



Environmental Factor

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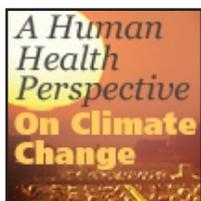
May 2010

NIEHS Spotlight



[Birnbaum Appears Before Subcommittee on Health](#)

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[Women's Health Advocates Honored](#)

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Science Notebook



[Illuminating Dark Mysteries of Intracellular Organelles](#)

"Seeing is knowing," explained Jennifer Lippincott-Schwartz, Ph.D., at the beginning of her Rodbell Lecture Series Seminar on "Advances in Super-Resolution Imaging."



[DNA Strand Break Repair and Human Disease](#)

On April 13, Steve West, Ph.D., of the London Research Institute, presented "Defects in DNA Strand Break Repair and Links to Human Disease."



[Chromosome Replication Stress and Health](#)

New findings about genome instability were front and center during a talk at NIEHS presented March 25 by grantee Thomas Glover, Ph.D.



[Discovery Through Computational Biology](#)

According to Harvard University biophysicist Martha Bulyk, Ph.D., molecular genetics is poised to take a big step forward thanks to applications of computational biology and 'omics technologies.

NIEHS Spotlight



[Environmental Stewards Gather at NIEHS](#)

As it has each year since 2007, NIEHS hosted the annual North Carolina Environmental Stewardship Initiative (ESI) Members Meeting on March 23 in Rodbell Auditorium.



[NIEHS Gains Senior Medical Advisor](#)

NIEHS expanded its Bethesda presence in April with the appointment of Aubrey Miller, M.D., senior medical advisor and liaison to the U.S. Department of Health and Human Services (HHS).



[Collman Honored by UNC](#)

The University of North Carolina at Chapel Hill (UNC-CH) recently conferred its distinguished alumni award on one of the top scientists at NIEHS — Gwen Collman, Ph.D.



[Simulation Technology Wins Award](#)

Developers of NIEHS-funded software for virtual emergency-responder training are winners of a 2009 Adobe Max award.



[Rogan to Head Epidemiology Group](#)

The prestigious American Epidemiological Society (AES) recently announced the election of NIEHS epidemiologist Walter Rogan, M.D., as its next president.

Science Notebook



[Study Well Positioned to Look at Age-Related Disease](#)

The established aging cohort of the Agricultural Health Study continues to be a prime resource for studying associations between pesticides and diseases of aging.



[Red Tide May Break Records](#)

NIEHS-funded scientists are monitoring a potentially significant regional bloom of toxic algae, popularly known as the New England “red tide.”



[Herbal Remedy Threatens Millions](#)

Recently, the widely used herb *Aristolochia* has become a major topic of discussion because of its potent toxicity.



[Metabolomics — A New Direction in Toxicology?](#)

NTP welcomed guest lecturer Sury Vulimiri, D.V.M., Ph.D., April 9 to speak on the potential of integrating metabolomics into the emerging science of predictive toxicology.



[Stanford Scientist Discusses Macrophage Activation](#)

On April 20, Ajay Chawla, M.D., Ph.D., discussed his research on the role of nuclear receptors in macrophage activation and inflammatory disease.

NIEHS Spotlight



[Wetterhahn Awardee Turns Attention to Schools](#)

Former Superfund Research Program Trainee and Karen Wetterhahn Memorial Award winner Laura Senior, Ph.D., recently paid a visit to NIEHS to discuss community-based outreach.



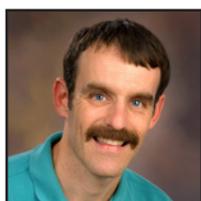
[Obama to Appoint Former Council Member](#)

If Congress agrees, the new chair of the Chemical Safety Board will be a scientist and labor specialist with ties to NIEHS — Rafael Moure-Eraso, Ph.D.



[Grantees Grapple with Harmonizing Air Pollution Studies](#)

Investigators with clinical air chamber facilities gathered at NIEHS to discuss how to design their air pollution studies to better facilitate regulatory decisions that affect public health.



[Ethics Works Both Ways for NIEHS Employee](#)

For NIEHS Bioethicist David Resnik, J.D., Ph.D., applying ethical standards recently helped him protect his intellectual property from improper use by a professor at a foreign university.



[NIEHS at Latino Worker Summit](#)

NIEHS and federal partners brought together nearly 1,000 participants for the National Action Summit on Latino Worker Health and Safety April 14-15 in Houston.

Science Notebook



[Ground-breaking Research Leads to New Cancer Theory](#)

Tufts University physician scientists report on investigations into the signals that mediate cellular proliferation and their new theory of cancer.



[Study Confirms Link Between Environmental Exposure and Allergy](#)

New findings by NIEHS-funded University of Cincinnati researchers indicate that environmental exposures and prolonged breast feeding are critical determinants of childhood allergic rhinitis.



[This Month in EHP](#)

The May 2010 issue of Environmental Health Perspectives (EHP) revisits the issue of water quality, with news section feature stories on lead and pharmaceutical contamination.



[Ronald Evans to Present Distinguished Lecture](#)



The NIEHS Distinguished Lecture Series welcomes Ronald Evans, Ph.D., a professor at the Salk Institute for Biological Studies, as its next speaker on May 11.

Inside the Institute



[Lab Staff Group Gets Promotions Update](#)

Members of the Assembly of Laboratory Staff (AoLS) heard some welcome news about promotions, during their spring meeting on April 14.



[Trainees Assembly Holds Spring Meeting](#)

In the NIEHS Trainees Assembly (NTA) spring meeting on April 19, trainees learned about how NTA functions, new programs, and upcoming events.



[NIEHS Recognizes Administrative Staff](#)

NIEHS celebrated Administrative Professionals Day on April 20 with a day of events honoring the Institute's clerical, administrative, secretarial, and technical employees.



[Going Green at the EPA Green Vendor Fair](#)

The sun was shining, the music was playing, and the vendors had information galore for increasing sustainability in daily living at the EPA Green Vendor Fair on April 20.



[Environmental Heroes Speak at EPA](#)

Staff of the Environmental Protection Agency invited their NIEHS neighbors to celebrate the 40th anniversary of Earth Day April 21-22 at EPA.



[Sustaining a Healthy Planet and Healthy People](#)

During the month of May, NIEHS will have many opportunities for staff to learn about what is being done at the Institute and what they can do at home.

Extramural Research

[Extramural Papers of the Month](#)

- [Flame Retardants Linked to Reduced Human Fertility](#)
- [Beauty Chemicals Tied to Early Puberty in Girls](#)
- [Mother's Exposure to Urban Air Pollutants Affects Children's Cognitive Abilities](#)
- [Key to Hormone-Resistant Prostate Tumors Discovered](#)

Intramural Research

[Intramural Papers of the Month](#)

- [PPAR gamma Protects Lungs Against Inflammation and Oxidative Stress](#)
- [Dust Mite Allergen Der p 7 Is Structurally Similar to Innate Immune Proteins](#)
- [Early-life Exposures Are Linked to Development of Uterine Fibroids](#)
- [Orphan G Protein-coupled Receptor Mediates the Regulation of ERRA Gene Expression in Breast Cancer Cells](#)

Calendar of Upcoming Events

- **May 4** in Rall D-350, 11:00–12:00 — Biostatistics Branch Seminar Series presentation on “High-Throughput Assembly and Analysis of Short-read Transcriptome Sequence Data,” by Gordon Robertson, Ph.D.
- **May 6** in Rall D-450, 10:00–11:00 — Laboratory of Molecular Carcinogenesis Seminar Series featuring Carey Anders, Ph.D., speaking on “Breast Cancer Brain Metastases: Clinical and Translational Research Efforts”
- **May 10** in Rodbell Auditorium, 8:00–4:30 — NTP Board of Scientific Counselors [meeting](#) 
- **May 11** in Rodbell Auditorium, 1:00–2:00 — NIEHS Distinguished Lecture Series featuring Ronald M. Evans, Ph.D., addressing “Nuclear Hormone Receptors: Biosensors of the Environment”
- **May 12–13** in Rodbell Auditorium, 8:00–4:30 — National Advisory Environmental Health Sciences Council [meeting](#) 
- **May 17 (Offsite Event)** at the North Carolina Biotechnology Center, 8:00–3:45 — “High Throughput Screening for Chemical Genomics and Computational Toxicology” GEMS Annual Spring Meeting, registration required.
- **May 17 (Offsite Event)** in the Natcher Auditorium on the NIH Bethesda Campus, 9:00 — [Commemoration of the life and accomplishments of Ruth L. Kirschstein, M.D.](#), the first woman to direct an NIH institute, the National Institute of General Medical Sciences. 
- **May 20** in Rall D-450, 10:00–11:00 — Laboratory of Molecular Carcinogenesis Seminar Series presentation on “Good Breast Gone Bad: Early Detection of Breast Cancer from the Bench to the Community,” by Victoria Seewaldt, M.D.
- **May 21** in Rodbell Auditorium A, 11:00–12:00 — Laboratory of Reproductive and Developmental Toxicology Lecture Series featuring Melissa Mann, Ph.D., discussing “Susceptibility of Genomic Imprinting to Assisted Reproductive Technologies”
- **May 25** in Rodbell Auditorium, 10:00–11:00 — Laboratory of Molecular Genetics Fellows Invited Lecture Series featuring Joanne Stubbe, Ph.D., exploring “Class I Ribonucleotide Reductases: Use of Unnatural Amino Acids to Probe Proton-Coupled Electron Transfer”
- **May 27** in Rodbell Auditorium, 10:00–11:00 — Keystone Lecture Seminar Series presentation on “SEMINAR: Bioinformatics Strategies for Gene-Environment Interaction Analysis,” by Jason Moore, Ph.D.
- View More Events: [NIEHS Public Calendar](#)

NIEHS Spotlight

Birnbaum Appears Before Subcommittee on Health

By Eddy Ball

Lawmakers turned once more to NIEHS/NTP Director [Linda Birnbaum, Ph.D.](#), on Earth Day, April 22 for expert advice about the environment and public health. Birnbaum joined Centers for Disease Control and Prevention (CDC) spokesman [Henry Falk, M.D.](#), during a hearing at the Rayburn House Office Building in Washington.

Speaking to members of the U.S. House Committee on Energy and Commerce Subcommittee on Health chaired by Representative [Rep. Frank Pallone Jr.](#) (D-NJ), Birnbaum and Falk addressed the issue of “The Environment and Human Health: The Role of HHS.” ([see video](#))

Both leaders discussed U.S. Department of Health and Human Services (HHS) programs studying, tracking, and addressing the effects of environmental factors on human health and illness, as they described their agencies’ efforts to translate environmental science research into primary prevention measures in communities. Birnbaum’s testimony is posted on the [NIEHS Web site](#) and on the hearing [Web site](#), where Falk’s testimony and a [video link](#) are also available.

Birnbaum began with an overview of NIEHS research initiatives and the challenges of studying complex diseases caused by the interplay of genes, environment, and developmental timing, before giving the lawmakers concrete examples of Institute-funded outreach and translation efforts. “At NIEHS, we also recognize that the ultimate goal is to move our science into real-world applications to solve problems in communities,” she told the committee.

She pointed to outreach efforts by grantees in the NIEHS Superfund Research Program (SRP) at New York University, which served as a consultant on the chromium cleanup program in Jersey City, N.J.; at the Harvard University SRP, which is working in a population of pregnant women with relatively low arsenic exposures in Tar Creek, Okla.; and at the Duke University SRP, which has conducted research on fipronil, a new pesticide, that shows it has the same adverse effects on neurodevelopment as the chemical it replaced, chlorpyrifos.

After discussing the emerging science of predictive toxicology and NIEHS and NTP partnerships to advance alternative testing and provide solid scientific evidence for regulatory agencies, Birnbaum concluded her testimony by reminding the lawmakers of the NIEHS mission. “At NIEHS,” she said, “we remain committed to leading the evolution of the field of environmental health sciences to meet emerging public health challenges.”



Birnbaum has succeeded in making sure that lawmakers are getting the NIEHS message on environmental public health. At the hearing, she discussed ways chemicals can trigger epigenetic alterations affecting gene transcription and windows of susceptibility can determine the effects of exposure to such chemicals as bisphenol A. (Photo courtesy of Steve McCaw)



Falk is the acting director of the National Center for Environmental Health and Agency for Toxic Substances and Disease Registry at CDC. Falk pointed to partnerships with NIEHS, the U.S. Environmental Protection Agency, and others to try to close regulatory gaps, such as the water quality of private wells. (Photo courtesy of CDC)

Group Issues White Paper on Climate Change

By Ed Kang

A report released April 21 by a federal working group led by NIH highlights 11 key categories of diseases and other health consequences that are occurring or will occur due to climate change (see [text box](#)). The report, “[A Human Health Perspective on Climate Change](#),” provides a starting point for coordination of federal research to better understand climate’s impact on human health. The recommendations of the working group include research to identify the most vulnerable populations and what efforts will be most beneficial.

“This white paper articulates, in a concrete way, that human beings are vulnerable in many ways to the health effects of climate change,” said Linda Birnbaum, Ph.D., director of the National Institute of Environmental Health Sciences (NIEHS) and the National Toxicology Program, whose institute led the interagency effort. “It lays out both what we know and what we need to know about these effects in a way that will allow the health research community to bring its collective knowledge to bear on solving these problems.”

The report also examines a number of cross-cutting issues for federal research in this area, including susceptible, vulnerable, and displaced populations; public health and health care infrastructure; capacities and skills needed; and communication and education efforts.

“Earth Day reminds us that changes in the environment are affecting our food, water, and our health,” said Birnbaum. “This report provides a guide for researchers throughout the world who are working to improve the health of the planet and the health of all people.”

“Increasingly, studies, including some co-funded by NIEHS, recently published in *The Lancet*, have shown us that by understanding how climate change, human health, and human activities intersect,” said Howard Koh, M.D., assistant secretary for Health for the U.S. Department of Health and Human Services, “we can prevent some of climate’s worst impacts while providing huge benefits to human health that actually offset the costs of mitigation and adaptation. The white paper integrates these new data in a framework that is a new way of looking at this complex and critical problem.”

The ad hoc Interagency Working Group on Climate Change and Health was formed following a 2009 Institute of Medicine Roundtable on Environmental Health Sciences, Research, and Medicine meeting on climate change. At the gathering, leaders from NIEHS, the U.S. Environmental Protection Agency, the National Oceanographic and Atmospheric Administration, and the Centers for Disease Control and Prevention recognized that the scientific discussion around climate change needed to be reframed to emphasize the human health impacts and research needs to address them.



Portier, above, pinpoints the co-benefits of addressing climate change, including money saved by potential improvements in human health worldwide. (Photo courtesy of Steve McCaw)

Led by NIEHS scientist Christopher Portier, Ph.D., membership of the working group also includes representatives from the NIH Fogarty International Center, the U.S. Department of Agriculture, the U.S. Department of State, the White House Office of Science and Technology Policy, and the U.S. Department of Health and Human Services, with support and input from the U.S. Global Change Research Program and others.

(Ed Kang is a public affairs specialist in the NIEHS Office of Communications and Public Liaison and a regular contributor to the Environmental Factor.)

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Grantee Honored for Online Science Education Resources

By Bono Sen

An [NIEHS-funded project](#) at Baylor College of Medicine (BCM) is enjoying high-profile recognition for its exceptional efforts to redefine science education for young learners.

The Houston-based project's principal investigator and editorial director, Nancy Moreno, Ph.D., recently accepted a Science Prize for Online Resources in Education (SPORE) — an award sponsored by [Science magazine](#) and the [American Association for the Advancement of Science \(AAAS\)](#) to recognize outstanding projects from around the world that promote innovation and excellence in education and use of high-quality on-line resources by students, teachers and the public.

