

February 2012

NIEHS Spotlight



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Two NIEHS/NTP scientists and two NTP postdoctoral fellows recently took an important step along toxicology's professional track with DABT certification.



[NIH turns 125](#)

As NIEHS looks forward to its 50th anniversary, NIH geared up for a celebration of 125 years of turning discovery into health.

Science Notebook



[Minisymposium brings epigenetic experts to NIEHS](#)

The daylong minisymposium Jan. 10 at NIEHS showcased scientific presentations by many leaders in the field of epigenetics, chromatin biology, development, and disease.



[BPA researchers meet for updates and assessment](#)

NIEHS grantees and government scientists gathered Jan. 17-19 at NIEHS to update their research efforts on bisphenol A in ARRA-funded research projects.



[Women's health takes the spotlight](#)

NIEHS welcomed fellow scientists, practitioners, and leaders in women's health to a consortium for the singular purpose of highlighting women's reproductive health.



[Study estimates millions have autoantibodies that target their own tissues](#)

The first nationally representative sample looked at the prevalence of the most common type of autoantibody known as antinuclear antibodies.



[Fry maps arsenic levels across NC](#)

Grantee Rebecca Fry, Ph.D., and her colleagues found elevated levels of arsenic over a period of 11 years in a number of counties that border the Carolina slate belt.

NIEHS Spotlight



[Public health officials work to keep research first during a tough economy](#)

Association of Schools of Public Health official Mike Stephens addressed the growing national deficit, specifically its impact on federal funding of public health research.



[Prins honored by University of Illinois at Chicago](#)

NIEHS grantee Gail Prins, Ph.D., is one of three researchers who are winners of 2011 Researcher of the Year awards at the University of Illinois at Chicago.



[NIEHS Public Interest Partner honored](#)

Mary Lamielle, executive director of the National Center for Environmental Health Strategies, received the 2012 Camden County (N.J.) Freedom Medal.



[Superfund promotes safe drinking water at Agua Fria Festival](#)

Researchers and Community Engagement Core leaders were on hand to share health and exposure information on arsenic and lead to the thousands of people at the two-day event.



[Registration is underway for NIEHS and HHS national research conference](#)

Organizers of the South Atlantic National Research Conference are accepting registrations for a forum March 21-22 at the Raleigh (N.C.) Convention Center.

Science Notebook



[Kumar explores regulation of male germline stem cell niche](#)

Rajendra Kumar, Ph.D., presented new findings that offer insights into the mechanisms responsible for infertility and insufficient production of the male sex hormone.



[Transcription of membrane-associated DNA highlights Lieb's encore](#)

University of North Carolina at Chapel Hill professor Jason Lieb, Ph.D., spoke Jan. 20 at NIEHS about how the organization of DNA in the genome affects gene expression.



[Armstrong discusses endocrine disruption of synaptic plasticity](#)

NIEHS senior investigator David Armstrong, Ph.D., reported on new findings about the regulation of synaptic plasticity by endocrine modulators found in the environment.



[This month in EHP](#)

In its feature story of the month, Environmental Health Perspectives examines the impact of environmental exposures on America's growing obesity epidemic.



[Upcoming Falk lecturer Danny Reinberg](#)

The epigenetic biochemist will provide insights into epigenetics research with his talk on "Molecular Mechanisms of Epigenetic Inheritance."

NIEHS Spotlight



[NTP toxicologist Kamal Abdo remembered](#)

NIEHS/NTP colleagues were saddened by the death of Kamal Abdo, Ph.D., Dec. 22, 2011, in Bahama, N.C. at age 73.

Extramural Research

[Extramural papers of the month](#)

- [New way to remove heavy metals from water](#)
- [Perfluorinated compounds and immune response in children](#)
- [Menthol lessens irritation from cigarette smoke](#)
- [Measuring cockroach allergen in the air](#)

Inside the Institute



[NIH celebrates King legacy with dance, music, and personal history](#)

The program featured a talk by toxicologist Lemuel Russell, Ph.D., and three inspirational performances by students from the Duke Ellington School of the Arts.



[Long recognized for CFC leadership](#)

One factor in CFC's success this year, several observers agree, was the leadership provided by NIEHS Deputy Associate Director for Management Chris Long.

Intramural Research

[Intramural papers of the month](#)

- [Catching DNA polymerase beta in the act of mutagenic bypass of 8-oxoG](#)
- [In utero tobacco smoke exposure associated with illnesses in adult women](#)
- [Crystal structure of a kinase advances research for rational drug design](#)
- [Phosphorylation status links cellular stress and GR transcriptional response](#)

Calendar of Upcoming Events

- **Feb. 3**, in Rodbell A, 11:00 a.m.-12:00 p.m. — Laboratory of Reproductive and Developmental Toxicology Seminar Series, featuring Michael Waterman, Ph.D., speaking on “Structure/Function of CYPs 21A2 and 17A1 in Biosynthesis of Steroid Hormones”
- **Feb. 6-7 (offsite event)**, at the U.S. Environmental Protection Agency, Research Triangle Park, N.C., 8:00 a.m.-5:00 p.m. — [NIEHS Data Sharing Workshop](#)
- **Feb. 7**, in Rodbell Auditorium, 11:00 a.m.-12:00 p.m. — Seminar featuring Ann Reed, M.D., “A Phenotypic Conundrum: My Experience Studying Inflammatory Myositis”
- **Feb. 8-9**, in Rodbell Auditorium, 8:00 a.m.-5:00 p.m. — NTP Technical Reports Peer Review
- **Feb. 10**, in Rodbell Auditorium, 11:00 a.m.-12:00 p.m. — Seminar featuring Elise Kohn, M.D., topic TBA
- **Feb. 14**, in Rodbell Auditorium, 10:00 a.m.-11:00 p.m. — Falk Lecture with Danny Reinberg, Ph.D., speaking on “Molecular Mechanisms of Epigenetic Inheritance.”
- **Feb. 15-16**, in Rodbell Auditorium, 8:00 a.m.-5:00 p.m. — [National Advisory Environmental Health Sciences Council meeting](#)
- **Feb. 16**, in Keystone 1003, 2:00-3:00 p.m. — Keystone Lecture Seminar Series, featuring Marie-Francoise Chesselet, M.D., Ph.D., exploring “Gene and environment risk factors for Parkinson’s disease: from man to mice and back”
- **Feb. 29 (offsite event)**, at the National Evolutionary Synthesis Center, 2024 W. Main Street, Ste. A200, Durham, N.C., 12:00 p.m. — Postdoc Professional Development Workshop, “[Scientific Publishing From the Inside Out,](#)” by Science Magazine Associate Editor Sacha Vignieri, Ph.D.
- **March 1**, in Keystone 1003, 10:00-11:00 a.m. — Keystone Lecture Seminar Series, with John Rawls, Ph.D., addressing “Host-microbe symbiosis in the zebrafish intestine”
- View More Events: [NIEHS Public Calendar](#)

Weis addresses industrial hygiene group on mineral fibers

By Eddy Ball

NIEHS Toxicology Liaison Chris Weis, Ph.D., was on the road last month speaking on the link between hazardous mineral fibers and an epidemic of respiratory ailments, including mesothelioma, lung cancer, asbestosis, and non-malignant pleural disease.

Weis addressed an audience of professionals concerned about workplace safety and public health on the final day of the 37th annual meeting of the Yuma Pacific Southwest section of the [American Industrial Hygiene Association \(AIHA\)](#) Jan. 18-20 at the Crowne Plaza in Irvine, Calif. Weis was a presenter during a special session titled “Fourth Wave: Ambient Exposures to Asbestos and Elongated Mineral Particles.”

Weis is among a growing number of toxicologists, biomedical researchers, and regulators striving to raise awareness of the ongoing hazards associated with occupational and environmental exposure to asbestos and asbestos-like fibers found in natural deposits, and in engineered nanomaterials (ENMs), which are used in a growing number of consumer and medical products.

“Over the past two decades, between 100,000 and 200,000 deaths have been attributed to fiber inhalation,” Weis told the audience. “Between the 1960s and 1990s, asbestos mortality increased nearly 20 fold and rates of mesothelioma continue to rise.”

Opening the asbestos box

Weis emphasized that researchers, industrial hygienists, and occupation medicine specialists need to look beyond the narrowly employed definition of asbestos, to better understand the potential health consequences of inhalation of micro- and nano-sized fibers. While there is general awareness of the hazards of asbestos exposure, he said, there is much less awareness of potential health effects from exposure to other naturally occurring minerals, such as erionite ([see story](#)) and some ENMs, which behave in ways similar to asbestos and, like erionite, could turn out to be even more dangerous.

Moving beyond the well-known link between asbestos and cancer, Weis summarized ongoing research into the molecular basis of inflammation and autoimmunity triggered by mineral fiber exposure. He also described NIEHS efforts with partners in government, nonprofits, and private enterprise to find better ways to define the mechanisms of fiber bioactivity, persistence, and distribution in mammalian models.

“We don’t have definitive answers yet,” Weis concluded, “but we have reasons to keep looking at these fibers.” He pointed to the likelihood of additional discoveries of deposits of erionite and other zeolite minerals, as well as the many unanswered questions about the potential effects of the physical, chemical, and electrical characteristics of ENMs and other nano-sized fibers that are capable of crossing protective barriers in the human body.



Weis joined a lineup of consultants and representatives of government agencies speaking as part of the special session. (Photo courtesy of Steve McCaw)

LST fellow makes a move from lab bench to global health

By Sonika Patial

Intramural Research and Training Award Fellow [Sindura Ganapathi, Ph.D.](#), took an important step in his career in January, when he transitioned from being a trainee in the Laboratory of Signal Transduction (LST) to his new role as an associate program officer in the [Bill and Melinda Gates Foundation Global Health Program](#).



Ganapathi found his job the old-fashioned way — by answering an advertisement. However, he credits networking with honing his interviewing skills, helping him maintain self-confidence, and creating a compelling CV and cover letter. (Photo courtesy of Sindura Ganapathi)



Linked video:
[Learn about some of the innovative ideas in global health the Gates Foundation is supporting \(04:12\)](#)

(Launches in new window)

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At NIEHS, Ganapathi worked in the LST Inositol Signaling Group, headed by [Stephen Shears, Ph.D.](#), exploring the regulation of cell migration by CIC-3 chloride channels and the development of inositol phosphates as therapeutic candidates targeting CIC-3 in diseases caused by abnormal cell migration, such as atherosclerosis and cancer.

In keeping with its slogan, “All lives have equal value,” the Bill and Melinda Gates Foundation, one of the world’s largest non-profit organizations, strives to help all people lead healthy and productive lives. Ganapathi will be involved in funding research and development of new initiatives in such areas as vaccines, drugs, and diagnostics, with the goal of reducing maternal and neonatal mortality and improving health. His role will also involve coordinating grant reviews and exploring new initiatives to improve maternal and neonatal health in developing countries.

Ganapathi acknowledges that his diverse background, a degree in veterinary medicine, research experience from his Ph.D. studies and postdoctoral fellowship, and experience growing up in a developing country made him a very good fit for the job. He was also able to highlight the predoctoral American Heart Association grant award that he received as evidence of experience in grant writing, which was an important part of the job description.

Starting the hunt early is the key

“Keeping an eye on available opportunities and starting the hunt early was the key to my success,” said Ganapathi, who started looking for jobs just six months after joining NIEHS. Networking, talking to people, attending job and career fairs, and keeping abreast of the job market helped him target the kind of jobs that interested him. “Finding the right opportunity can be complicated, to say the least,” he explained.

In addition to working in the Shears group, Ganapathi served as a member of the NIEHS Trainees Assembly (NTA) steering committee, as well as the planning committee for the Biomedical Career Fair in 2011. “These activities not only helped broaden my network, but also kept me updated on what was happening around me. I was able to gain experience in leadership and teamwork skills that are an essential part of nearly every job description.”

According to Ganapathi, serving as the NTA steering committee liaison to the NIEHS Environmental Factor newsletter and contributing stories were also useful in the interview process. He was able to provide both scientific and non-scientific writing samples when requested during the second round of telephone interviews, which certainly made him a stronger candidate. “It helped me process my application and interview much faster, as I had well-edited writing samples ready to be sent,” he said.

Quality mentoring played a role

Speaking of his experience with mentoring at NIEHS, Ganapathi said he was grateful for guidance from his group leader. “Steve was very supportive and flexible in the lab and also served as a reference for the job application,” Ganapathi said.

In addition, he felt that Patricia Phelps, Ph.D., deputy director of the Graduate Partnerships Program in the [NIH Office of Intramural Training and Education \(OITE\)](#) and the Institute’s interim fellows career development specialist, was extremely helpful in preparing his curriculum vitae (CV) and cover letter. He had several one-on-one career consultations with her and thought her presentations on “Jobs in the Industry” gave him greater insight into opportunities away from the bench. Ganapathi said he had three interviews, including one for his new job, and all of them were the result of advertisements on the OITE website.

(Sonika Patial, D.V.M., Ph.D. is a visiting fellow in the NIEHS Laboratory of Signal Transduction Polypeptide Hormone Action Group.)

