreffler, who is program officer for the Training and Career Development Program at NIEHS. In order to be considered as a promising early-stage investigator, applicants must be within 10 years of their professional degrees in tenure-track positions with at least 80 percent of protected time for research.

The elite scientists granted ONES funding enjoy benefits not shared by awardees of the standard R01 research project grant. In addition to research funding, the ONES program supports career advancement by providing an allotment for lab resources and equipment, travel to conferences, and travel to visit other labs. As Shreffler explained, “The ONES program provides an infrastructure for a career.”

The ONES program is intended to continue in fiscal year 2016 and beyond, but program length will be based on availability of funds.

(Shannon Whirlledge, Ph.D., is an Intramural Research Training Award fellow in the NIEHS Laboratory of Signal Transduction.)



Jordt was one of several speakers who discussed departmental politics at academic institutions. After nine years at Yale, Jordt moved to Duke this summer, largely because of diminishing support for environmental research at Yale. “I never really got sufficient space [for my lab there],” he said. “[Plus], Duke is closer to NIEHS.” (Photo courtesy of Steve McCaw)



Shreffler, who organizes the annual ONES meetings and administers early career support and training grants, is also a driving force in maintaining a high profile for the ONES program. “Let us know of your career accomplishments,” she urged the awardees. “This is the sort of information we need to keep the program going.” (Photo courtesy of Steve McCaw)

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ICCVAM engages interest groups at public meeting

By Catherine Sprankle

Members of the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) met with representatives of industry, academia, and animal welfare organizations, to discuss alternatives for chemical and product safety testing.

The June 25 public forum was held at the National Institutes of Health in Bethesda, Maryland.

Updates from member agencies

ICCVAM co-chair Anna Lowit, Ph.D., from the U.S. Environmental Protection Agency (EPA), summarized ICCVAM activities since the September 2013 meeting of the [Scientific Advisory Committee on Alternative Toxicological Methods](#). She also provided updates on ICCVAM scientific focus areas, plans for improved stakeholder communication, and new paradigms for test method validation.

Casey discusses nonanimal testing approaches with regulators

A key point raised by public forum participants — training regulatory agency reviewers on the applicability and availability of nonanimal test methods and strategies — was precisely the topic Casey discussed with EPA personnel in a June 24 webinar titled “Validation and Utilization of Alternative Test Methods.”

Casey presented an overview of internationally accepted nonanimal methods for identifying substances that can cause skin or eye irritation. He discussed current efforts to develop strategies that use data from multiple sources to arrive at a hazard classification for potential skin sensitizers — an approach that may soon enable elimination of animal testing for this purpose.

Joanna Matheson, Ph.D., of the U.S. Consumer Product Safety Commission, detailed activities in one of ICCVAM's priority areas — skin sensitization. "Because the adverse outcome pathway for skin sensitization is well-characterized, and a number of nonanimal test methods have been developed, it has great promise for the near-term development of testing strategies that do not require the use of animals," she noted. To reach this goal, ICCVAM is actively collaborating with its European counterparts and industry, to identify an optimal strategy.



Agencies highlight ongoing activities

After a summary of National Toxicology Program (NTP) Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM) activities, by director [Warren Casey, Ph.D.](#), other ICCVAM member agencies highlighted their activities relevant to replacing, reducing, or refining animal use.

Lowit; her fellow co-chair Abigail Jacobs, Ph.D., of the U.S. Food and Drug Administration; and ICCVAM members [Raymond Tice, Ph.D.](#), from NIEHS; Barnett Rattner, Ph.D., from the U.S. Department of the Interior; and Christine Kelley, Ph.D., of the National Institutes of Health (NIH) gave updates on a wide spectrum of activities. These ranged from near-term solutions, such as product-specific validation of nonanimal methods, to longer-term, more complex approaches, such as organs-on-a-chip, to predict human health hazards and minimize animal use.

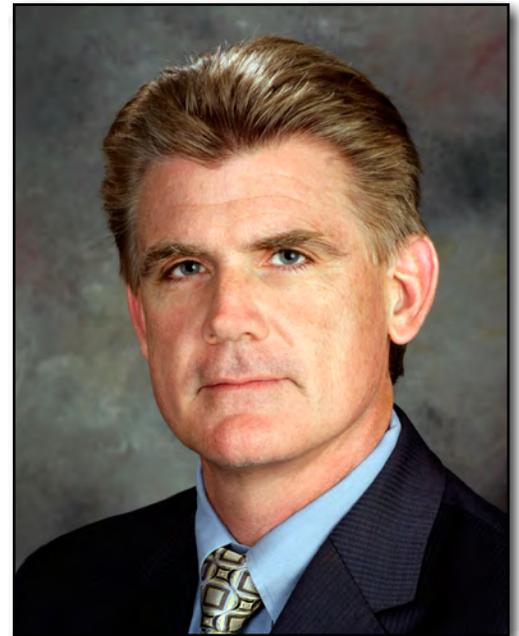
Key points raised in response to the agency updates, and during the open comment period included requests for increased transparency in reporting animal use by industry, and the need for adequate training on nonanimal test methods for reviewers at ICCVAM regulatory agencies (see [side bar](#)).

Casey closed the meeting by noting that ICCVAM plans to hold similar events annually. "We want to ensure that our stakeholders have ample opportunity to interact in person with ICCVAM, by having these types of open dialogue," he said, encouraging all participants to provide feedback on how the meetings could be improved.

NICEATM, which supports ICCVAM, organized the forum.

(Catherine Sprankle is a communications specialist with ILS Inc., support contractor for NICEATM.)

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In his presentation at the forum, Casey highlighted NICEATM's ongoing projects, including efforts associated with endocrine disruptor screening methods, aquatic models of toxicity testing, extrapolation of in vitro data to in vivo effects, and adverse outcome pathways. (Photo courtesy of Steve McCaw)

New NIEHS-funded center focuses on urban environmental stressors

By Joe Balintfy

A new grant from NIEHS will allow researchers to study how exposures to stressors that are prevalent in the urban industrialized environment impact human health in Detroit and beyond.

The grant, awarded to Wayne State University, is one of 21 Environmental Health Sciences **Core Centers** funded by NIEHS. The new Center for Urban Responses to Environmental Stressors (**CURES**) includes collaborators at Henry Ford Health System, the University of Michigan, and Michigan State University, as well as community organizations.

“This group has really embraced community-engaged research as part of a central core value for their center,” said Claudia Thompson, Ph.D., head of the NIEHS Population Health Branch. At the heart of CURES is a grass-roots community engagement program committed to improving living and working environments in the city of Detroit.

Understanding environmental health disparities

CURES places special emphasis on understanding how environmental exposures, during life windows of heightened susceptibility, can adversely affect health, particularly in vulnerable persons, such as children and adults of low socioeconomic status, older adults, first responders, and refugees. The center emphasizes broad interactions with the public, as well as leaders of advocacy, community, and government organizations dealing with the environment and health. “This center is focused in on areas and questions of environmental health disparities,” added Thompson.

CURES will study diseases that compromise quality of life in an industrialized urban environment, such as Detroit, explained CURES co-leader, Melissa Runge-Morris, M.D., director of the Institute of Environmental Health Sciences (IEHS) and professor of oncology at Wayne State University. “Our team of researchers, along with community members, will explore the role of environmental exposure on immune disorders, metabolic disease, cancer, and mental health,” she said.

Studying multiple sources of exposure

CURES takes a unique approach toward the origins of disease in the urban setting. It proposes that quality of life may be compromised due to dynamic interactions involving an individual’s genes, nutrition, and environmental stressors. The center specifically focuses on chronic low-level exposures to toxic substances, as well as psychosocial and physical stressors, that reprogram key cellular regulatory networks, which may lead to disease.



CURES, co-led by Runge-Morris, applies team-based approaches that integrate multiple disciplines to address pressing environmental health problems. (Photo courtesy of Wayne State University)



Thompson explained that core centers are hubs of intellectual integration and translation, bringing researchers together and allowing for synergy and collaboration on projects, to enhance their own research, as well as environmental health science research. (Photo courtesy of Steve McCaw)

(This story was adapted from a Wayne State University [news release](#). Joe Balintfy is a public affairs specialist in the NIEHS Office of Communications and Public Liaison.)

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Library InfoFest highlights resources for NIEHS scientists

By Simone Otto

NIEHS scientists enjoyed an opportunity to stop and think about how their data and research articles are discovered, shared, and archived, at the June 23 Library Infifest. After a warm welcome by NIEHS Deputy Director Rick Woychik, Ph.D., the keynote speaker, Todd Vision, Ph.D., described his proposed approach to connecting researchers, data, and scientific literature. Afterwards, library staff and vendors provided demonstrations of research tools available to save scientists time and effort.

Vision, associate professor of biology at the University of North Carolina at Chapel Hill (UNC), expressed dismay over the ability of the average scientist to access relevant research information in an accurate, timely, and convenient fashion, due in large part to the increasing number of scientific articles published every day.

“When I first started, an afternoon in the library, reading the targeted journals, was sufficient to keep up,” Vision said. “That has changed in the last 20 years.” With more than one million research articles published annually, it becomes increasingly important to use search engines and several databases. But are they enough?

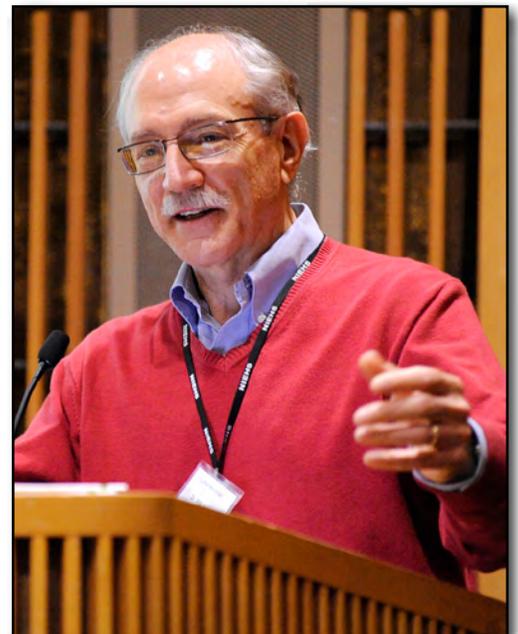
Proposed data archiving policy

According to Vision, the majority of researchers fail to disseminate the data behind their published research, even when asked. This makes replicating experiments difficult.

Vision and other scientists have proposed a joint data archiving policy (JDAP). If accepted uniformly, the benefits of JDAP could be enormous. For example, data would be preserved and usable for decades to come. A one-year embargo on access would preserve proprietary rights, with longer exemptions for sensitive data. And archiving data would be a condition of publication.



According to Vision, only 20 percent of research data that is more than 20 years old is recoverable. (Photo courtesy of Steve McCaw)



NIEHS Deputy Director Woychik oversees several programs, including the Office of Scientific Information Management, which supports the data and information needs of NIEHS staff. (Photo courtesy of Steve McCaw)

Several high-impact journals have already adopted data preservation policies. “The impact factor is positively related to the strength of the data preserving policy,” said Vision. “When the data are most reliable, we get a 30 percent citation advantage for those that do share their data.”

Vision provided an overview of one such archive, [Dryad](#), a nonprofit digital repository for data underlying the international scientific and medical literature.

Simplifying author identification with ORCID

Vision also explained the benefits of [ORCID](#), a unique numerical identifier that simplifies the tracking of a scientist’s work across their career. The identifier enables one to locate all journal articles published by a particular author, regardless of different spellings, or use of initials, while also distinguishing articles by other authors with similar names. An ORCID identifier also allows increased access to research outputs, by linking professional sites, such as LinkedIn, to a site with access to the scientist’s published work.

Information tables at the Infofest

Biomedical apps for research — Helpful iPad tools

BNA newsletters — Topics on environmental health, safety, and more (Bloomberg)

EndNote — Search, organize, share, and create with this citation tool (Thomson Reuters)

Dryad — A nonprofit repository for scientific and medical data

ORCID — A unique link between you and your research output

SciFinder — World’s largest collection of chemistry and related scientific information

Scopus — Database of citations featuring smart tools to track, analyze, and visualize research (Elsevier)

Web of Science — Multidisciplinary research, citation tracking, and more (Thomson Reuters)



Knight oversees the NIEHS library, with its extensive information resources and professional staff. (Photo courtesy of Steve McCaw)



Hugh Tilson, Ph.D., retiring editor of the NIEHS journal Environmental Health Perspectives, grapples daily with issues related to accessibility and future retrieval of research data. (Photo courtesy of Steve McCaw)



Jui-Hua Hsieh, Ph.D., research fellow in the NIEHS Molecular Toxicology and Informatics Group, and Yuxia Cui, Ph.D., a contract program analyst for the NIEHS Exposure, Response, and Technology Branch, learned about ways to ensure research data remains accessible for years to come. They also learned many ways the library staff can help them move their research forward. (Photo courtesy of Steve McCaw)

Infofest Vendors

NIEHS Library Manager Erin Knight closed the presentation by providing an overview of library services, and introducing the vendors who came to share the tools available to help manage the overwhelming growth in relevant scientific information.

NIEHS staff and vendors had exciting products to talk about (see [side bar](#)). “The InfoFest was an easy way for researchers to quickly learn about many information tools and services available,” Knight said. NIEHS researchers and members of the public can get additional assistance from the [NIEHS library](#).

(Simone Otto, Ph.D., is an Intramural Research Training Award fellow in the Ion Channel Physiology Group.)



Library fellow Caitlin Pike, left, shows an InfoFest participant how to register for a unique author identifier with ORCID. (Photo courtesy of Steve McCaw)



Knight, left, discussed the library's resources with Julie Foley, lead of the NTP Special Techniques Group. (Photo courtesy of Steve McCaw)



As a data scientist in the NIEHS Office of Scientific Information Management, Becky Boyles is keenly aware of the key role data and scientific information management plays in advancing environmental health. (Photo courtesy of Steve McCaw)



Alyson Scoltock, right, biologist in the NIEHS Molecular Endocrinology Group, received a demonstration of one vendor's information management resources. (Photo courtesy of Steve McCaw)

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2014 summer interns build experience in research and presentations

By Kelly Lenox

Students in the 2014 NIH Summer Internship Program (SIP) at NIEHS experienced a summer rich with research, seminars, workshops, and new connections, as the Institute continued its efforts to develop a new generation of skilled and inspired environmental health scientists.