In its March 26 issue, Science highlighted an [essay](#) by Moreno and Managing Editor Dianne B. Erdmann describing BCM's innovative web-based resources for elementary- and middle-school teachers, who face the daily challenge of incorporating accurate, timely scientific information into their existing curricula.

Targeting Research Priorities

The white paper highlights the state-of-the-science on the human health consequences of climate change on:

- Asthma, respiratory allergies, and airway diseases
- Cancer
- Cardiovascular disease and stroke
- Foodborne diseases and nutrition
- Heat-related morbidity and mortality
- Human developmental effects
- Mental health and stress-related disorders
- Neurological diseases and disorders
- Waterborne diseases
- Weather-related morbidity and mortality
- Vectorborne and zoonotic diseases (like malaria, which can be transmitted from animals to humans)



Moreno, above, spoke at NIEHS in July 2008 on “Environmental Health Partnerships to Improve Science Education” (see [story](#)). Her talk outlined the ways innovation and collaboration have sparked hands-on scientific inquiry across the curriculum in projects in Texas public schools. (Photo courtesy of Steve McCaw)

According to Moreno and Erdmann, the project is a cost-effective approach to providing open access to resources for a wide audience, “including all life-science teachers, undergraduate faculty, home-schooling families, and the general public.” The project provides additional benefits for “schools with significant populations of economically disadvantaged and at-risk students, where teachers tend to be less prepared to teach science.”

The integrated Web sites, [BioEdOnline](#) and [K8 Science](#), enable instructors to learn about a topic, download a related lesson and watch a demonstration on how to teach the lesson. The sites also offer science content presentations, biology news, and downloadable Powerpoint slides with notes.

Redefining Science Education

Science education in America’s kindergarten through middle-school classrooms is in need of major changes, according to a National Academies report. “Across classrooms everywhere, students are being told about science and asked to remember facts, but not being taught how to think scientifically,” says Bruce Alberts, editor-in-chief of Science.

The report points out that teachers need opportunities to learn how to teach science and students need help to become proficient in science, irrespective of inequities in learning opportunities and differences in teaching styles.

According to the report, reform in science education should achieve four goals:

- Prepare students to “know, use, and interpret scientific explanations of the natural world”
- Prepare students to generate and evaluate scientific evidence and explanations
- Prepare students to understand the nature and development of scientific knowledge
- Prepare students to actively participate in scientific practices and discussion

(Bono Sen, Ph.D., is the science education and outreach program manager for the NIEHS journal Environmental Health Perspectives.)

Environmental Health Perspectives (EHP) Science Education Program

The NIEHS journal EHP has its own innovative [science education program](#), the only one of its kind offered by a scientific journal. EHP has created an inventory of more than 100 lesson plans that address some of the issues raised by the National Academies report. Using current and credible information, these lessons aim to teach students about the interconnection between their health and the world around them.

Designed to promote environmental health science as an integrative context for inquiry-based learning, the lessons encourage students’ use and understanding of the scientific literature. This freely available online resource can be used to teach a variety of subjects in high school and undergraduate classrooms, including biology, environmental science, chemistry, ecology, physics, and social studies.

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Women's Health Advocates Honored

By Eddy Ball

Two breast cancer advocates with ties to NIEHS are being honored by the U.S. Environmental Protection Agency (EPA) with its 2010 Environmental Quality Award — the highest honor presented by the agency to people in the public sector.

EPA recognized Karen Miller, president of the [Huntington Breast Cancer Action Coalition \(HBCAC\)](#) and founder of [Prevention is The Cure](#), and Laura Weinberg, president of the [Great Neck Breast Cancer Coalition](#), for their “outstanding commitment to protecting and enhancing environmental quality and public health.” Along with environmental advocate Beth Fiteni, issues program director of the Neighborhood Network, Miller and Weinberg received their [awards](#) on April 23 to coincide with Earth Day celebrations.

Miller has been a member of the NIEHS [Public Interest Partners](#) and Breast Cancer and Environment Working Group for more than six years and now serves as co-chair of the Partners group. Weinberg created and implemented a [program](#) at Great Neck North and Huntington high schools in New York for Students and Scientists United for Breast Cancer Prevention Research who participate with her in the annual meetings of the [Breast Cancer and the Environment Research Centers \(BCERC\)](#). The BCERC are jointly funded by NIEHS and the National Cancer Institute.

A long-time friend and colleague of Miller and Weinberg, Acting Director of the NIEHS Division of Extramural Research and Training Gwen Collman, Ph.D., described the awards as “a wonderful honor — richly deserved by both for their tireless efforts on behalf of women’s health and prevention. NIEHS is proud to be associated with these remarkable women.”

Each year, EPA selects Environmental Quality Award winners from among non-profit environmental and community groups, individual citizens, educators, business organizations, and members of the news media, as well as from federal, state, local or tribal governments and agencies. The honor is given to those individuals or organizations making significant contributions to improving the environment and public health.

In its announcement of the awards, the HBCAC Website called the winners “amazing women [who] are a powerful triptych, combining diverse and extensive backgrounds to advocate for environmental health and legislation through a powerful partnership. They are pillars of perseverance in our community and we congratulate them for this outstanding achievement.”

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Awardee Karen Miller, above, is shown during one of her many talks advocating improved detection and treatment of breast cancer and support for women who have the disease itself or are at risk of developing it. (Photo courtesy of Karen Miller)



Weinberg posed for a photo at the EPA awards ceremony. (Photo courtesy of Laura Weinberg)

Environmental Stewards Gather at NIEHS

By Eddy Ball

As it has each year since 2007, NIEHS hosted the annual [North Carolina Environmental Stewardship Initiative \(ESI\)](#) Members Meeting on March 23 in Rodbell Auditorium. In recent years, the meeting has come to mark the beginning of a season of Earth Day celebration and sustainability events that follow it each spring at NIEHS.

Sponsored by the North Carolina Department of Environment and Natural Resources (DENR), the daylong event offers environmental managers from across the state a venue for celebrating successes and sharing strategies. Members share the common goal of nurturing their social and economic bottom lines by making operations more environmentally sustainable.

Members of the ESI program advance through three stages of stewardship. NIEHS is currently an ESI “partner” with plans to advance to status as a “rising steward” in 2011. A handful of members have achieved the status of “stewards,” who serve as standard bearers for the program and mentors for other members.

Stewardship at NIEHS

NIEHS Office of Management Deputy Associate Director Chris Long welcomed the stewards to campus, as he pointed to the Institute’s recent installation of LED lighting in the auditorium, operation of solar collectors on the roof of B module, and other stewardship accomplishments throughout campus. “We’re proud of what we do,” he told the audience.

Long referred attendees to the recently published NIEHS [“Sustainability Report”](#) outlining accomplishments of the Institute’s initiatives to reduce energy use and environmental impact.

He invited them to take one of the copies on display at the registration table — or, even better, to read it online. In the spirit of stewardship, Long added, “Don’t print it unless you really need to.”

Honoring stewards and sharing best practices

Representing DENR Secretary Dee Freeman, DENR Assistant Secretary for Environment Robin Smith welcomed attendees on behalf of the State of North Carolina. The meeting facilitator, DENR Pollution Prevention and Environmental Assistance Division Director Gary Hunt, introduced the five new stewards and noted the “phenomenal growth” of the ESI program statewide.



The folks at DENR are thoughtful and grateful guests who bring along their banner for the special day each year at NIEHS. (Photo courtesy of Steve McCaw)



During her remarks, Smith, center, traced the roots of stewardship to a “commitment to pay attention” to the environmental impact of every aspect of operations — and not simply to getting a job done or a product manufactured. (Photo courtesy of Steve McCaw)

The program included presentations by five members on management strategies that produced environmental benefits while also cutting costs. Attendees enjoyed networking time during a poster session and breaks for lunch and refreshments.

Representing NIEHS and sharing lessons learned on campus were members of the Health and Safety Branch (HSB) environmental team — HSB Chief Scott Merkle, Environmental Specialist Bill Steinmetz, Hazardous Waste Manager Paul Johnson, and Sustainability Coordinator Trisha Castranio — as well as NIEHS Environmental Awareness Advisory Committee (EAAC) co-chairs Danica Andrews and Dick Sloane.



In between the presentations, Hunt, above, joined the audience to listen to the new stewards speak proudly of their accomplishments. (Photo courtesy of Steve McCaw)



Joel Lee, plant engineer at the massive Bridgestone Americas Tire Operations in Wilson — one of this year's new stewards — presented an impressive catalogue of environmentally friendly measures implemented there and an ambitious list of goals for 2010. (Photo courtesy of Steve McCaw)

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Members of the NIEHS team gathered afterwards for a group photo. Shown, left to right, are Steinmetz, Castranio, Andrews, Merkle, and Sloane. (Photo courtesy of Steve McCaw)

NIEHS Gains Senior Medical Advisor

By Eddy Ball

NIEHS expanded its Bethesda presence in April with the appointment of Aubrey Miller, M.D., M.P.H., as senior medical advisor and liaison to the U.S. Department of Health and Human Services (HHS). Miller will also supervise staff at the NIEHS office in Bethesda.

A medical epidemiologist and captain in the U.S. Public Health Service, Miller previously served as the Chief Medical Officer for the U.S. Food and Drug Administration (FDA), Office of Counterterrorism and Emerging Threats. Prior to joining FDA, he worked as a senior medical officer and regional toxicologist for the U.S. Environmental Protection Agency (EPA) and for the HHS Office of the Secretary in Denver, coordinating multi-agency emergency responses, such as the Libby, Mont., asbestos situation (see related [story](#)). He also worked for a number of years as a medical officer for the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH).

Miller received his M.D. from Rush Medical College in Chicago and his M.P.H. in Environmental and Occupational Health Sciences from the University of Illinois, School of Public Health. He is board certified in Occupational and Environmental Medicine.



Miller, above, will help NIEHS be at the tables in Bethesda and Washington, and, as Birnbaum has said, keep the Institute from being “out of sight and out of mind.” (Photo courtesy of Aubrey Miller)

Miller’s appointment was an important step for NIEHS/NTP Director Linda Birnbaum, Ph.D., as she puts in place an expanded institutional presence in Bethesda to raise the visibility of the Institute on the NIH Campus and on Capitol Hill. Birnbaum has said she also wants to hire a liaison to the toxicological community.

Miller’s experience at several other agencies within HHS will also help NIEHS maintain federal partnerships and establish stronger ties with other government groups with interests in public health and environmental science.

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Collman Honored by UNC

By Eddy Ball

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The University of North Carolina at Chapel Hill (UNC-CH) recently conferred its distinguished alumni award on one of the top scientists at NIEHS — Gwen Collman, Ph.D., acting director of the NIEHS Division of Extramural Research and Training (DERT).

The UNC-CH Epidemiology Chapter of the General Alumni Association formally presented Collman with the 2009 H.A. Tyroler Distinguished Alumni Award at her keynote presentation on “Community Engagement in Environmental Epidemiology” on April 28 at the UNC-CH School of Social Work.

An award from fellow alumni

In a letter to Collman announcing the award, UNC Epidemiology Alumni Association President Aaron Fleischauer, Ph.D., wrote, “Your nominators highlighted your contributions as a scientist and administrator at the National Institute of Environmental Health Sciences in developing and advancing the field of environmental and genetic determinants of chronic disease.”

“From basic science to applied public health, mentorship of junior scientists, and advancement of extramural research and training programs, you have embodied the spirit of this distinguished award during your illustrious career,” Fleischauer continued. “We, as fellow alumni, are proud to be bonded to you through our University.”

Remembering an outstanding scientist and teacher

The award is a memorial to the late Herman Alfred (Al) Tyroler, M.D., Alumni Distinguished Professor Emeritus of Epidemiology at the UNC School of Public Health, who died in 2007. The award honors Al Tyroler’s life-long dedication to teaching and mentoring and four decades teaching and mentoring at UNC. Each spring the Epidemiology Alumni Association recognizes the achievements of an alumna or alumnus for outstanding career contributions in specific areas of epidemiology during the prior year.

The award is especially meaningful for Collman, who worked with Tyroler from 1979 to 1981 when she came to UNC as part of the Lipids Clinics Program coordinating center.

A stellar career at NIEHS

Collman joined NIEHS as an epidemiologist in the Institute’s Epidemiology Branch, following completion of her doctorate in Environmental Epidemiology at the UNC-CH School of Public Health in 1984. In 1992, she moved to DERT as a scientific program administrator overseeing grants for breast cancer research, environmental and molecular epidemiology, and children’s health and disease prevention.

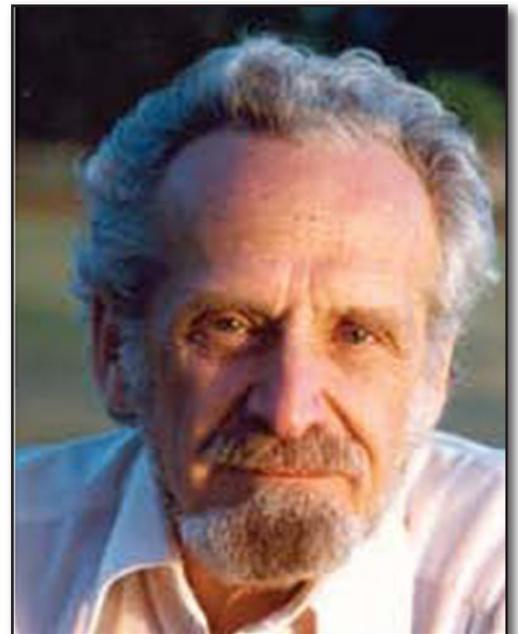
In 2003, Collman became chief of the DERT Susceptibility and Population Health Branch, a post she held until being named acting director of the division in 2008. She has been recognized many times for her work and has to her credit an impressive list of NIH Merit and Directors Awards and other honors, scientific and policy publications, and presentations to a wide variety of audiences.

Previous Tyroler awardees were Ed Wagner, M.D., a senior investigator in the Center for Health Studies of the Group Health Cooperative in Seattle, Wash., as well as director of The W.A. MacColl Institute for Healthcare Innovation, for 2007; and Louise A. Brinton, Ph.D., chief of the NCI Hormonal and Reproductive Epidemiology Branch, for 2008.

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Collman, above, is a long-time advocate of environmental justice and community-based participatory research. Under her leadership, DERT is entering the first phase of its new Partnerships for Environmental Public Health initiative — an umbrella program for advancing the impact of environmental public health research at local, regional, and national levels. (Photo courtesy of Steve McCaw)



During his long career at UNC, Tyroler received many honors for his influential studies in the areas of cardiovascular disease, genetic epidemiology, minority health, women’s health and international health. (Photo courtesy of UNC-CH)

Simulation Technology Wins Award

By Eddy Ball

Developers of [NIEHS-funded](#) software for virtual emergency-responder training are winners of a 2009 Adobe Max award. In a March 29 press release, Equipment Simulations LLC, a Worker Education and Training Program (WETP) Small Business Innovation Research (SBIR) grant recipient, announced that its fire-engineering simulation technology, [CommandSim](#), placed first in the Adobe Max Public Sector competition — ahead of entries funded by the U.S. Department of State, U.S. Army, and the National Aeronautics and Space Administration.

“We are filling the need for realistic, recurrent, safe, and affordable training for emergency responders,” wrote Jonathan Kaye, President of [Equipment Simulations](#), parent company of [CommandSim](#).

The [Adobe Max](#) award-winning simulation solution was created using the programs Adobe Flex 3, AIR, Dreamweaver CS4, Flash CS4 Professional, Flash Media Interactive Server, Illustrator CS4, and Photoshop CS4. [CommandSim](#) is the software used to power a growing line of [fire-engineering simulations](#) available for training programs.

Equipment Simulations’ press release featured testimonials from people in the fire-fighting and training sectors. “The value [CommandSim](#) brings is enormous, because we can practice how we work in a no-consequence setting,” said Nyle Zikmund, Fire Chief of the Spring Lake Park-Blaine-Mounds View Fire Department in Minnesota. Others pointed to the value of training “in a dynamic, real-time environment” and “reducing out-of-service time because people can participate in the exams in their respective districts.”