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Former staff fellow appointed vice chancellor at Colorado

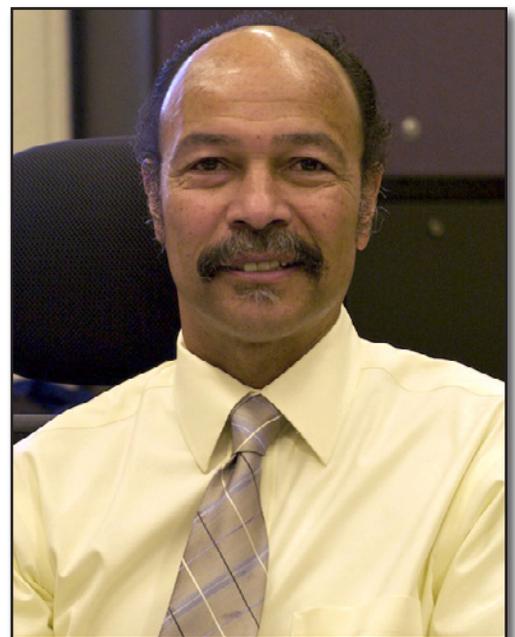
By Eddy Ball

Former staff fellow Robert Boswell, Ph.D., began the new year with yet another addition to his long list of honors and accomplishments since leaving NIEHS in 1986. Before moving to the University of Colorado at Boulder (CU-Boulder), Boswell completed a four-year training experience at the bench, nurturing his career-long interest in the molecular and developmental genetics of *Drosophila*.

CU-Boulder, where [Boswell](#) earned his Ph.D. in 1981 and where he returned as an assistant professor in 1986, announced his appointment to the post of vice chancellor for diversity, equity, and community engagement, effective Jan. 1. A professor of molecular, cellular, and developmental biology with a long and distinguished career at CU-Boulder, Boswell had held the position on an interim basis since July 2010. In December 2011, a search committee named him the sole internal finalist for the post.

Diversity as a core value at CU-Boulder

“As vice chancellor for diversity, equity, and community engagement, Bob Boswell will continue the vital work of establishing diversity as a core value for CU-Boulder,” Provost Russell Moore, Ph.D.,



Newly appointed vice chancellor Robert Boswell (Photo courtesy of Regents of the University of Colorado)

was quoted as saying in the university's [press release](#). "I am charging him with building on his previous work, and that of the Office of Diversity, Equity and Community Engagement [ODECE], to engage our faculty, staff and students in these essential aspects of our university environment."

"I am honored by this appointment and am eager to continue ODECE's important mission of making diversity a central part of all we do at CU-Boulder," said Boswell.

Teaching, research, and service

Boswell was a teaching and graduate research assistant while completing his doctorate at CU-Boulder from 1975 to 1981, before moving on to a Damon Runyon-Walter Winchell Postdoctoral Fellowship at Indiana University from 1981 to 1982, and a staff fellowship at NIEHS from 1982 to 1986. He was a member of what was then the Eukaryotic Gene Structure Section of the Laboratory of Genetics, working on projects that included a long-term study of mutation, "Analysis of *Drosophila* Germ Cell Determination."

After returning to CU-Boulder in 1986, Boswell rose quickly in the ranks of academia and was promoted to full professor in 1991. While retaining his CU-Boulder faculty appointment, he also served as a [Howard Hughes Medical Institute investigator](#) from 1994 to 1998.

Boswell became the principal investigator of the NIH [Initiative for Maximizing Student Development](#), or IMSD, in 2003. The IMSD program encourages educational institutions with fully developed research programs to initiate or expand innovative programs to improve the academic and research capabilities of underrepresented students. Boswell was also co-director of the [Colorado Diversity Initiative](#), which seeks to increase the diversity of students working in labs.

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Staffers and trainees gain toxicology certification

By Eddy Ball

Two NIEHS/NTP scientists and two NTP postdoctoral fellows recently took an important step along toxicology's professional track, by satisfying requirements for Diplomate of the American Board of Toxicology (DABT) certification. DABT certification often offers an advantage in the job market and career advancement, and has been associated with higher levels of compensation.

The [American Board of Toxicology](#) was established in 1979 to advance standards in the field of toxicology and confer recognition upon those members of the profession who, measured against such standards, demonstrate competence. Certification requirements include a combination of education and experience and a three-part examination.

Several toxicologists at NIEHS/NTP have qualified for the coveted DABT, among them NIEHS/NTP Director Linda Birnbaum, Ph.D., who is the first toxicologist to head the Institute. Birnbaum offered the new diplomates her sincere congratulations. "Welcome to the club!" she wrote. "This marks a very important milestone in your careers."

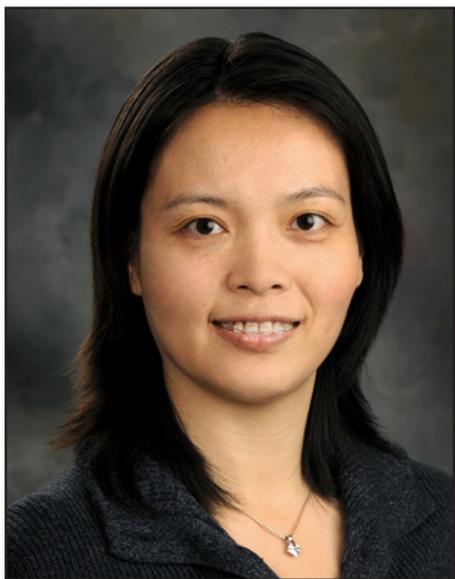


Carlin, above, and Rider co-chaired a September 2011 workshop in Chapel Hill, N.C., on "Advancing Research on Mixtures." (Photo courtesy of Steve McCaw)

New holders of the DABT are:

- Danielle Carlin, Ph.D., a health scientist administrator with the NIEHS Superfund Research Program, who joined the NIEHS Division of Extramural Research and Training in 2010, after completing a postdoctoral fellowship at the U.S. Environmental Protection Agency
- [Xiaoqing Chang, Ph.D.](#), a visiting fellow in the NTP Biomolecular Screening Branch headed by Raymond Tice, Ph.D., mentored by Michael DeVito, Ph.D., leader of the Experimental Toxicology Group in the NTP Toxicology Branch
- [Minerva Mercado-Feliciano, Ph.D.](#), an Intramural Research Training Award fellow in the NTP Toxicology Branch headed by Paul Foster, Ph.D.
- [Cynthia Rider, Ph.D.](#), a toxicologist in the NTP General Toxicology Group who joined NIEHS/NTP in 2010, after completing postdoctoral work at Duke University and the U.S. Environmental Protection Agency

Diplomates hold initial DABT certification for 5 years and must demonstrate that they actively practice toxicology, engage in continuing education, and maintain expert knowledge in their field prior to receiving recertification.



In 2011, Chang earned a Society of Toxicology [Nanotoxicology Specialty Section](#) Outstanding Postdoc Award and an NIEHS Fellows Award for Research Excellence for her work with micro- and nano-sized fluorescent polystyrene spheres. (Photo courtesy of Steve McCaw)



*Mercado-Feliciano has designed and monitored several toxicology studies on the herbal supplement black cohosh, or *Actaea racemosa*, and is actively presenting study results at scientific meetings and preparing them for publication in peer-reviewed journals. (Photo courtesy of Minerva Mercado-Feliciano)*



Rider currently serves as secretary and treasurer of the Mixtures Specialty Section of the Society of Toxicology. (Photo courtesy of Steve McCaw)

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NIH turns 125

By Eddy Ball

As NIEHS looks forward to its 50th anniversary, NIH geared up for a celebration of 125 years of turning discovery into health. The NIH Staff Training in Extramural Programs kicked off the NIH quasiquintennial celebration with a special event Jan. 12 titled “NIH: Looking Back and Moving Forward,” featuring presentations by NIH scientists David Cantor, Ph.D., of the Office of NIH History; David M. Morens, M.D., of the National Institute of Allergy and Infectious Diseases; and Alan Schechter, M.D., of the National Institute of Diabetes and Digestive and Kidney Diseases.

NIH traces its roots to August 1887, when a one-room laboratory was created within the Marine Hospital Service (MHS), which later became the U.S. Public Health Service (PHS), parent agency of NIH.

The MHS had been established in 1798 to provide for the medical care of merchant seamen. In the 1880s, Congress charged the MHS with examining passengers on arriving ships for clinical signs of infectious diseases, especially the dreaded diseases cholera and yellow fever, in order to prevent epidemics.

The Hygienic Laboratory is born

In 1887, MHS authorized [Joseph Kinyoun, M.D.](#), a young MHS physician trained in new bacteriological methods, to set up a one-room laboratory in the Marine Hospital at Stapleton, Staten Island, New York. Kinyoun called this facility a laboratory of hygiene, in imitation of the leading-edge German facilities of the time, and to indicate that the laboratory’s purpose was to serve the public’s health.

Within a few months, Kinyoun had identified the cholera bacillus and used his Zeiss microscope to demonstrate it to his colleagues as confirmation of their clinical diagnoses. Three years later, Kinyoun’s Hygienic Laboratory moved to Washington, D.C., where Kinyoun started a training program in bacteriology for MHS officers, and conducted numerous tests of water purity and air pollution for the District of Columbia and Congress.

In 1901, Congress appropriated \$35,000 for a new building to house the laboratory and its expanded programs. In 1902, MHS was reorganized as PHS, and Kinyoun’s lab transitioned into the Division of Pathology and Bacteriology with three new components that represented the most fruitful areas for research at that time — the Divisions of Chemistry, Pharmacology, and Zoology.



Scientists worked at the bench of the Hygienic Laboratory at its first facility in Washington, D.C., circa 1899. (Photo courtesy of NIH)



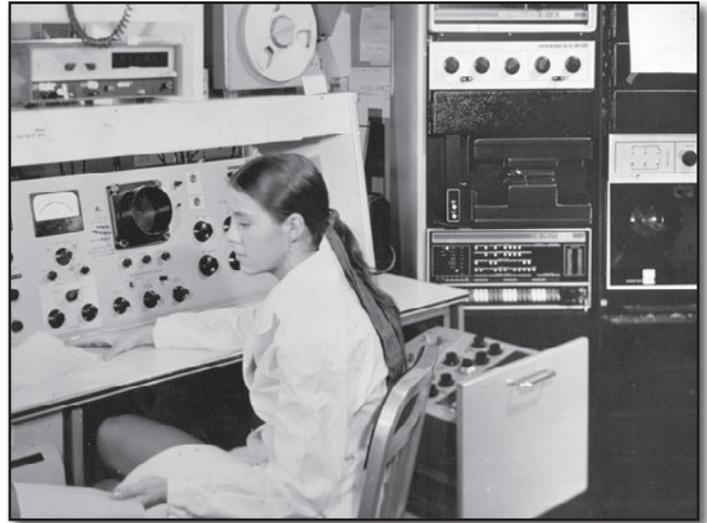
In 1916, four years before the 19th Amendment gave women the right to vote, bacteriologist [Ida Bengtson, Ph.D.](#), who was a major figure in typhus research, became the first woman on the professional staff at the PHS Hygienic Laboratory. (Photo courtesy of NIH)

The importance of these new programs was underscored by the provision that the PHS could hire scientist researchers with Ph.D. degrees to head them. Up until this time, the professional staff had been limited to physicians.

With its roots established and the landscape of medicine and public health changing dramatically during the first decades of the 20th century, in 1930 Congress changed the name of the Hygienic Laboratory to the National Institute of Health. The establishment of the National Cancer Institute in 1937; a reorganization in 1948 that modified the name of NIH to reflect additional institutes; and an expansion of the number of new institutes and centers, including NIEHS in 1966, to their current number of 27, all helped make NIH what it is today.

(This story was adapted from narrative on the NIH History [website](#).)

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By the 1970s, NIH labs began to look more like their modern counterparts, with computers to aid in the collection, analysis, and display of data from laboratory instruments, such as this mass spectrometer. (Photo courtesy of NIH)

Public health officials work to keep research first during a tough economy

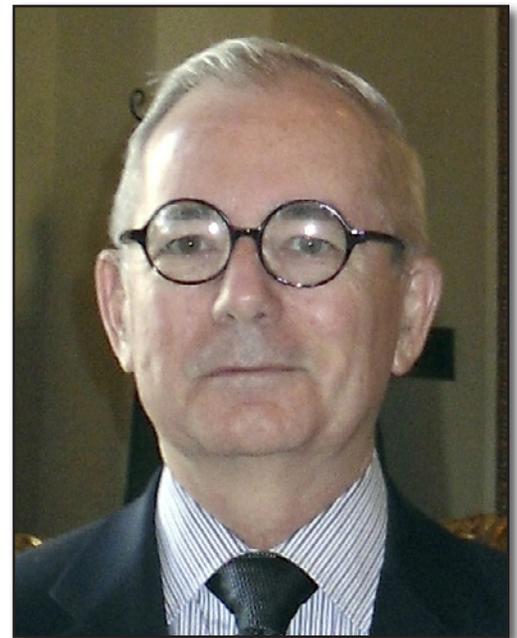
By Ian Thomas

During a Jan. 11 talk at NIEHS, Mike Stephens spoke on the growing national deficit, specifically its impact on federal funding of public health research. Currently, the senior director of policy with the [Association of Schools of Public Health \(ASPH\)](#), Stephens made it clear that scientists and administrators alike must be willing to rethink their way of doing business, if the field hopes to maintain its present level of commitment to research.

“Virtually every policy debate in Washington right now is somehow connected to the deficit,” said Stephens, who noted NIEHS’ status among NIH institutes and centers as the second largest funder of ASPH-affiliated research.

A half century of growth

Established in 1953 with roughly a dozen schools, ASPH now showcases an impressive roster of 49 educational institutions, including public health schools in Mexico, Canada, and France. With an annual enrollment of nearly 26,000 students, ASPH member schools award about 9,000 degrees per year in various career paths in public and global health.