Organized by Debbie Wilson, coordinator of SIP, with key involvement from Tammy Collins, Ph.D., director of the NIEHS Office of Fellows' Career Development, nearly 40 interns began their summer research projects in May and June and finished by presenting research posters in a July 24 competition.



Bill Schrader, Ph.D., NIEHS deputy scientific director, poses with poster award winners. From left, William G. Enloe High School senior Tanika Bantukul; Elon University sophomore Emma Gierman; Schrader; and Tulane University School of Public Health and Tropical Medicine graduate student Kaitlyn Gam. (Photo courtesy Steve McCaw)



Linked video:

[Learn more about the NIEHS summer internship program \(3:56\)](#)

(Launches in new window)

Download Media Player: Quicktime

Workshops combine topical studies and fun

The summer program held a rich variety of learning experiences (see [story](#)), including two workshops on hot topics among environmental health scientists. The first, on June 27, explored Developmental Origins of Health and Disease (DOHAD), and the second, on July 10, focused on Climate Change and Human Health.

At each workshop, after initial presentations, the interns worked in small groups to research specific questions. For example, in the climate change workshop, one group studied increasing rainfall in the Great Lakes region. Organized and assisted by trainees and staff (see [side bar](#)), the groups presented their findings on the problem, its causes and public health effects, and recommendations for how to mitigate those health impacts — all in only three minutes. After all groups had presented, organizers tested the interns with lively contests formatted as popular game shows.



There were two awards for NIEHS Scholars Connect Program (NCSP) interns, who are just at the beginning of their research year, and DeAsia Lewis, center; a junior at St. Augustine's University, won both — best poster and overall presentation. Cathy Jamison, right, program coordinator for NCSP (see [story](#)), made the presentation with Schrader. (Photo courtesy of Steve McCaw)

Poster session and awards sum up great learning experience

Despite organizers' efforts to control the crowd by splitting poster presenters into two groups, Rodbell Auditorium buzzed with activity July 24, as interns presented their summer research to NIEHS leadership, scientists, family, and interested staff.

It didn't take long, while mingling with the well-spoken interns, to begin to feel one was talking to tomorrow's award-winning researchers. "The quality of the interns each year is just amazing," said Thomas Kunkel, Ph.D., head of the NIEHS Replication Fidelity Group.

That excellence was celebrated in an awards ceremony and ice cream social later that afternoon. "About half of these interns were presenting posters for the first time," remarked Bill Schrader, Ph.D., NIEHS deputy scientific director and emcee of the awards ceremony. Three best poster awards were given out — one each to a high school, undergraduate, and graduate student. Following the ceremony, one last competition was held — a trivia game covering everything from pop culture to NIH arcana.



In the climate change workshop, interns worked together to research their presentation and compete in the game show afterwards. (Photo courtesy of Steve McCaw)

2014 Summer Intern Workshops

Developmental Origins of Health and Disease

Team Leader: Bonnie Joubert, Ph.D.

Team Members: Miranda Bernhardt, Ph.D.; Sophia Harlid, Ph.D.; Rui Liu, Ph.D.; Sabrina Robertson, Ph.D.; Alisa Suen; and Joy Winuthayanon, Ph.D.

Presenter: John Balbus, M.D.

Climate Change and Human Health

Team Leader: Sara Andres, Ph.D.

Team Members: Palmyra Romeo; Cathy Jamison; Joy Winuthayanon, Ph.D.; and Suchandra Bhattejee, Ph.D.

Advisor: Bono Sen, Ph.D.



The small groups in the climate change workshop enjoyed the lighter side of the exercise, as they enthusiastically competed in the game shows, which combined questions everybody knew, with some that stumped most contestants. (Photo courtesy of Steve McCaw)



Jamison helped lead the climate change workshop. (Photo courtesy of Steve McCaw)



Balbus, NIEHS senior advisor for public health and lead for the WHO-NIEHS Collaborating Centre for Environmental Health Sciences, discussed policy aspects of global environmental health and DOHAD. (Photo courtesy of Steve McCaw)



The workshop groups used handouts and online resources to research their assigned problem and prepare three-minute presentations. (Photo courtesy of Steve McCaw)



"I'm one year away from a master's in public health," said Andrew Nguyen, a student at the University of North Carolina at Chapel Hill (UNC), during the poster session. Nguyen is applying to both medical school and graduate school, as he determines which direction will best meet his goals. (Photo courtesy of Steve McCaw)



Oriana Yost, a rising senior studying animal science at North Carolina State University, described her research to Darryl Zeldin, M.D., NIEHS scientific director. Yost was recommended to the program by a mentor, Shweta Trivedi, Ph.D., a former postdoc at NIEHS. (Photo courtesy of Steve McCaw)



Daniel Gehle was interested in DNA replication research, a change from his lab work at UNC, where he's a rising senior. "I also wanted to get a feel for what research outside of academia is like," he said. (Photo courtesy of Steve McCaw)

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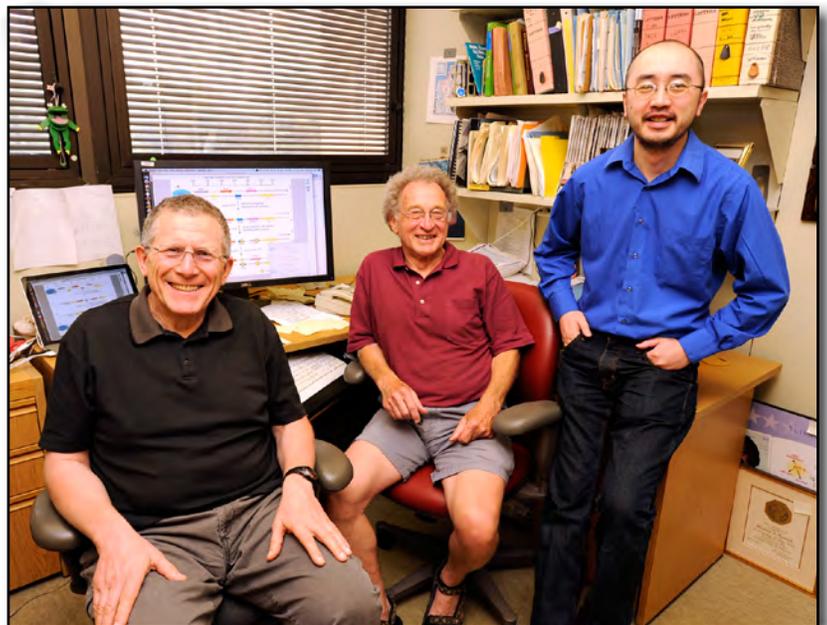
Two more trainees enter their pathway to independence

By Eddy Ball

This summer, NIEHS postdoctoral fellows Kin Chan, Ph.D., and Bret Freudenthal, Ph.D., became the latest winners of an NIH [Pathway to Independence Award \(K99/R00\)](#).

The award is designed to facilitate a timely transition from a mentored, postdoctoral research position to a stable, independent research position in two phases. The first phase (K99) provides 1-2 years of mentored support, which is followed by up to 3 years of independent support (R00).

[Chan](#), a molecular geneticist whose research is mentored by senior associate scientist [Dmitry Gordenin, Ph.D.](#), is a member of the Chromosome Stability Group, headed by lead researcher [Michael Resnick, Ph.D.](#) During the K99 phase, Gordenin will serve as mentor of the K99 phase while David Fargo, Ph.D., head of the Integrative Bioinformatics Group, will provide additional expertise as co-mentor.



Chan, standing, said of his award, "I hope that my research [to define the mutation signatures induced by poorly understood environmental carcinogens] will be of outstanding value to the mission and priorities of the NIEHS extramural research program for a long time to come." Shown with him are Gordenin, left, and Resnick. (Photo courtesy of Steve McCaw)

Freudenthal is a structural biologist in the DNA Repair and Nucleic Acid Enzymology Group, led by Samuel Wilson, M.D., who will be Freudenthal's primary mentor. Others in Wilson's group and in the Laboratory of Structural Biology will also make important contributions, in particular staff scientist William Beard, Ph.D.

The awards also provide financial support. During the R99 phase, awardees receive a salary of up to \$75,000 plus fringe benefits, and up to \$25,000 in research support each year. The R00 phase includes support up to \$249,000 per year, which includes salary, fringe benefits, and research support. Research projects funded must have a defined focus in the environmental health sciences, and be responsive to the mission of NIEHS.

In letters to the new winners, NIEHS Health Scientist Administrator Carol Shreffler, Ph.D., lauded the trainees and underscored the importance of the Pathway to Independence Award. "Your scientific credentials and training were deemed extremely meritorious..." she wrote. "NIEHS considers this K99/R00 award as the first step in your development as an important member of the NIEHS grantee community."

Productive scientists with quality mentors

Both Freudenthal and Chan are winners of Fellows Awards for Research Excellence (FARE). Along with co-authoring other papers published by their groups in leading peer-reviewed journals, they were first authors on papers based on their FARE studies. In 2013, the NIEHS Office of the Scientific Director recognized both studies as Intramural Papers of the Month.

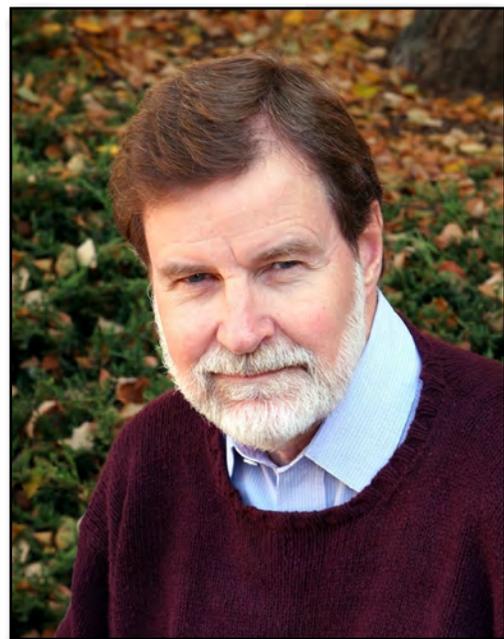
Freudenthal won his 2014 FARE for a study mentored by Wilson, utilizing advanced macromolecular crystallography, and subsequently published in the journal *Cell*. Chan won his 2012 FARE for a DNA mutation study mentored by Gordenin and Resnick, and later published in *PLOS Genetics*.

Wilson, Resnick, and Gordenin have been recognized in the past for their quality mentorship, both by their trainees and their fellow lead researchers. In addition, Wilson was honored with the prestigious 2014 Southeast Regional Collaborative Access Team (SER-CAT) Outstanding Science Award for the high scientific impact of his group's paper (see [story](#)).

Chan and Freudenthal join two other trainees awarded K99/R00 support in 2014, which could turn out to be a record year for NIEHS — Natalie Gassman, Ph.D., also of Wilson's group, and Shannon Whirledge, Ph.D., a member of the Molecular Endocrinology Group, led by John Cidlowski, Ph.D. (see [story](#)).



"I am interested in probing how DNA polymerases process oxidative DNA damage and the influence this has on larger repair complexes," said Freudenthal. "Understanding how oxidative DNA damage arising from environmental exposures is processed will identify novel steps that can be exploited to modulate repair and intervene to enhance human health." (Photo courtesy of Steve McCaw)



Wilson has authored and co-authored more than 400 research and environmental health policy publications, and has been on the editorial board of several journals. (Photo courtesy of Steve McCaw)

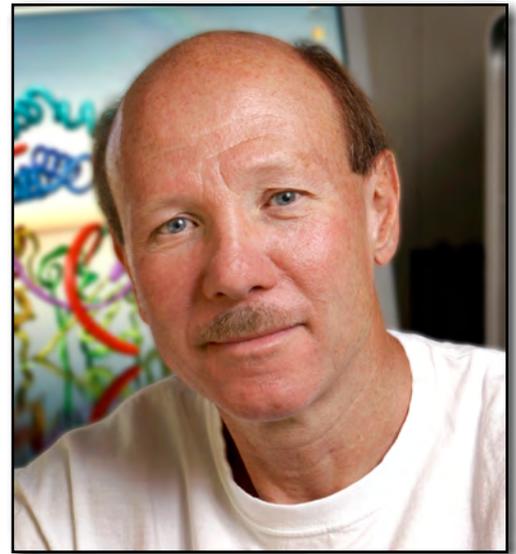
Trainees receive encouragement from NIEHS Scientific Director Darryl Zeldin, M.D., and Deputy Scientific Director Bill Schrader, Ph.D., who directs scientific training at the Institute.

Citations:

Chan K, Sterling JF, Roberts SA, Bhagwat AS, Resnick MA, Gordenin DA. 2012. Base damage within single-strand DNA underlies *in vivo* hypermutability induced by a ubiquitous environmental agent. PLoS Genet 8(12):e1003149. [Summary](#)

Freudenthal BD, Beard WA, Shock DD, Wilson SH. 2013. Observing a DNA polymerase choose right from wrong. Cell 154(1):157-168. [Story Summary](#)

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Beard served as coauthor on five of the six papers Freudenthal has published with Wilson's group. (Photo courtesy of Steve McCaw)

Three more trainees make biomedical career moves

By Jacqueline Powell

This spring and summer, three more trainees joined the ranks of NIEHS postbaccalaureate and postdoctoral fellows transitioning from their mentored experiences at the bench to the next steps in their careers. Although their destinations differ, their paths have one thing in common — each took advantage of the many career development resources available at NIEHS to complement training in the lab.

“Don’t underestimate the value of your NIEHS peer network, as more and more connections are being made through NIEHS alumni,” said Tammy Collins, director of the NIEHS Office of Fellows’ Career Development. “One of my goals is to expand the bridge between current and former trainees, particularly for the purposes of informational interviews, a key element of career planning.”

Aleksandra Adomas, Ph.D.

In May, Adomas began a career as a medical writer at MicroMass Communications Inc., in Cary, North Carolina. MicroMass specializes in healthcare marketing and provider promotion, and behavior research geared towards improving patient outcomes. Impressed by the company’s mission to better the lives of patients, Adomas had a long-standing interest in MicroMass and was enthusiastic about accepting her new position.

“After identifying MicroMass as a potential employer, I created a company-specific job alert to notify me of openings as soon as they were advertised,” she said. A phone interview for an opening last year left a positive impression, and when Adomas applied for a second position, MicroMass offered her the job she wanted.