NIEHS Program Administrator Ted Outwater oversees the SBIR grant funding of [CommandSim](#) as part of the WETP’s Hazardous Waste Worker Training Program. When he learned of the award, Outwater described [CommandSim](#) as the culmination of efforts to make high-quality first-responder training available to more people in the field and help reduce injuries and fatalities among firefighters and other first responders.

“If we can save lives by preparing first responders for the wide range of scenarios they’ll face on the job,” Outwater explained, “then this kind of state-of-the-art technology pays for itself many times over. It also helps us get more training for new and veteran responders from every dollar we spend,” he added.

The annual Adobe Max Award honors the creativity of designers, developers, and decision-makers using the firm’s leading-edge software in the areas of [Advertising and Branding](#), [Education](#), [Enterprise Productivity](#), [Entertainment](#), [Mobile](#), [Public Sector](#), [Social Computing](#), and [Social Responsibility](#) to shape the future.

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Members of the International Association of Firefighters, above, participate in a WETP-funded “dirty bomb” training demonstration at the [HAMMER Training and Education Center](#) in Hanford, Wash. Simulated training can complement live training exercises and make them safer. (Photo courtesy of Ted Outwater)

Rogan to Head Epidemiology Group

By Eddy Ball

The prestigious American Epidemiological Society (AES) recently announced the election of NIEHS epidemiologist [Walter Rogan, M.D.](#), as its next president. Rogan is a principal investigator who heads the NIEHS Pediatric Epidemiology Group. At the Society meeting in 2011, he will succeed sitting president David Morens, M.D., of the National Institute of Allergy and Infectious Diseases.

During the 83rd annual meeting of [AES](#) in Baltimore, March 25–26, where members voted for their new president, Rogan presented findings from a paper, “Soy Infant Formula and Early Menarche: A Test of the Endocrine Disruptor Hypothesis,” co-authored by doctoral student Margaret Adgent and University of North Carolina at Chapel Hill Associate Professor [Julie Daniels, Ph.D.](#)

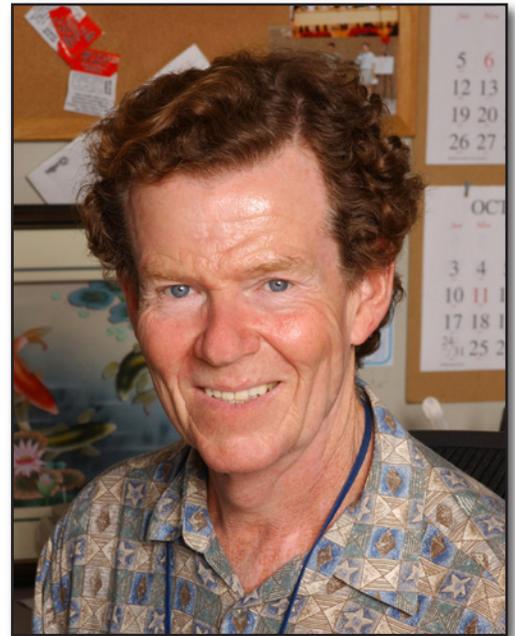
Rogan’s current work includes the Study of Estrogen Activity and Development (SEAD) and the Infant Feeding and Early Development (IFED) study. SEAD was a series of pilot investigations that established methods characterizing the effects of exogenous estrogens on infants using soy formula, which contains plant estrogens, as a model exposure. The IFED study uses those methods to follow 600 infants over their first year with careful measurement of estrogen effects. IFED will be conducted in collaboration with pediatricians at the Children’s Hospital of Philadelphia.

AES and the NIEHS Epidemiology Branch

According to NIEHS Epidemiology Branch Chief [Dale Sandler, Ph.D.](#), the [AES](#) was established in 1927 by scientists affiliated with the Center for Disease Control and the Epidemic Intelligence Service to provide a scientific forum for senior epidemiologists. “Early members were leading experts in infectious disease epidemiology and vaccine trials,” she said.

Since then, like the field of epidemiology itself, the organization has broadened its scope to include epidemiologists like Rogan — a member since 1990 — whose focus is on chronic diseases, genetics, environment, biostatistics, and other concerns beyond the scope of infectious disease and vaccination. Calling Rogan’s election “a mark of distinction in the field of epidemiology,” Sandler explained, “Membership in AES is by nomination, and selection is based on scientific contributions and stature.”

Along with Rogan, several NIEHS epidemiologists are members. They include Sandler, Principal Investigator [Donna Baird, Ph.D.](#), a new member of AES, and Senior Investigator [Allen Wilcox, M.D., Ph.D.](#), a former president of the society. NIEHS Biostatistics Branch Chief [Clarice Weinberg, Ph.D.](#), is also a member.



A retired Public Health Service officer, Rogan, above, has enjoyed a productive career at NIEHS since joining the Institute as a staff associate in 1976. He has accumulated an impressive list of honors and accolades for his research and published more than 100 articles and chapters. (Photo courtesy of Steve McCaw)



Although Rogan is an athletic legend of sorts around NIEHS — the annual “Rogathon” running competition is named for him — he probably won’t be carrying around the AES symbol as he serves as its keeper. (Photo courtesy of AES)

A presidential tradition at AES

As president, Rogan will engage in one of the society's noteworthy traditions. During his term, he will serve as keeper of the AES symbol – a preserved section of the old wooden pipes crafted from hollow tree-trunks that had carried London's drinking water since the Middle Ages (see photo).

The city replaced the wooden trunks with iron pipes in the aftermath of one of epidemiology's legendary public health achievements during the mid-19th century — when physician John Snow implicated the city's water system in the outbreak of a cholera epidemic. In 1967, London's Wellcome Historical Medical Museum presented the section of wooden pipe to AES as an historic symbol of the society's scientific and social purpose.

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Wetterhahn Awardee Turns Attention to Schools

By Rebecca Wilson

Former Superfund Research Program (SRP) Trainee and [Karen Wetterhahn Memorial Award](#) winner Laura Senier, Ph.D., (see [story](#)) recently paid a visit to NIEHS to discuss the community-based outreach she participated in as part of Brown University's SRP program. Her presentation was well received and sparked a lively discussion among attendees.

The special presentation by Senier demonstrated how the SRP can be an effective vehicle for bringing together many stakeholders who are concerned about environmental public health and environmental justice.

Training and working with the Brown SRP

[Senier](#) received her Ph.D. in 2009 from Brown University, and is now an associate professor at the University of Wisconsin-Madison. She calls herself the “non-traditional Wetterhahn Award winner” because she is the first social scientist to receive the honor in its 11-year history of recognizing outstanding trainees engaged in more traditional bench science research.

With substantial experience working with environmental justice issues and in environmental health activism, Senier applies her social science training to outreach work to bring about change. Her approach to outreach is demonstrated by her work with the [Brown University SRP Community Outreach Core](#), which investigated the siting of Providence, RI public schools near toxic waste sites and made stakeholder involvement a key element of the project.

Building schools in all the wrong places

According to Senier, inappropriate school siting is a nationwide problem that disproportionately impacts poor communities and communities of color. The first Providence-area school brought to Brown's attention was an elementary/middle school built in 1999 on a former city dump. The site was known to be contaminated with lead, arsenic, volatile and semi-volatile organic compounds, and mercury.



*During her doctoral program at Brown, Senier worked with Professor of Sociology and Environmental Studies [Phil Brown, Ph.D.](#), in the *Reuse In Rhode Island: A State-based Approach to Complex Exposures* project (see [story](#)) funded by SRP. (Photo courtesy of Steve McCaw)*

Parents of students and nearby residents filed a civil action lawsuit, citing environmental racism —78 percent of the student body is nonwhite; lack of environmental equity; and inadequate public notice. The city then built a middle school atop another dump in 2000, and in 2005, the city selected a slag heap for an area high school. Half the neighboring community is below the federal poverty limit, and more than 90 percent of the residents are nonwhite.

The site for the proposed high school was the old Gorham silver factory. Once America’s premier silver manufacturer, the factory closed in 1986. The land went through subsequent owners before being seized by the City of Providence in 1992 for unpaid taxes. The 37-acre lot was subdivided into four parcels, one of which became the proposed home of the school. The site is heavily contaminated with polychlorinated biphenyls (PCBs), a slag heap containing lead and copper, and ground- and surface-water contaminated with the chemicals perchloroethylene (PCE) and trichloroethylene (TCE).

The Brown SRP outreach team educated the community about the site, then helped the residents organize to protest the construction of the school. The team worked in middle school classrooms, teaching students about environmental justice and public speaking so they could take their concerns to the city and the school board. While investigators were engaging with community stakeholders on these projects, Brown faculty members were working through the Research Translation Core to better characterize potential for vapor intrusion at the site.

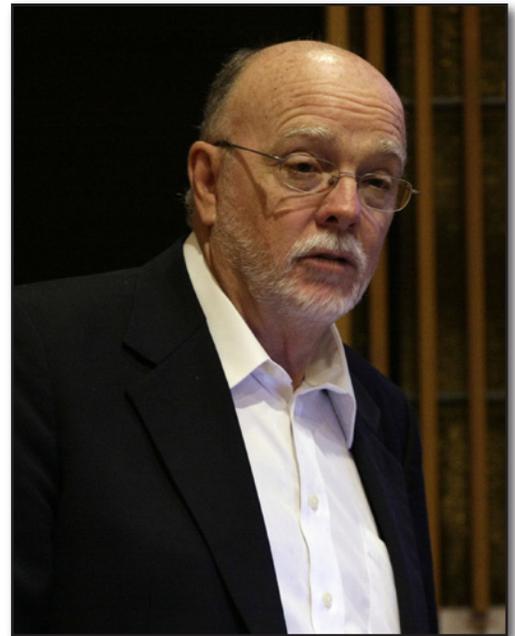
Stakeholder participation leads to community involvement

Senier argues that the Brown SRP team was successful because the researchers carefully balanced the needs of the multiple stakeholders concerned about contamination around the site — the Rhode Island Department of Environmental Management, legal advocacy groups, community-based environmental justice organizations, and the surrounding community. The Brown SRP dedicated substantial resources to this problem through both the Community Outreach Core and the Research Translation Core.

Senier points out that because Brown SRP had relationships with all stakeholders, “We were also able to bring stakeholders together by convening a statewide panel to develop new guidelines for brownfield redevelopment that mandate community involvement in new projects, to prevent situations like this from occurring in the future.”

(Rebecca Wilson is an environmental health information specialist for MDB, Inc., a contractor for the NIEHS Superfund Research Program and Worker Education and Training Program.)

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NIEHS SRP Director Bill Suk, Ph.D., introduced Senior and told the audience about the history of the prestigious Karen Wetterhahn Award. (Photo courtesy of Steve McCaw)



NIEHS Program Administrator Ted Outwater was part of the Worker Education and Training Program group in attendance at the talk. (Photo courtesy of Steve McCaw)

Obama to Appoint Former Council Member

By Eddy Ball

If Congress agrees, the new chair of the [U.S. Chemical Safety and Hazard Investigation Board \(CSB\)](#) will be a scientist and labor specialist with ties to NIEHS and the National Toxicology Program (NTP). On March 22, a White House [press release](#) identified industrial hygienist Rafael Moure-Eraso, Ph.D., as one of four new appointments President Obama intends to make to key posts in his administration.

During his 22-year career at the University of Massachusetts Lowell, [Moure-Eraso](#) has been a professor, administrator, and chair in the Department of Work Environment in the School of Health and Environment.

Ties to NIEHS and NTP

Along with other high-level appointments in government, with labor unions, and at other universities, Moure-Eraso was a member of the NIEHS Study Section to Evaluate Educational Grants for Hazardous Waste Workers in 1987, 1990, and 1991. He served from 1991 to 1995 as an NIEHS National Advisory Environmental Health Sciences Council member. From 1999 to 2001, he was a member of the NTP Board of Scientific Counselors.

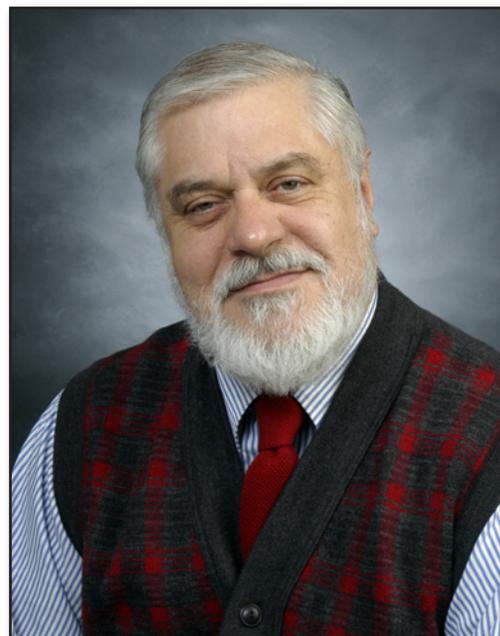
Moure-Eraso has served as principal investigator for several extramural research grants from the NIH, World Health Organization, National Institute for Occupational Safety and Health, and other organizations. He was co-principal investigator for the NIEHS Center for Family Work and Community (CFWC) and Department of Work Environment — University of Massachusetts Lowell “Southeast Asian Environmental Health: New Ventures” from 1995 to 2005.

Advising on worker safety

Commenting on the expertise of his long-time friend and colleague, NIEHS Worker Education and Training Program Director Chip Hughes said, “Rafael will make certain that workers’ safety and the environment are a part of the conversation when it comes to the deliberations of the CSB.” Hughes described Moure-Eraso as a “top-notch environmental scientist” who “takes a holistic view to the setting of work environment policy.”

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The CSB conducts root cause investigations of chemical accidents at fixed industrial facilities. The agency does not issue fines or citations, but does make recommendations to plants, regulatory agencies such as the Occupational Safety and Health Administration (OSHA) and the U.S. Environmental Protection Agency (EPA), industry organizations, and labor groups.

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Moure-Eraso, above, has worked in the field of worker safety, work environment, and environmental science for more than 37 years. (Photo courtesy of Rafael Moure-Eraso)

Grantees Grapple with Harmonizing Air Pollution Studies

By Laura Hall

On March 31, investigators with clinical air-chamber facilities in the U.S. and Canada gathered at NIEHS to discuss how to integrate, coordinate, and standardize their air pollution studies to better facilitate regulatory decisions that affect public health. The all-day meeting on “Harmonization of Human Clinical Chamber Air Pollution Exposure Studies” was sponsored by the NIEHS Division of Extramural Research and Training (DERT) and attended by NIEHS grantees and other researchers, as well as NIEHS and U.S. Environmental Protection Agency (EPA) grant administrators.

Jerry Heindel, Ph.D., acting chief of the DERT Cellular, Organs, and Systems Pathobiology Branch (COSPB), opened the meeting by saying that in addition to the traditional practice of “funding the best science by the best scientists,” NIEHS needed to work with investigators to develop more coordinated study designs. Harmonization of studies will not only advance the field but also have much greater impact on regulatory decisions, said Heindel.

COSPB Health Science Administrator Sri Nadadur, Ph.D., said he initiated and organized this meeting because previous discussions at grantee meetings recommended harmonization of human clinical air pollution studies, and participants expressed a need for a formal process to initiate this discussion.

There is a need for standardized exposure and end-point response measurement protocols as well as sharing resources and data across different laboratories, Nadadur explained. Harmonization will “aid in cross-study comparisons, novel-effects identification, increased statistical power for genetic susceptibility studies, biomarker validation, and robust clinical translation from chamber air pollution to epidemiology studies.”