Stephens noted that the average cost of an extramural grant has grown over the years from roughly \$250,000 to a hefty \$433,000. (Photo courtesy of Michael Stephens)

“A lot of people tend to think of ASPH as simply being a collection of social work schools with a health emphasis, and they don’t take into account the strength of the basic science we conduct,” Stephens said, while highlighting several of ASPH member schools’ contributions to the public health field, such as discovery of the first influenza vaccine in 1944, the original Salk vaccine in 1955, and contributions to worker health and safety standards. “If you look back at the portfolio of our achievements in the last 50 years, the strength of the work we produce is plainly evident.”

In addition to degree programs, ASPH member schools are also heavily involved in continuing education in the workforce, offering some 200,000 training sessions per year through its Public Health Training Centers.

Building a new model

Operating on an annual budget of approximately \$3 billion, ASPH’s 49 schools draw a third of their funding from government sources. However, in a time when most federal budgets are either frozen or shrinking, Stephens was adamant that public health officials must be ready to make some tough decisions in the days ahead.

“For years, we’ve gotten accustomed to the idea of expanding budgets and growing resources, but the reality is that it just isn’t that way anymore,” said Stephens, who added that applications for NIH grants hit an all-time high in 2011. “We have some really promising science on the horizon from some outstanding young scientists, and it’s imperative to the future of the field that we continue to support those endeavors.”

According to Stephens, options for lowering NIH grant costs for funding new investigators are likely to include reductions of overall salaries that are recoverable from a grant, the funding of a larger quantity of less expensive grants, capping the amount or number of grants given to a single investigator, and shortening the lifespan of a grant from its current 4.3-year average.

“The partnership between the schools of public health and NIH is an extremely natural one, not only from a business standpoint, but also a philosophical one, because of our mutual commitment to the overall public health,” said Stephens. “Still, most people in my community agree that the support for biomedical research has never been under greater stress than it is now and it’ll take all of us working together to maintain the level of excellence we’ve come to expect of that commitment.”

(Ian Thomas is a public affairs specialist with the NIEHS Office of Communications and Public Liaison, and a regular contributor to the Environmental Factor.)

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NIEHS Legislative Liaison Mary Gant, a veteran on the Washington scene, hosted Stephen’s visit and talk. (Photo courtesy of Jennifer Weinberg)

Prins honored by University of Illinois at Chicago

By Eddy Ball

NIEHS grantee Gail Prins, Ph.D., is one of three researchers who are winners of 2011 Researcher of the Year awards at the University of Illinois at Chicago (UIC). These awards recognize the efforts and commitment of researchers who have demonstrated outstanding research achievements to advance the knowledge in their field of expertise.

The UIC Office of the Vice Chancellor for Research honored Prins for her internationally recognized leadership in [prostate cancer research](#), particularly her research on the effects of early exposure to bisphenol A (BPA) on prostate development and risk of prostate cancer, which has advanced the field and directly influenced public policy. Prins and her co-winners will each receive a one-time \$5,000 prize and a commemorative award at a ceremony Feb. 8 in Chicago.

Prins is a professor of urology and physiology, as well as director of the [Andrology Laboratory](#) at UIC. Her lab is accredited under the [Clinical Laboratory Improvement Amendments](#) and [CAP/COLA](#) certified. Prins is a reproductive biologist and a longtime NIEHS grantee. She currently has funding from three NIEHS grants to examine prostate carcinogenesis triggered by early and chronic exposures to estrogens and endocrine disrupting chemicals.

Prins is part of the NIEHS BPA consortium led by Jerry Heindel, Ph.D., a program administrator in the extramural division at NIEHS. “Gail richly deserves this recognition,” Heindel said of the award. “Her research is uncovering mechanisms responsible for prostate cancer that are rooted in exposure to endocrine disrupting compounds within critical windows of susceptibility during development, which will help inform strategies for primary and secondary prevention.”

According to its award [website](#), UIC is one of only 108 Carnegie classified research universities with very high research activity in the U.S., and one of but four Illinois universities to be honored with this distinction. Along with Prins, UIC honored physicist Cecilia Gerber, Ph.D., for her leading role in the discovery of the single top quark production by an international collaboration at Fermilab, and gerontologist Susan Hughes, Ph.D., for scholarship that has significantly contributed to understanding the role of exercise in the lives of older adults.

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NIEHS Public Interest Partner honored

Mary Lamielle, executive director of the National Center for Environmental Health Strategies, is one of 14 Camden County, N.J., residents chosen to receive the 2012 Camden County Freedom Medal, honoring the legacy of Martin Luther King Jr., for their unselfish contributions to improving their community.

Lamielle is a member of the NIEHS [Public Interest Partners](#), whose membership represents diverse groups, including disease, disability, and environmental education and advocacy organizations. The Partners meet



Prins is shown during a 2010 presentation at NIEHS. She also presented at the BPA grantee meeting in January. (Photo courtesy of Steve McCaw)

periodically with the NIEHS/NTP director and staff to provide input and improve communication with communities and organizations directly affected by the Institute's mission and research.

For three decades, Lamielle has dedicated herself to promoting the public health and improving the lives of people sick or disabled by environmental exposures. She has served on dozens of federal and state advisory committees, including the recently concluded Centers for Disease Control and Prevention National Conversation on Public Health and Chemical Exposures, and the U.S. Department of Housing and Urban Development's Consortium of Citizens with Disabilities Housing Task Force.

She was nominated for the Freedom Medal by Diane Reibel, Ph.D., research associate at Thomas Jefferson University Jefferson Medical College in Philadelphia. In her nomination, Reibel wrote, "I met Mary twenty-five years ago when I became ill from chemicals in my research laboratory. Mary's knowledge, support, and advocacy were a life saver for me. What Mary did for me, she has done for thousands of people across New Jersey and tens of thousands nationwide."



Camden County Freedom Medal winner Mary Lamielle (Photo courtesy of Mary Lamielle)

Lamielle was recently honored with the 2011 New Jersey State Governor's Jefferson Awards for Environmental Stewardship and a 2010 U.S. Environmental Protection Agency Region 2 Environmental Quality Award, the highest civilian award given by the EPA.

The Camden County Freedom Medal was created in 2001 to honor the ideals indicative of the slain civil rights leader. According to Camden County Freeholder Director Louis Cappelli Jr., "This is Camden County's way of honoring Dr. King."

Medals were presented during an evening ceremony Jan. 20 at the Camden County Boathouse at Cooper River.

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Superfund promotes safe drinking water at Agua Fria Festival

By Rebecca Wilson

The NIEHS-funded [University of Arizona Superfund Research Program \(UA SRP\)](#) made its third appearance at the Agua Fria Festival last fall in Dewey-Humboldt, Ariz. Researchers and Community Engagement Core leaders were on hand to share health and exposure information on arsenic and lead with the thousands of people who turned out for the two-day event.



Dewey-Humboldt is a small farming community located approximately 80 miles north of Phoenix, Ariz. It's surrounded by its mining heritage, with the abandoned Iron King Mine and Humboldt Smelter situated on the opposite edges of town. The facilities, in operation from the early 1900's until the late 1960's, were combined into a single Superfund site in 2008. According to the U.S. Environmental Protection Agency Superfund [report](#), arsenic, lead, and sulfate are the primary contaminants, which permeate ground and surface water, soil, and the air.

Public health outreach

The UA SRP had several documents available in both English and Spanish to share with visitors, including information about arsenic and lead, mining residue or tailings, and how risk assessments are conducted. “Events like this are great for reaching out to the public,” said Sarah Wilkinson, Ph.D., research translation coordinator for the UA SRP. “We are starting to have informational events in the area, but at this festival we are able to reach the people who don’t attend those.”

Wilkinson said that the most popular documents the UA SRP distributed were booklets informing readers about water quality in Arizona and advising them on water quality testing for household wells. Many area residents rely on private wells for their water and, Wilkinson said, “Some may not even realize that they have a Superfund site in their town.”



SRP researchers Raina Maier, Ph.D., far left, and Todd Camenisch, Ph.D., right, discuss water quality issues with a resident of Dewey-Humboldt, Ariz. (Photo courtesy of UA SRP)

SRP projects in the area

The UA SRP is currently conducting three studies in the area, with a fourth scheduled to begin this year. The first is led by Raina Maier, Ph.D. She is conducting a phytostabilization trial to assess whether a plant cap can stabilize metal contaminants in mine tailings. Eric Betterton, Ph.D., is conducting the second project, using air samplers to determine whether wind-blown dust from mine tailing sites in the town contain metals.

Graduate student Monica Ramirez-Andreotta is leading the third study, conducting a greenhouse trial and working with local residents to determine the metal content of homegrown vegetables. Ramirez-Andreotta was this year’s winner of the SRP Karen Wetterhahn Memorial Award, and her research project, “Gardenroots,” was featured in the December issue of the Environmental Factor ([see story](#)).

This year marked the 107th year the festival has been held, making it one of the oldest in Arizona. Participants travelled from across the state and from northern Mexico to attend the event, which featured parades, musical acts, races, skill and craft demonstrations, and several hundred exhibitors.

(Rebecca Wilson is an environmental health information specialist with MDB, Inc., a contractor for the NIEHS Division of Extramural Research and Training SRP.)

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Registration is underway for NIEHS and HHS national research conference

By Eddy Ball

Organizers of the [South Atlantic National Research Conference \(SANRC\)](#) are currently accepting registrations for a two-day forum March 21-22 at the Raleigh (N.C.) Convention Center. The event, titled “Engaging the Community for Research Success: What Scientists and IRBs [Institutional Review Boards] Need to Know,” is jointly sponsored by the NIEHS Office of Human Research Compliance and the U.S. Department of Health and Human Services (HHS) Office for Human Research Protections (OHRP).

[Registration](#) fees received by Feb. 1 are \$150. After the deadline, the registration fee is \$200.

The [agenda](#) covers a range of topics related to community-engaged research, including stakeholders and their roles, ethical challenges, social and legal considerations, and effective communication. The program features plenary sessions, luncheon talks, and 14 breakout sessions. Continuing education units will be offered.

Speakers include medical, legal, and public health experts from the government, non-profit, and private sectors. Several NIEHS scientists and grantees, including NIEHS/NTP Director Linda Birnbaum, Ph.D., are scheduled to speak or lead breakout sessions.

SANRC co-sponsors include Duke University School of Medicine, East Carolina University, Emory University, FHI360, Howard University, Medical University of South Carolina, North Carolina Central University, RTI International, University of North Carolina at Chapel Hill, University of Virginia, U.S. Environmental Protection Agency, Wake Forest University School of Medicine, and Applied Human Research Protections, Inc.

Scholarships are available for students and postdocs.

For additional information about the conference and scholarships, contact:

Joan Pakenham, Ph.D.

Director, NIEHS Office of Human Research Compliance

Phone: 919-541-9844

Email: 2012sanconference@mail.nih.gov

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NTP toxicologist Kamal Abdo remembered

By Eddy Ball

NIEHS/NTP colleagues were saddened by the death of Kamal Abdo, Ph.D., Dec. 22, 2011 in Bahama, N.C. at age 73. Abdo is survived by his widow Jeanette, three sons, three daughters, nine grandchildren, and many nieces and nephews.

Writing of his longtime friend and colleague, NIEHS toxicologist James Huff, Ph.D., told Jeanette Abdo, “The world, science, and public health and humanitarianism, especially, have lost a great man.” Another of Abdo’s associates, retired NTP toxicologist Ron Melnick, Ph.D., said, “Kamal was a very dear friend and I will always think of him as a cheerful individual who cared about people and worked to promote a healthy environment for everyone.”

“Kamal’s death is a loss to the toxicology community,” said NIEHS/NTP Director Linda Birnbaum, Ph.D. “He combined his genuine concern about people and their public health with scientific rigor to help make a real difference in the quality of their lives.”

Testing environmental chemicals for carcinogenicity

One of the first NIEHS scientists to join NTP, Abdo was a 25-year veteran of the Institute who retired in March 2005 after a career overseeing contract studies on the toxicity and carcinogenicity of high-profile chemicals and compounds, such as hexavalent chromium, rotenone, and naphthalene. Through his work at NIEHS/NTP, Abdo was one of several researchers whose scientific rigor and integrity helped the NTP two-year rodent study emerge as the gold standard of toxicology testing and contribute to reducing cancer risks from environmental exposures.

Abdo was the NIEHS originator long-term director of the Project on the Safe and Effective Use of Pesticides that was requested by the U.S. State Department to coordinate a Middle East regional program to reduce exposures to pesticides by farmers, farm families, and other agricultural workers in Egypt, Jordan, Israel, and the Palestine Territories as part of the Multilateral Middle East Peace Process. This project involved the joint effort of scientists in Middle East nations working together to address their regional agricultural, health, and environmental problems.



Shown at an NTP Board of Scientific Counselors meeting circa 2000, Abdo was known for his sense of humor and endearing smile. (Photo courtesy of Steve McCaw)

Memorials

A devout Muslim born Aug. 28, 1938 in Shuwaikah, Palestine, Abdo was memorialized with a service at Jamaat Ibad Ar-Rahman, a Sunni Mosque in Durham, N.C., before he was laid to rest at Union Grove United Methodist Church in Bahama. Abdo’s family requested that in lieu of flowers, contributions be made in his honor to Jamaat Ibad Ar-Rahman, 3034 Fayetteville St., Durham, N.C. 27707 or Union Grove United Methodist Church, 8009 Bunny Road, Rougemont, N.C. 27572.

Friends and colleagues from NIEHS/NTP gathered for a second memorial Jan. 14 at Union Grove United Methodist Church in celebration of Abdo’s life.