Adomas took advantage of teaching opportunities with the NIEHS Scholars Connect program. (Photo courtesy of Steve McCaw)

Since joining the company, Adomas has worked on presentations, papers, and advertising materials. She credits her broad scientific background and extensive writing experience with giving her the skills and confidence she needed to pursue a career as a medical writer. At NIEHS, Adomas served as associate editor on the NIH Fellows Editorial Board, an editor for the journal *Epigenetics in Cancer*, and a guest writer for the NIEHS *Environmental Factor*. Impressively, she managed to handle these responsibilities alongside her research fellowship in the Laboratory of Molecular Carcinogenesis, where she investigated the role of C-terminal mutation on the GATA3 transcription factor, a mutation driver gene in breast cancer.

Adomas encourages fellows to attend NIEHS career development workshops, so they can better identify career options, pin down a career path, and gain professional experiences that give them a competitive advantage in the job market.

Kristin Lichti-Kaiser, Ph.D.

After completing her postdoctoral training in the Laboratory of Respiratory Biology, Lichti-Kaiser accepted a position with Syngenta Crop Protection as a product safety scientist. She works at Syngenta's Research Triangle Park, North Carolina, campus, where the company develops technology to help meet the world's changing needs for food, fuel, feed, and fiber. In a department focused on toxicology and human health, she is involved in assessing the safety of genetically modified crops.

With a Ph.D. in toxicology and postdoctoral fellowship focused on diabetes research, Lichti-Kaiser had not envisioned a career in agricultural biotechnology earlier in her training. However, she became acquainted with opportunities in this area, by attending the NIEHS fellows' brown bag lunch series and conducting informational reviews.

Lichti-Kaiser also pursued opportunities that would better position her for a career in the industry, including a class in good laboratory practices offered by Wake Technical Community College, a course in U.S. regulatory affairs sponsored by the North Carolina Regulatory Affairs Forum, and a regulatory affairs internship at the Duke Translational Medicine Institute.

Underscoring the importance of professional networking, an acquaintance passed along her resume, after she applied for the position online. Lichti-Kaiser successfully navigated multiple rounds of interviews, beginning with a phone interview and culminating with the presentation of a seminar on her postdoctoral research, and was offered the job.

Zachary McCaw

McCaw, a postbaccalaureate research fellow in the Laboratory of Respiratory Biology (LRB), is starting graduate school at Harvard University this fall, working towards a Ph.D. in biostatistics. He began working with Steven Kleeberger, Ph.D., in the NIEHS Environmental Genetics Group during his sophomore year at the University of North Carolina at Chapel Hill (UNC). He continued



Keeping an open mind was important for Lichti-Kaiser in recognizing opportunities in agricultural biotechnology. (Photo courtesy of Steve McCaw)



McCaw gained a solid foundation in the lab and during training sessions, which will serve him well as he goes on to pursue his doctorate in biostatistics at Harvard University. (Photo courtesy of Steve McCaw)

working in the lab throughout his undergraduate years, spending two summers in the NIH Summer Internship Program (SIP) at NIEHS. After graduating from UNC last year with a Bachelor of Science in public health, biostatistics, and quantitative biology, McCaw continued his work with Kleeberger's group.

Describing his time in the lab as a great experience that allowed him to do both lab work and biostatistical analyses, McCaw said his research at NIEHS helped him feel well prepared for graduate school interviews. He also benefitted from seminars held by SIP and LRB. McCaw is entering graduate school with an open mind to a variety of career paths that include both academia and industry.

(Former NIEHS postdoctoral fellow Jacqueline Powell, Ph.D., is a writer and analyst with Education and Training Systems International.)

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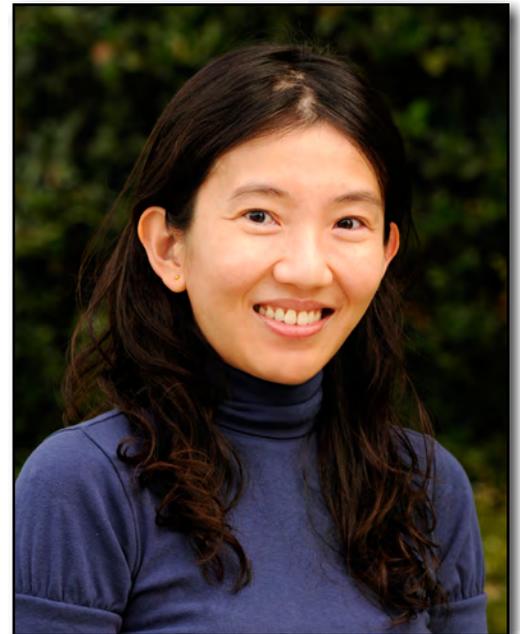
Former postdoc honored for research

By Eddy Ball

Former NIEHS and NTP trainee Pui-Ling “Melissa” Chan, D.Eng., has been recognized for her research by Southern Illinois University Edwardsville (SIUE), where she has been an assistant professor of environmental sciences since joining the university in 2011.

SIUE announced in a July 16 [press release](#) that Chan is the recipient of the 2014 Vaughnie Lindsay New Investigator Award. The award recognizes tenure-track faculty members whose scholarly activities have the promise of making significant contributions to their fields of study and to the university in general. Along with recognition, the award includes a research grant of \$12,500 from the university, for Chan to pursue her research on the blood-brain barrier response to drugs and environmental chemicals.

“Supporting young investigators who have the potential for making significant advancements in their area is important to the development of their research careers,” said Jerry Weinberg, Ph.D., associate provost for research and dean of the Graduate School at SIUE.



Chan was also awarded a [BRIDGE Fellowship Award](#) in 2013 from the Japan Society for the Promotion of Science. (Photo courtesy of Melissa Chan)

Chan's research agenda

Chan's current research focuses on understanding how the blood-brain barrier (BBB) can impact the neurological absorption of potentially harmful consumer products, such as pesticides or pharmaceuticals. The goal of her research is to fundamentally advance the field of extrapolation from *in vitro* to *in vivo* studies.

According to Chan, the preliminary results of this research will be used to improve laboratory methods used in producing these materials, and to develop useful tools and biomarkers for public health risk assessment.

During her career, Chan has published 11 peer-reviewed articles, and contributed to a book, “Endocrine-disrupting chemicals: An overview.” She has also served in various roles in several service organizations, and is the current chair of the Environmental Science Division at the Illinois State Academy of Science.

A native of Malaysia, Chan completed her doctorate in global environment engineering from Kyoto University in Japan, prior to joining a molecular toxicology group headed by former NIEHS associate director Christopher Portier, Ph.D., in 2007, where she studied environmental systems biology and climate change modeling (see [story](#)). Following Portier's departure from NIEHS, Chan joined the NTP Biomolecular Screening Branch (BSB), where she worked with BSB head Raymond Tice, Ph.D., and toxicologist Michael DeVito, Ph.D.

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Science Notebook

NIEHS researchers show low doses of arsenic cause cancer in male mice

By Robin Mackar

Michael Waalkes, Ph.D., knows how to end his career on a high note. Waalkes was head of National Toxicology Program (NTP) Laboratory until his retirement in June, after 31 years of federal service. He and his colleagues in NTP published a [paper](#) July 9 in the journal *Archives of Toxicology* with far-reaching impact, showing that mice exposed to low doses of inorganic arsenic in drinking water, similar to what some people might consume, developed lung cancer.

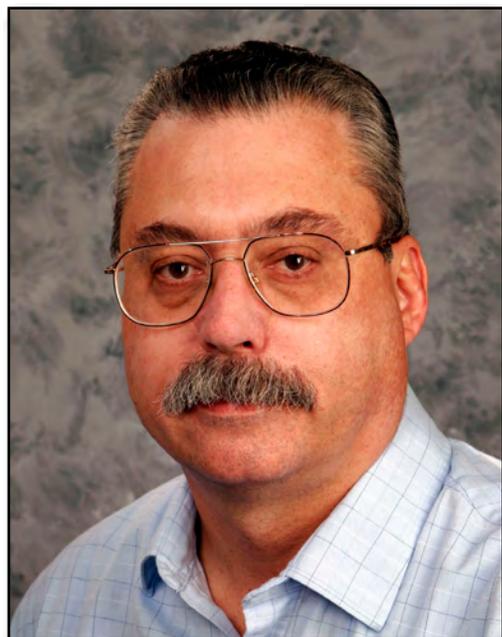
Whole life model duplicates human exposure

The Waalkes team used a model that mimics how humans are exposed to arsenic over their lifetime. Mice were given arsenic in their drinking water three weeks before breeding, as well as throughout pregnancy and lactation. Arsenic was then given to the offspring after weaning, and all through adulthood, at concentrations relevant to human exposure. The researchers then examined tumors in the adult offspring.

Concentrations in the drinking water were 50 parts per billion (ppb), 500 ppb, and 5,000 ppb. The 50 ppb dose is the lowest concentration tested in an animal study, and many researchers feel that differing rates of metabolism and excretion mean that mice need to be exposed to greater concentrations than humans to achieve similar internal doses.

“This is the first study to show tumor development in animals exposed to very low levels of arsenic — levels similar to which humans might be exposed,” said Waalkes. “The results are unexpected and certainly give cause for concern.”

Arsenic is present in the environment, both as a naturally occurring substance and due to contamination from human activity. Arsenic may be found in many foods, including grains, fruits, and vegetables, due to plant absorption from soil and water. This study focused on inorganic arsenic, which occurs in the drinking water of millions of people worldwide and is known to be a human carcinogen that targets the lung and several other sites. More information about arsenic can be found in a newly developed NIEHS [fact sheet](#).



The study is a paradigm shift for low dose studies, said Waalkes, who is known for his research capabilities and mentoring of future scientists. (Photo courtesy of Steve McCaw)



Erick Tokar, Ph.D., biologist in the NTP Inorganic Toxicology Group and a co-author on the paper, presented the new findings to Her Royal Highness Princess Chulabhorn of Thailand, founder and president of the Chulabhorn Research Institute, during her visit July 11 to NIEHS (see [story](#)). (Photo courtesy of Steve McCaw)

Findings add to growing evidence of low dose effects

More than half of the male offspring in the study developed significant increases in benign and malignant lung tumors at the two lower doses (50 ppb and 500 ppb). Female offspring also developed benign tumors at the lower concentrations. Interestingly, the researchers did not find significant increases in lung tumors in either sex at the highest dose (5,000 ppb).

“Although this is only one study, it adds to a growing body of evidence showing adverse health effects from very low exposures to arsenic, raising the possibility that no level of arsenic appears to be safe,” said Linda Birnbaum, Ph.D., director of the NIEHS and NTP.

Citation: Waalkes MP, Qu W, Tokar EJ, Kissling GE, Dixon D. 2014, Lung tumors in mice induced by “whole-life” inorganic arsenic exposure at human-relevant doses. Arch Toxicol 88(8):1619-1629.

(Robin Mackar is the news director in the NIEHS Office of Communications and Public Liaison and a regular contributor to the Environmental Factor.)

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Lead in kids’ blood linked with behavioral and emotional problems

By Joe Balintfy

Emotional and behavioral problems show up even with low exposure to lead, and as blood lead levels increase in children, so do the problems, according to an NIEHS-funded study published online June 30 in the journal JAMA Pediatrics.

“This research focused on lower blood lead levels than most other studies and adds more evidence that there is no safe lead level,” explained NIEHS Health Scientist Administrator Kimberly Gray, Ph.D. “It is important to continue to study lead exposure in children around the world, and to fully understand short-term and long-term behavioral changes across developmental milestones.”

The team of researchers included scientists at universities in the U.S. and China, as well as NIEHS lead researcher [Walter Rogan, M.D.](#), head of the Pediatric Epidemiology Group (see text box).

Measuring blood lead levels

Blood lead concentrations measured in more than 1,300 preschool children in China were associated with increased risk of behavioral and emotional problems, such as being anxious, depressed, or aggressive. The average blood lead level in the children was 6.4 micrograms per deciliter.



“Continuing monitoring of blood lead concentrations, as well as clinical assessments of mental behavior during regular pediatric visits, may be warranted,” emphasized Jianghong Liu, lead researcher. (Photo courtesy of Penn Nursing News)

While many studies to date have examined health effects at or above 10 micrograms per deciliter, this study focused on lower levels. The Centers for Disease Control and Prevention now uses a reference level of 5 micrograms per deciliter to identify children with blood lead levels that are higher than normal, and recommends educating parents on reducing sources of lead in their environment and continued monitoring of blood lead levels.

“Young children are particularly vulnerable to the toxic effects of lead, because lead can affect children’s developing nerves and brains,” said senior author [Jianghong Liu, Ph.D.](#), of the University of Pennsylvania School of Nursing in Philadelphia.

Sources of lead exposure

Lead is a naturally occurring toxic metal, but sources of lead exposure are often due to human activities, including burning fossil fuels, mining, and manufacturing. In the U.S., lead exposure usually comes from lead-containing products, such as paint, caulking, and pipe solder, in older homes. In China, lead exposure is more often related to air pollution.

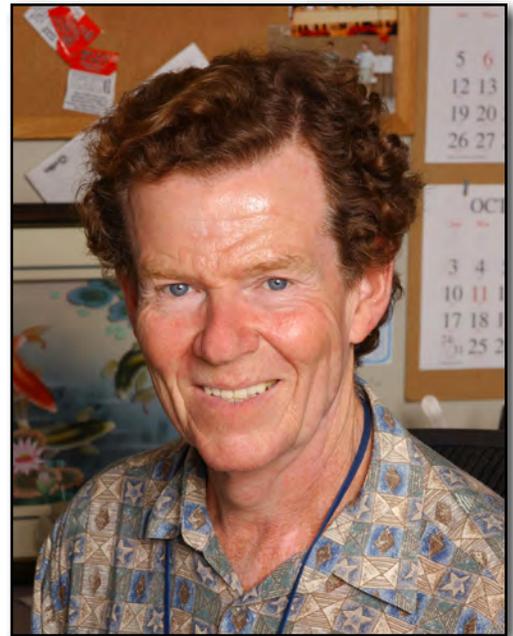
“The sources of lead exposure may explain why concentrations of lead are different,” explained Liu. “In China, we found that blood lead concentrations increased with age in preschool children. In the United States, however, blood lead concentrations increase with age in children up to 2-3 years old and then decline.”

For the study, the researchers analyzed one blood sample taken from each child between the ages of 3-5. Behavioral problems were assessed at age 6 using standardized questionnaires. The questionnaires were filled out by the children’s teachers and parents, which the authors noted is both a strength and limitation. “The study used scores from two sources, but the ratings do not provide a clinical diagnostic measure of behavioral problems,” said Liu.