In her charge to the workshop, NIEHS/NTP Director Linda Birnbaum, Ph.D., pointed out that there were only about 10 laboratories across the U.S. and Canada with “the expertise and facilities to conduct clinical air pollution studies,” each with minor variations in protocol that sometimes “make it difficult to harmonize these studies.” Birnbaum said, “The beauty of the clinical studies is that it allows us to complete that bridge between animal and epidemiology studies, to identify early biomarkers of responses, and to begin to hone in on some gene-environment interactions.”

Birnbaum stressed the need for guidelines for integrating data across laboratories to better make use of ongoing and future studies to address genetic or disease susceptibilities associated with air pollution.



“The goals of today’s workshop are really to facilitate a forum to develop some standardized protocols and methods that allow us to integrate the human chamber studies across North America,” said Birnbaum. (Photo courtesy of Steve McCaw)



“Harmonization doesn’t mean identical, but a commonality of study design,” said EPA Senior Scientist Bob Devlin, Ph.D. (Photo courtesy of Steve McCaw)



“We need to establish a governance and use committee for a tissue/specimen bank and data sharing,” said University of Pennsylvania Professor Rey Panettieri, Jr., M.D. “There are ethical considerations, quality assurance issues, and sample viability issues that must be examined.” (Photo courtesy of Steve McCaw)

In the first session of the day, University of Southern California Professor Ed Avol explained the translational power of chamber studies to address observations made in epidemiology studies. NIEHS Program Administrator David Balshaw, Ph.D., discussed the new innovative portable sensors and monitors that can characterize the individual’s exposures. The developmental research for these devices was funded by the [NIH Genes, Environment, and Health Initiative](#) led by NIEHS. Balshaw said that the prototypes are available for validation in chamber studies.

EPA National Program Director for Air Research Dan Costa, Sc.D., told the audience that all studies — encompassing animal to epidemiology research — are used in the regulatory decision-making process. “Population studies will continue to carry a lot of weight, but I think that there is an increasing importance in having these set in a strong foundation of biological plausibility and that is where the chamber studies come in.” He added, “Standardization will allow us to do a fairer evaluation scientifically as well as help the regulatory folks in trying to pull all this information together.”

By the end of the workshop, the group agreed that there are protocols that would be fairly easy to standardize and that approaching standardization as a tiered system of difficulty, from easy to problematical, would help the harmonization process. They also agreed that there was a need for a consortium to make final decisions on protocols and methodology and to oversee compliance and data sharing.

Harmonization — the Doable and the Difficult

In the five moderated panel discussions, the experts discussed pulmonary and cardiovascular effects assessments as well as types of exposure protocols that are made in chamber exposure studies and how they might be standardized. They also discussed the use of genetic markers for genetic and disease susceptibility studies and the advantages of sharing data, tissue, and specimen samples that are collected.

The discussion brought up some challenges to harmonization because of the many variables involved in air chamber studies. Different equipment, equipment settings, and methodology for the same exposure type can create very different test conditions. For instance, particulate matter exposures would have to be carefully characterized in particle numbers and size to achieve harmonization. There are not even standard definitions of asthma and chronic obstructive pulmonary disease (COPD) across the different studies.

Nadadur chaired the organizing committee which was made up of members from NIEHS, EPA, Duke University, University of Rochester, University of Pittsburgh, and the University of Pennsylvania.



“We will need training by a core laboratory to facilitate consistency in the standardized protocols used,” said University of Rochester Professor, Mark Frampton, M.D. (Photo courtesy of Steve McCaw)

NIEHS and EPA air pollution grant administrators will work together to increase the coordination of these chamber studies to use available research dollars even more efficiently and effectively.

(Laura Hall is a biologist in the NIEHS Laboratory of Toxicology and Pharmacology, currently on detail as a writer for the Environmental Factor.)



“Core measures should be small in number and relatively easy to do,” said Professor David Peden, M.D., of the University of North Carolina at Chapel Hill. (Photo courtesy of Steve McCaw)



“This is just the beginning,” said Nadadur. “We will continue these discussions on harmonization by conference calls and deliberate on these issues.” (Photo courtesy of Steve McCaw)

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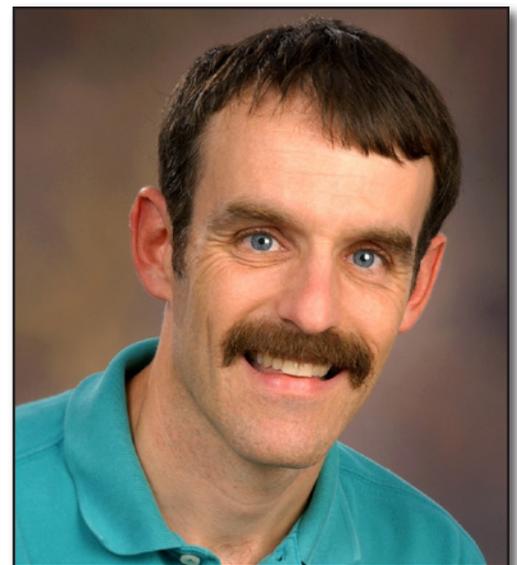
Ethics Works Both Ways for NIEHS Employee

By Eddy Ball

Usually, applying ethical standards results in a few extra, but necessary steps for conscientious NIH employees — a free lunch or dinner graciously declined, a nice gift politely refused or returned, careful review and revision of a clinical study plan in the interest of patient rights or humane treatment of animals, or sometimes even giving up an honorarium or outside job that just won’t pass muster with the ethics office.

But for NIEHS Bioethicist David Resnik, J.D., Ph.D., applying ethical standards recently helped him protect his own intellectual property from improper use by a professor at a university in the Czech Republic and regain something he might very well have lost otherwise.

Alerted by an email from a student group overseas that included copies of his paper and the allegedly plagiarized version, Resnik compared the documents and decided that the similarities between the two were too great to be coincidental. He conferred with NIEHS Deputy Ethics Counselor Bruce Androphy, J.D., and then contacted administrators at the university, who agreed that a violation had occurred.



Resnik, above, is more often involved in ethical determinations before an impropriety — or even the appearance of one occurs — than afterwards. (Photo courtesy of Steve McCaw)

Confronted with the embarrassing evidence, the professor resigned his deanship at the university and now faces further disciplinary action for his violation of ethics — and plain old common sense.

The lesson, of course, is simple — just what every college professor routinely tells his or her students. As well as being in terribly bad taste, plagiarism is a form of intellectual theft that can mean a failing grade for a student and the loss of employment or reputation for the very people who should know better.

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NIEHS at Latino Worker Summit

By Deborah Weinstock

NIEHS, the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH) brought together nearly 1,000 participants for the National Action Summit for Latino Worker Health and Safety. The meeting took place in Houston, Texas April 14 and 15.

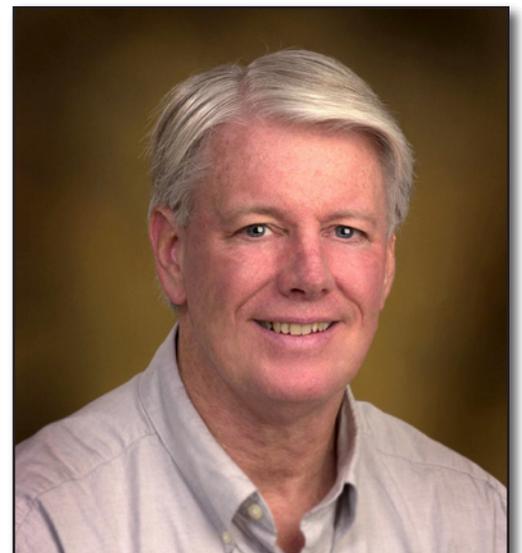
Attending the [conference](#) were Latino workers, community- and faith-based groups, employers, unions, consulates, the medical community, health and safety professionals, and government representatives.

The summit's goal was reducing injuries and illnesses among Latino workers by enhancing knowledge of their workplace rights and improving their ability to exercise those rights. "This summit gave NIEHS the opportunity to showcase our safety and health training for Latino workers, as well as to build new partnerships with numerous community organizations dedicated to eliminating health disparities," said Chip Hughes, chief of the NIEHS Worker Education and Training Program.

The summit's workshops and exhibits highlighted employers and companies with effective education programs to reach Latino workers; successful community-based and public-private partnerships to educate and empower workers about workplace hazards; and the many free educational resources that NIEHS, OSHA, NIOSH, and nonprofit organizations make available to help small business owners prevent worker illness, injury, and death on the job. Plenary sessions and selected workshops featured simultaneous translation for the audience.



U.S. Secretary of Labor Hilda Solis gave the keynote talk at the summit. (Photo courtesy of OSHA)



WETP Director Chip Hughes led the NIEHS delegation to the historic summit. (Photo courtesy of Steve McCaw)

An NIEHS-sponsored poster session highlighted effective collaborations and partnerships; safety and health training strategies to reach Latino workers; and on-the-job strategies for improving health and safety for Latino workers. More than 40 posters were on display from community groups, academics, and government agency representatives.

The Latino labor force represents 14.8 percent of the total civilian labor force in the United States. Latino workers suffer injuries and die on the job at a higher rate than the workforce as a whole. According to worker safety advocates, many of these workers are employed in dangerous and hazardous professions, and they often do not know their rights under the law and are not trained in addressing workplace hazards.

(Deborah Weinstock is the director of the NIEHS National Clearinghouse for Worker Safety and Health Training operated by contractor MDB, Inc.)

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Jaime Zapata, senior managing director of the Office of Public Affairs at the Department of Labor, right, moderated the Voices from the Workplace worker panel during the plenary session. (Photo courtesy of OSHA)



Summit participants broke into discussion groups within session workshops to discuss issues in Latino worker health and safety. (Photo courtesy of OSHA)

Science Notebook

Illuminating Dark Mysteries of Intracellular Organelles

By *Negin Martin*

“Seeing is knowing,” explained Jennifer Lippincott-Schwartz, Ph.D., at the beginning of the 12th annual Dr. Martin Rodbell Lecture Series Seminar on March 30 at NIEHS.

In her hour-long presentation, Lippincott-Schwartz dazzled her audience with a discussion of “Advances in Super-Resolution Imaging.” In her talk, she demonstrated how new techniques of selective illumination are helping scientists see dynamic aspects of cell organelles that they could only have speculated about just a few years earlier — uncovering things she said “we’d never see with conventional fluorescent proteins” (watch a [movie](#) of peroxisomal turnover within cells).

[Lippincott-Schwartz](#) is the chief of the Section on Organelle Biology in the Cell Biology and Metabolism Branch at the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). She was elected in 2008 to the National Academy of Sciences (read [profile](#)).

Tracking movement over time

Using super-resolution microscopy to study the eukaryotic endomembrane system, Lippincott-Schwartz has changed our understanding of many biological processes by revealing how intracellular membrane-bound organelles, such as endoplasmic reticulum (ER), Golgi apparatus, vesicles, lysosomes, and plasma membranes, work in concert to coordinate the dynamic movement of proteins and lipids throughout the cell.

The result of more than 35 years of development, the newest generations of fluorescent proteins are photo convertible moieties that can be turned on and off with a pulse of light, explained Lippincott-Schwartz — opening up for investigators “an incredible variety of approaches.” In a 2002 [study](#), she and postdoctoral fellow [George H. Patterson, Ph.D.](#), reported on the discovery of a photoactivatable variant of avGFP, *Aequorea victoria* green fluorescent protein, (PA-GFP). The fluorescence of PA-GFP is increased 100 fold after irradiation with 413-nanometer light and it is stable for days, which allows scientists to track the movement over time of labeled proteins in a cell.



Lecturers in the Rodbell Lecture Seminar Series receive a statue depicting the hand of Nobel Laureate and former NIEHS Scientific Director [Martin Rodbell, Ph.D.](#), holding the three key elements involved in cell signaling. (Photo courtesy of Steve McCaw)



Lippincott-Schwartz engaged her audience as she answered a question. Her talk, the first Rodbell Lecture by a woman scientist, was postponed because of a blizzard in February and rescheduled during Women’s History Month. (Photo courtesy of Steve McCaw)

Lippincott-Schwartz gave several examples of types of biological questions that can be answered using photoactivated fluorescent proteins. She has used PA-fluorescent proteins to assess the inter-lysosomal exchange mechanism and to characterize the movement of vesicular stomatitis virus glycoprotein (VSVG)-PA-GFP between ER, Golgi apparatus, and plasma membrane. VSVG facilitates viral entry into cells.

In addition to dynamic applications, photoactivated fluorescent proteins can be used to measure protein turnover. Lippincott-Schwartz presented an elegant study comparing the ER-associated degradation of CD3-delta protein using either classical pulse chase experiments or PA-fluorescent proteins. Although both experiments revealed the same rate of turnover for the CD3-delta protein, the PA-fluorescent protein technology yielded many more data points over time — painting a more thorough picture of the dynamics of degradation.

Selective illumination enhances clarity

Photoactivated localization microscopy (PALM) is another application employed by Lippincott-Schwartz's lab to create more precise structural data. In this method, only a small fraction of PA-fluorescent labeled proteins become activated, and their movement is imaged repeatedly by PALM. Thousands of PALM images are analyzed and combined to create a detailed image. The PALM created image is clearer than the typically hazy images that result from overlapping GFP fluorescence. The [photo gallery](#) at Lippincott-Schwartz's lab website features images, including ones of autophagosomes, ER-associated degradation, and Golgi apparatus organization.

Lippincott-Schwartz's lab has also helped in the development of a new imaging technology that produces the best resolution ever seen with an optical microscope. Interferometry is a technique used to study the pattern of interference created by two or more waves. Adapting interferometry to be compatible with photoactivated fluorescent proteins has given scientist a powerful imaging tool — interferometric PALM or iPALM. The new technology was first described in a [research article](#) published in 2009 in *Proceedings of the National Academy of Sciences* accompanied by a number of high-resolution images of microtubules and focal adhesions.

Laboratory of Neurobiology Chief David Armstrong, Ph.D., and head of the Transmembrane Signaling Group, Lutz Birnbaumer, Ph.D., hosted the talk by Lippincott-Schwartz. NIEHS Calcium Regulation Group Staff Scientist Gary Bird, Ph.D., who nominated the speaker, gave her introduction.

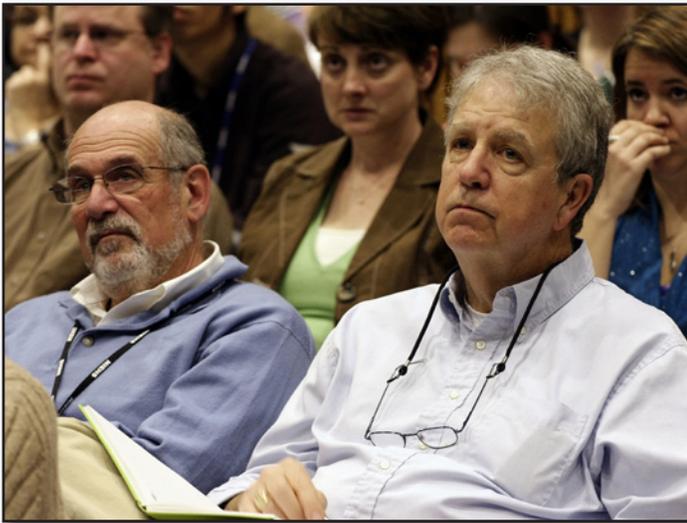


An honored guest at each year's lecture, Rodbell's widow Barbara, center, sat with family friend Monroe Wechsler, Ph.D., left, of the North Carolina State University Department of Nuclear Engineering. Seated next to them is lecture host Birnbaumer, right, a former postdoctoral fellow in Rodbell's lab. (Photo courtesy of Steve McCaw)



Shown in the audience following his introduction of Lippincott-Schwartz, Bird appeared to ponder expanded applications for advanced photomicroscopy in his own work. (Photo courtesy of Steve McCaw)

(Negin Martin, Ph.D., is a biologist in the NIEHS Laboratory of Neurobiology Viral Vector Core Facility and a 2009 Science Communication Fellow with Environmental Health Sciences. She recently completed a postdoctoral fellowship with the NIEHS Membrane Signaling Group.)