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Science Notebook

Minisymposium brings epigenetic experts to NIEHS

By Ashley Godfrey

Sponsored by the Division of Extramural Research and Training (DERT), a minisymposium Jan. 10 at NIEHS showcased scientific presentations by many leaders in the field of epigenetics, chromatin biology, development, and disease. Speakers from the NIEHS intramural and extramural communities were on hand to discuss findings from their latest research ([see text box](#)).

The daylong symposium was part of the DERT Keystone Science Lecture Seminar Series. DERT scientists Astrid Haugen, Lisa Chadwick, Ph.D., and Frederick Tyson, Ph.D., hosted the event's 10 scientific presentations.

“NIEHS has made a commitment to translating basic fundamental research and really putting it to work for the benefit of public health and disease prevention,” said Deputy Director Rick Woychik, Ph.D., in his welcoming remarks.

Woychik explained the significance of epigenetic research in relation to the Institute's mission. Environmental exposure is increasingly linked to changes in epigenetic profiles and subsequently with disease. “One area we are very interested in is better understanding why it is that, when you take two different individuals and you expose them to exactly the same environment, there are different phenotypic outcomes or health outcomes,” Woychik told the near-capacity audience.



Woychik gave the welcome remarks and introduction for the symposium. He ended by emphasizing, “The epigenome serves as an interface between the genome and the environment in complex human disease.” (Photo courtesy of Steve McCaw)



Linked video:
[Watch as Woychik describes the NIEHS commitment to epigenetics research \(10:29\)](#)

(Launches in new window)

Download Media Player: [Quicktime](#)

Epigenetics an emerging frontier in science

Epigenetics refers to heritable changes in the regulation of gene activity and expression that are independent of any change in the gene sequence itself. Epigenetic mechanisms, such as DNA methylation and histone tail modifications, can serve as the interface between the genome and the environment. While epigenetics refers to the study of single genes or sets of genes, epigenomics refers to a more global analysis of epigenetic changes across the entire genome.



Jack Taylor, M.D., Ph.D., head of the NIEHS Molecular and Genetic Epidemiology Group diligently takes notes during the first session. Taylor said he was interested in the data Stamatoyannopoulos presented, showing that most of the common disease associated variants in the human gene sequence are concentrated in DNA regulatory regions. (Photo courtesy of Steve McCaw)

The day before the symposium, several of the speakers participated in a steering committee advisory meeting for the [NIH Roadmap Epigenomics Mapping Consortium](#). NIEHS and the National Institute on Drug Abuse are administrative leads for the NIH Common Fund effort. The goal of the consortium is to produce a public resource of human epigenomic data to help jumpstart basic biology and disease-oriented research. The consortium plans to continue to build a publically accessible collection of reference epigenomes, from a wide range of species and human tissue types, which will provide the framework for a broad array of future studies.

“The steering committee actually met yesterday and they reported that there are now 39 different reference genomes that are completed,” reported Woychik, referring to data now posted [online](#).

Bringing together diverse epigenetic research interests

The symposium was divided into three sessions, each with a different focus on epigenetic research. The first focused on epigenomics and disease. The three speakers demonstrated how epigenomics can be used to understand the epigenetic mechanisms that contribute to cell type specificity and also to human disease.

In the second session, the emphasis was on chromatin and transcription. The four speakers sought to answer the question of how epigenetic modifications work in combination, both with each other and with transcription factors and other proteins to direct gene expression.

Finally, the third session explored the role of epigenetic mechanisms in development and disease. The three speakers showcased examples of the critical role epigenetics plays in normal mammalian development through different processes, including maintaining stem cell pluripotency, genomic imprinting, and B cell activation and differentiation.

Translating research into treatment and prevention

In her closing comments, Gwen Collman, Ph.D., DERT director, focused on the enormous opportunity epigenetics research offers as a protective and preventive strategy. Collman emphasized that this research could be used not only to understand the causes of human disease, but also to create strategies and interventions that will help keep populations and individuals healthy and strong.

“There is a lot to do in this field of epigenetics, and we are only at the beginning,” concluded Collman. “I hope the take-home message is to stay the course and help us use the tools and technology and knowledge we have now, to be able to protect our health in the future.”



Ren and his group used genome-wide mapping of parent of origin specific DNA methylation in mouse strains to discover 24 novel methylated regions, with 9 of those outside of any previously known imprinted regions in the genome. (Photo courtesy of Steve McCaw)



Adelman, right, waited for her chance to describe her group's research on paused polymerase and chromatin architecture. (Photo courtesy of Steve McCaw)



Shown, right to left, Tyson joined Kellis and Bartolomei in the audience. Kellis presented his group's work on the interpretation of the genomics and epigenomics of human disease variants during the morning session, while Bartolomei presented her group's work on the epigenetic regulation of genomic imprinting during the last session in the afternoon. (Photo courtesy of Steve McCaw)



Members of the Wade lab were on hand, as many of the leaders in the field of epigenetics, including their own group leader, presented their work. Shown, left to right, are Hrisavgi Kondilis-Mangum, Ph.D., and Lai. (Photo courtesy of Steve McCaw)



Archer presented data from his lab on the molecular mechanisms of hormone-mediated chromatin remodeling. He explained that most of this work was done by Kevin Trotter, a biologist in his group. (Photo courtesy of Steve McCaw)



Biostatistician Raja Jothi, Ph.D., head of the NIEHS Systems Biology Group, was on hand for the symposia. Jothi's group is also interested in understanding how transcription regulators and epigenetic modifications control gene expression programs during cellular development and differentiation. (Photo courtesy of Steve McCaw)



Wade rounded out the minisymposium with the last presentation of the day. Research from his group has shown that two different types of B cells, naive and memory, have closely related gene expression profiles, but have distinct DNA methylation signatures. (Photo courtesy of Steve McCaw)



Bartolomei began her presentation by saying how much she enjoyed being part of the NIH Roadmap Epigenomics Mapping Consortium External Scientific Panel. (Photo courtesy of Steve McCaw)

Epigenetics research highlighted by the keystone minisymposium

Session I — Epigenomics and Disease

- “Epigenomic contributions to cell identity in the human breast,” by [Martin Hirst, Ph.D.](#), of the University of British Columbia. Working closely with collaborators within the NIH Roadmap Epigenomics project, Hirst and his team have undertaken a comprehensive study of sequencing based methodologies for DNA methylation profiling of normal human mammary epithelial cells.
- “Widespread variation in regulatory DNA associated with common human disease,” by [John Stamatoyannopoulos, M.D.](#), of the University of Washington. Stamatoyannopoulos and his research team have used the application of novel molecular and computational technologies to read eukaryotic regulatory genomes and epigenomes, with the goal of predicting the functional consequences of non-coding human genetic variation, especially in relation to common human disease.
- “Comparative and epigenomic signatures for interpreting disease variants,” by [Manolis Kellis, Ph.D.](#), of the Massachusetts Institute of Technology. Kellis and his group have developed new algorithms and machine learning techniques that can help researchers with the interpretation of the genomics and epigenomics of human disease variants.

Session II — Chromatin and Transcription

- “Decoding the genome’s second code,” by [Bing Ren, Ph.D.](#), of the University of California, San Diego. Ren and his lab have developed a high throughput method for genome-wide mapping of parent of origin specific DNA methylation, and have also used this method to characterize the epigenomic landscape of human embryonic stem cell differentiation.
- “Potentiating signal-responsive transcription: a dynamic dance between paused polymerase and chromatin,” by [Karen Adelman, Ph.D.](#), head of the NIEHS Transcriptional Responses to the Environment Group. Adelman and her research group have used cutting-edge genomic techniques to determine the global distribution of promoter-proximally paused polymerase and have found that Pol II pausing plays a critical role in establishing an accessible chromatin architecture around gene promoters that facilitates further or future gene activation.
- “Nuclear receptors modulate chromatin to regulate transcription,” by [Trevor Archer, Ph.D.](#), chief of the NIEHS Laboratory of Molecular Carcinogenesis. Archer and his group are using cancer cell culture models and biochemical assays to understand the molecular mechanisms of hormone-mediated chromatin remodeling to allow gene transcription.
- “Chromatin and transcription factor dynamics in development and disease,” by [Jason Lieb, Ph.D.](#), of the University of North Carolina at Chapel Hill. Lieb and a postdoctoral student, Dan McKay, Ph.D., are using the model organism *Drosophila* and a technique developed in his lab to map where transcription regulatory elements are in the genome during early development and also during the formation of different body structures.

(continued on next page)

Epigenetics research highlighted by the keystone minisymposium (cont'd)

Session III — Epigenetics and Development

- “DNA methylation dynamics in development,” by [Alex Meissner, Ph.D.](#), of Harvard University and the Broad Institute. Meissner and his research group have developed a high-throughput bisulfite sequencing technology for DNA methylation analysis and have used this to address questions about the transmission of epigenetic marks and also to identify epigenetic changes involved in reprogramming and maintaining cellular states.
- “Epigenetic regulation of genomic imprinting,” by [Marisa S. Bartolomei, Ph.D.](#), of the University of Pennsylvania. Bartolomei and her lab are using a mouse model system to understand the biology behind the epigenetic regulation of genomic imprinting and have further translated those findings to a human disease model possibly regulated by similar epigenetic mechanisms.
- “Epigenetic reprogramming during B lymphocyte activation and differentiation,” by [Paul Wade, Ph.D.](#), head of the NIEHS Eukaryotic Transcriptional Regulation Group. Wade and a postdoctoral fellow in his lab, Anne Lai, Ph.D., have been using surgically removed tonsil cells to study DNA methylation in four different populations of B cells and are using this model to study the pathway of activation and ultimate differentiation of these cells.

(Ashley Godfrey, Ph.D., is a postdoctoral fellow in the Molecular and Genetic Epidemiology Group in the NIEHS Laboratory of Molecular Carcinogenesis.)

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BPA researchers meet for updates and assessment

By Thaddeus Schug

NIEHS grantees and government scientists gathered Jan. 17-19 at NIEHS to update their research efforts on bisphenol A (BPA). The purpose of the meeting was to highlight new findings from the research projects funded by the American Recovery and Reinvestment Act (ARRA) and for the BPA consortium to develop a comprehensive disease-specific assessment of possible human health effects due to BPA exposure.

NIEHS/NTP Director Linda Birnbaum, Ph.D., welcomed more than 60 attendees to the meeting and described the Institute’s extensive support for BPA research.



Birnbaum, like Heindel and others at the meeting, has ridden the growing wave of BPA research since the Chapel Hill meeting in 2006 and the [consensus statement](#) published the following year. (Photo courtesy of Steve McCaw)

“NIEHS has invested heavily in research related to BPA and other endocrine disrupting chemicals,” Birnbaum said. “Recently, NIEHS awarded ten BPA Grand Opportunity and three Challenge grants, and altogether we funded 39 projects studying the health effects and risks associated with BPA exposure.”



Linked video:
[Watch a video of Birnbaum's opening remarks at the BPA minisymposium... which concluding the meeting \(09:43\)](#)
(Launches in new window)

Download Media Player:  Quicktime

The consortium, as it now exists, has mobilized the three research divisions at NIEHS/NTP, engaged the interagency predictive toxicology partnership Tox21, and is currently supporting advanced animal and human clinical research.

Taking aim at endocrine disruption

BPA is a chemical used to produce polycarbonate plastics and epoxy resins. Polycarbonate plastics have many applications, including use in some food and drink packaging, water and baby bottles, and other products. Epoxy resins are used to coat metal products such as food cans, bottle tops, and water supply pipes. BPA can also be found in certain thermal paper products, including some cash register and ATM receipts.

Humans are exposed to BPA when the chemical leaches from these products. Some animal studies have shown a link between BPA exposure and a variety of physiological problems, such as infertility, weight gain, behavioral changes, early onset puberty, prostate and mammary gland cancer, and diabetes.

An integrated research initiative

Along with updates on BPA biomonitoring studies and the new NIEHS/NTP/U.S. Food and Drug Administration consortium, the meeting was organized into research groups, with presentations and review updates from their respective areas, as part of the coordinated effort to advance BPA research.

- Pharmacokinetics Group Research Update, by Wade Welshons, Ph.D., and Frederick vom Saal, Ph.D., of the University of Missouri
- Immunity Group Research Update, by Paige Lawrence, Ph.D., of the University of Rochester, and Robin Whyatt, Dr.P.H., of Columbia University



Heindel pondered the update on pharmacokinetics. Seated behind him, right, is his colleague Newbold, a fellow veteran specialist in endocrine disruption research at NIEHS. (Photo courtesy of Steve McCaw)



Two of the major players in the consortium were on hand for the discussion — Gwen Collman, Ph.D., left, director of the NIEHS Division of Extramural Research and Training, and John Bucher, Ph.D., associate director of NTP and director of the NIEHS Division of the National Toxicology Program.. (Photo courtesy of Steve McCaw)

- Cancer Group Research Update, by Ruth Keri, Ph.D., of Case Western Reserve University
- Reproduction Group Review Update, by Shelly Ehrlich, M.D., of Harvard University; Jodi Flaws, Ph.D., of the University of Illinois; William Ricke, Ph.D., of the University of Wisconsin; and Retha Newbold of NIEHS
- Neurobehavior Group Review Update, by Joseph Braun, Ph.D., of Harvard University, and Heather Patisaul, Ph.D., of North Carolina State University
- Low Dose Group Research Update, by Laura Vandenberg, Ph.D., of Tufts University
- Metabolism, Diabetes and Obesity Group Update, by Kim Harley, Ph.D., of the University of California, Berkeley; and Richard Stahlhut, M.D., and Bernard Weiss, Ph.D., of the University of Rochester

Looking ahead

Jerry Heindel, Ph.D., the meeting organizer and health scientist administrator who oversees many of the NIEHS BPA grants said, “This meeting showcased some of the outstanding scientific progress we have made in BPA research, due to the collaborative efforts of the ARRA grantees and other BPA researchers.” In addition to presentations during the 2 1/2 day grantee portion of the meeting, there was a public minisymposium held on the afternoon of the final day (see text box).