U.S. studies have reported that lead exposure causes what psychologists call externalizing behavior problems, such as aggressiveness and bullying, which may lead to truancy and even jail time as children get older. In this study, children with higher blood lead levels had internalizing problems, such as anxiety and depression, as well as some externalizing problems. Though not addressed in this study, Liu said these differences could be explained by cultural, genetic, or environmental variations, or research gaps.

For more on this story, read the JAMA Pediatrics [press release](#), and the University of Pennsylvania [press release](#).

Citation: [Liu J, Liu X, Wang W, McCauley L, Pinto-Martin J, Wang Y, Li L, Yan C, Rogan WJ. 2014. Blood lead levels and children’s behavioral and emotional problems: a cohort study. JAMA Pediatr; doi:10.1001/jamapediatrics.2014.332.](#)



Rogan has been a pioneer in lead exposure research. (Photo courtesy of Steve McCaw)



Gray said, “It is well-documented that lead exposure lowers the IQ of children.” (Photo courtesy of Steve McCaw)

Pinpointing the cause and effect connections in lead exposure

Rogan, who has studied the effects of environmental chemicals, including lead, on the growth and development of children for almost 40 years, contributed to the data analysis of this paper. He said that, while there is broad agreement that lead exposure lowers IQ in kids, there is less agreement that it alters behavior.

“These things are particularly difficult to study in the U.S., where lead exposure is largely caused by deteriorated housing,” he said. “There is always the question of whether you have disentangled the lead from the setting.”

Senior author Liu turned to a former Rogan postdoc, child psychiatrist Xianchen Liu, M.D., Ph.D., of Indiana University and Shandong University in China, who in turn invited Rogan to contribute to the data analysis.

“I think Xianchen Liu and I helped frame the question, and provided Jianghong Liu some reassurance that the approach in the analysis would be acceptable to the people interested primarily in lead,” explained Rogan.

Rogan is credited with writing one of the few papers that distinguished between a direct effect of lead on behavior, and an indirect effect through lowered IQ. “That was difficult to do in the U.S. data, but a little easier in the Chinese data, because the relative strength of the associations was different,” said Rogan.

(Joe Balintfy is a public affairs specialist in the NIEHS Office of Communications and Public Liaison.)

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Predictive toxicology advances with new paper and data challenge

By Eddy Ball

In July, partners in the Tox21 consortium published a new study on pathway profiling of the Tox21 compound library, and announced a chemical toxicity data model competition.

“We are entering an exciting phase of **Tox21**,” said NIEHS and NTP Director Linda Birnbaum, Ph.D. “According to the latest count from NCATS [National Center for Advancing Translational Sciences], the consortium partners have screened the 10,000 compound library against 30 cell-based assays and produced nearly 50 million data points.”

“Now the challenge is to develop advanced predictive models for analyzing and understanding this massive amount of data,” she said. “This is an important part of our ongoing mission to improve environmental public health and prevent disease, by addressing the backlog of thousands of untested chemicals.”

Tox21

Tox21 is a collaborative effort among NIH partners NTP and NCATS, the U.S. Environmental Protection Agency, and the U.S. Food and Drug Administration.

Now in Phase II of the program, the consortium is working to develop a model for anticipating adverse responses to potentially harmful drugs and chemicals, rapidly, through *in vitro* screening, using multiple assay approaches, and prioritizing chemicals for more comprehensive testing with more resource-intensive test methods.

The new [study](#), published July 11 in Nature Publishing Group's Scientific Reports, contains the latest data emerging from screening of the Tox21 library of approximately 10,000 (10K) environmental chemicals and drugs, for agonists and antagonists of the estrogen receptor (ER) alpha signaling pathway. The 22-member team included NTP scientists, led by Biomolecular Screening Branch head Raymond Tice, Ph.D., and scientists from Tox21 consortium partner agencies (see [side bar](#)).

The Tox21 chemical toxicity data model [competition](#), launched by NCATS, is an effort to crowdsource data analysis by independent researchers, to reveal how well they can predict a compound's interference in biochemical pathways, using only chemical structure data. The compound profiling studies and data model competition are key components of the Tox21 initiative to develop next-generation predictive toxicology using quantitative high-throughput screening (qHTS) of chemicals.

Profiling potential endocrine-disrupting compounds

Using two ER reporter gene cell line assay formats, the Tox21 team screened chemicals for their effects on the ER alpha signaling pathway that may disrupt endocrine function in humans through unwanted interactions of chemicals with steroid hormone receptors.

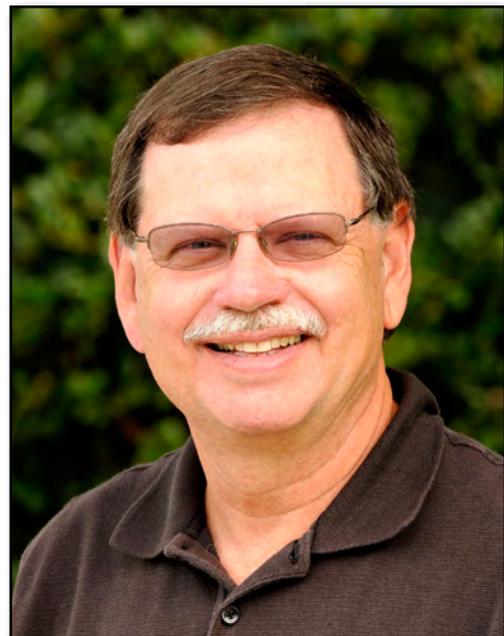
Estrogenic effects occur through the numerous ER target genes that are either upregulated (agonized) or downregulated (antagonized) in response to ligand-induced activation of ERs. Both responses to estrogen produced by the body, or to such compounds as therapeutic agents, industrial chemicals, pesticides, and plasticizers can have potentially adverse effects on development, reproduction, and metabolic homeostasis, or balance.

According to the researchers, the results of their study support the feasibility of qHTS to identify environmental chemicals with the potential to interact with the ER alpha signaling pathway. Additionally, the two different assay formats improve the confidence in correctly identifying these chemicals.

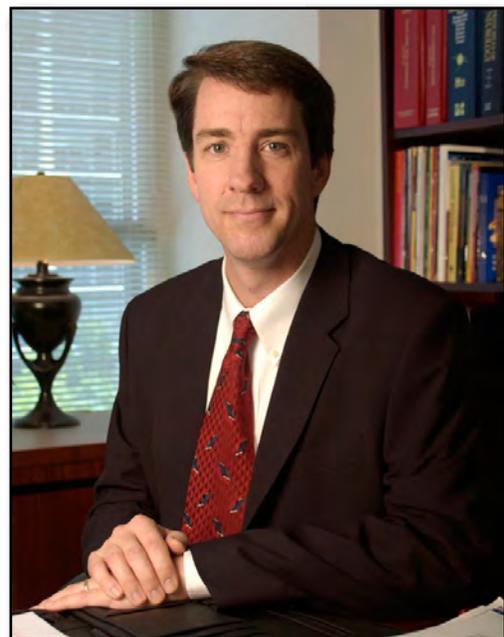
Helping the data speak a language we can understand

“The Tox21 program is a wonderful example of what can be accomplished when government agencies join forces and pool resources,” said NCATS Director Christopher Austin, M.D., in the announcement of the competition.

“Our researchers have generated more data about chemical toxicity than we can realistically analyze and understand without additional collaboration,” he explained. “Similar to many other large-scale scientific endeavors that generate public data, we have created the [2014 Tox21 data challenge](#) to crowdsource the best predictive models from researchers across the globe.”



Tice was part of the five-member team of lead researchers who designed the study, which tested the 10K library in triplicate for each assay and evaluated the performance of the two assays. (Photo courtesy of Steve McCaw)



Austin began his career at NIH in 2002 as the senior advisor to the director for translational research at the National Human Genome Research Institute. In 2012, he was appointed the first permanent director of NCATS. (Photo courtesy of NIH)

The computational model submission deadline is Nov. 14. NCATS will announce the winners in January 2015.

Citation: Huang R, Sakamuru S, Martin MT, Reif DM, Judson RS, Houck KA, Casey W, Hsieh JH, Shockley KR, Ceger P, Fostel J, Witt KL, Tong W, Rotroff DM, Zhao T, Shinn P, Simeonov A, Dix DJ, Austin CP, Kavlock RJ, Tice RR, Xia M. 2014. Profiling of the Tox21 10K compound library for agonists and antagonists of the estrogen receptor alpha signaling pathway. *Sci Rep* 4:5664.

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Cerebral palsy may have family ties

By Kelly Lenox

Researchers from NIEHS and Norway reported elevated risk of cerebral palsy (CP) for people born into families in which someone has been diagnosed with CP. In a [study](#) published July 15 in the journal *BMJ*, scientists used the Medical Birth Registry of Norway, and other national data resources, to examine family patterns in the recurrence of CP. These patterns may, in turn, point to genetic or shared environmental causes of CP.

The researchers analyzed a cohort of more than two million Norwegians, born between 1967 and 2002, for CP risk among first, second, and third degree relatives. First degree relatives are full siblings; second degree are half siblings, aunts, and uncles; and third degree are first cousins.

According to the authors, other studies have suggested a familial risk for CP, but none has considered the full range of relationships within a single population, including full and half siblings.



Tollanes, who is currently a postdoctoral fellow at the University of Bergen in Norway, is due to join NIEHS in August as a guest researcher in the Epidemiology Branch. (Photo courtesy of Mette Tollanes)



Linked video:
[Watch Allen Wilcox, M.D. h.D., discuss how the environment affects fertility, pregnancy, and childhood development. \(04:54\)](#)

(Launches in new window)

Download Media Player:  Flash [↗](#)

High-quality resource yields surprising results

“The national registries in Norway provide an incredible resource for studying family patterns of risk,” said [Allen Wilcox, M.D., Ph.D.](#), head of the NIEHS Reproductive Epidemiology Group and one of the study’s authors. “We were particularly surprised to see the gradient of cerebral palsy risk — highest for twins, and decreasing as the family relation became more distant, even out to first cousins. This pattern suggests there are important family-related causes of CP still waiting to be discovered.”

In a *BMJ* [editorial](#) published the same day, Peter Rosenbaum, Ph.D., professor of pediatrics and Canada Research Chair in Childhood Disability at McMaster University in Ontario, characterized the study as excellent. “The Norwegian study suggests that genes, a shared early familial environment, or perhaps both, are important

contributors to overall risk, although many other as yet unidentified causative factors remain,” he wrote. “Epidemiological studies such as the one by [first author Mette] Tollanes and colleagues are the cornerstone of research into the causes of cerebral palsy.”

Increased risk for closer relatives

Researchers found a fifteenfold increased risk among twins when one had CP, a ninefold increase among younger full siblings if an older sibling had CP, and a threefold risk among half siblings. Remarkably, the study also found a weak association among first cousins.

Babies who subsequently develop CP often had difficult deliveries. For many years, CP was regarded as the result of anoxia, or a lack of oxygen, during delivery. More recently, CP has been suggested to be a condition that precedes delivery and may, in fact, be the cause of difficult delivery, rather than the result. Results from the Norwegian data support the idea that CP has more complex causes that precede birth.

[Dale Sandler, Ph.D.](#), head of the NIEHS Epidemiology Branch, agrees. “While many of us have thought that cerebral palsy was a mechanical problem at birth, it is actually more than that — and genetic, biologic, and possibly environmental factors may play a role,” she said.

Citations:

[Tollanes MC, Wilcox AJ, Lie RT, Moster D](#). 2014. Familial risk of cerebral palsy: population based cohort study. *BMJ* 349:g4294.

[Rosenbaum, P](#). 2014. What causes cerebral palsy? *BMJ* 349:g4514.

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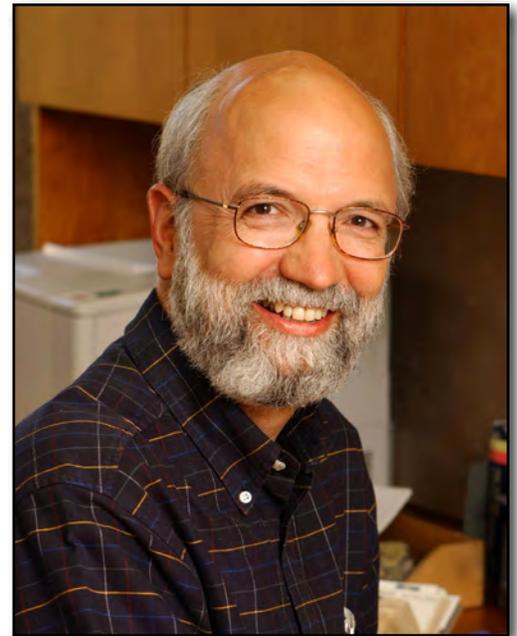
Rogan honored for lifetime achievement

By Eddy Ball

NIEHS lead researcher Walter Rogan, M.D., will receive an award this fall for his significant and lasting contributions in maternal and child health (MCH) epidemiology.

[Rogan](#), who is head of the Pediatric Epidemiology Group, at NIEHS, will receive the Zena Stein and Mervyn Susser Award for Lifetime Achievement during an awards luncheon Sept. 18 at the [2014 CityMatCH Leadership and MCH Epidemiology Conference in Phoenix](#). The purpose of the award is to recognize an internationally or nationally known expert, or team of experts, who have contributed broadly and substantially to the advancement of the field of MCH epidemiology throughout their careers.

The award is especially significant, because it is presented by the Coalition for Excellence in MCH Epidemiology, which is made up of representatives of 16 national health organizations, to only one recipient a year, and only when deemed merited, so not necessarily every year. It was named in honor of two MCH pioneers — Columbia University epidemiologists [Zena Stein, M.D.](#), and [Mervyn Susser, M.D., D.P.H.](#), who is also Stein’s husband and collaborator.