Also in the at-capacity audience were two NIEHS experts in the field of fluorescent microscopy — David Miller Ph.D., left, chief of the Laboratory of Toxicology and Pharmacology, and Jim Putney Ph.D., right, head of the Calcium Regulation Group. (Photo courtesy of Steve McCaw)



As Scientific Director John Pritchard, Ph.D., presented the Rodbell Award to Lippincott-Schwartz, she joined the ranks of the leading scientists, including three Nobel Laureates, who have been so honored by the scientists at NIEHS. (Photo courtesy of Steve McCaw)

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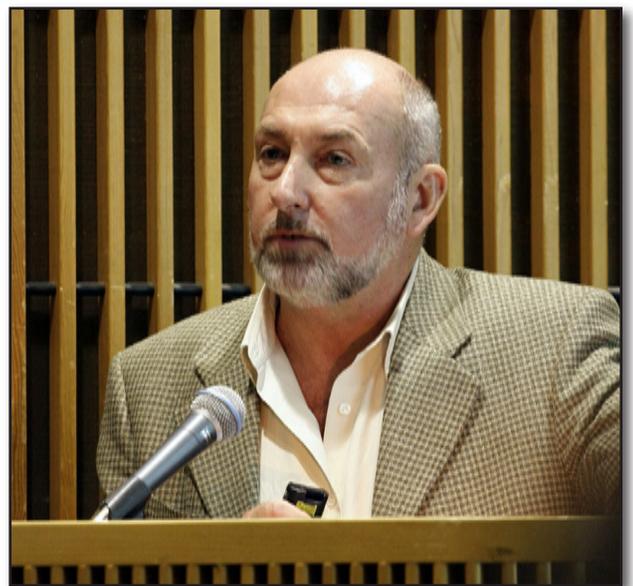
DNA Strand Break Repair and Human Disease

By Omari J. Bandele

On April 13, Steve West, Ph.D., of the London Research Institute in the United Kingdom, presented “Defects in DNA Strand Break Repair and Links to Human Disease,” a talk hosted by NIEHS Staff Scientist Dmitry Gordenin, Ph.D.

The seminar was the latest in the NIEHS Distinguished Lecture Series. West’s research involves understanding how flaws in basic DNA repair processes — such as homologous recombination — contribute to [tumorigenesis](#).

Early in his presentation, [West](#) explained that cells are constantly bombarded with a wide variety of DNA damage, including DNA strand breaks and cross-links, alkylation lesions, and base loss. “The maintenance of genome integrity is essential to all organisms,” West emphasized. “Cells have elegant mechanisms that can specifically recognize and repair different types of DNA damage.”



West presented an overview of DNA repair before moving into his findings on resolution of Holliday junctions. West has made major contributions to understanding this process. (Photo courtesy of Steve McCaw)

West underscored the vital role of DNA repair by observing that defects in repair processes are associated with many human cancers, such as xeroderma pigmentosum, hereditary non-polyposis colorectal cancer (HNPCC), Fanconi anemia, and breast cancer.

BRCA2 in the repair of double-strand DNA breaks

In his talk, West illustrated the contribution of the *BRCA2* tumor suppressor and the Rad51 recombinase to the repair of double-strand DNA breaks via homologous recombination. He stated that approximately 10 percent of genetically linked breast cancers — the second leading cause of cancer in women — involve a mutated version of the *BRCA2* gene. Defects in *BRCA2* are associated with decreased DNA repair and elevated levels of chromosome instability, which can lead to tumorigenesis.

To further investigate the role of *BRCA2* in repairing double-strand DNA breaks, West and colleagues successfully purified the full-length protein — a feat that had not previously been accomplished. The researchers observed extensive Rad51 binding to the intact protein. They also revealed that *BRCA2* bound only single-stranded DNA.



The talk drew scientists from throughout the Institute. Shown, left to right, are Principal Investigator Mike Resnick, Ph.D., Staff Scientist Katarzyna Bebenek, Ph.D., Principal Investigator Samuel Wilson, M.D., and Special Assistant to the Scientific Director Joel Abramowitz, Ph.D. (Photo courtesy of Steve McCaw)

Identification of eukaryotic nucleases that resolve Holliday junctions

The removal of Holliday junctions (HJ) is paramount for proper chromosome segregation during homologous recombination-dependent DNA repair. After searching nearly 20 years, West and colleagues identified two eukaryotic HJ resolvases — Yen1 in yeast and GEN1 in humans. These proteins represent a new subclass of the Rad2/XPG nuclease family, which resolves HJs in a manner analogous to the bacterial resolvase, RuvC.

West explained that yeasts utilize Yen1 and the Mus81-EME1 nuclease complex to remove HJ that form during meiosis or following treatments that cause replication blockage. Cells defective in both Mus81 and Yen showed a severe phenotype indicating that toxic recombination intermediates accumulate in the absence of Yen1 and Mus81-EME1. He also proposed that Yen1 acts to remove intermediates that escape detection by the Mus81-EME1 complex.



Chromosome Stability Group Research Fellow Daniel Menendez, Ph.D., took notes during West's talk. (Photo courtesy of Steve McCaw)

GEN1, Mus81, and BLM proteins play distinct roles in homologous recombination

West believes junction dissolution — unlike junction resolution — is a safer way to remove HJ in human mitotic cells. Junction dissolution is mediated by the BLM protein complex and involves DNA decatenation reactions. “This may be the primary mechanism to avoid potentially cytotoxic sister chromatid exchanges (SCE) in mitotic cells,” West noted.

Cells from patients with Bloom syndrome — characterized by the lack of BLM helicase activity — have high levels of SCE and genome instability due to the absence of the junction dissolution pathway. As a result, the GEN1 and Mus81-EME1 resolvase-mediated junction-resolution pathways predominate.

To determine the role of GEN1 and the Mus81-EME1 complex in SCE during DNA repair, West and colleagues examined Holliday junction resolution in BLM-deficient cells in the absence of GEN1, Mus81, or both proteins. They observed reduced SCE in cells that lacked Mus81, whereas no obvious changes were seen in the absence of GEN1. West suggests that these results indicate that the Mus81-EME1 complex is primarily responsible for SCE formation.

West concluded his presentation by illustrating that cells which lack all three pathways — BLM, GEN1, and Mus81-EME1 — display “chromosome catastrophe” characterized by extensive chromosome fragmentation. West’s work provides evidence that the removal of HJ is critical for the maintenance of genomic stability and, ultimately, protection against tumorigenesis.

(Omari J. Bandele, Ph.D., is a postdoctoral fellow in the NIEHS Laboratory of Molecular Genetics Environmental Genomics Group.)

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Chromosome Replication Stress and Health

By Eddy Ball

New findings about genome instability were front and center during a talk at NIEHS presented March 25 by [grantee](#) Thomas Glover, Ph.D., on “Mechanisms, Consequences, and Environmental Risks for CNV [Copy Number Variation] Mutations in Human Chromosomes.”

A professor in the Department of Human Genetics and Department of Pediatrics and Communicable Diseases at the University of Michigan, [Glover](#) is striving to develop a unified theory of the causes and consequences of replication stress in mammalian cells and to determine whether there are predictable pathways of stress-induced DNA damage.



Host Gordenin, right, joined the speaker during the question-and-answer session following West’s talk. Gordenin investigates DNA repair as part of the NIEHS Chromosome Stability Group. (Photo courtesy of Steve McCaw)

He and his group seek to better understand the potential role of CNV — microscopic deletions and insertions found throughout the genome — in a range of complex human diseases. They are particularly interested in understanding spontaneous or *de novo* CNVs — those present in an affected individual, but absent in both parents — and their connection to environmental factors.

Genome-wide implications

These *de novo* CNVs, Glover said, are responsible “much more than we’d expected” for “a surprising number” of diseases, such as mental retardation, autism, developmental defects, and genetic disorders, and copy number alterations are found in cancer cells. “It’s almost certain that genetic variations and environmental insults can induce increased risk for new and deleterious CNVs.”

Although there are “fragile sites” and “hot spots” in the genome where spontaneous CNVs are common, he noted, “CNVs stagger all across the genome.” Investigators have described more than 1,400 CNVs in healthy individuals — a number that is sure to grow with further research — and Glover expects to discover an even greater number in people with complex diseases as he searches for patterns in their occurrence.

Uncovering the mechanisms of environmental stress

As Glover explained, CNVs are an important component of genetic variation, playing a prominent role in phenotypic diversity, complex disease, and evolution. However, despite advances in understanding CNV mechanisms, he concedes, “It’s harder to understand how environmental events are involved.”

Glover hypothesizes that environmentally induced replication defects and DNA double-strand breaks are two of the major factors leading to CNVs during mitotic cell division in the somatic cells and in cancer cells. His group’s goal is developing a high-resolution catalogue of genomic manifestations of two categories of environmental stressors responsible for these two different processes in mammals — induced replication stress, building on previous work with the polymerase inhibitor amphidicolin, using hydroxyurea and folate, and double-strand breaks induced by ionizing radiation or bleomycin.

Glover’s talk was hosted by the NIEHS health scientist administrator who manages his America Reinvestment and Recovery Act-funded challenge grant, Dan Shaughnessy, Ph.D. Glover was the sixth speaker in the popular Keystone Science Lecture Seminar Series sponsored each month by the NIEHS Division of Extramural Research and Training.



Glover opened his talk by saying, “Our genomes they are a-changin,’” to underscore the large submicroscopic structural changes that occur continuously in the mammalian genome. (Photo courtesy of Steve McCaw)



Keystone lectures give Intramural scientists with shared research interests, such as NIEHS Environmental Genomics Group head Doug Bell, Ph.D., above, the opportunity to learn about the research of high-profile grantees. (Photo courtesy of Steve McCaw)



Lecture host Dan Shaughnessy, right, joined the speaker at the podium for questions. (Photo courtesy of Steve McCaw)



NIEHS Reproductive Medicine Group head Carmen Williams, M.D., Ph.D., above, was one of several in the audience with questions for Glover. (Photo courtesy of Steve McCaw)

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Discovery Through Computational Biology

By Bono Sen

According to Harvard University biophysicist Martha Bulyk, Ph.D., molecular genetics is poised to take a big step forward thanks to applications of computational biology and ‘omics technologies to advance understanding of how a cell responds to environmental stresses, differentiates properly, and progresses normally through its life cycle.

Speaking at the most recent NIEHS Laboratory of Molecular Genetics (LMG) Fellows Invited Guest Lecture on April 12, [Bulyk](#) discussed her [group's](#) experimental and computational approaches to determining the interactions of transcription factors (TFs) with DNA binding sites from a variety of genomes — yeast, nematode, fruit fly, mouse, and human. In her talk on “Transcription factor-DNA interactions: cis regulatory codes in genomes” hosted by LMG Postdoctoral Fellow Brian Chorley, Ph.D., Bulyk shared impressive new findings on the intricate interactions that are an integral part of the gene regulatory networks controlling critical cellular processes and responses to environmental conditions.

Surveying the regulatory landscape

“The regulatory landscape is very complex with lots of different TFs working together to bind to lots of different binding sites,” Bulyk told her audience. She pointed out that in order to understand these complex interactions at the genome level, it is important to understand the DNA binding preferences and specificities of these proteins.



Bulyk gave several examples of the scope of the task involved. In the 1,200 mouse TFs that they analyzed, for example, Bulyk said her group was able to identify DNA binding domains for over 400 mouse TFs. (Photo courtesy of Steve McCaw)

Along with colleagues in her lab and other collaborators, Bulyk seeks to characterize DNA sequence-specific regulation of co-expressed genes and understand the role of variants in the DNA binding sites, including variants that affect the binding affinity of the TF for its DNA site in gene regulation.

“To do this on a genome-wide scale and to better understand the effect of regulatory sequence variants or mutants on transcription, it is important to know all the different sequence-specific DNA binding proteins and their DNA binding preferences,” noted Bulyk.

“Until recently, this was not doable because there was not much DNA binding data for most TFs,” Bulyk explained. “Until a year ago, even for yeast which has over 200 sequence specific TFs, DNA binding site data were available for only half the TFs. In higher organisms, such as humans with over 2,000 TFs, only a few have been characterized for DNA binding site data.”

Universal protein binding microarray (PBM) technology

To address this problem, Bulyk’s team developed PBM technology to understand the binding preferences of hundreds of TFs from a variety of genomes. So that the same array could be used to study multiple genomes, Bulyk and her colleagues created a universal synthetic sequence design to provide information on the preference of the TFs to bind to every possible DNA binding site.

The multiplex format of the PBM technology is similar to the standard microarray technology. The signal intensity for the DNA sequences at each of the spots on the PBM provides information on the binding preferences of the TFs. This method also allows the identification of previously undiscovered DNA binding proteins and their DNA binding specificities. Bulyk noted that the PBM data are complementary to *in vivo* ChIP chromatin immunoprecipitation (ChIP)-based studies and that the PBM data can be used to interpret microarray readout of chromatin immunoprecipitation (ChIP-chip) data to distinguish direct versus indirect DNA binding targets.

While Bulyk fascinated the audience with her findings and copious data, she also reminded her listeners of the many challenges ahead. She pointed out that there is much we still don’t know about the diversity and complexity of DNA recognition by TFs in a tissue-specific, condition-specific manner. Much of the work to come will likely involve the kind of systems biology cross-disciplinary discovery approach that Bulyk herself has conducted so impressively.



NIEHS Chromosomal Stability Group head Mike Resnick, Ph.D., foreground, was one of several LMG principal investigators who joined their trainees for Bulyk’s talk. LMG Postdoctoral Fellow Kin Chan, Ph.D., left, seemed to ponder the implications of Bulyk’s discoveries. (Photo courtesy of Steve McCaw)



NIEHS Staff Scientist Matthew Longley, Ph.D., center, sat with other members of the Mitochondrial DNA Replication Group, headed by William Copeland, Ph.D., partly visible to his right. (Photo courtesy of Steve McCaw)

“This research nicely complements the work we do in LMG,” Chorley said following the talk. “Dr. Bulyk’s efforts in developing experimental and computational tools to examine protein-DNA interactions allow us to re-examine old ideas and datasets to uncover things that were not possible before.”

(Bono Sen, Ph.D., is the science education and outreach program manager for the NIEHS journal *Environmental Health Perspectives*.)



As host, Chorley, above, introduced the guest lecturer and moderated questions after the talk. Chorley is a member of the LMG Trainee Action Committee, which selects speakers whose research parallels investigations by NIEHS trainees. (Photo courtesy of Steve McCaw)

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A Young Investigator with a Stellar Career

Just nine years after completing her Ph.D. as a National Science Foundation fellow, Bulyk is already an associate professor of Medicine and Pathology at the Harvard University Medical School and Brigham and Women’s Hospital, as well as a member of the faculty of Harvard-Massachusetts Institute of Technology (MIT) Division of Health Sciences and Technology and head of the Bulyk Lab at Harvard.

Bulyk is also an associate member of [The Broad Institute of MIT and Harvard](#), and an associate member of the [Dana-Farber Cancer Institute’s Center for Cancer Systems Biology](#). At an age when the average junior scientist has just received that first grant as a principal investigator, Bulyk already has nearly 50 peer-review publications to her credit.

Technology Review recognized Bulyk in 2005 by naming her to the T35 list of young innovators under the age of 35 for her discoveries about gene regulation. Each year, the publication recognizes young technologists and scientists whose inventions and research its editors find most exciting and potentially world changing.

Bulyk’s research has also been recognized by the Faculty of 1000 Biology — an online research service that comprehensively and systematically highlights and reviews the most interesting papers published in the biological sciences, based on the recommendations of a faculty of more than 2,300 selected leading researchers.