The meeting marked the end of ARRA support for BPA research, but work remains for members of the consortium. “Even though the official ARRA funding period has ended, there is a great deal of data forthcoming, and this consortium of scientists plans to organize the findings in a series of comprehensive reviews later this year,” Heindel observed. “We hope that this organized effort will help solve some of the issues regarding the health and safety implications of BPA exposure.”

(Thaddeus Schug, Ph.D., is a health scientist in the NIEHS Division of Extramural Research and Training (DERT) and a regular contributor to the Environmental Factor. Prior to joining DERT in 2011, he was a postdoctoral research fellow in the NIEHS Laboratory of Signal Transduction.)



Grantee Gail Prins, Ph.D., right, joined in the discussion of biomonitoring studies. Prins, who studies BPA's effects on prostate cancer, was honored for her NIEHS-funded work by the University of Illinois at Chicago, where she teaches and conducts research. (Photo courtesy of Steve McCaw)



Rissman pointed to data from her studies projected on the screen behind her. (Photo courtesy of Steve McCaw)



NIEHS lead researcher Ken Korach, Ph.D., standing, was one of several representatives at the meeting from the Institute's Division of Intramural Research. Korach is chief of the Laboratory of Reproductive and Developmental Toxicology. (Photo courtesy of Steve McCaw)

BPA minisymposium

With their planning and consensus-building behind them, attendees joined others from NIEHS and NTP Jan. 19 for an afternoon of science talks.

- **Introduction and Overview**, by Birnbaum, who surveyed the substantial investment by NIEHS/NTP in understanding how BPA and endocrine disruption impact human health. Birnbaum, along with Heindel and several others at the meeting, was part of the historic state of the science meeting held in Chapel Hill, N.C., Nov. 28-30, 2006 ([see story](#)) that sparked a virtual explosion of research and public health discourse on BPA.
- **Developmental Exposure to BPA Affects Multiple Organ Systems**, by Catherine VandeVoort, Ph.D., of the University of California, Davis. VandeVoort reported on findings of significant changes in reproductive tract, mammary gland, lung, heart, nervous system, and brain with BPA exposures. Her group's research is shedding light on the issue of cross-species extrapolation in terms of similarity and species-specific outcomes.
- **BPA and Children's Growth and Neurodevelopment: Results from the CHAMACOS Cohort Study**, by Harley, who reported on her group's findings in the longitudinal birth cohort study of children of 601 pregnant women in the Salinas Valley, Calif. area. Her group is looking for associations between BPA and a broad range of data, including questionnaire responses, physical exams, biological samples, teacher reports, and intelligence test results.
- **Developmental Exposure to BPA, Social Behavior and Gene Expression Across Generations**, by Emilie Rissman, Ph.D., of the University of Virginia. Funded by Autism Speaks, Rissman is using a mouse model to study the transgenerational effects of BPA on epigenetic changes that shape behavior. Rissman is testing a range of behaviors and looking at effects on brain morphology and biomarkers associated with patterns of BPA exposure and nurturing.
- **In Vivo and in Vitro Cardiovascular Effects of BPA**, by Hong-Sheng Wang, Ph.D., of the University of Cincinnati. Wang, who began by reminding his audience that the leading cause of death in women is cardiovascular disease, reported results of his studies in a rat model, where he found associations between BPA exposure and factors that trigger or intensify cardiac events in women, such as arrhythmogenic spontaneous excitation and calcium cycling abnormalities.

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Women's health takes the spotlight

By Melissa Kerr

NIEHS welcomed leading scientists to a meeting Jan. 20 to lay the foundation for a consortium focused on advancing research in women's reproductive health. The all-day event was co-hosted by Jerry Heindel, Ph.D., a program administrator in the Division of Extramural Research and Training (DERT) and Karin Russ, national coordinator of [The Collaborative on Health and the Environment \(CHE\)](#) 450-member Fertility and Reproductive Health working group and the meeting's facilitator.

DERT Director Gwen Collman, Ph.D., welcomed the attendees and opened the meeting with a push for scientists to continue thinking of the women for whom the research could provide answers. "Women's

reproductive health is a huge area covering many diseases and dysfunctions over the lifetime, and we have a lot of work to do,” she said. “I believe that what you have started here is an important step in the right direction.”

Heindel opened the day by challenging attendees to answer the question, “How [can we] improve our interactions and the impact on the field, and get the data out there to make a difference?” Answers ranged from suggestions about sharing samples and technology to raising public awareness and educating legislators.

Science on the run

Along with two keynote scientific sessions, the agenda included a tight schedule of research summaries from 15 speakers, all eager to discuss their research in as much detail as possible within the ten minutes allotted and connect with others (see text box). With speakers limited to three slides, Russ compared the format to speed dating, intended to introduce researchers and pique the scientists’ interest in forming partnerships.

The morning’s keynote speaker, veteran grantee [Cheryl Walker, Ph.D.](#), of Texas A&M University, described her team’s work on the interaction of environmental estrogen exposure with the epigenome. “We are interested in how environmental compounds are regulating the readers, the writers, and the erasers of the epigenetic program,” she explained. Her team is using a newly developed microarray testing protocol to isolate key histone methyl marks that may be causing an elevated risk of disease later in life.

The afternoon’s keynote session featured [John McLachlan, Ph.D.](#), who served as NIEHS scientific director prior to moving to Tulane University in 1995. McLachlan discussed the concept of developmental estrogenization syndrome and asked the audience to question how the study of this syndrome should proceed. Despite extensive research on the topic, he said, “there are huge gaps in mechanistic data in humans.”

Outcomes of the day

Heindel joined McLachlan in an animated discussion of how the group could engage the general public and policy-makers, as well as the broader scientific community. Women’s reproductive health needs something to make it resonate, suggested McLachlan, the way Bhopal and the AIDS epidemic moved people to get involved and take action.



Collman opened the meeting with a personal story about why research in women’s reproductive health is important. (Photo courtesy of Steve McCaw)



Russ passed out index cards and asked attendees to articulate their goals for the day and for the consortium in the long term. She was a gracious, but strict, facilitator who kept speakers to their allotted ten minutes. (Photo courtesy of Steve McCaw)

Russ concluded the meeting by describing the way CHE could help bring together scientists to share research on various environmental factors that can contribute to disease. She spoke about the importance of reaching out to professional organizations and advocacy groups by making science relevant. “Being a former health care provider, I am very interested in translation to clinical practice,” she explained.

Reflecting on the day’s presentations and discussions, Russ also shared some of the encouraging outcomes of the meeting. She noted that one scientist asked for help in analyzing tissue and data, another offered to share biorepository samples, and yet another offered to share a new array testing technology.

These were just a few examples that Russ came across, but she seemed delighted about the future contributions the group will make in women’s reproductive health. “These concrete outcomes are very, very exciting,” she said. She encouraged the consortium to take advantage of CHE resources, to spread their message at public talks and at meetings of clinical and disease societies, and to build on the relationships they formed at the meeting.



Walker described her group’s protein domain microarray strategy for identifying modular signaling units as candidates for empirical verification to determine whether phosphorylation makes a difference in estrogen binding. (Photo courtesy of Steve McCaw)



Holland came to offer the consortium the use of her laboratory’s extensive biorepository, as well as to speak about her work on how exposure to pollutants, including pesticides, may result in epigenetic effects. (Photo courtesy of Steve McCaw)

The presenters

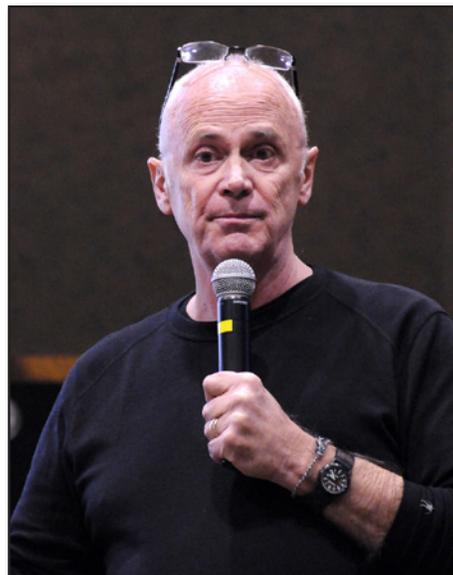
- Kevin Osteen, Ph.D., and Kaylor Bruner-Tran, Ph.D., of Vanderbilt University
- David Crews, Ph.D., of the University of Texas at Austin
- Andrea Gore, Ph.D., of the University of Texas at Austin
- David Waxman, Ph.D., Alexander Suvorov, Ph.D., and Nicholas Lodato of Boston University
- Nina Holland, Ph.D., of the University of California, Berkeley
- Louis Guillette Jr., Ph.D., and Satomi Kohno, Ph.D., of the Medical University of South Carolina
- Ana Soto, M.D., of Tufts University
- Rita Loch-Carusio Ph.D., of the University of Michigan
- Shanna Swan, Ph.D., of the Mount Sinai School of Medicine
- Michael Bloom, Ph.D., University at Albany
- Vasantha Padmanabhan, Ph.D., University of Michigan
- Hugh Taylor, M.D., of Yale University
- Carmen Williams, M.D., Ph.D., of the NIEHS Reproductive Medicine Group



Best known for his Heinz Award-winning work with alligators, Guillette recently moved from the University of Florida to the Medical University of South Carolina, where he will have the opportunity to translate his wildlife work to clinical research with human subjects. (Photo courtesy of Steve McCaw)



Williams was one of several NIEHS Division of Intramural Research scientists participating in the meeting. She presented recent findings on infertility and altered gene expression following neonatal exposure to DES and genistein in a mouse model. (Photo courtesy of Steve McCaw)



McLachlan asked the attendees several questions on how to categorize chemicals with estrogenic properties and the potential effects on a woman's reproductive system, as well as how to raise visibility of environmental estrogens by capitalizing on concerns about obesity. (Photo courtesy of Steve McCaw)



The consortium gathered on the lakeside patio at NIEHS. (Photo courtesy of Steve McCaw)

(Melissa Kerr studies chemistry at North Carolina Central University. She is currently an intern in the NIEHS Office of Communications and Public Liaison.)

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Study estimates millions have autoantibodies that target their own tissues

By Robin Mackar

According to a new NIEHS-funded study, more than 32 million people in the U.S. have autoantibodies — proteins made by the immune system that target the body’s tissues and define a condition known as autoimmunity. The findings appear [online](#) in the Jan. 11 issue of the journal *Arthritis and Rheumatism*.

The first nationally representative sample looking at the prevalence of the most common type of autoantibody, known as antinuclear antibodies (ANA), found that the frequency of ANA is highest among women, older individuals, and African-Americans. The study was conducted by NIEHS/NTP scientists, in collaboration with researchers at the University of Florida.

Earlier studies have shown that ANA can actually develop many years before the clinical appearance of autoimmune diseases, such as type 1 diabetes, lupus, and rheumatoid arthritis. ANA are frequently measured biomarkers for detecting autoimmune diseases, but the presence of autoantibodies does not necessarily mean a person will get an autoimmune disease. Other factors, including drugs, cancer, and infections, are also known to cause autoantibodies in some people.

New estimate based on large data set

“Previous estimates of ANA prevalence have varied widely and were conducted in small studies not representative of the general population,” said [Frederick Miller, M.D., Ph.D.](#), an author of the study and acting clinical director at NIEHS. “Having this large data set that is representative of the general U.S. population and includes nearly 5,000 individuals provides us with an accurate estimate of ANA and may allow new insights into the etiology of autoimmune diseases.”

Miller, who studies the causes of autoimmune diseases, explains that the body’s immune system makes large numbers of proteins called antibodies to help the body fight off infections. In some cases, however, antibodies are produced that are directed against one’s own tissues. These are referred to as autoantibodies.

A multi-disciplinary team of researchers evaluated blood serum samples using a technique called immunofluorescence to detect ANA in 4,754 individuals from the 1994-2004 National Health and Nutrition Examination Survey (NHANES). The overall prevalence of ANA in the population was 13.8 percent, and was found to be modestly higher in African-Americans compared to whites. ANA generally increased with age and were higher in women than in men, with the female to male ratio peaking at 40-49 years of age and then declining in older age groups.



Along with his duties as acting head of clinical research at NIEHS, Miller also leads the NIEHS Environmental Autoimmunity Group based in Bethesda, Md. (Photo courtesy of Steve McCaw)



NIEHS/NTP Director Birnbaum (Photo courtesy of Steve McCaw)

“The peak of autoimmunity in females compared to males during the 40-49 age bracket is suggestive of the effects that the hormones estrogen and progesterone might be playing on the immune system,” said [Linda Birnbaum, Ph.D.](#), director of NIEHS/NTP and an author on the paper.

The paper also found that the prevalence of ANA was lower in overweight and obese individuals than persons of normal weight. “This finding is interesting and somewhat unexpected,” said [Edward Chan, Ph.D.](#), an author on the study and professor in the Department of Oral Biology at the University of Florida.

“It raises the likelihood that fat tissues can secrete proteins that inhibit parts of the immune system and prevent the development of autoantibodies, but we will need to do more research to understand the role that obesity might play in the development of autoimmune diseases,” said [Minoru Satoh, M.D., Ph.D.](#), another author on the study and associate professor of rheumatology and clinical immunology at the University of Florida.