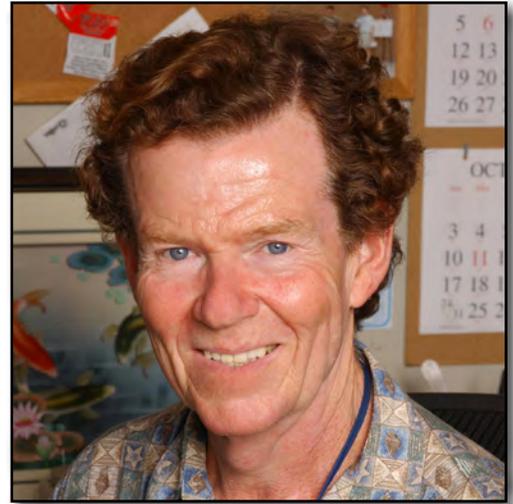


The Wilcox group works to extend the study of environmental exposures to the area of human reproduction. Wilcox has a long-standing collaboration with colleagues at the University of Bergen and within the Norwegian public health community. (Photo courtesy of Steve McCaw)

Writing on behalf of the coalition in a July 10 message, awards committee chair Mark Klebanoff, M.D., explained, “There was unanimous consensus that Walter’s work to generate new data, turn that data into useable information, and apply that information to policy over a nearly 40-year career was monumental and deserved recognition.”

In her message of congratulations, NIEHS Epidemiology Branch head Dale Sandler, Ph.D., wrote to Rogan, “This is a terrific honor and well deserved.”

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Rogan’s latest publication is a study of blood lead and emotional and behavioral problems in a cohort of Chinese children (see [story](#)). He was nominated for this latest award by NIEHS colleague Allen Wilcox, M.D., Ph.D. (Photo courtesy of Steve McCaw)

Study reveals remarkable genetic diversity across Mexico

By Staton Wade

In the largest genetic study of Native Americans to date, researchers have discovered a level of genetic diversity across Mexico that is as extensive as that observed between Europeans and Chinese. This unexpected diversity may have important implications for diagnosis and treatment of diseases, such as lung disease, that rely on clinical thresholds for disease diagnosis that differ depending on ethnicity.

Carlos Bustamante, Ph.D., of Stanford University, and Esteban Burchard, M.D., of the University of California, San Francisco, led the [study](#), published in the June 13 issue of the journal *Science*. Bustamante and Burchard collaborated with an international team of researchers from New York, the UK, Mexico, Puerto Rico, France, and NIEHS.



“As we deploy genomics technology in previously understudied populations like those of Latin America, we discover remarkable richness in the genetic diversity of these important groups and why it matters for health and disease,” Bustamante said. (Photo courtesy of Deneb Semprum)



Linked audio:
[Listen to a podcast from the journal Science in which Bustamante discusses the study’s findings. \(18:18\)](#)

(Launches in new window)

Download Media Player:  Quicktime 

Modern mestizos reflect Native American genetic substructure

The researchers analyzed one million genetic loci in 511 Native Mexican individuals, from 20 indigenous populations, as well as 500 admixed mestizos, or Mexicans with mixed ancestry, from 10 Mexican states. While previous Native American studies have been limited to one gene or a small population size, this study provided the kind of large-scale data that until now has been available only for populations of European descent.

What the researchers found was a surprising amount of genetic diversity, reflecting the high degree of isolation between indigenous groups in Mexico. Interestingly, the same genetic substructure was observed in metropolitan populations of mestizos, despite generations of mixing with Europeans and Africans.

Implications for lung disease diagnosis

To understand the possible health implications of Mexican genetic diversity, the researchers turned to data from genome-wide association studies of asthma, performed in Mexican and Mexican-American populations.

NIEHS researcher Stephanie London, M.D., Dr.P.H., led one of those [studies](#), which aimed to identify genetic loci associated with the response to ozone in asthmatic children in Mexico City. “We have been collaborating with co-first author Chris Gignoux, Ph.D., and Burchard for many years, to examine admixture in our Mexico City study, and how it can contribute to knowledge of both population genetics and the identification of disease genes,” said London.

This latest collaboration allowed the researchers to predict clinical measures of lung function across the diverse populations of Mexico, based on ancestry. The results of the new study revealed that individuals from Yucatan in the east and Sonora in the west vary greatly in measurements of normal lung function. This variation is relevant when diagnosing lung diseases such as asthma and chronic obstructive pulmonary disease.

The authors also pointed out that the availability of rich genetic data sets in previously understudied populations, such as Native Americans, will greatly improve large-scale genetic mapping efforts, such as the HapMap and 1000 Genomes projects.

Citation: Moreno-Estrada A, Gignoux CR, Fernandez-Lopez JC, Zakharia F, Sikora M, Contreras AV, Acuna-Alonzo V, Sandoval K, Eng C, Romero-Hidalgo S, Ortiz-Tello P, Robles V, Kenny EE, Nuno-Arana I, Barquera-Lozano R, Macin-Perez G, Granados-Arriola J, Huntsman S, Galanter JM, Via M, Ford JG, Chapela R, Rodriguez-Cintron W, Rodriguez-Santana JR, Romieu I, Sienra-Monge JJ, del Rio Navarro B, London SJ, Ruiz-Linares A, Garcia-Herrera R, Estrada K, Hidalgo-Miranda A, Jimenez-Sanchez G, Carnevale A, Soberon X, Canizales-Quinteros S, Rangel-Villalobos H, Silva-Zolezzi I, Burchard EG, Bustamante CD. 2014. Human genetics. The genetics of Mexico recapitulates Native American substructure and affects biomedical traits. *Science* 344(6189):1280-1285.

(Staton Wade, Ph.D., is an Intramural Research Training Award fellow in the NIEHS Chromatin and Gene Expression Group.)



“Our genetic and lung function data from Mexico were combined with data from Dr. Burchard’s U.S.-based study of Mexican-Americans, to examine the contribution of ancestry to the lung function parameters commonly used in clinical medicine, for diagnosing and monitoring diseases,” London said. (Photo courtesy of Steve McCaw)

Keystone seminar highlights multiple chemical exposures

By Robin Arnette

Researchers have long known that metals, such as arsenic and lead, can be toxic to the body. The scientific literature is full of articles relating the negative human health effects from exposure to one of these elements. However, Birgit Claus Henn, S.D., wants to understand the physiological repercussions, in particular, the neurodevelopmental impacts, produced by exposure to combinations of metals.

[Claus Henn](#), a research associate in the Department of Environmental Health at Harvard School of Public Health, talked about her work July 15 as part of the NIEHS Keystone Science Lecture Seminar Series. Caroline Dilworth, Ph.D., and Danielle Carlin, Ph.D., health scientist administrators in the NIEHS Division of Extramural Research and Training (DERT), co-hosted the seminar, in support of the NIEHS [strategic plan](#) goal on combined exposures.



Claus Henn's interest in simultaneous metal exposure began during her postdoctoral training at the Harvard Superfund Research Center. (Photo courtesy of Steve McCaw)

Multiple metal exposure impacts brain development

Claus Henn prefaced her presentation by saying the brain is the most complex system in the body, and its complexity is due in large part to how it develops. The brain undergoes a series of specific development stages — proliferation, migration, selective cell loss, synaptogenesis, and myelination — that begin prenatally and continue into early adulthood. If any phase is disrupted by toxic insult, subsequent downstream processes will be impaired.

“The prevalence of autism worldwide has increased 20-30 times since the 1970s, and diagnosis rates for ADHD have increased 3-5 percent every year since the late 1990s,” she said. “Some increases are due to changes in disease definition and an increase in disease recognition, but there are other determinants, such as hereditary factors, gene-environment interactions, and chemical exposures.”

Data from other labs indicate that metals tend to interact with each other. Claus Henn and colleagues previously studied a cohort of Mexican children exposed to manganese and lead. Children with high levels of manganese had lower neurodevelopment scores and experienced lead toxicity, compared to children with lower manganese in their blood.

Tar Creek, Oklahoma and Brescia, Italy

More recently, Claus Henn and colleagues conducted two studies examining children who lived near sites that exposed them to multiple metals simultaneously.

Tar Creek, Oklahoma, is a Superfund site, and the researchers tested prenatal exposure to manganese, lead, and arsenic using maternal blood from 225 mother and infant pairs. The scientists collected the mothers' blood at time of birth and assessed neurodevelopment at age 2.

Using weighted quantile sum regression and standard regression models, the research team determined that children with the most metals in their bodies performed poorly on performance tests of mental development. In addition, the models suggested that the largest cause — 70 percent — of poor mental development was due to manganese exposure, with 25 and 5 percent attributed to lead and arsenic, respectively.

The Brescia, Italy, region has long had a ferroalloy industry and is also an area of elevated Parkinson's disease and Parkinson-like syndrome. Claus Henn's team measured exposure to manganese, lead, copper, and chromium in 497 children, aged 11-14, living in the region.

The children completed an 87-item behavior self-assessment, including hyperactivity, anger control, and inattention. Claus Henn used Bayesian kernel machine regression to determine that the amount of manganese in their bodies was associated with degree of changes in self-reported ADHD-like behaviors, and varied by lead levels. Copper and chromium did not appear to be associated with behavior, or to influence the manganese-behavior association.

Thaddeus Schug, Ph.D., also a DERT health scientist administrator, attended the talk. He believed Claus Henn's studies will play an important role in environmental research. "Birgit's innovations in statistical modeling provide us with the opportunity to analyze whether coexposure to metals causes more severe impacts on neurodevelopment than exposure to the individual metals alone," Schug said.

Claus-Henn received a National Institutes of Health Pathway to Independence Award and has since parlayed that research into a career in pediatric environmental health. She will begin a faculty position at Boston University in January 2015.

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Promising Superfund trainees receive K.C. Donnelly award

By Sara Mishamandani

Five exceptional NIEHS-funded Superfund Research Program (SRP) trainees received a 2014 [K.C. Donnelly Externship Award Supplement](#) to enrich their research in environmental health science.

Now in its fourth year, the annual award was established to honor environmental health researcher and longtime SRP grantee Kirby (K.C.) Donnelly, Ph.D., who died in 2009 after a distinguished career with the Department of Environmental and Occupational Health at the Texas A&M University System Health Science Center School of Rural Public Health.



"Dr. Claus Henn's work is a great example of how environmental epidemiologists are beginning to address exposure mixtures — an important area of emphasis under the NIEHS strategic plan and for the field at large," said Dilworth (Photo courtesy of Steve McCaw)

Andres Cardenas

Andres Cardenas is a doctoral student at the Oregon State University (OSU) SRP center under the guidance of Molly Kile, Ph.D., Sc.D. Cardenas will conduct an eight-week externship at the Dartmouth College SRP center with Margaret Karagas, Ph.D., and Carmen Marsit, Ph.D. He will join them in their study of prenatal effects of metal mixtures on a birth cohort in New Hampshire. Cardenas will apply and validate newly developed methods in environmental and molecular epidemiology research to adjust for cellular variability when measuring methylation of DNA extracted from whole blood and other tissues. He will also apply this new biostatistical method to measure specific cell types in blood.

Andrea Gonzalez

Andrea Gonzalez is a master's degree candidate at the University of Puerto Rico Graduate School of Public Health, part of the Northeastern University SRP center, under the guidance of Jose Cordero, Ph.D. Gonzalez will conduct a 12-week externship at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, with Victor De Jesus, Ph.D., head of the Biochemical Mass Spectrometry Laboratory, within the Newborn Screening and Molecular Biology Branch. Gonzalez will work to develop an assay to detect a biological marker of inflammation in newborns, using previously collected blood spot samples. The methods she learns at the CDC will be applied to ongoing work at the Northeastern SRP center, to determine environmental factors that contribute to preterm birth in Puerto Rico.

William Klaren

William Klaren, a doctoral student at the University of Iowa SRP center, studies the connection of micronutrients to polychlorinated biphenyl (PCB) toxicity, under the guidance of Larry Robertson, Ph.D. For his externship at the U.S. Department of Energy Argonne National Laboratory Advanced Photon Source in Lemont, Illinois, he will work with Stefan Vogt, Ph.D., using X-ray fluorescence microscopy to determine changes in distribution of metals in the body following exposure to a specific form of PCBs. X-ray fluorescence microscopy offers a way to spatially visualize the micronutrient distribution. This study will enhance Klaren's ongoing research at the University of Iowa.



“Working with this highly dynamic group of diverse scientists and students at the Dartmouth SRP will enrich my personal and academic growth and leave a lasting mark on my career,” said Cardenas. (Photo courtesy of Andreas Cardenas)



“The K.C. Donnelly fellowship offers a unique opportunity to train at the CDC, to learn the most cutting-edge laboratory techniques,” said Gonzalez. “This will prepare me better to develop a research track on environmental factors linked to preterm birth.” (Photo courtesy of Andrea Gonzalez)



“One aspect of toxicology that I am fascinated by is its multifactorial and multidisciplinary nature,” said Klaren. “This externship will provide an interesting perspective from a different discipline, and provide me with an opportunity to collaborate with experts.” (Photo courtesy of William Klaren)

Christopher Olivares

Christopher Olivares is a doctoral student from the University of Arizona SRP center, working under Jim Field, Ph.D., and Reyes Sierra, Ph.D. Olivares' current research explores how nitroaromatic pollutants are biotransformed in soils, and the toxicity implications of these transformations to microorganisms and multicellular organisms. Olivares will be doing a five-week externship with Robert Tanguay, Ph.D., at the OSU SRP center, to conduct high-throughput zebrafish ecotoxicity assays using nitroaromatic compounds and their transformation products.



“With the K.C. Donnelly externship, I will expand my research scope, by learning and utilizing the automated zebrafish ecotoxicity assay,” said Olivares. “This experience will expand my research vision and will help me develop professional networks to start my career as a researcher.” (Photo courtesy of Christopher Olivares)

Vivien Taylor

Vivien Taylor, Ph.D., is a postdoctoral researcher at the Dartmouth College SRP center, under the mentorship of Brian Jackson, Ph.D. Taylor will conduct her externship at the U.S. Environmental Protection Agency (EPA) laboratory in Narragansett, Rhode Island, where she will be investigating strategies for sampling the bioavailable fraction of mercury and methylmercury in estuaries. Sampling techniques will be tested over a range of salinity and dissolved organic matter concentrations. Robert Burgess, Ph.D., from the EPA Office of Research and Development Atlantic Ecology Division, will serve as her mentor.

Celebrating a renowned mentor and scholar

Donnelly was a dedicated mentor to his students and postdoctoral researchers, instilling the importance of applying knowledge and findings to improve the health of communities exposed to environmental contaminants. To honor Donnelly, the award supports SRP graduate students and postdoctoral fellows who are pursuing transdisciplinary research and emphasizes the importance of research application and collaboration to promote human health.