Study Well Positioned to Look at Age-Related Disease

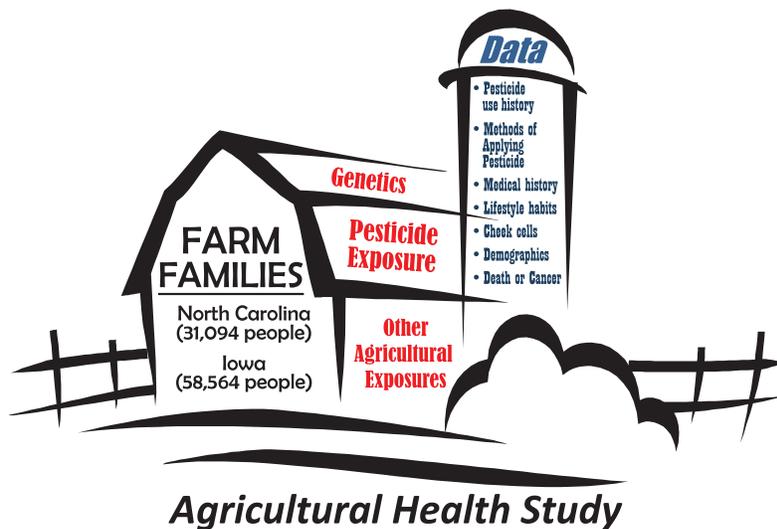
By Colleen Chandler

“As the third phase of data collection in the [Agricultural Health Study \(AHS\)](#) draws to a close, the established aging cohort will likely continue to be a prime resource for studying associations between pesticides and diseases of aging, such as those that involve cognitive function and late-in-life development of autoimmune diseases or Parkinson’s disease,” said NIEHS Epidemiology Branch Staff Scientist [Jane Hoppin, Sc.D.](#)

Hoppin is the study’s NIEHS co-principal investigator. NIEHS Epidemiology Branch Chief [Dale Sandler, Ph.D.](#), is NIEHS principal investigator on the study. Together with their collaborators at the National Cancer

Institute, they recently compiled an impressive overview of [accomplishments](#) since the launch of the study 20 years ago.

Field data collection for the third phase of the study concluded earlier this year. Hoppin said new data will be available to researchers this summer. Researchers are preparing to delve into the wealth of new information that can be gleaned from the data — especially as it relates to the health effects of pesticides from occupational and general population exposures.



Drawing on resources of the AHS, Hoppin and colleagues at NIEHS and elsewhere are also involved in two additional studies — the Farming and Movement Evaluation (FAME) Study and the AHS Neurobehavioral Study. FAME is a case-control study of Parkinson’s disease nested in the AHS, while the extramurally funded AHS Neurobehavioral Study will examine results of neurobehavioral tests and biological samples to evaluate whether long-term, low-level exposures to pesticides have neurological consequences.

“We are observing the world as it happens,” Hoppin explained. Hoppin has been deeply involved with the AHS since joining the Institute in 1999 — nine years after the study was launched by NIEHS and the National Cancer Institute (NCI), along with collaborators from the Environmental Protection Agency (EPA) and the National Institute for Occupational Safety and Health (NIOSH). Hoppin and colleagues at NIEHS and NCI have been authors on more than [120 papers](#) published so far by researchers working with the AHS data (see [text box](#)).

Families with known exposures to pesticides

One of the basic premises of the AHS was that, as a group, farmers are not only routinely exposed to pesticides, but they also know what chemicals they use. And that, epidemiologists say, makes them a near perfect group to follow to determine what health effects may be expected in the general population as a result of pesticide exposure. The average person is incidentally exposed to pesticides in daily life, but often knows little about the chemicals he or she is using.

NCI, of course, is specifically interested in cancers related to pesticide exposure. Not only are they conducting cancer analyses using the questionnaire-based data, they are also using the buccal cell DNA to assess whether specific individuals may be more susceptible to pesticide exposure.

EPA and NIOSH have been part of the research team to contribute exposure assessment expertise to the study. EPA researchers conducted a field monitoring study of 2,4-D and chlorpyrifos applicators and NIOSH investigators monitored fungicide exposure in orchard farmers. Results of both these studies have contributed information to the predictors of pesticide exposure and help to refine the algorithm used in the AHS to assign exposure intensity.



*Co-principal investigator Jane Hoppin
(Photo courtesy of Steve McCaw)*

Mining the data for associations with complex diseases

Hoppin said the potential disease processes related to pesticide exposure are not very well understood. While much is known about the potential neurotoxic effects of insecticides at high levels of exposure, low-level neurotoxic effects and effects in other organ systems are not well characterized. For cancer, no specific pesticides, with the exception of arsenicals, have been classified as known human carcinogens, although IARC currently considers “occupational exposures in spraying and application of non-arsenical pesticides” as a probable human carcinogen. Researchers in the AHS have looked at respiratory effects, diabetes, thyroid, Parkinson’s Disease, neurologic effects, and endocrine disruption as well as cancer.

(Colleen Chandler is a writer/editor in the NIEHS Office of Communications and Public Liaison and a regular contributor to the Environmental Factor.)



*Principal Investigator Dale Sandler
(Photo courtesy of Steve McCaw)*

Farm Families Provide a Rich Database for Health Studies

Following its launch in 1990, researchers with the AHS recruited 89,000 pesticide applicators, mainly farmers, and spouses in Iowa and North Carolina between 1993 and 1997. Certified and trained pesticide applicators and their spouses were recruited as they sought to renew their state licenses or took refresher courses on pesticide handling. The pesticide exposure and lifestyle information collected is much more detailed than any previous study of agricultural workers, and the AHS itself is the largest and most comprehensive health study of its kind, according to the study [Web site](#).

Both North Carolina and Iowa have cancer databases. Researchers check the registries each year to determine if any participants have been diagnosed with cancer and use the database to confirm the type and extent of the cancer. Researchers also search the National Death Index and death certificate databases in both North Carolina and Iowa to determine if any participants have died. Hoppin said the information in the cancer registries is backed by pathology confirmation, providing solid data on incidence of cancer. The death records provide cause-of-death information on participants who die during the study, she said.

The average age of farmers and spouses who enrolled in the study in its infancy was 45. That means those individuals are now around 60, but they range in age from younger than 30 to more than 90 years. Researchers have already collected a variety of demographic, medical history, and pesticide-use data as well as buccal cells for DNA. Hoppin said this information will enable researchers to look at associations and establish connections between agricultural exposures and health effects. The study has been flexible enough to change as needed during the course of the last 15 years. For example, by collecting information on all pesticides used since enrollment, the AHS has the ability to identify new trends in pesticide use, such as the increased use of fungicides in Iowa to combat soybean rust.

According to Hoppin, the stage is now set to look at effects of chronic, long-term exposure by assessing the new cases of disease identified since the study began. As researchers evaluate the data looking for new ways to use the pesticide exposure-related health effects data set, they will likely collect more targeted data from participants. These sub-studies allow for more detailed characterization of disease or exposure status than can be done through questionnaires and record linkage alone. Currently, there are already a number of add-on studies using sub-cohorts of the AHS being conducted by both intramural researchers and extramural grantees. These studies leverage the strength of the AHS to enhance the study of pesticides and diseases of aging.

Red Tide May Break Records

By Ed Kang

NIEHS-funded scientists from the Woods Hole Oceanographic Institution (WHOI) are monitoring a potentially significant regional bloom of toxic algae, popularly known as the New England “red tide.” This spring and summer, these Harmful Algal Blooms (HABs) of toxic *Alexandrium* could threaten the New England shellfish industry — and less-than-careful consumers — by contaminating filter feeders such as clams and mussels.

Biologist [Donald Anderson, Ph.D.](#), principal investigator of the Gulf of Maine Toxicity (GOMTOX) project jointly funded by NIEHS and the National Science Foundation (NSF), has been studying HABs and their cyclical outbreaks along the New England coast for much of his career. He and a team of co-investigators have developed a sophisticated [computer model](#) to help predict the intensity and location of blooms of *Alexandrium* in the Gulf of Maine.

2010 could see massive bloom

This year, abundant cyst populations have set the stage for a potentially record-breaking bloom. A cyst survey conducted in late 2009 shows the highest number of cysts the GOMTOX team has ever measured — more than 60 percent higher than what was observed immediately prior to the historic red tide of 2005. The cyst bed also appears to have expanded to the south.

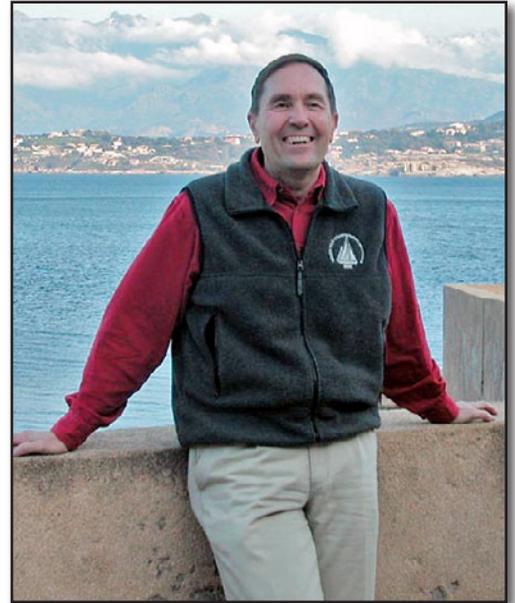
The 2005 bloom shut down shellfish beds from Maine to Martha’s Vineyard for several months, causing \$50 million in losses to the Massachusetts shellfish industry. A 2008 outbreak was similar in scale.

“This year’s bloom could be even larger,” explained Anderson. “But the prediction is weather dependent. Strong northeast winds in May, June, or July, would drive *Alexandrium* towards the coast and sensitive shellfish beds.”

Seafood industry and consumers at risk

While significant blooms have a tremendous environmental and economic impact, regional scale studies and monitoring are useful in preparing for contingencies and preventing exposure to humans.

Although the algae in the water pose no direct threat to human beings, “eating just a few affected clams could be lethal,” cautions Anderson. “There have been severe cases of paralytic shellfish poisoning (PSP) in individuals who ignored these warnings.”



In September 2007, Senior Scientist and Director of the WHOI Coastal Ocean Institute and Rinehart Coastal Research Center, Donald Anderson, gave a presentation (see story) at NIEHS. (Photo by Pat Tester, NOAA)



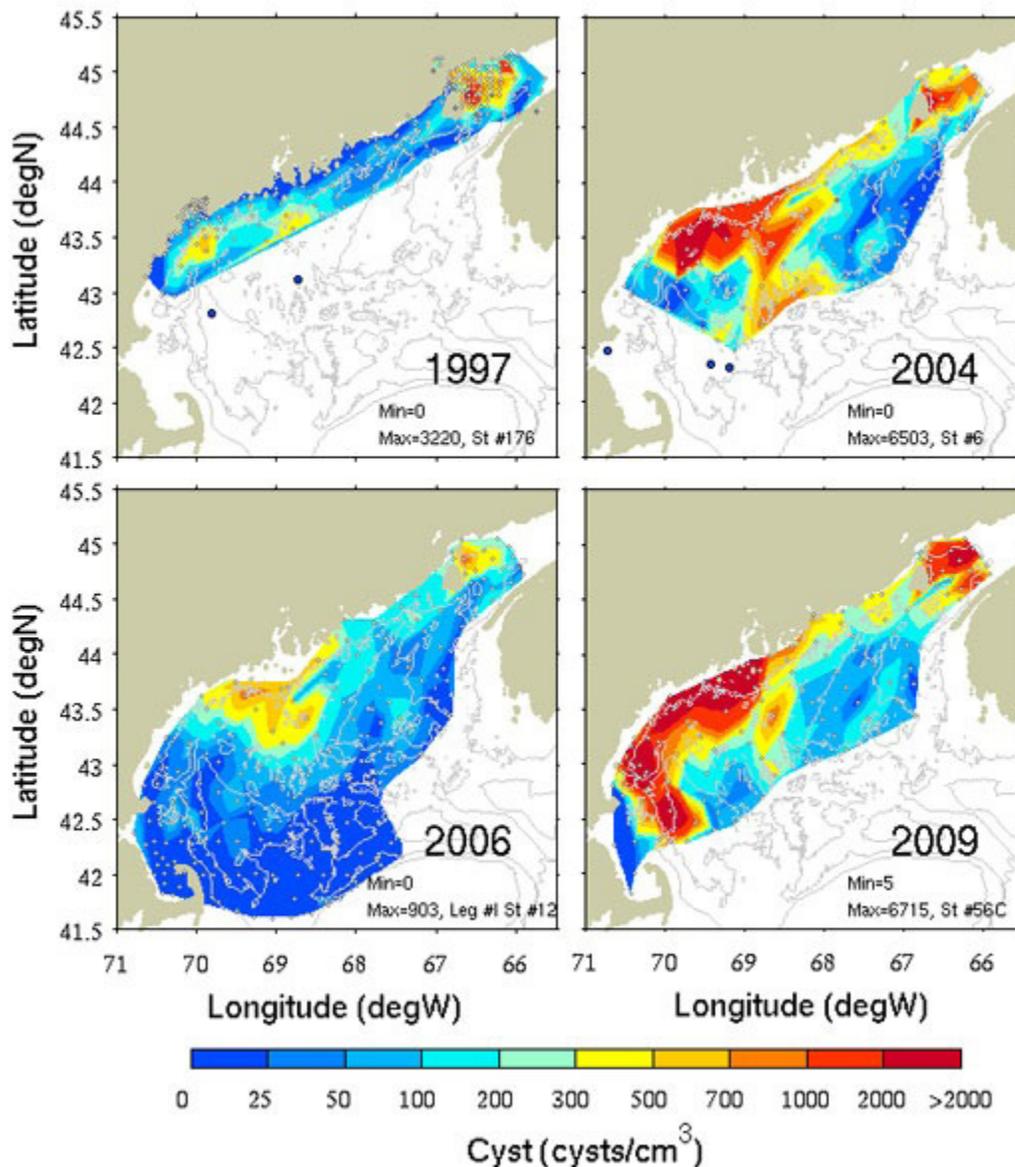
Shown above is one of the specially equipped vessels WHOI employs to gather samples of water off the New England coast. Accurate prediction and frequent monitoring are essential for developing advance warning of human health impact. (Photo courtesy of WHOI)

Advanced warning and frequent updates can help state agencies prepare for public health risks and give precious time to help shellfish farmers, suppliers, and restaurants make alternate plans. State agencies close shellfish beds when toxicities rise above dangerous levels. In fact, despite severe blooms in recent years, state agencies have prevented any illness from legally harvested shellfish.

Thus far in 2010, an early season closure of a shellfish bed in the Casco Bay area of Maine indicates that Anderson and his colleagues' models and simulations might be on target.

“Unfortunately, worldwide prevalence of ‘red tide’ is increasing,” Anderson observed. “Our research is focused on bridging the gap between oceanography and this growing human health problem.”

(Ed Kang is a public affairs specialist in the Office of Communications and Public Liaison and a regular contributor to the Environmental Factor.)



Maps of the Gulf of Maine reveal the concentration of Alexandrium cysts buried in seafloor sediments. The cyst abundance in 2009 is the highest ever observed in past surveys. Note also that the Alexandrium cyst “seedbed,” shown in red, extends farther to the south than was ever observed before. (Courtesy of Don Anderson and the Woods Hole Oceanographic Institution)

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Herbal Remedy Threatens Millions

By Ed Kang

Since the days of the ancient Greeks and Romans, people have turned to the ubiquitous plant *Aristolochia* — named after Aristotle — as an herbal medicine to treat a variety of symptoms and diseases, including arthritis and inflammation. Recently, this widely used herb has become a major topic of discussion because of its potent toxicity.