The researchers say the paper should serve as a useful baseline for future studies looking at changes in ANA prevalence over time and the factors associated with ANA development. The paper is the first in a series analyzing these data from the NHANES dataset, and exploring possible environmental associations with ANA.

Citation: [Satoh M, Chan EKL, Ho LA, Rose KM, Parks CG, Cohn RD, Jusko TA, Walker NJ, Germolec DR, Whitt IZ, Crockett PW, Pauley BA, Chan JYF, Ross SJ, Birnbaum LS, Zeldin DC, Miller FW.](#) 2012. Prevalence and sociodemographic correlates of antinuclear antibodies in the United States. *Arthritis and Rheumatism*; doi: 10.1002/art.34380 [online 2012 January 11].

(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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Fry maps arsenic levels across NC

By Brant Hamel

With more than two million people in North Carolina obtaining their drinking water from private wells, it is critical for public health to monitor the quality of the groundwater they consume. A team of researchers led by NIEHS grantee Rebecca Fry, Ph.D., published a [study](#) in the January issue of the journal *Environment International* analyzing levels of arsenic, a known carcinogen, in private well water systems across the state.



Co-first author Chan (Photo courtesy of Edward Chan)



Co-first author Satoh (Photo courtesy of Minoru Satoh)

According to the researchers, it is thought that much of the arsenic contamination found in the study is naturally occurring, due to the underlying geology of the Carolina slate belt and known arsenic deposits. However, there were also a number of counties with elevated arsenic levels that do not border the Carolina slate belt, and additional studies will be needed to determine the source of the contamination.

Arsenic contamination is difficult to mitigate, as there are few simple and cost-effective technologies to deal with the contamination. Modification of well depth may decrease contamination or, if feasible, households can use an alternative water source to limit exposure.

Because an estimated 75,000 people, most with no access to public water systems, use well water in the two counties with the highest levels of arsenic contamination, the team concluded, increasing well-monitoring programs, expanding community education, and biomonitoring of at-risk populations, such as pregnant women, should be future steps in these areas.

Citation: Sanders AP, Messier KP, Shehee M, Rudo K, Serre ML, Fry RC. 2012. Arsenic in North Carolina: public health implications. *Environ Int* 38(1):10-16.

(Brant Hamel, Ph.D., is a postdoctoral fellow in the NIEHS Molecular Endocrinology Group.)

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Kumar explores regulation of male germline stem cell niche

By Raluca Dumitru

In a talk Jan. 6 at NIEHS, Rajendra Kumar, Ph.D., presented new findings on the fundamental role that gonadotropin hormones play in male reproductive health, offering insights into the mechanisms responsible for infertility and hypogonadism, or insufficient production of the male sex hormone. With rates of infertility on the rise, Kumar's research clearly addresses a significant public health concern.

Hosted by NIEHS lead researcher [Humphrey Yao, Ph.D.](#), Kumar's talk was part of the Laboratory of Reproductive and Developmental Toxicology (LRDT) Seminar Series. "Dr. Kumar's research identifies new molecular mechanisms underlying male germline differentiation," Yao said. "Components of these mechanisms could be susceptible to genetic mutations and environmental insults, which could be the causes of idiopathic infertility in humans."

[Kumar](#) is an associate professor in the Department of Molecular and Integrative Physiology at the University of Kansas Medical Center. His research is focused towards understanding the complex regulation of the hypothalamus-pituitary-gonadal (HPG) axis by using unique mouse models that reproduce human reproductive diseases. His work is clinically relevant and will enhance understanding of the basic biology of the niche environment. Long term, Kumar's research may pave the way for optimizing conditions for germ cell transplantation studies.



Kumar captivated the audience by showing the role of the microenvironment in setting the stage for proper gametogenesis. (Photo courtesy of Steve McCaw)

As Kumar explained, the male germline stem cell niche is controlled by extrinsic, intrinsic, and epigenetic factors. Key events involved in fertility, such as the development and production of the male and female germ cells required to form a new individual, or gametogenesis; the synthesis of steroid hormones, or steroidogenesis; and testis development, are carefully regulated by the HPG axis. Alterations in this network can lead to abnormalities of reproductive tract development and may result in idiopathic infertility, as well as the occurrence of gonadotropin-dependent testicular cancers.

Homing in on follicle stimulating hormone

Haploid gametes arise from a tightly controlled differentiation process that begins with precursor cells, which undergo multiple rounds of differentiation and maturation. “The most important factor for a proper gametogenesis is the microenvironment or the niche that is essential for maintaining spermatogonia self-renewal capacity and subsequent differentiation,” Kumar told the audience. “Surprisingly, little is known about niche regulation or how the niche regulates the stem cells.”

In his talk, Kumar showed that follicle stimulating hormone (FSH), a hormone produced by the pituitary gland, regulates the proliferation and differentiation of Sertoli cells, a major component of the germline stem cell niche. “By controlling the somatic cells indirectly,” Kumar said, “gonadotropin hormones such as FSH maintain the microenvironment within the reproductive system.” In the absence of FSH from the testis, the mice displayed hypogonadism, but were still fertile. So the next question was why the loss of FSH causes such a mild phenotype.

Cyclin D2 is important for the maintenance of the germline stem cell niche integrity

Sertoli cell proliferation is regulated by the cyclin D kinases and, intriguingly, the loss of cyclin D2 in a mouse model creates a phenotype similar to the one resulting from the loss of FSH. To investigate whether there are interactions between the FSH and cyclin D signaling pathways, Kumar’s team performed gene arrays followed by computational network analysis.

The results showed a minimal overlap between these two pathways. Using knock-out and knock-in mouse models, Kumar demonstrated next that removing cyclin D2 in the FSH knock-out background exacerbates the phenotype and the mice displayed hypogonadism, as well as infertility.



Underscoring the importance of research on germline stem cell research, Yao said that impairment of fetal organ development has profound consequences on adult health. (Photo courtesy of Steve McCaw)



Kumar’s talk drew several scientists from the LRDT, including biologist Gina Goulding, center, a member of the NIEHS Gamete Biology Group headed by Mitch Eddy, Ph.D. (Photo courtesy of Steve McCaw)

Proper gametogenesis depends on an intact germline stem cell niche

Near the end of his talk, Kumar described the mechanism underlying such a severe phenotype. He showed that the integrity of the membrane of the niche is compromised in the double mutant, with the loss of FSH and cyclin D2. Subsequently, this loss of membrane integrity causes a failure of the germ cells to adhere to Sertoli cells, leading to sperm ultrastructure abnormalities and infertility.

These promising results raise new questions, such as understanding what upstream factor regulates cyclin D2.

(Raluca Dumitru, M.D., Ph.D., is an Intramural Research Training Award (IRTA) fellow in the NIEHS Laboratory of Molecular Carcinogenesis Stem Cell Biology Group.)

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Transcription of membrane-associated DNA highlights Lieb's encore

By Jeffrey Stumpf

Shortly after his participation at an NIEHS minisymposium earlier in the week, University of North Carolina at Chapel Hill (UNC-CH) professor Jason Lieb, Ph.D., spoke Jan. 20 at NIEHS about how the organization of DNA in the genome affects gene expression. As part of the Laboratory of Molecular Carcinogenesis (LMC) Seminar Series, hosted by staff scientist Harriet Kinyamu, Ph.D., Lieb demonstrated that the interactions between chromosomes and the nuclear envelope are likely important in orchestrating transcriptional programs.

Transcriptional processes determine the extent to which genes are expressed. The initiation of gene expression is influenced by promoters, which contain DNA sequences that recruit the binding of transcription factors. Understanding how transcription factors bind to the proper DNA sequences is fundamental to future development of cancer therapies, Lieb explained.

“Our studies of gene regulation will lead to better predictions of what happens when transcriptional programs go haywire in cancer,” Lieb said, pointing to Burkitt’s lymphoma as an example of what goes wrong when transcription factors bind to inappropriate targets. “These studies may lead to new therapies, based on maintaining proper chromosome organization and inhibiting transcription factor binding to inappropriate targets.”



Lieb is also the director of the Carolina Center for Genome Sciences. Several days prior to his LMC seminar, Lieb spoke at NIEHS about DNA elements that regulate transcription during fruit fly development, as part of a minisymposium on epigenetics, chromatin biology, development, and disease. (Photo courtesy of Steve McCaw)

Small DNA loops accommodate high levels of transcription

UNC-CH postdoctoral fellow Kohta Ikegami, Ph.D., carried out all of the experiments Lieb discussed, using the simple 959-celled roundworm *Caenorhabditis elegans*. His work determined that both ends of the autosomal chromosomes are plastered to the nuclear membrane, while the centers looped away. The 1000 kilobase membrane-bound plastered ends contained subdomains of approximately 60 kilobases that were defined by smaller chromatin loops emanating from the membrane. Interestingly, transcription of the loop region increased as the size of the loop decreased.

Lieb asked if the DNA sequence determines the association with the membrane. Results from an elegant chromosome fusion mutant suggested that the formerly end DNA region in the fused chromosome was still membrane-bound despite being in the middle of the chromosome, and that DNA or chromatin composition determined binding to the nuclear envelope.

The increase in transcription at small loops, Lieb hypothesizes, may occur for convenient use of cellular resources. “Small loops may concentrate transcriptional factors, allowing increased residency times and component recycling,” Lieb remarked.

Nuclear pore proteins interact with the transcription machinery

In search of other relationships between transcription and the nuclear membrane, Lieb turned his attention to the nuclear pores, channels that host the active transport of thousands of molecular interactions per second. One hypothesis is that transcription of highly active genes could occur near nuclear pores to facilitate the transport of RNAs to the ribosomes.

Lieb identified 223 locations where nuclear pore proteins bound to DNA. These sites corresponded to binding sites where RNA polymerase III (pol III) initiates transcription of tRNAs and other small RNAs important for normal cell growth.

How important is nuclear pore location to transcription? Reducing the levels of a nuclear pore protein prevented nuclear pore assembly, changing how the chromosomes interact with the nuclear membrane. Also, loss of nuclear pores caused the mistargeting of the alternative RNA polymerase pol II to pol III-specific genes. “To our knowledge, this is the first demonstration of modifying polymerase specificity of a promoter without changing the DNA sequence of the promoter,” Lieb concluded.

Lieb wants to know which of these processes is calling the shots. Does the Pol II transcription machinery peel the chromosome away from the nuclear membrane, or does the membrane actively prevent Pol II from binding to genes? Does the Pol III machinery bring the chromosome to the nuclear pore, or does the nuclear pore function in the initiation of transcription? Lieb’s research will be the foundation for uncovering whether chromosome association with the nuclear envelope is used as a primary mechanism to regulate and coordinate transcription throughout the genome.

(Jeffrey Stumpf, Ph.D., is a postdoctoral fellow in the NIEHS Laboratory of Molecular Genetics Mitochondrial DNA Replication Group.)

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Kinyamu performs research in the LMC Chromatin and Gene Expression Group. (Photo courtesy of Steve McCaw)



Ikegami performed the research that was the basis of Lieb’s seminar. Lieb described the senior postdoctoral fellow as a “fastidious scientist that you should hire.” (Photo courtesy of Kohta Ikegami)

Armstrong discusses endocrine disruption of synaptic plasticity

By Negin Martin

The Integrated Toxicology and Environmental Health Program (ITEHP) at Duke University hosted a Jan. 13 presentation by NIEHS senior investigator [David Armstrong, Ph.D.](#), reporting on new findings about the regulation of synaptic plasticity by endocrine modulators. Synaptic plasticity is the ability to change the strength of neuronal connections in brain to facilitate learning and memory formation.

The presentation, hosted by neurotoxicologist Edward Levin, Ph.D., was part of the ITEHP weekly seminar series, supported in part by the NIEHS Superfund Research Program.

Armstrong's presentation focused on endocrine disruption of oxytocin and thyroid hormone signaling pathways. Disruption of thyroid hormone signaling by environmental toxicants that resemble thyroid hormone in structure, such as PCBs, flame retardants, and dioxin, could interfere with proper development of neuronal maturation and cause learning disorders. Oxytocin is known as a social neuropeptide, because blocking its secretion or mutations in its receptor are associated with social disorders, such as autism, depression, and impaired social bonding.

Regulation of ion channels

Armstrong, chief of the Laboratory of Neurobiology and the head of the Membrane Signaling Group at NIEHS, is an expert electrophysiologist who studies the regulation of ion channels by endocrine signaling. Ion channels regulate membrane potential that controls neuronal signaling and secretion of hormones. By monitoring the effects of chemicals on channel activity and synaptic function in cultured cells and mouse brain slices, Armstrong and his colleagues have discovered molecular mechanisms that govern neuronal signaling and designed a high throughput assay to screen for endocrine disruption.

A capacity audience of young toxicologists in training at Duke attended the lecture to gain insight into how to exploit detailed knowledge of molecular pathways in the design of effective toxicological screens.



Armstrong tailored his talk to the toxicological perspectives of his audience, as he described public health concern about exposure to endocrine-disrupting compounds in the environment and the need for faster, more cost-effective screening of chemicals. (Photo courtesy of Steve McCaw)



After his presentation, Armstrong talked with Stapleton, right, about the next steps in advancing their collaborative research. (Photo courtesy of Steve McCaw)

Disruption of oxytocin signaling by flame retardant TDCPP

Although fluorescent indicators of intracellular calcium have been available for decades, only recently have scientists at Howard Hughes Medical Institute's [Janelia Farm](#) Research Campus developed an indicator, GCAMP3, that can be stably expressed in neurons and reliably report individual calcium transients without killing the cells. Armstrong's lab used GCAMP3 to create a stable human cell line that can be used to measure oxytocin signaling. Oxytocin regulates neuronal function through a calcium signaling cascade that is initiated by a G protein-coupled receptor.