The award provides the SRP trainees with up to \$10,000 to fund supplies, travel, housing, and costs for research, training, and collaboration at other SRP centers, government laboratories, and state, local, or tribal agencies, for up to three months.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)



“This experience will allow me to develop a new technique and skillset for studying mercury behavior,” said Taylor. “The collaboration between Dartmouth SRP and the EPA will also be valuable, because both groups have been monitoring contaminants in New England estuaries.” (Photo courtesy of Vivien Taylor)

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Biologist uses art to further amphibian limb deformity research

By Kelly Lenox

Art and science work together to enhance understanding of the causes of amphibian limb deformities in the work of Brandon Ballengee, Ph.D., who presented an NTP seminar July 17 on “Predation-induced Limb Deformities in Southern Quebec Amphibians.”

In response to a rash of discoveries of malformed frogs, NTP researched whether chemical exposures could account for the malformations, a project initiated by a 1997 NIEHS public workshop, according to seminar host Stephanie Smith-Roe, Ph.D., genetic toxicologist with NTP. “Ballengee’s seminar was an opportunity to revisit the field,” Smith-Roe said. “We are keenly interested in understanding how chemicals affect various organisms, because that can inform how those same chemicals might affect human health.”

Ballengee, a visiting scientist at the McGill University [Redpath Museum](#) in Montreal, was the first to report that selective predation by dragonfly nymphs caused missing limbs in anurans, or frogs and toads. In addition to discussing his findings, Ballengee shared some of the ways he uses art and participatory research, or citizen science, to advance research and awareness of ecological concerns.



Ballengee answered a question about why hind limbs appear to be targeted by predators. “In the case of anurans, as the legs emerge, forelimbs are protected by the gills,” he explained. Additional factors may involve nutrient content, easier removal, “Or, maybe they’re more tasty,” he added, laughing. (Photo courtesy of Steve McCaw

Linked video:
[Watch as Ballengee, in a ScienceFriday video, discusses the artworks that emerge from his scientific research. \(2:15\)](#)
(Launches in new window)

Download Media Player: Flash [↗](#)

Dragonfly nymphs with a taste for tadpoles

Awareness of amphibian limb deformity has been building since the 1990s, and researchers looked for causes in chemical contamination, or impacts of endocrine-disrupting chemicals. While this work has resulted in reports of possible reasons for deformed and multiple limbs, there have been few insights into missing limbs.

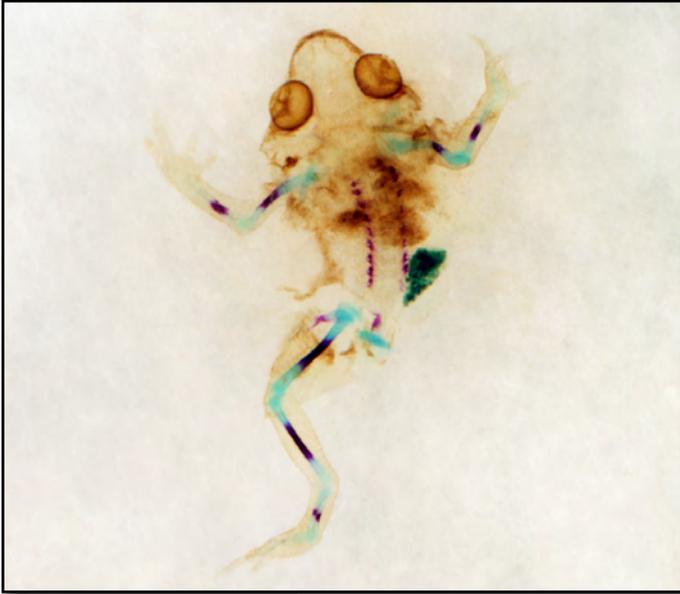
Ballengee, in a [study](#) published in 2009, reported that dragonfly nymphs prey on tadpoles, particularly on the developing hind limbs. He conducted his research in wetlands degraded by pollutants, where the number of species able to survive is diminished. This may account for the increased predation on anurans. Ballengee speculated that perhaps because the wounds heal without leaving a scar, predation was overlooked as scientists concentrated on developmental causes, rather than selective predation.

Exploring how art and science can further each other

Ballengee has worked in several locations, including Slovenia, Italy, Ireland, and England, to train the public in what he terms participatory biology. Volunteers are trained to catch, document, and sort specimens, but Ballengee does the scoring himself, to preserve data quality. Such assistance enables him to collect more data than he could alone, with the added benefit of raising awareness among participants regarding environmental risks to amphibians in particular, and the environment more generally.

His own artwork also raises awareness. As he worked with the frogs in the lab, Ballengee became interested in the artistic possibilities of the images (see photos). Beyond the prints, Ballengee creates sculptural installations, which concern changes in aquatic ecosystems that affect all species, including fish and mammals.

Art exhibits have allowed Ballengee to recruit citizen scientists among groups of people who may not think they are interested in science, but become engaged through his art, thus spreading scientific knowledge and experience among groups of people who may not otherwise be reached.



“DFBB, Khaos” 2009/10. Unique IRIS print on watercolor paper. Cleared and stained missing limb English toad from Yorkshire, England in scientific collaboration with Richard Sunter. Title by the poet KuyDelair. 47 x 35 in. (Photo courtesy of Ballengee and Ronald Feldman Fine Arts, New York, NY)



“DFA 204:Erebus” 2013. Unique Iris print on Arches watercolor paper. Cleared and stained North American green frog collected in North Hempstead, New York in scientific collaboration with Peter Raymond Warny. 46 x 34 in. (Photo courtesy of Ballengee and Ronald Feldman Fine Arts, New York, NY)



“DFA 83, Karkinos” 2001/07. Unique digital-C print on watercolor paper. Cleared and stained Pacific tree frog collected in Aptos, California. In scientific collaboration with Stanley K. Sessions. Title by the poet KuyDelair. 46.5 x 34.5 in. (Photo courtesy of Ballengee and Ronald Feldman Fine Arts, New York, NY)



“DFA 186: Hades” 2012. Unique digital-C print on watercolor paper. Cleared and stained Pacific tree frog collected in Aptos, California in scientific collaboration with Stanley K. Sessions. 46 x 34 in. (Photo courtesy of Ballengee and Ronald Feldman Fine Arts, New York, NY)

PEPH webinar highlights environmental health literacy

By Audrey Pinto

NIEHS has long championed communication strategies and health messages aimed at building public awareness of the effects of environmental exposures on human health and reinforces that commitment through the NIEHS [2012-2017 Strategic Plan](#).

Through the Partnerships for Environmental Public Health (PEPH) program, NIEHS also highlights the important contributions grantees make to environmental health literacy (EHL).

To initiate a broader discussion, PEPH organized a June 24 webinar on the topic, with two recognized experts in the fields of health and environmental literacy. [Michael Paasche-Orlow, M.D.](#), of the Boston University School of Medicine, and [Anna Hoover, Ph.D.](#), of the University of Kentucky (UK) College of Public Health, discussed the definitions and metrics used to measure EHL. The presenters highlighted the relationship between health literacy and health outcomes, and how this knowledge may be applied to the emerging field.

Building a framework and working definition

Paasche-Orlow discussed the importance of developing a clear, workable definition of EHL. “When launching a new endeavor like EHL, the definition should be operational and flow into tool development and measurement,” he said.

He also noted the need to develop a conceptual model to examine causal pathways between EHL and health outcomes. “It should include input from multiple disciplines and community-based organizations, to identify the appropriate skills, tasks, and contexts that work within the EHL domain to achieve successful outcomes.”

At the intersection of environmental literacy and health literacy

Hoover proposed that the definition of EHL should draw from the convergent themes of health literacy and environmental literacy. “EHL requires a multidisciplinary team to develop, craft, and share important messages about the environment, so that the public and policy makers can make informed decisions,” she said.

“This is an exciting time to be involved in this emerging field, and we have many opportunities to provide intentional development in defining EHL,” she continued. “We have a lot of work to do to promote a basic understanding of environmental health issues that can support evidence-based decisions at the individual and community levels.”

(Audrey Pinto, Ph.D., is technical editor for the journal *Environmental Health Perspectives*.)

PEPH annual meeting to focus on EHL

The PEPH annual meeting will bring together multidisciplinary teams to examine the issue of EHL. The three-day event will take place Sept. 22-24 at NIEHS.

For further information and details about the meeting, see the [2014 PEPH annual meeting](#) website.





With support from the National Cancer Institute and National Institute on Minority Health and Health Disparities, Paasche-Orlow employs behavioral informatics to empower people with limited health literacy to overcome literacy barriers, both in terms of personal health and informed consent. (Photo courtesy of Angelo Volandes)



Hoover is deputy director of the [Public Health Practice-Based Research Networks National Coordinating Center](#). She also leads communication and translation efforts for the NIEHS-funded Superfund Research Program at UK. (Photo courtesy of Anna Hoover)

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SRP and EPA collaborate on passive sampling devices

By Sara Mishamandani

NIEHS-funded Superfund Research Program (SRP) scientists are making sure devices for hazardous site assessment and cleanup get into the hands of end users, by working closely with colleagues at the U.S. Environmental Protection Agency (EPA), as well as other partners.

A course at the 23rd National Association of Remedial Project Managers (NARPM) Training Program June 16-20 in Atlanta (see [article](#)) provided a foundation to collaborate on the adoption of SRP technologies that measure bioavailability of contaminants — an EPA priority.

Bioavailability refers to the amount of a substance that can be absorbed or used by living organisms. As a result of an SRP targeted research program begun in 2011, several SRP grantees are now developing breakthrough designs for practical and cost-effective passive sampling devices that target the most relevant contaminants.

A forum to facilitate implementation of tools

The course brought these technology developers together with EPA passive sampling experts, and included case studies from EPA remedial project managers (RPMs), who are early adopters of some of the innovative technologies (see side bar). Heather Henry, Ph.D., health scientist administrator in the NIEHS Hazardous

Substances Research Branch, and Matthew Lambert of the EPA Office of Superfund Remediation and Technology Innovation (OSRTI), co-organized the course, designed to combine technical research with practical implementation steps.

“This exchange is an iterative process, so forums like these allow technology developers to learn ways to improve their devices for practical use and get the word out about how to properly use new technologies,” Henry said.

“The information provided by researchers and RPMs helped me to frame the sediment and contaminant processes, explained how to use passive sampling devices to sample for contaminants, and provided some common challenges in characterizing a site and some options to design the remediation system,” said Brian Lewis, a course participant and head of the California Department of Toxic Substances Control Geological Services Unit.

Continuing the discussion

Henry and Lambert will continue to promote information exchange between technology developers and RPMs who need passive sampling devices and can provide input on practical issues in their application. The course will be the basis of a webinar series in the fall, designed to reach a broader audience.

“This is a pivotal time for the future success of passive sampling device use in environmental sampling,” said Henry. “Continuing this dialogue is essential to reinforcing the confidence of users that site management decisions, supported by passive sampling device data, are truly protective of human and ecological health.”



“Bringing together all stakeholders at this early stage of technology transfer provides an opportunity for technology developers to better meet user needs and improve guidance documents,” Henry said. (Photo courtesy of Steve McCaw)

Course instructors and development team

Heather Henry, Ph.D. — Course Lead

Matthew Lambert — Course Lead

Robert Burgess, Ph.D., EPA Office of Research and Development

Mark Cantwell, EPA Office of Research and Development

Upal Ghosh, Ph.D., University of Maryland, Baltimore County

Marc Greenberg, OSRTI Environmental Response Team

Karl Gustavson, Ph.D., U.S. Army Corps of Engineers, Engineer Research and Development Center

Judy Huang, EPA Region 9

Keith Maruya, Ph.D., Southern California Coastal Water Research Project

Rachelle Thompson, EPA Region 9



James Smith of EPA Region 4, left, and Ghosh discussed passive sampling methods during a course break. Smith is using the SediMite remediation technology, developed by Ghosh with SRP funding, at the Turkey Creek Superfund site in Mississippi. (Photo courtesy of Heather Henry)



From left, Gosh, Henry, Thompson, Gustavson, Burgess, Maruya, Huang, Cantwell, Lambert, and Greenberg served as instructors and development team of the well-received NARPM course. (Photo courtesy of Heather Henry)

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

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This month in EHP

The August issue of Environmental Health Perspectives (EHP) focuses on advances in the study of harmful algal blooms (HABs), and public communication successes and challenges during environmental crises, with the West Virginia chemical spill into the Elk River as a case in point.

Keeping Tabs on HABs: New Tools for Detecting, Monitoring, and Preventing Harmful Algal Blooms

Emerging technologies enable researchers to study the ecology of harmful algal blooms, in both fresh and saltwater environments, more precisely and efficiently than ever before. Improved communication capabilities, higher-resolution satellite imagery, and smaller, more powerful sensors have contributed to significant advances in recent years, at the same time that HAB activity has escalated worldwide.

Crisis and Emergency Risk Communication: Lessons From the Elk River Spill

In the chaos of an unfolding environmental crisis, the public's urgent need for accurate, credible information sometimes goes unmet. The January 2014 chemical spill in West Virginia's Elk River is a case in point. The story of the Elk River spill provides valuable examples of public communications that worked well, and improvements that can be applied next time a disaster occurs.

Featured research and related news articles this month include:

Heat-Related Mortality and Adaptation to Heat in the United States — Learning to Take the Heat: Declines in U.S. Heat-Related Mortality

Prenatal Polybrominated Diphenyl Ether Exposures and Neurodevelopment in U.S. Children Through 5 Years of Age: The HOME Study — More Evidence for PBDEs as Neurotoxicants: Cohort Study Corroborates Earlier Findings

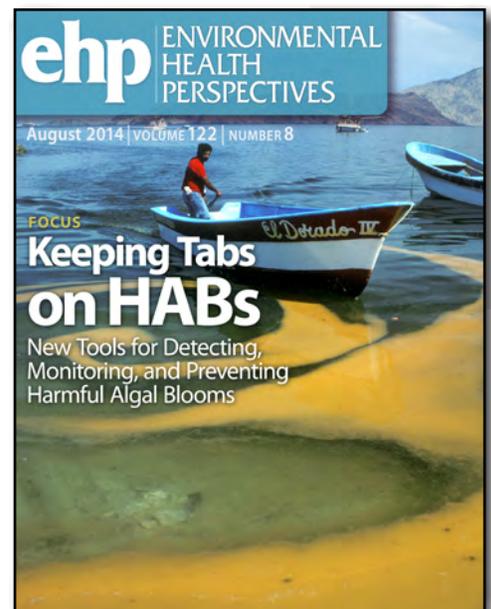
Arsenic Thiolation and the Role of Sulfate-Reducing Bacteria from the Human Intestinal Tract — Fire in the Belly? Sulfur-Reducing Gut Microbes Fuel Arsenic Thiolation

Bisphenol A and Reproductive Health: Update of Experimental and Human Evidence, 2007-2013 — BPA and Reproductive Health: Reviewing the Current State of the Science

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<http://twitter.com/ehponline>



Extramural papers of the month

By Nancy Lamontagne

- Broccoli sprout beverage helps detoxify air pollutants
- The effects of early-life air pollution exposure on brain development
- Enhancing vesicular packaging may offer new therapeutic target for Parkinson's
- Potential treatment for mustard gas skin exposure

Read the current Superfund Research Program [Research Brief](#). New issues are published on the first Wednesday of each month.