On April 21, NIEHS [grantee](#) and Stony Brook University Professor [Arthur Grollman, M.D.](#), presented new findings from his ongoing research on the disease now known as aristolochic acid nephropathy at the [American Association of Cancer Research \(AACR\)](#) meeting in Washington, D.C. He hopes to convene a global conference to spark discussion of research and prevention of *Aristolochia* exposure.

“*Aristolochia* grows throughout the world,” said Grollman, “and for millennia, every culture has used it for medicinal purposes. But it is such a potent and persistent toxin, one can’t safely take even a small amount.” In China and India especially, where herbal remedies play an important role in medicine, *Aristolochia* has emerged as a silent killer of those caught up in the claims of its healing power.

Decades-long latency

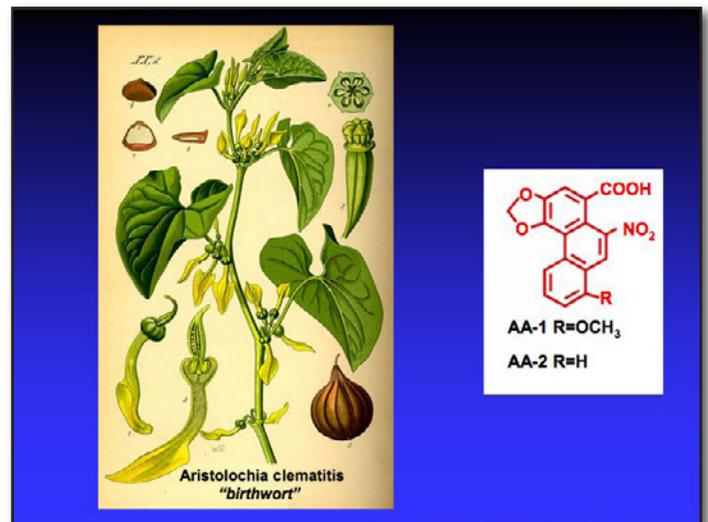
As Grollman explains, “It might take 20, 30, or more years for symptoms to appear, but ultimately people develop chronic kidney disease and urothelial cancer. We have detected the toxin in patients’ tissues 50 years after the last exposure. I don’t know of any other toxin that persists in tissues in an active form for half a century.” The long delay between ingestion and disease appearance makes it difficult for traditional healers or those using the herb to make the connection between the two.

Grollman’s investigations into the effects of *Aristolochia* began in the scattered, rural farm communities located in the Danube river basin where kidney disease and upper urinary tract cancer are prevalent. In these areas of Croatia, Serbia, and Bosnia, the *Aristolochia* plant grows freely in fields cultivated for wheat.

“About 50 percent of the local diet is comprised of bread from flour prepared in the old fashioned way — no effort is made to separate wheat grain from *Aristolochia* seeds. So residents of the endemic region are, in effect, ingesting on a daily basis low doses of this potent toxin from a very young age.”

Fingerprint of a silent killer

The pathology of the renal disease — also called Balkan endemic nephropathy — is relatively unique and the associated cancer is found in an unusual location – the upper urinary tract. In searching for its cause, Grollman analyzed mutations in the P53 gene – a tumor suppressor gene mutated in 50 percent of all cancers.



The ancient Greeks describe Aristolochia as an antidote for poison, including snakebites; in Europe, they call it “birthwort,” and women for 1000 years have used it to help expel the placenta after birth; in India, the herb is used in children to reduce fever; and in China, it’s used for arthritis and for inflammation. In April 2001, the U.S. Food and Drug Administration issued a [warning](#) to consumers to stop use of products containing aristolochic acid after women in Belgium developed serious and permanent kidney disease. (Photo courtesy of Arthur Grollman and Stony Brook University)

“Mutations in P53 are generally nonspecific, but with a handful of environmental agents, you can detect a definitive ‘signature’ mutation,” said Grollman. “We have established the pattern of P53 mutations generated by aristolochic acid, which now joins aflatoxin and vinyl chloride as established human chemical carcinogens with distinct mutational signatures.”

New findings point to significant global health impact

Grollman’s newest findings shed light on the risk to the 80 percent of the world population that relies heavily on traditional herbal remedies to treat disease.

Epidemiologists from Taiwan National University recently examined Taiwan’s national health care system records. The results indicated that one-third of the island’s 25 million people have ingested herbs containing aristolochic acid for purported medicinal benefit.

Grollman is blunt about the Taiwanese findings. “It’s an enormous, well-documented exposure and undoubtedly connected to the high incidence of chronic kidney disease and upper urinary tract cancers in Taiwan.”

If *Aristolochia* herbal use in mainland China mirrors that of Taiwan, as suspected by Grollman, the number of cases of aristolochic-acid induced renal disease and cancer could be staggering.

(Ed Kang is a public affairs specialist in the Office of Communications and Public Liaison and a regular contributor to the Environmental Factor.)

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Metabolomics – A New Direction in Toxicology?

By Mamta Behl

As part of its High Throughput Screening (HTS) Initiative, the National Toxicology Program (NTP) welcomed guest lecturer Sury Vulimiri, D.V.M., Ph.D., to NIEHS April 9th to speak on the potential of integrating metabolomics into the emerging science of predictive toxicology.

A toxicologist working in the U.S. Environmental Protection Agency (EPA) Office of Research and Development at the National Center for Environmental Assessment in Washington, D.C., Vulimiri focuses on the application of modes of action (MOA) information of xenobiotics in dose-response analysis. He is exploring the use of metabolomics, an evolving complementary approach that utilizes the systematic study of unique biochemical fingerprints altered by exposure to environmental chemicals and xenobiotics. NTP Biomolecular Screening Branch Chief [Ray Tice, Ph.D.](#), hosted the talk as part of his ongoing efforts to familiarize NTP scientists with new approaches for conducting hypothesis-driven and discovery toxicology studies.



Arthur Grollman, M.D., whose primary interest is mechanisms of DNA repair and environmental carcinogenesis, is director of the [Laboratory for Chemical Biology](#) at Stony Brook University. He is a member of NIEHS’ Environmental Health Sciences Review Committee and a former member of the Board of Scientific Counselors. (Photo courtesy of Arthur Grollman and Stony Brook University)

Toxicity in the 21st century

Vulimiri opened the talk by emphasizing the increasing need for new approaches such as ‘omics technologies in toxicity testing for the 21st century, specifically the potential role of metabolomics in the Tox21 program. Tox21 is a joint endeavor by the NTP, the [NIH Chemical Genomics Center \(NCGC\)](#), and EPA, to implement state-of-the-art HTS tools including biochemical methods and cell-based assays to develop better predictive models of human response to toxicants (see [related story](#)).

As Vulimiri explained, “Current methods in toxicity testing involve the use of a large number of animals and depend on the detection of pathological end-points. Hence, there is a need to develop alternate methods to use resources economically.” He also pointed to the benefits of the 3R concept of replacement, reduction and refinement in decreasing the use of animals in toxicology studies, while simultaneously obtaining a range of valuable information on pathway activation of xenobiotics using human cell culture systems that are relevant to a target organ of interest. Vulimiri said the ‘omics approach offers investigators increased ability for predicting early toxicity of xenobiotic compounds prior to the development of overt pathology and adverse outcomes.

Adding versatility to toxicology studies

According to Vulimiri, metabolomics is a medium- to high-throughput screening technique for measuring small molecular weight metabolites based on a combination of platforms, which can be used either as targeted or global approaches depending on the availability of *a priori* information on the test compound. He systematically compared and contrasted metabolomics with other omics technologies, such as transcriptomics, proteomics, and genomics, and explained the need for integration of these various technologies.

Vulimiri then enumerated the specific advantages and limitations of metabolomics and cautioned researchers about the importance of gender differences, a parameter often ignored when interpreting results of metabolic profiles. Citing several examples from the literature, Vulimiri

explained how parameters such as dose-response and different MOAs of xenobiotics, crosstalk, specificity, and phenotypic effects can be distinguished with the metabolomics approach. He also underscored the utility of this approach in identifying different biomarkers to distinguish the effects of drugs, diet, diseases and cancer. He illustrated the use of metabolomics as an early predictor of toxicity by providing a case study on carbon tetrachloride, a known hepatotoxin and carcinogen (see [text box](#) for this and other citations).



Vulimiri emphasized, “Using these [‘omics] approaches, one could provide a more comprehensive and global picture of metabolic pathways which may potentially be affected by toxicant exposure, a paradigm often overlooked by the targeted biochemical assays currently in use.” (Photo by Eddy Ball)



During his introduction, Tice, above, placed Vulimiri’s talk within the context of the NTP HTS initiative and Tox21. (Photo by Eddy Ball)

The presentation concluded with Vulimiri effectively persuading the audience about the immense potential of metabolomics approach in generating and testing hypotheses, and in its ability to measure several MOAs of xenobiotics such as lipid peroxidation, oxidative stress, genotoxicity, regenerative cell proliferation, and inflammation using pathway metabolites as biomarkers. The talk stirred up an interesting and lively discussion addressing the current status of metabolomics, its promising potential in future NTP studies, and its advantages as a tool for toxicity testing in the 21st century.

(Mamta Behl, Ph.D., is a research fellow in the NTP Toxicology Branch)



NTP General Toxicology Group Leader Raj Chhabra, Ph.D., was one of several classically trained toxicologists in the audience with questions about how 'omics' approaches can build on existing animal studies to add a predictive dimension to the science. (Photo by Eddy Ball)

Metabolomic Applications: Additional Research by Vulimiri and Other Relevant Review Articles

- [Vulimiri SV, Berger A, Sonawane B.](#) 2010. The potential of metabolomic approaches for investigating mode(s) of action of xenobiotics: Case study with carbon tetrachloride. *Mutat Res* Feb. 25. [Epub ahead of print]
- [Vulimiri, S.V., Misra, M., Hamm, J.T., Mitchell, M. and Berger, A.](#) 2009. Effects of mainstream cigarette smoke on the global metabolome of human lung epithelial cells. *Chem Res Toxicol* Jan. 22:492-503.
- [Kim KB, Chung MW, Um SY, Oh JS, Kim SH, Na MA, et al.](#) 2008. Metabolomics and biomarker discovery: NMR spectral data of urine and hepatotoxicity by carbon tetrachloride, acetaminophen, and D-galactosamine in rats. *Metabolomics*, 4, 377-392.
- [Chen C, Gonzalez FJ, Idle JR.](#) 2007. LC-MS-based metabolomics in drug metabolism. *Drug Metab Rev*, 39(2-3):581-597.
- [Bajad S, Shulaev V.](#) 2007. Highly-parallel metabolomics approaches using LC-MS2 for pharmaceutical and environmental analysis *Trends Analyt Chem* 26(6):625-636.
- [Manibusan MK, Odin M, Eastmond DA.](#) 2007. Postulated carbon tetrachloride mode of action: a review. *J Environ Sci Health C Environ Carcinog Ecotoxicol Rev*, 25(3):185-209.

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Stanford Scientist Discusses Macrophage Activation

By Thaddeus Schug

On April 20, Ajay Chawla, M.D., Ph.D., visited NIEHS to discuss his research, which involves determining the role of nuclear receptors in macrophage activation and inflammatory disease. Chawla, an endocrinologist and assistant professor of medicine at Stanford University, presented a seminar titled “PPAR Regulation of Macrophage Activation in Health and Disease,” as part of the Laboratory of Signal Transduction Seminar Series.

Chawla began his talk by telling his at-capacity audience, “Chronic inflammation is an underlying factor in the development of several pathological disorders including obesity-associated metabolic disease, heart disease, atherosclerosis, and autoimmune disease. Macrophages, which are white blood cells and part of the innate immune system, play key roles in regulating the body’s inflammatory response to pathogens, cellular debris, and environmental stimuli.”

Chawla’s group has identified a signaling pathway that determines whether macrophages become classically activated (M1) and prone to inflammation, or alternatively activated (M2) and therefore more involved with tissue repair.

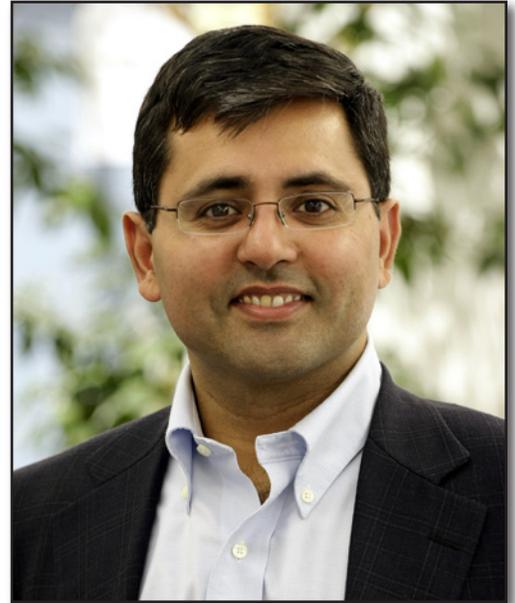
PPARs control macrophage activation

According to Chawla, the lipid-sensing nuclear receptor, PPAR delta, controls the phenotypic switch between M1 and M2 activation in the macrophage. “We used a bone marrow transplant trick commonly used by immunologists, to show that PPAR delta-deficient hepatic macrophages were less prone to alternative activation. Loss of PPAR delta in macrophages resulted in liver dysfunction and whole-body insulin resistance in the mice.”

Chawla explained that, in addition to impairments in activation status, PPAR delta-deficient macrophages display disrupted fatty acid metabolism. He noted that M1 macrophages tend to migrate to and take residence in white adipose tissue (WAT). High levels of WAT macrophages further predispose mice to chronic inflammation, obesity, and disrupted insulin signaling.

Disruptions in macrophage activation cause autoimmune disease

Shifting gears, Chawla observed, “Macrophages are also known as the scavenger cells of the immune system.” They are responsible for disposing of dead cells or cells undergoing programmed cell death called apoptosis. He added, “If you don’t clear the dying cells, then they can provide antigens against ourselves, leading to



Chawla’s group at Stanford Medical School has discovered that nuclear receptors are critical for proper macrophage activation and for regulating autoimmune disease. (Photo courtesy of Steve McCaw)



Lecture host Thaddeus Schug, Ph.D., left, and NIEHS Principal Investigator Jau-Shyong Hong, Ph.D., right, are both interested in Chawla’s research on alternative activation in macrophages. (Photo courtesy of Steve McCaw)

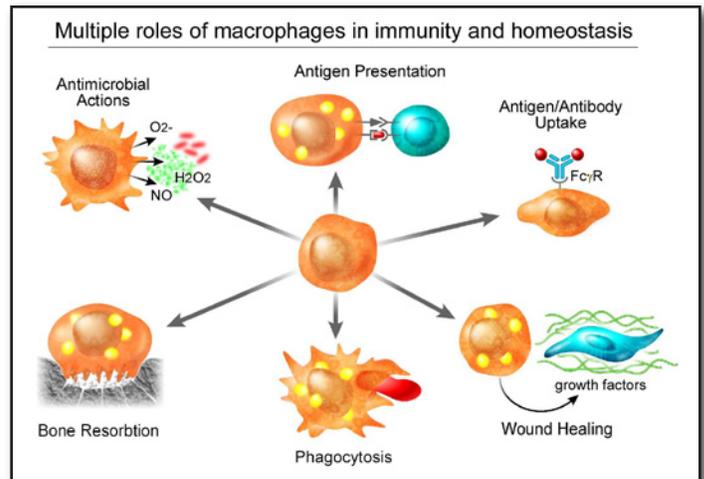
development of autoimmune diseases such as lupus.” It is estimated that lupus affects 1.5 to 2 million people in the United States.

When macrophages consume dying cells, certain genes, called opsonins, are activated to assist in debris clearance. Chawla discovered that PPAR delta appears to control expression levels of opsonins and is therefore essential in arranging the timely disposal of dying cells. PPAR delta-deficient macrophages are unable to efficiently clear apoptotic cells, resulting in buildup of modified lipids and dangerous antigens.