The GCAMP3 cell line has been used to develop a high throughput assay on a fluorescent plate reader for identifying environmental toxicants that disrupt oxytocin signaling. The initial chemicals used to disrupt oxytocin signaling and to test the system were flame retardants provided by environmental chemist [Heather Stapleton, Ph.D.](#), a collaborator at Duke and the recipient of an Outstanding New Environmental Scientist award from NIEHS. "To our great surprise," said Armstrong, "two out of the first eight compounds that we tested disrupted oxytocin signaling."

In the process of confirming this result on single cells using confocal microscopy, they discovered that the flame retardants block calcium entry after store depletion. Oxytocin's potentiation of neuronal synapses depends on calcium entry, and is completely blocked by 50 micrometers of Tri(2,3-dichloropropyl) phosphate (TDCPP). "Fortunately, no one is exposed to such high levels of TDCPP," Armstrong noted, "but we have only tested eight chemicals so far."

Currently, the predictive toxicology consortium Tox21 is using the new cell line to screen over 1,500 chemicals for their effects on oxytocin signaling.

(Negin Martin, Ph.D., is a biologist in the NIEHS Laboratory of Neurobiology Viral Vector Core Facility.)

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Mutant thyroid receptor blocks potentiation of excitatory response in neurons

In a separate project in Armstrong's lab, researchers have discovered a cytoplasmic signaling pathway involving phosphatidylinositol 3-kinase (PI3K) that is activated by TR-beta, a nuclear receptor for thyroid hormone. Thyroid hormone also potentiates synaptic responses in the hippocampus, but through a calcium independent mechanism.

The Armstrong laboratory has created a strain of mice with mutated thyroid hormone receptor that cannot stimulate PI3K, but still regulates transcription. Electrophysiological studies performed on mouse hippocampal brain slices by Fengxia Mizuno, Ph.D., a research fellow in Armstrong's group, have revealed that blocking thyroid hormone-dependent stimulation of PI3K by mutating the receptor prevents potentiation of excitatory response in hippocampal neurons.

"Now that we have shown that some of the effects of thyroid hormone on brain development are mediated by signaling through PI3K," Armstrong concluded, "we would like to develop a similar cell line for high throughput screening of endocrine disruptors of thyroid hormone signaling through PI3K."

This month in EHP

By Ian Thomas

In its feature story of the month, the February issue of [Environmental Health Perspectives \(EHP\)](#) examines the impact of environmental exposures on America's growing obesity epidemic. While many scientists and physicians have historically attributed much of this problem to poor dietary habits and a lack of exercise, a growing body of evidence suggests that environmental exposures to certain chemicals, known as obesogens, may be a strong contributor.

In a second story, titled "Decoding Neurodevelopment: Findings on Environmental Exposures and Synaptic Plasticity," EHP explores the latest findings about how environmental factors may affect synaptic plasticity in the C2 portion of the hippocampus, the region of the brain tasked with memory and learning development.

In this month's Researcher's Perspective [podcast](#), host Ashley Ahearn sits down with [Robert B. Jackson, Ph.D.](#), to discuss the impact of hydraulic fracturing used in natural gas drilling on community health, specifically the millions of gallons of contaminated water that it produces.

Featured commentaries, reviews, and research this month include:

- Environmental Lead Levels After Hurricane Katrina
- Health Risks of Limited-Contact Water Recreation
- Air Pollution, Temperature, and Blood Pressure in People With Type 2 Diabetes
- Health Impacts of the Built Environment
- Maternal Cadmium Exposure and Birth Size

(Ian Thomas is a public affairs specialist with the NIEHS Office of Communications and Public Liaison, and a regular contributor to the Environmental Factor.)

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Upcoming Falk lecturer Danny Reinberg

By Angelika Zaremba

Epigenetic biochemist Danny Reinberg, Ph.D., will present this year's annual Hans Falk Lecture Feb. 14. Hosted by NIEHS Deputy Director Rick Woychik, Ph.D., Reinberg will provide insights into epigenetics research with his talk on "Molecular Mechanisms of Epigenetic Inheritance."

[Reinberg](#) is a professor in the Department of Biochemistry at the New York University (NYU) School of Medicine. After completing his B.S. in Chile, he completed a doctorate in molecular biology at the Albert Einstein College of Medicine in New York. In 1986, he became an independent investigator at the University of Medicine and Dentistry of New Jersey. In 2006, Reinberg received an appointment as a [Howard Hughes Medical Institute investigator](#). That same year, he moved to NYU to continue pursuing his passion for exploring the biochemistry of gene expression.

Reinberg's team is focusing on the molecular mechanisms of epigenetics. This field of science is defined as the study of the extra-genetic information that gives rise to different patterns of gene expression that distinguish different cells and influence phenotype. The research team is using mice and ants as model systems to study epigenetic modifications. Reinberg hypothesizes that, like other multicellular organisms, similar mechanisms are at work at the organism level in ants to establish and maintain an individual identity for their respective roles in the colony and give rise to distinct cell identities.

Gene expression pattern regulation is also an important factor in different diseases, such as cancer, that may be caused, at least in part, by environmental factors. Woychik said of his guest, "Dr. Reinberg has been a leader in the field of studying the biochemistry associated with changes in chromatin structure that drive epigenetic regulation of the genome. With the increasing interest in understanding the influence of the environment on epigenetic regulation of gene expression, his research is highly relevant to the work at NIEHS."

Hans Falk, Ph.D., joined NIEHS in 1967 and made important contributions to the emerging field of environmental health science during his career as the Institute's first scientific director. Initiated by scientists and friends of Falk, the annual memorial lecture series features noted guest speakers who have made significant contributions to environmental health science research, among them several Nobel Prize winners.

(Angelika Zaremba, Ph.D., is a visiting postdoctoral fellow in the NIEHS Laboratory of Signal Transduction Inositol Signaling Group.)

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Reinberg, one of the leading scientists in the field of epigenetics, received the Faculty Research Award from the American Cancer Society. He holds a sculpture of an ant, an unusual, but informative, model for studying modifications in gene expression. (Photo courtesy of NYU)

Extramural papers of the month

By Nancy Lamontagne

- [New way to remove heavy metals from water](#)
- [Perfluorinated compounds and immune response in children](#)
- [Menthol lessens irritation from cigarette smoke](#)
- [Measuring cockroach allergen in the air](#)



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

New way to remove heavy metals from water

A system developed by NIEHS-supported engineers can cleanly and efficiently remove trace heavy metals from water. The low concentrations of these metals make them difficult to extract.

The engineers created a cyclic electrowinning/precipitation (CEP) system that increases the concentration of the heavy metals so that electrowinning can be used. Electrowinning employs an electrical current to transform positively charged metal ions into a stable solid state that can be easily separated from the water and removed.

In tests, the CEP system lowered levels of cadmium, copper, and nickel — both individually and as a mixture — to near or below maximum contaminant levels established by the U.S. Environmental Protection Agency. The system produced a very large reduction in the volume of the heavy metal contaminants, turning them into a solid metal deposited on particles that can be safely discarded or further processed to recover particular metals.

The technique is scalable and the researchers say it can be used to remove other heavy metals, such as lead, mercury, and tin.

Citation: [Grimshaw P, Calo JM, Hradil G](#). 2011. Cyclic electrowinning/precipitation (CEP) system for the removal of heavy metal mixtures from aqueous solutions. *Chem Eng J* 175:103-109.

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Perfluorinated compounds and immune response in children

Research funded by NIEHS has shown that elevated exposure to perfluorinated compounds was associated with reduced immune responses in children. Perfluorinated compounds are widely found in food packaging and textiles, but their impact on human health is not fully understood.

The prospective study followed children in the Faroe Islands, which are located in the North Atlantic about halfway between Scotland and Iceland. The investigators assessed prenatal exposure by measuring perfluorinated compounds in the mother's serum during pregnancy, and later checked for the compounds in samples from the children at age five. They found that children with elevated exposure to perfluorinated compounds had lower antibody responses to childhood immunizations. The antibody response to childhood immunization reflects how well the immune system is functioning.

The researchers report that this study is one of the first to link childhood exposure to perfluorinated compounds with immune system deficiency. The results point to the importance of assessing the immunotoxic potential of these compounds, which are highly persistent and can contaminate drinking water, as well as food.

Citation: [Grandjean P, Anderson EW, Budtz-Jorgensen E, Nielsen F, Molbak K, Weihe P, Heilmann C.](#) 2012. Serum vaccine antibody concentrations in children exposed to perfluorinated compounds. *JAMA* 307(4):391-397.

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Menthol lessens irritation from cigarette smoke

An NIEHS-supported study has shown that menthol, the cooling agent in peppermint, counteracts the irritating effects of cigarette smoke constituents. Menthol is added to most commercially sold cigarettes.

The researchers studied acrolein, acetic acid, and cyclohexanone, which are irritating components of cigarette smoke that vary widely in their chemical structure and biological properties. Using a mouse model of human sensory irritant sensitivity, the investigators found that the sensation of irritation was suppressed immediately in mice that inhaled the irritants and menthol at a concentration less than would be present in smoke from menthol cigarettes. When menthol was absent, the mice had more difficulty inhaling the irritants and exhibited more lung irritation. The experiments demonstrated that menthol's counterirritant effects resulted from activation of the chemical receptor TRPM8.

By suppressing reactions such as coughing, menthol could increase the amount of smoke inhaled and thus promote addiction to nicotine. The 2009 Family Smoking Prevention and Tobacco Control Act banned flavored tobacco additives but exempted menthol while the U.S. Food and Drug Administration evaluated scientific data.

Citation: [Willis DN, Liu B, Ha MA, Jordt SE, Morris JB.](#) 2011. Menthol attenuates respiratory irritation responses to multiple cigarette smoke irritants. *FASEB J* 25(12):4434-4444. [Story](#)

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Measuring cockroach allergen in the air

NIEHS grantees have developed a new sampling and analysis system for measuring exposure to indoor cockroach allergens. Indoor allergens are one factor that can increase risk for asthma development or exacerbation.

Cockroach allergen exposure is usually assessed by collecting and analyzing settled dust, but this method might not provide accurate measurements of inhaled allergens. To measure airborne cockroach allergen, the researchers developed a technique that involves collecting a seven-day integrated total suspended particulate sample at approximately 10 to 15 liters per minute. They used the technique to collect airborne particle samples in 19 New York City apartments that were home to an asthmatic child who was allergic to cockroach allergen. The new method detected allergen in 87 and 93 percent of air samples in the bedroom and kitchen, respectively, where cockroach allergen was present in settled dust.

Sensitive and quantitative measurements of airborne cockroach allergen could reveal more about allergen aerodynamics in the homes of children with asthma.

Citation: [Esposito WA, Chew GL, Correa JC, Chillrud SN, Miller RL, Kinney PL. 2011. Quantitative measurement of airborne cockroach allergen in New York City apartments. Indoor Air 21\(6\):512-520.](#)

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

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Intramural papers of the month

By Brant Hamel, Anshul Pandya, Jeffrey Stumpf, and Emily Zhou

- [Catching DNA polymerase beta in the act of mutagenic bypass of 8-oxoG](#)
- [In utero tobacco smoke exposure associated with illnesses in adult women](#)
- [Crystal structure of a kinase advances research for rational drug design](#)
- [Phosphorylation status links cellular stress and GR transcriptional response](#)

Catching DNA polymerase beta in the act of mutagenic bypass of 8-oxoG

NIEHS researchers continue a series of reports that capture three-dimensional structures of human DNA polymerase beta (pol beta) performing a potentially mutagenic event. The structures, published in the Proceedings of the National Academy of Sciences, reveal how pol beta binds to an oxidized guanine base, 8-oxoG, in the template DNA and inserts the incorrect dATP nucleotide.

8-oxoG is a common base damage resulting from oxidative stress caused by endogenous sources and environmental agents. Organisms that cannot remove 8-oxoG develop mutations that can ultimately cause tumor formation. The mutations arise from mutagenic dATP incorporation opposite 8-oxoG instead of the correct dCTP incorporation. Of the 15 human DNA polymerases, pol beta is relatively proficient at mutagenic bypass of 8-oxoG, making it ideal for structural studies.

Mutagenic bypass requires an unconventional Hoogsteen base pair between the syn-conformation of 8-oxoG and dATP. Pol beta stabilizes the syn-conformation with hydrogen bonding between the O8 oxygen from the base and the side chain from arginine-283 from the enzyme. The structures also reveal that the base pair requires a dramatic bend of the DNA backbone. The flexibility of pol beta allows mutagenic bypass of oxidized bases, which is necessary for tolerance of potentially toxic base damage.

Citation: [Batra VK, Shock DD, Beard WA, McKenna CE, Wilson SH. 2012. Binary complex crystal structure of DNA polymerase beta reveals multiple conformations of the templating 8-oxoguanine lesion. Proc Natl Acad Sci U S A 109\(1\):113-118.](#)

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***In utero* tobacco smoke exposure associated with illnesses in adult women**

A recent epidemiological study conducted by NIEHS scientists found an association between the exposure to tobacco smoke *in utero* with obesity, hypertension, and gestational diabetes mellitus in adult women. This study is the first to examine the relationship of gestational diabetes mellitus to *in utero* exposure to tobacco smoke.