Broccoli sprout beverage helps detoxify air pollutants

Research funded in part by NIEHS has shown that drinking a broccoli sprout beverage daily can enhance the detoxification of some airborne pollutants. This inexpensive food-based intervention may provide a way to decrease the long-term health risks of air pollution.

The researchers conducted a clinical trial that included 291 men and women living in a rural farming community in Jiangsu Province, China, which experiences high levels of air pollution, due to its proximity to Shanghai. Broccoli sprouts provide a good source of glucoraphanin, which is converted to sulforaphane in the body. Sulforaphane has been shown to increase levels of enzymes involved in detoxification. During the 12-week trial, the researchers asked one group of study participants to drink a broccoli sprout-derived beverage that provided daily doses of 600 micromol glucoraphanin and 40 micromol sulforaphane, while a control group of participants consumed a drink that did not contain broccoli sprouts.

For participants receiving the broccoli sprout beverage, the rate of excretion of the carcinogen benzene increased 61 percent on the first day and was maintained throughout the 12 weeks. The rate of excretion of the irritant acrolein rapidly increased 23 percent during the 12-week trial. Additional analyses indicated that sulforaphane might activate the signaling molecule NRF2, which increases the capacity to adapt to and survive a broad range of environmental toxins.

Citation: Egner PA, Chen JG, Zarth AT, Ng D, Wang J, Kensler KH, Jacobson LP, Munoz A, Johnson JL, Groopman JD, Fahey JW, Talalay P, Zhu J, Chen TY, Qian GS, Carmella SG, Hecht SS, Kensler TW. 2014. Rapid and sustainable detoxication of airborne pollutants by broccoli sprout beverage: results of a randomized clinical trial in China. *Cancer Prev Res*; doi:10.1158/1940-6207.CAPR-14-0103 [Online 9 June 2014].

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The effects of early-life air pollution exposure on brain development

A study by an NIEHS grantee and colleagues provided new insights into mechanisms by which early-life exposure to air pollution produces harmful brain changes in mice, including brain enlargement that is also seen in humans with autism and schizophrenia.

Exposure to air pollution has been linked with neurological and behavioral health effects in children and adults. To explore the biology involved, the researchers exposed mice to levels of ultrafine particles similar to what people might experience in mid-sized U.S. cities during rush hour. For two weeks after birth, the mice were exposed to four hours of polluted air a day, for two four-day periods.

The researchers examined the brains of one group of mice 24 hours after the final pollution exposure. All showed inflammation throughout the brain and had lateral brain ventricles two to three times larger than normal. As seen in autism and schizophrenia, the changes occurred predominately in males. The white matter normally surrounding the ventricles wasn't fully developed, which the researchers attributed to damage from inflammation. The ventricles likely expanded to fill the space normally occupied by the white matter. The changes were also observed in mice examined 40 and 270 days after exposure, indicating that damage was permanent. The exposed mice performed poorly in tests of short-term memory, learning ability, and impulsivity. Brains of mice in all three groups also showed higher levels of the neurotransmitter glutamate, which is elevated in people with autism and schizophrenia.

Citation: [Allen JL, Liu X, Pelkowski S, Palmer B, Conrad K, Oberdorster G, Weston D, Mayer-Proschel M, Cory-Slechta DA.](#) 2014. Early postnatal exposure to ultrafine particulate matter air pollution: persistent ventriculomegaly, neurochemical disruption, and glial activation preferentially in male mice. *Environ Health Perspect*; doi:10.1289/ehp.1307984 [Online 5 June 2014].

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Enhancing vesicular packaging may offer new therapeutic target for Parkinson's

NIEHS grantees report that mice genetically engineered to overexpress a protein involved in packaging the neurotransmitter dopamine showed higher levels of dopamine neurotransmission and were protected from a neurotoxin that causes permanent symptoms of Parkinson's disease. The findings point to a possible new therapeutic target for Parkinson's, which is associated with the loss of dopamine-producing neurons.

Vesicular monoamine transporter 2 (VMAT2) is a protein that packages dopamine and other monoamine neurotransmitters into vesicles for later release by neurons. Recent research has shown that VMAT2 function is impaired in people with Parkinson's. To learn more about the potential benefits of increasing VMAT2 function, the researchers generated transgenic mice with increased levels of the protein.

The VMAT2-overexpressing mice exhibited a twofold increase in vesicular transport, which increased dopamine release 84 percent. The mice also showed improved outcomes for anxiety and depressive behaviors, increased movement, and protection from the effects of 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP). MPTP causes permanent symptoms of Parkinson's and is used to study the disease in animal models. Overall, the work suggests that enhanced vesicular function can be sustained over time and, thus, interventions that target vesicular function might be beneficial to Parkinson's, as well as other disorders that involve storage and release of dopamine, serotonin, or norepinephrine neurotransmitters.

Citation: [Lohr KM, Bernstein AI, Stout KA, Dunn AR, Lazo CR, Alter SP, Wang M, Li Y, Fan X, Hess EJ, Yi H, Vecchio LM, Goldstein DS, Guillot TS, Salahpour A, Miller GW.](#) 2014. Increased vesicular monoamine transporter enhances dopamine release and opposes Parkinson disease-related neurodegeneration in vivo. *Proc Natl Acad Sci U S A* 111(27):9977-9982.

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Potential treatment for mustard gas skin exposure

A new study, funded in part by NIEHS, demonstrates the potential of an antioxidant metalloporphyrin in treating skin lesions caused by 2-chloroethyl ethyl sulfide (CEES). CEES is similar in structure to sulfur mustard gas, a chemical warfare agent, and is used to study toxic effects of the gas. The findings show the antioxidant's potential as a medical countermeasure against skin effects from exposure to chemical warfare agents.

Since previous studies showed that oxidative stress plays a role in skin injuries caused by CEES, the researchers tested the ability of the antioxidant Mn(III) tetrakis(N,N'-diethylimidazolium-2-yl)porphyrin, known as AEOL 10150, to treat skin effects of CEES exposure. Mouse skin exposed to CEES and then treated with AEOL 10150 showed more than 50 percent ($p < 0.05$) reversal of increases in skin bi-fold and epidermal thickness and in myeloperoxidase activity — all markers of CEES-induced skin injury — as well as decreased DNA oxidation.

Treating cultured mouse epidermal cells and human skin cells with AEOL 10150 (50micrometers) one hour after CEES exposure brought about significant ($p < 0.05$) reversal of decreases in both cell viability and DNA synthesis induced by CEES. The researchers also measured reactive oxygen species in the cytoplasm and mitochondria, finding that the treatment improved CEES-induced oxidative stress in both cell lines.

Citation: Tewari-Singh N, Inturi S, Jain AK, Agarwal C, Orlicky DJ, White CW, Agarwal R, Day BJ. 2014. Catalytic antioxidant AEOL 10150 treatment ameliorates sulfur mustard analog 2-chloroethyl ethyl sulfide-associated cutaneous toxic effects. Free Radic Biol Med 72:285-295. (BJ Day is a consultant for and holds equity in Aeolus Pharmaceuticals, which is developing metalloporphyrins as potential therapeutic agents.)

(Nancy Lamontagne is a science writer with MDB Inc., a contractor for the NIEHS Division of Extramural Research and Training.)

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Intramural papers of the month

By Tara Ann Cartwright, Deacquita Diggs, Ernie Hood, Deepa Singh, and Annah Wyss

- [NTP develops novel testing strategy](#)
- [Solvent exposure before first birth may increase breast cancer risk](#)
- [GWAS meta-analysis reveals new DNA loci of lung function](#)
- [dGTP starvation has detrimental effects on cells](#)
- [Nrf2 increases ABC transporter expression at blood-brain barriers](#)

NTP develops novel testing strategy

Researchers at the National Toxicology Program (NTP) have developed a new study design, the modified one generation (MOG) reproduction study, which was compared and contrasted with the new Organisation for Economic Co-operation and Development (OECD) 443 test guideline, the extended one generation reproduction study. The MOG study increases the detection of reproductive and developmental effects, by retaining more offspring for longer periods of time and with continued toxicity testing following gestational exposure to toxic agents. This method will reduce animal use in toxicity studies while capitalizing on toxicity endpoints.

In the MOG study, toxicant exposure occurs during gestation. Offspring are saved longer and under continued exposure conditions. This new design allows assessment of target organ toxicity, developmental toxicity, and clinical pathology; covers observations conducted during teratology studies; and allows analysis of fertility and fecundity. The advantages of the MOG study over the OECD 443 test guideline include a focus on the critical periods of the F1 generation reproductive life cycle, measurements of reproductive structure and function in the same animals, and the incorporation of other developmental outcome data.

The MOG study can effectively utilize and reduce animal use versus conducting individual developmental and reproductive toxicity or 90-day toxicity studies. This method allows for a range of toxicity and teratology effects to be assessed from gestation to death. **(DD)**

Citation: [Foster PM](#). 2014. Regulatory forum opinion piece: new testing paradigms for reproductive and developmental toxicity — the NTP Modified One Generation Study and OECD 443. *Toxicol Pathol*; doi:10.1177/0192623314534920 [Online 26 May 2014].

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Solvent exposure before first birth may increase breast cancer risk

In a study recently published in the journal *Cancer Research*, NIEHS scientists reported that women exposed to solvents before the birth of their first child may have an increased risk for breast cancer, particularly estrogen receptor-positive breast cancers. These findings suggest that the time between puberty and first birth, a crucial period of breast development, may be an important window of susceptibility.

To assess the association between lifetime occupational solvent exposure and breast cancer, the researchers used data from the Sister Study, a prospective cohort study of initially breast cancer-free women who have a sister previously diagnosed with breast cancer. In addition to evaluating how the timing of solvent exposure affects breast cancer risk, the investigators also studied the impact of solvent use within specific occupations. Women who worked with solvents as clinical laboratory technicians, maids and housekeepers, or production workers appeared to have an increased risk of estrogen receptor-positive breast cancer, though occupation-specific estimates were sometimes based on only a small number of breast cancer cases.

Although this study highlights both time periods and occupations in relation to solvent exposure and breast cancer risk, the authors say that additional large-scale studies are needed to further examine the association, by focusing on types of solvents. (See [story](#).) **(AW)**

Citation: [Ekenga CC](#), [Parks CG](#), [D'Aloisio AA](#), [DeRoo LA](#), [Sandler DP](#). 2014. Breast cancer risk after occupational solvent exposure: the influence of timing and setting. *Cancer Res* 74(11):3076-3083.

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GWAS meta-analysis reveals new DNA loci of lung function

NIEHS researchers and their collaborators in a global consortium identified six new loci —specific regions of the genetic code — associated with individual variations in a widely used clinical measure of lung function. The genetic variants appear to influence an individual’s forced vital capacity (FVC), a measure used to diagnose and monitor lung diseases. The new loci may shed light on mechanisms involved in lung development and the pathogenesis of lung diseases.

Using a large-scale meta-analysis approach, members of the research group analyzed the results of genome-wide association studies (GWAS) in 52,253 individuals from 26 countries. They followed up the FVC associations in 32,917 additional individuals of European descent. The analysis identified six new regions associated with FVC that had not been seen in previous GWAS lung function studies. The newly implicated regions were also followed up in samples from African-American, Korean, Chinese, and Hispanic individuals.

The genes closest to the six loci associated with FVC variation were expressed in lung tissue and in primary lung cells. The expression associations were confirmed in 762 whole blood samples, using expression quantitative trait locus analysis. Better understanding of the role genes play in normal lung development and pathogenesis may lead to identification of novel therapeutic targets for lung diseases. (See [story](#).) **(EH)**

Citation: Loth DW, Artigas MS, Gharib SA, Wain LV, Franceschini N, Koch B, Pottinger TD, Smith AV, Duan Q, Oldmeadow C, Lee MK, Strachan DP, James AL, Huffman JE, Vitart V, Ramasamy A, Wareham NJ, Kaprio J, Wang XQ, Trochet H, Kahonen M, Flexeder C, Albrecht E, Lopez LM, de Jong K, Thyagarajan B, Alves AC, Enroth S, Omenaas E, Joshi PK, Fall T, Vinuela A, Launer LJ, Loehr LR, Fornage M, Li G, Wilk JB, Tang W, Manichaikul A, Lahousse L, Harris TB, North KE, Rudnicka AR, Hui J, Gu X, Lumley T, Wright AF, Hastie ND, Campbell S, Kumar R, Pin I, Scott RA, Pietilainen KH, Surakka I, Liu Y, Holliday EG, Schulz H, Heinrich J, Davies G, Vonk JM, Wojczynski M, Pouta A, Johansson A, Wild SH, Ingelsson E, Rivadeneira F, Volzke H, Hysi PG, Eiriksdottir G, Morrison AC, Rotter JI, Gao W, Postma DS, White WB, Rich SS, Hofman A, Aspelund T, Couper D, Smith LJ, Psaty BM, Lohman K, Burchard EG, Uitterlinden AG, Garcia M, Joubert BR, McArdle WL, Musk AB, Hansel N, Heckbert SR, Zgaga L, van Meurs JB, Navarro P, Rudan I, Oh YM, Redline S, Jarvis DL, Zhao JH, Rantanen T, O’Connor GT, Ripatti S, Scott RJ, Karrasch S, Grallert H, Gaddis NC, Starr JM, Wijmenga C, Minster RL, Lederer DJ, Pekkanen J, Gyllensten U, Campbell H, Morris AP, Glaser S, Hammond CJ, Burkart KM, Beilby J, Kritchevsky SB, Gudnason V, Hancock DB, Williams OD, Polasek O, Zemunik T, Kolcic I, Petrini MF, Wjst M, Kim WJ, Porteous DJ, Scotland G, Smith BH, Viljanen A, Heliovaara M, Attia JR, Sayers I, Hampel R, Gieger C, Deary IJ, Boezen HM, Newman A, Jarvelin MR, Wilson JF, Lind L, Stricker BH, Teumer A, Spector TD, Melen E, Peters MJ, Lange LA, Barr RG, Bracke KR, Verhamme FM, Sung J, Hiemstra PS, Cassano PA, Sood A, Hayward C, Dupuis J, Hall IP, Brusselle GG, Tobin MD, London SJ. 2014. Genome-wide association analysis identifies six new loci associated with forced vital capacity. *Nat Genet* 46(7):669-677.

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dGTP starvation has detrimental effects on cells

Researchers from NIEHS have shown, for the first time, that starvation of cells for 2'-deoxyguanosine 5'-triphosphate (dGTP), one of the four building blocks of DNA, can exert replication stress, ultimately leading to growth impairment and cell death. This adverse effect is similar to a phenomenon called thymineless death (TLD), cell death as the result of a depletion of another DNA precursor, 2'-deoxythymidine 5'-triphosphate (dTTP). The work suggests that targeting cells for death by dGTP starvation, as happens with TLD, may be a potential avenue for antimicrobial and anticancer therapies.

To study the effect of dGTP starvation, the scientists employed an *Escherichia coli* (*E. coli*) strain, which combined an allele of the *dgt* gene with a defective *gpt* gene. The *dgt* gene encodes an enzyme that hydrolyzes dGTP into deoxyguanosine and triphosphate, while *gpt* encodes an enzyme that converts guanine into guanosine monophosphate, both required for nucleotide pool maintenance.

This particular *E. coli* strain showed tenfold lower levels of dGTP, which led to replication fork collisions, double-strand breaks, and generation of lethal multibranching nucleoids. dGTP deprivation also led to DNA damage, as reflected by the induction of the SOS response, a set of events that result in cell cycle arrest and the induction of DNA repair. **(DS)**

Citation: Itsko M, Schaaper RM. 2014. dGTP starvation in Escherichia coli provides new insights into the thymineless-death phenomenon. PLoS Genet 10(5):e1004310.

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Nrf2 increases ABC transporter expression at blood-brain barriers

Researchers from the NIEHS Laboratory of Toxicology and Pharmacology have defined the mechanism by which nuclear factor E2-related factor-2 (Nrf2) increases activity and expression of three ABC transporters at the blood-brain and blood-spinal cord barriers. These transporters are xenobiotic efflux pumps that prevent foreign chemicals, including therapeutic drugs, from entering the central nervous system (CNS), thereby limiting our ability to treat CNS disorders.

Previous studies indicated Nrf2, a redox-sensor and ligand-activated transcription factor that plays a critical role in cellular defenses against oxidative stress, was neuroprotective in stroke and traumatic brain injury. The study, published in the *Journal of Neuroscience*, showed that dosing rats with sulforaphane, an Nrf2 activator, increased P-glycoprotein, multidrug resistance-associated protein-2, breast cancer resistance protein expression at the blood-brain barrier, and reduced drug entry into the brain. In isolated brain and spinal cord capillaries, Nrf2 induction of ABC transporter expression and activity required tumor suppressor p53, p38 MAPK signaling, and the transcription factor, NF-kappaB. These experiments define a sequence of events in two brain barriers where Nrf2 signals through p53, p38 MAPK, and NF-kappaB to increase ABC transporter expression and activity.

These findings suggest caution when activating Nrf2 for neuroprotection, since increased drug efflux transporter expression would impair subsequent CNS pharmacotherapy. **(TAC)**

Citation: Wang X, Campos CR, Peart JC, Smith LK, Boni JL, Cannon RE, Miller DS. 2014. Nrf2 upregulates ATP binding cassette transporter expression and activity at the blood-brain and blood-spinal cord barriers. *J Neurosci* 34(25):8585-8593.

(Tara Ann Cartwright, Ph.D., is a former postdoctoral fellow in the NIEHS Intracellular Regulation Group. Deacquinta Diggs, Ph.D., is a National Health and Environmental Effects Laboratory fellow in the EPA Developmental Toxicity Branch. Ernie Hood is a contract writer with the NIEHS Office of Communications and Public Liaison. Deepa Singh, Ph.D., is a visiting fellow in the NIEHS Mechanisms of Mutation Group. Annah Wyss, Ph.D., is an Intramural Research Training Award fellow in the NIEHS Genetics, Environment, and Respiratory Disease Group.)

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Inside the Institute

Tilson honored as retiring editor-in-chief of EHP

By Kelly Lenox

When is good-bye not good-bye? When you're Hugh Tilson, Ph.D., retiring from six-plus years as editor-in-chief of the NIEHS journal *Environmental Health Perspectives* (EHP), but continuing a nearly 40-year tradition of federal service by helping out until a replacement is found. NIEHS and NTP leadership and staff celebrated Tilson's tenure with a good-natured retirement celebration July 25.

Jane Schroeder, D.V.M., Ph.D, EHP science editor and interim editor-in-chief, welcomed the crowd and set a warm and generous tone. "I've had many bosses, and honestly, Hugh is the best boss I have ever had," she said.

Managing an evolving journal

Rick Woychik, Ph.D., NIEHS deputy director, referring to Tilson's agreement to continue on for a time, quipped, "This is retirement with an asterisk." Becoming more serious, Woychik ticked off the improvements and advances to EHP that Tilson oversaw, especially bringing the journal into compliance with federal requirements that it be accessible to citizens with disabilities, known as 508 compliance; going paperless, as one of the first scientific journals to publish in an online-only format; and managing through the uncertainties of sequestration while continuing to meet standards of scientific quality.

Perhaps most notably, the impact factor of the journal increased under Tilson to 7.26, a track record his successor will be challenged to match. "Sometimes superlatives don't suffice," said Woychik.

Tilson, not one to grab the spotlight, spoke briefly. "These six and a half years are the most rewarding and most productive of my career," he said. "They allowed me to make a difference." The assembled group heartily agreed.



Almost too beautiful to cut into — but not quite — the cake was just one of the refreshments assembled by Tilson's staff. (Photo courtesy of Steve McCaw)



"He served with remarkable professionalism," said Woychik, left, of Tilson. (Photo courtesy of Steve McCaw)



Schroeder presented the gifts, including the traditional photograph of the Institute, bordered with signatures and well-wishes. (Photo courtesy of Steve McCaw)



The January 2008 issue was first with Tilson's name as editor-in-chief on the masthead. (Image from NIEHS files)



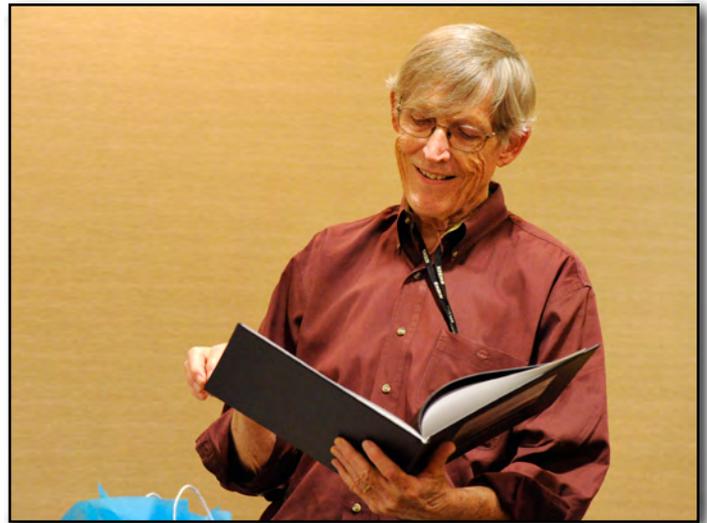
EHP program specialist Judy Hanson, with the assistance of publications director Joseph Tart, brought hilarity to the event, enacting the song Tilson would no longer need to sing, "It's a Five O'Clock World." (Photo courtesy of Steve McCaw)



Susan Booker, EHP news editor, thoroughly enjoyed Hanson's skit. (Photo courtesy of Steve McCaw)



Former scientific editor Jim Burkhart, Ph.D., left, with Tracey Glazener, senior science production coordinator, and Jennifer Garner, science production coordinator, noted that another of Tilson's contributions to the journal was bringing on a strong team of associate editors. (Photo courtesy of Steve McCaw)



Tilson was genuinely touched by the book of photographs and quotes, prepared by his staff. (Photo courtesy of Steve McCaw)



Cassandra Carter, EHP publication specialist, and Tanya Tillett, writer and editor, wished Tilson well in his retirement. (Photo courtesy of Steve McCaw)



The EHP team and other NIEHS staff joined the celebration, including from left, Audrey Pinto, Ph.D, EHP technical editor, with Stephanie Holmgren, informationist in the Office of Scientific Information Management, and Martha Dimes, Ph.D., EHP children's health editor. (Photo courtesy of Steve McCaw)

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Volunteers conduct STEM outreach

By Sharon Beard

The Durham (North Carolina) Alumnae Chapter of Delta Sigma Theta Sorority conducted its ninth annual Science and Everyday Experiences (SEE) Summer Day Camp June 21 at the Durham Alumnae Delta House.

The theme, “STEM in the News,” intrigued the 32 students in grades 4-9 who attended the half-day camp. The program highlighted the impact of science, technology, engineering, and math (STEM) issues in the world around them, during various modules conducted by volunteers from the sorority, NIEHS, area universities, and the Durham community.

The morning began with a welcome and introductions, including remarks by Gloria McNeil, Ph.D., president of the Durham Alumnae Chapter. Relays, dance, and other health and fitness activities, lead by Eboni Quick of Durham Alumnae, kick-started the day of learning and fun.

During the STEM hands-on rotations, students engaged in learning activities, while parents participated in a parent involvement workshop (see [text box](#)).

Thinking critically about pollution on the Dan River

Stephanie Luster-Teasley, Ph.D., an engineering professor at North Carolina Agricultural and Technical (A&T) State University, developed a thought-provoking activity titled “So What Happened at Duke Energy? The Dan River Runs Black.” She described the February 2014 incident at a Duke Energy facility, involving a break in a pipe that resulted in coal ash contamination of 70 miles of the Dan River in North Carolina and Virginia (see related [story](#)).

The Dan River is used for recreation, habitat for animals and fish, and a source for drinking water for many towns located downstream. The students worked as a team of environmental engineers to design a water treatment system to filter contaminated water and track the cost of building the system. Students received certificates for accomplishments, such as best design, best cost, and best treatment.

Kudos for community service

In recognition of its SEE activities, the Durham Alumnae Chapter received a first place South Atlantic Region Educational Awareness Award for its program at the sorority’s Regional Conference in Raleigh in July.



SEE camps traditionally begin with warm-up exercises, including the ever-popular rope pull. (Photo courtesy of Sharon Beard and Willis Page)



When the students moved inside for learning activities, Beard helped activity leaders transition through the modules and gave them certificates of participation. (Photo courtesy of Sharon Beard and Willis Page)

Engineering humanitarian rescue

Led by SEE co-chair Lauren Davis, Ph.D., professor of engineering at A&T, the engineering rescue mission module introduced the concept of engineering design in the context of humanitarian activities. Students watched a video about the delivery of food, medicine, and water to Haiti by the U.S. Air Force and other aid organizations after the 2010 earthquake. They were challenged to design a landing pad capable of supporting the weight of a cargo container dropped from a specific height.

The cargo container was made from Lego blocks. The students were given supplies for constructing their landing pad and had a great time testing their Lego cargo containers and parachutes with their innovative designs. The winning team created a landing pad that supported a five-foot drop.



Luster-Teasley, right, circulated around the room as students conducted water filtration exercises related to the Dan River coal ash spill. (Photo courtesy of Sharon Beard and Willis Page)

Understanding Internet cost and accessibility

In a module designed by Delta Sigma Theta member Lauren Thomas, Ph.D., the students learned about net neutrality, or the idea that Internet service providers should not charge more for access to certain content. Many companies sell access by bandwidth. The greater the bandwidth, the more content can be received at one time without interruption, creating a level of artificial demand that some providers want to incorporate into their pricing structures.

Earlier this year, Google began to explore bringing its broadband fiber network to the Raleigh-Durham area. To gauge the impact of this potential new provider, the students compared costs with four other cable Internet providers, based on a Raleigh News and Observer [article](#). In addition, the students used fiber optics to develop their own laser optics demonstration.

(Sharon Beard is an industrial hygienist with the NIEHS Worker Education and Training Program. She is a Durham Alumnae member and co-chair of the Durham SEE.)



Davis led students in the engineering rescue exercise, which included the construction of parachutes for delivering supplies. (Photo courtesy of Sharon Beard and Willis Page)



Students and volunteers gathered to mark the ninth successful summer science camp. (Photo courtesy of Sharon Beard and Willis Page)

Parent involvement at summer science camp

Ten parents participated in an informative parent involvement workshop organized by Marian Johnson-Thompson, Ph.D., retired NIEHS director of science education and outreach. It featured several presentations on STEM resources and opportunities in the Durham community.

Robert Panoff, Ph.D., D.Sc., president of [The Shodor Education Foundation](#), and Jamie Lathan, Ph.D., dean of distance education at the North Carolina School of Science and Mathematics ([NCSSM](#)), described the computer-based programs and materials available to students, how best to access information about [camps](#) and [distance learning opportunities](#), and the road to success for several underserved students from their programs who have graduated and started computer businesses. Lathan also provided an overview of NCSSM and described the best ways to prepare children to successfully enroll in the school and various distance-learning classes available to any public school in North Carolina.

Pamela Gilchrist, Ph.D., of the Imhotep Academy, part of the [Science House](#) at North Carolina State University, introduced parents to the academy created to encourage students from African-American backgrounds to pursue mathematics and science, celebrate their heritage, and equip them for careers in STEM and the humanities. Today, the Imhotep Academy is a year-round STEM program for students in grades 6-8. Students discover the world of science through hands-on projects, laboratory tours, field trips, and communication with STEM professionals.

Jaclyn Ellis, Ph.D., explained how she participated in similar programs, beginning in middle school, and described the support and mentoring she received to become a STEM professional. The parents asked her about her journey and the support systems that were important to making her STEM career successful.

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