Carried out in collaboration with scientists from the University of Bergen in Norway, University of North Carolina at Chapel Hill, and the Norwegian Institute of Public Health, this research included 74,023 women volunteers aged 14 to 47. The analysis was based on the Norwegian Mother and Child Cohort Study (MoBa) conducted by the Norwegian Institute of Public Health. MoBa is a cohort based on 108,000 pregnancies from 90,700 women enrolled from 1999 to 2008.

The results suggested that women exposed to tobacco smoke *in utero* have higher odds of developing obesity, hypertension, and gestational diabetes mellitus compared with unexposed women. The probability of developing type 2 diabetes mellitus was also observed to increase slightly, but this increase was not statistically significant. This work is in agreement with previous studies, which have established that prenatal exposure to tobacco smoke is detrimental to the developmental process of the fetus. This exposure can have a lasting impact on the health of the individual, even during adult life.

Citation: [Cupul-Uicab LA, Skjaerven R, Haug K, Melve KK, Engel SM, Longnecker MP. 2011. *In utero* exposure to maternal tobacco smoke and subsequent obesity, hypertension, and gestational diabetes among women in the MoBa cohort. Environ Health Perspect; doi:10.1289/ehp.1103789 \[Online 29 November 2011\].](#)

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Crystal structure of a kinase advances research for rational drug design

In a recent publication in *Nature Chemical Biology*, NIEHS researchers describe, for the first time, the crystal structure for a key inositol pyrophosphate kinase, PPIP5K2. Precursors and products of this kinase regulate the body's metabolic balance, which is under frequent environmental insult. Breakdown of metabolic control processes is evident in diabetes, cancer, and aging. The rational design of drugs to improve human health is facilitated by the molecular template that is provided by this atomic level description of the structure and reaction mechanism of this enzyme that synthesizes inositol pyrophosphates.

Human PPIP5K2 phosphorylates IP7 to form IP8. This synthesis reaction requires the formation of high-energy phosphoanhydride bonds, in a class of molecules that have the highest degree of phosphate congestion in nature. Therefore, the focus for the authors was to determine how the active site of PPIP5K2 accommodates the phosphates' steric bulk and intense electronegativity, and yet retains selective substrate specificity. The exact structure of IP8 also emerged from this work.

This structural information will also be useful for developing small-molecule inhibitors of the kinase for possible therapeutic benefit. Knowledge of the structure of IP8 will now permit its chemical synthesis, the deciphering of its molecular interactions with receptors, and the design of IP8 antagonists.

Citation: Wang H, Falck JR, Hall TM, Shears SB. 2011. Structural basis for an inositol pyrophosphate kinase surmounting phosphate crowding. *Nat Chem Biol* 8(1):111-116. [Story](#)

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Phosphorylation status links cellular stress and GR transcriptional response

NIEHS researchers have discovered a new pathway that links environmentally-induced cellular stress to the transcriptional response mediated by the glucocorticoid receptor (GR). The GR is a nuclear receptor that binds to stress hormones to activate or repress thousands of genes that control pathways ranging from metabolism to the immune response. Glucocorticoids are some of the most widely proscribed drugs in the world and this work suggests that the response of patients to these drugs may be altered by external factors such as inflammation and stress.

Although GR was known to be phosphorylated in response to hormone binding, the authors discovered a novel hormone-independent site at Ser134. This amino acid is phosphorylated by p38 MAPK in response to a variety of extracellular stress-inducing pathways, including glucose starvation, oxidative stress, and UV irradiation. Significantly, the authors found that Ser134 phosphorylation allowed GR to bind 14-3-3zeta proteins and altered the suite of genes expressed by GR. Ser134 phosphorylation is necessary for the induction of many genes involved in metabolic and endocrine disorders, as well as the inflammatory response.

This particular GR pathway may also explain previous observations that linking chronic glucocorticoid exposure to insulin resistance as Ser134 may act as a metabolic sensor within cells to direct the transcriptional output of the glucocorticoid receptor.

Citation: [Galliher-Beckley AJ](#), [Williams JG](#), [Cidlowski JA](#). 2011. Ligand-independent phosphorylation of the glucocorticoid receptor integrates cellular stress pathways with nuclear receptor signaling. *Mol Cell Biol* 31(23):4663-4675.

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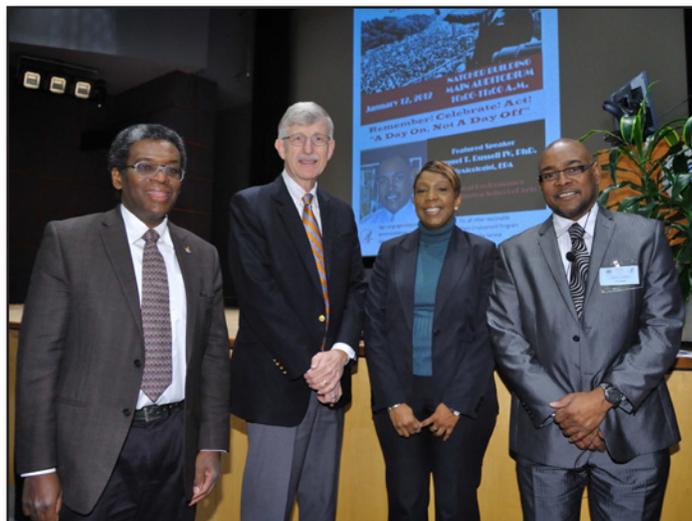
Inside the Institute

NIH celebrates King legacy with dance, music, and personal history

By Eddy Ball

NIH offered attendees something a little different this year at its annual Dr. Martin Luther King Jr. Observance Program Jan. 12 in Bethesda, Md. Although the program featured an engaging talk by African-American toxicologist Lemuel Russell, Ph.D., the event also showcased three inspirational dance and musical performances by students from the [Duke Ellington School of the Arts](#) in Washington, D.C.

The theme for the anniversary of King's birthday in 2012 was "Remember, celebrate, act — A day on, not a day off," and the event was webcast to NIH facilities in Bethesda and other locations, including NIEHS.



NIH program leaders joined the guest speaker before their talks. Shown, left to right, are Owens, Collins, Stokes, and Russell. (Photo courtesy of NIH and Ernie Branson)

Linked video:
Watch a [Duke Ellington School of the Arts Piano Concert Preview](#). (00:53)

(Launches in new window)

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Enlivened by a dream

Following a welcome by Assistant Director of the NIH Office of Intramural Research Roland Owens, Ph.D., NIH Director Francis Collins, M.D., Ph.D., presented opening remarks. Collins encouraged employees to volunteer during the Jan. 16 holiday, as he set the tone for the speakers and performers who followed him.

"NIH's annual observance gives the chance here, this morning, to raise our awareness of the changes that have been made as a consequence of Dr. King's leadership," Collins said, "recognizing, however, that we have not reached that Promised Land. We still have many things that need attention before we are truly to be able to say that our country is a place where justice and fairness are equally available in every way that Dr. King dreamed of."



As a child in segregated postwar America, Russell could mark the milestones in his own life in sync with those of the Civil Rights Movement itself. (Photo courtesy of NIH and Ernie Branson)

Dance, music, and oral history

Before Russell came to the podium for his keynote presentation, “Toxicology, Scientific Development, and Civil Rights,” the audience experienced the first of three performances by young artists. Moving to a tenor’s rendition of the 23rd Psalm, accompanied by harp and strings, a young woman presented a modern dance expression of triumph over adversity through unwavering faith in a higher power.

Russell began his talk about “What I do and how I got here” with a sort of primer on toxicology that merged at several points with key events from the civil rights struggle and what King’s life has meant to him as a scientist and a citizen. Russell began his personal narrative with a 1968 photo of himself, at age 8, with his brother and sister in Compton, Calif., just a few days before King’s death Apr. 5, 1968.

With photos and oral history, Russell described the milestones leading up to the Civil Rights Act and the importance of desegregation in the post-World War II military to the African-American experience since. He reinforced the military connection with a photo of himself in uniform at Walter Reed Army Medical Center, where he conducted scientific research during the early 1990s on cyanide ion binding. “What we were trying to do,” he said, “is develop systems to identify candidate antidotes.”

With his presentation complete, Russell turned the podium over to Owens, who welcomed dancers back to the stage. The students performed two more numbers based on African-American cultural themes.

The first was a stirring modern dance rendition of the coded slave escape song, “Wade in the Water,” with rhythm and blues inspired musical accompaniment, featuring a finale of ballet-influenced movement by a group of female dancers dressed in white.

The second brought a male modern dance ensemble to the stage, as a chorus performed an a cappella version of the spiritual, “Sometimes I Feel Like a Motherless Child (A Long Way from Home).”

Working together

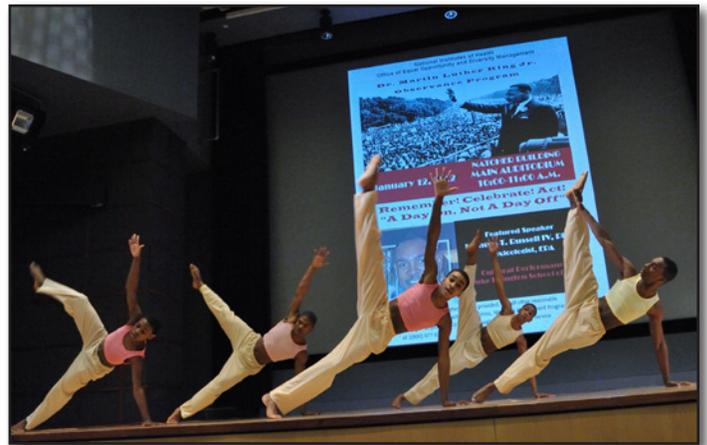
The event concluded with remarks by Sheila Stokes, acting director of the NIH Office of Equal Opportunity and Diversity Management, which sponsored the observance. “Many of us today can talk about the legacy of Dr. Martin Luther King Jr.,” Stokes told the audience. “I am here today because of the hard work that others put into embracing his vision, embracing his message.”

Stokes ended the program by reminding attendees of the universality of King’s legacy. “It’s a combined and collective effort.... It’s about what we do as a people together.”

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Three of the students from the Duke Ellington School danced gracefully to the rhythm of “Wade in the Water.” (Photo courtesy of NIH and Ernie Branson)



Male dancers moved to the haunting lyrics and music of “Sometimes I Feel Like a Motherless Child.” (Photo courtesy of NIH and Ernie Branson)

Long recognized for CFC leadership

By Eddy Ball

NIEHS and NIH enjoyed a banner year for pledges to the Combined Federal Campaign (CFC). One factor in this year's success on the home front, several observers agree, was the leadership provided by NIEHS Deputy Associate Director for Management Chris Long, who served as chairperson of the Greater North Carolina (N.C.) CFC Local Federal Coordinating Committee.



In a message to NIH CFC chairs Jan. 6, U.S. National Library of Medicine Associate Director for Administrative Management and NIH 2011 CFC chairperson Todd Danielson praised Long's contribution to the 2011 campaign. "I'd be remiss if I didn't tip my hat to NIEHS for their service in the Greater North Carolina CFC," Danielson wrote. "Congratulations to Chris Long who did a stellar job as statewide chair!"

A Happy New Year, indeed

Danielson was right to be filled with New Year cheer, as he reported on the performance of the 27 institutes and centers. NIH exceeded its 2011 goal of \$2.4 million by \$150,000, raising 106 percent of its goal. With the addition of pledges made between the official close of the campaign Dec. 15 and the final accounting Dec. 31, NIEHS raised a total of \$113,526, an impressive 108 percent of its goal of \$105,000.

In the Greater N.C. CFC campaign, only the much larger workforces at the U.S. Environmental Protection Agency and U.S. Postal Service raised more than NIEHS employees. The Greater N.C. Area CFC now includes counties that were previously within the boundaries of the CFC of Central Carolinas, the Piedmont Triad CFC, the Research Triangle Area CFC, and 18 counties that were not previously associated with a CFC, serving more than 27,000 federal employees in 56 North Carolina counties and 7 South Carolina counties.

This year, the Greater N.C. CFC raised more than \$1.3 million. But, with many agencies, particularly the Postal Service, facing the specter of significant cuts, reduced hours, and downsizing, the overall campaign finished about 15 percent below last year. "We feared it would be much worse, so I am happy we did this well," said Long, "NIEHS was one of the few bright spots in a very difficult fundraising year."

Reflecting on the 2011 CFC, NIEHS/NTP Director Linda Birnbaum, Ph.D., who supported Long's service as statewide chair and rallied employees during the CFC campaign at NIEHS, thanked Long and NIEHS co-chairs Cindy Innes and Ron Cannon, Ph.D., for their hard work and dedication. "These totals are especially impressive during a time of high unemployment and hard times for many families in our communities," she wrote. "Chris, Cindy, Ron, and the many generous people at NIEHS and elsewhere make me proud to be a federal employee and a part of the NIEHS and NIH communities."



Long said he feels a commitment to give back to the community (see text box). "My mother was a United Way executive director, so it's in my blood." (Photo courtesy of Steve McCaw)

The Long tradition of service at home and abroad

Since joining NIEHS in 2007, Long has provided leadership and support for charitable efforts by NIEHS employees, including the annual CFC and Feds Feed Families drives. Previously, at the U.S. Environmental Protection Agency, he served as chairperson of the Research Triangle Area CFC and served on the board of directors of the U.S. Partnership for Education for Sustainable Development.

He has also worked as a staff executive for the Boy Scouts of America, volunteered more than two decades as a Big Brother, and helped start a charity serving a small village in Nicaragua.

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