Chawla said that PPAR agonists, or drugs that are traditionally used to treat diabetes and metabolic disorders, also aid macrophages in debris clearance. Chawla’s findings provide both a better understanding of the cause of autoimmune disease and potential for development of drugs or screening procedures used for disease prevention.

Citation: Mukundan L, Odegaard JI, Morel CR, Heredia JE, Mwangi JW, Ricardo-Gonzalez RR, et al. 2009. PPAR-delta senses and orchestrates clearance of apoptotic cells to promote tolerance. *Nat Med* 15(11):1266-1272.

(Thaddeus Schug, Ph.D., is a postdoctoral research fellow in the NIEHS Laboratory of Signal Transduction.)



According to Chawla, macrophages have specific functions in immunity and homeostasis, which are dependent on their activation status and resident tissue. (Slide courtesy of Ajay Chawla)



Two-time Summer of Discovery student Ashwin Peres-da-Silva, above, applies research experience learned at NIEHS to Chawla’s lab at Stanford University Medical School. (Photo courtesy of Steve McCaw)

Summer of Discovery Student Joins Lab at Stanford

Following two successful internships at NIEHS, former Summer of Discovery student Ashwin Peres-da-Silva has joined the lab of Ajay Chawla at Stanford Medical School. Peres-da-Silva participated in the NIEHS program during his junior and senior years, 2008-2009, while a student at the North Carolina School of Science and Math. Peres-da-Silva conducted research in the in the laboratory of Mammalian Aging Group Principal Investigator [Xiaoling Li, Ph.D.](#)

Peres-da-Silva’s project involved determining the role of the SIRT1 gene in regulation of macrophage biology. Together with his mentor, Thaddeus Schug, he learned bone marrow cell harvesting and cell culture techniques that he continues to employ in his new lab at Stanford.

Chawla noted that Peres-da-Silva has done very well in his lab and that the experience that he obtained at NIEHS has made him a well-equipped scientist. Peres-da-Silva was recently awarded a [Stanford University Vice Provost for Undergraduate Education Major Grant](#), which will allow him to continue his research through the summer of 2010.

Ground-breaking Research Leads to New Cancer Theory

By Brian Chorley, Ph.D.

Cancer researchers tackle the nearly insurmountable task of identifying the mechanisms of carcinogenesis – the processes of transforming normal cells into cancer cells.

Two such theorists are NIEHS grantees working at Tufts University School of Medicine in Boston. Carlos Sonnenschein, M.D., and Ana Soto, M.D., have dedicated the majority of their research careers to describing the signals that mediate cellular proliferation. On April 20, the researchers presented their findings during a seminar at NIEHS on investigations of chemicals that mimic the biological actions of estrogen. Their talk, “Carcinogenesis: Development Gone Awry,” also presented evidence from their experiments that lend support to a new theory of carcinogenesis.

The current scientific consensus is that cancer-causing agents result in the uncontrolled proliferation of a single cell. Because this paradigm cannot explain all tumors, Soto and Sonnenschein have developed an alternative theory to describe these not-so-uncommon exceptions.

The tissue organization field theory of carcinogenesis

The prevailing sporadic carcinogenesis theory, known as the somatic mutation theory, explains that carcinogens mutate cells that are normally in a non-growing, quiescent state. These mutations lead to a cascade of programmatic errors that cause a state of irreversible proliferation. Therefore a change in a single cell can lead to tumor formation.

Sonnenschein, drawing on the connection between carcinogenesis and tissue development, explained why this scenario may not always be the case. “Development is not a program,” he said. “Development decisions are made instead by an *ad hoc* committee.”

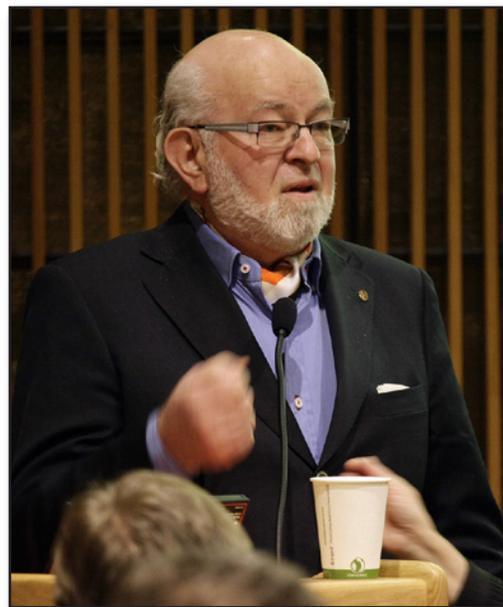
In his tissue organization field theory of carcinogenesis, Sonnenschein characterizes cancer as a disease of the tissue organ. Cells, he explained, are in a default state of proliferation and motility — constantly maintaining homeostasis of the tissue through cellular communication and organization. Disruption of this organization can lead to disease states, such as cancer, as carcinogens target whole tissues, not just individual cells.

Sonnenschein’s theory may account for some situations that somatic mutation theory fails to explain. For example, some cancers are not autonomous — that is, the cancerous cells do not control their own fate. Uncontrolled cellular proliferation, therefore, may be signals from the surrounding milieu, not just simply errors in the cell’s replication machinery.

Bisphenol A alters mammary tissue organization

To support this theory, Soto focused on the team’s mammary development studies in rodents exposed to the xenoestrogen, bisphenol A (BPA).

Pre-natal exposure to BPA, a common component of plastics, alters normal mammary gland development in these models. Soto’s findings demonstrated that in mice BPA accelerates mammary maturation by increasing



Sonnenschein, who led off the team presentation, said that he’d had “some very interesting” discussions with researchers at the National Cancer Institute about his tissue organization field theory of carcinogenesis. (Photo courtesy of Steve McCaw)

epithelial cell branching, reorganizing connective tissue, and altering fat deposits. In rats, a common animal model for breast cancer, BPA caused pre-cancerous lesions in the mammary tissue.

These lesions were directly linked to tissue disorganization caused by the BPA exposure during gestation and lactation.

The mechanisms are still unclear

While altered mammary development due to BPA exposure led to abnormal cellular proliferation in these rodent models, the cellular signaling mechanisms involved are still being teased out.

Soto described multiple experiments in progress. One exciting finding was that the methylome — the methylation patterns of the genome — changed constantly with BPA exposure. Soto explained that thousands of methylation sites were altered, but these changes were inconsistent over different points of time during and after the BPA exposure. The challenge is to determine if these methylation changes are causative or simply consequences of the tissue disorganization.

Parallel gene expression analysis may solve part of the mechanistic mystery. Soto believes the preliminary results are encouraging. “The molecular results are consistent with the [mammary] histology... the locale and time of [BPA] exposure is of the essence,” she explained.

NIEHS Cellular, Organs, and Systems Pathobiology Branch Acting Chief Jerry Heindel, Ph.D., oversees NIEHS grants supporting the research by Soto and Sonnenschein on the [developmental toxicity of BPA](#) and [mammogenesis and neoplasia](#). Heindel was host for the talk, which was sponsored by NIEHS/NTP Director Linda Birnbaum, Ph.D.

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Heindel, left, moderated as Soto, right, answered questions about her data. (Photo courtesy of Steve McCaw)



The talk drew a standing-room-only audience from throughout the Institute. Latecomers also sat in the aisles because of the shortage of seating. (Photo courtesy of Steve McCaw)

Study Confirms Link Between Environmental Exposure and Allergy

By *Thaddeus Schug*

New findings by NIEHS-funded researchers at the University of Cincinnati (UC) indicate that environmental exposures and prolonged breastfeeding are critical determinants of childhood allergic rhinitis.

Conducted by an interdisciplinary team of investigators that includes first author Christopher Codispoti, M.D., and senior author David Bernstein M.D., the [study](#) was published online by the Journal of Allergy and Clinical Immunology (JACI). The research is featured as one of April's [JACI Clinical Highlights](#). [Grace LeMasters, Ph.D.](#), is the principal investigator and a National Advisory Environmental Health Sciences Council member.



Co-authors David Bernstein, M.D., center, and Christopher Codispoti, M.D., right, examine a patient as part of the CCAAPS cohort. (Photo courtesy of UC)

A widespread and costly health issue

According to the authors, allergic rhinitis (AR) affects 40 percent of children and is associated with \$11 billion in direct costs. The prevalence of AR begins to increase at age three, and identifying early predictors of AR allows implementation of cost-effective prevention strategies. While the environmental factors associated with the development of AR are not well understood, children living near high traffic areas experience higher symptoms of the disease.

To identify important predictors in infancy of AR, the group examined the relationship of multiple exposures on AR at age 3. Parents of high-risk infants enrolled in the NIEHS-funded Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS), were interviewed regarding the infant's medical, nutritional, and social history. The CCAAPS included 762 infants sampled from 2001 to 2003.

The study consisted of comprehensive physical examination and skin prick testing to 15 aeroallergens, and testing for cow's milk and egg were performed at ages one, two, and three. House dust from the infant's primary activity room was collected and assayed for endotoxin, beta-D-glucan, and Fel d 1.

The results indicate that prolonged breastfeeding in African-American infants was protective of AR at age 3. Having multiple children in the home during infancy was also protective. Infant food sensitivity was predictive of AR, as was tree pollen sensitivity. House dust endotoxin was associated with AR, with the effect being dependent on the concentration of exposure.

The researchers concluded that bottle-fed African-American infants and infants with food sensitivities are at increased risk for AR. This study brings together infant, environmental and host characteristics in predicting early childhood AR.



Principal Investigator and NIEHS grantee Grace K. LeMasters, Ph.D., oversees the Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS) at UC. (Photo courtesy of UC)

NIEHS funding supports translational research

Codispoti is a clinical fellow in allergy and immunology, a Center for Environmental Genetics New Investigator Scholar, and a doctoral candidate in the Molecular Epidemiology and Children's Environmental Health Center's NIEHS-sponsored T32 program at UC. The T32 program supports the professional development of medical doctors, giving them the opportunity to learn molecular and epidemiological techniques that will result in translational research.

Citation: Codispoti CD, Levin L, LeMasters GK, Ryan P, Reponen T, Villareal M, et al. 2010. Breast-feeding, aeroallergen sensitization, and environmental exposures during infancy are determinants of childhood allergic rhinitis. *J Allergy Clin Immunol* Apr 13. [Epub ahead of print]

(Thaddeus Schug, Ph.D., is a postdoctoral research fellow in the NIEHS Laboratory of Signal Transduction.)

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This Month in EHP

By Eddy Ball

In its news section, the May 2010 issue of [Environmental Health Perspectives \(EHP\)](#) revisits the issue of water quality, with feature stories on lead and pharmaceutical contamination.

The article “Reaction to the Solution: Lead Exposure Following Partial Service Line Replacement” reports that well-intentioned efforts to reduce lead in drinking water by partial replacement of older lead pipes in water systems may actually increase levels for days and even weeks afterwards. “Drugs in the Environment: Do Pharmaceutical Take-Back Programs Make a Difference?” looks at whether diverting unused drugs from landfills is an effective strategy for curbing the introduction of active pharmaceutical ingredients into the environment.

This month's EHP also highlights intriguing new research in several areas, including —

- High-Fat Diet Increases Dioxin-Induced Mammary Cancer
- Modeling Thyroid Hormone Activity of Flame Retardants
- Air Pollution and Economic Activity
- Ecological Niche Modeling of *Cryptococcus* in British Columbia
- Plasma Organochlorines and Prostate Cancer in Japan
- Flame Retardants and Time to Pregnancy
- Prenatal Flame Retardant Exposure and Neurodevelopment

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<http://twitter.com/ehponline>



Ronald Evans to Present Distinguished Lecture

By Eddy Ball

The NIEHS Distinguished Lecture Series welcomes Ronald Evans, Ph.D., a professor at the Salk Institute for Biological Studies, as its next speaker on May 11. Hosted by Deputy Scientific Director Bill Schrader, Evans will address “Nuclear Hormone Receptors: Biosensors of the Environment” beginning at 1:00 p.m. in Rodbell Auditorium.

Evans directs the Salk Gene Expression Laboratory, where he holds the March of Dimes Chair in Developmental and Molecular Biology and is a Howard Hughes Medical Institute Investigator. He is a member of the Institute of Medicine, American Academy of Arts and Sciences, American Philosophical Society, and the National Academy of Sciences. He has a long list of awards in recognition of his research, including the 2004 Albert Lasker Award for Basic Medical Research.

Evans is a pioneer in the molecular biology of the nuclear receptor superfamily. His group has identified and cloned numerous members of this group, including the thyroid hormone receptor and its molecular partner, RXR. This family of receptors includes transcriptional sensors that play a role in the body’s storage and burning of fat as well as the development of several kinds of cancer.

Evans’ research promises to impact the prevention and treatment of metabolic syndrome, a cluster of diseases such as type-2 diabetes, high blood pressure, heart disease, and obesity. He and his team have extended their bench research to potential clinical application through their recent targeting of the nuclear receptor PPAR-delta.

Evans’ group has developed the candidate drug AMPK, which activates this receptor. In experiments using insulin-resistant mice, AMPK dramatically increased exercise endurance, protected against weight gain from a high-fat diet, and improved response to insulin (watch [Salk Institute video](#)). These characteristics have led others to view AMPK as a potential “exercise pill” that would augment the value of exercise in maintaining a healthy body weight while lowering fat accumulation.

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*Distinguished Lecturer Ronald Evans
(Photo courtesy of Ronald Evans and the
Salk Institute for Biological Studies)*

Extramural Papers of the Month

By Jerry Phelps

- [Flame Retardants Linked to Reduced Human Fertility](#)
- [Beauty Chemicals Tied to Early Puberty in Girls](#)
- [Mother’s Exposure to Urban Air Pollutants Affects Children’s Cognitive Abilities](#)
- [Key to Hormone-Resistant Prostate Tumors Discovered](#)



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

Flame Retardants Linked to Reduced Human Fertility

Women exposed to high levels of flame retardants take longer to become pregnant, according to an NIEHS funded study at the University of California Berkeley. This is the first study to show decreases in human fertility related to the chemicals.

Polybrominated diphenyl ethers, or PBDEs, are a class of flame retardants found in many consumer products such as foam cushions in furniture, carpet padding, clothing, and electronics. The compounds are essentially ubiquitous in the environment and some consumer products contain as much as 90 percent PBDEs by weight.

In the current study, more than 97 percent of the women participating in the study had measureable levels of PBDEs in their blood. The analysis was limited to four congeners detected in more than 75 percent of the population. Increased levels of the compounds were associated with longer time to pregnancy. With each 10-fold increase in the blood level, the odds of becoming pregnant dropped by 30 percent. None of the women in the study were infertile, and on average they took about 3 months to become pregnant. However, PBDEs may be pushing some women into a sub-fertile zone making it more difficult for them to conceive. About 15 percent of the women in the study took longer than 12 months to conceive.

Citation: [Harley KG, Marks AR, Chevrier J, Bradman A, Sjödin A, Eskenazi B.](#) 2010. PBDE Concentrations in Women's Serum and Fecundability. *Environ Health Perspect.* Jan 26. [Epub ahead of print]

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Beauty Chemicals Tied to Early Puberty in Girls

Exposure to three common classes of chemicals in young girls may disrupt the timing of pubertal development, according to a multi-city epidemiologic study of young girls. The authors conclude that these exposures may put these girls at risk for health complications later in life.

Girls 6-8 years old were enrolled in the study beginning in 2004 from New York City, Cincinnati, and northern California. Urine samples were analyzed for phenols, phthalates, and phytoestrogens and compared to breast and pubic hair development assessed as the girls got older. The data show that the three different classes of chemicals were widely detectable in the study population and that exposure to certain chemicals was associated with early breast development. Use of personal care products such as lotions and shampoo that contain phthalates, especially formulations with fragrance, was associated with early breast and pubic hair development.

Previous research has shown that early pubertal development in girls can have adverse social and medical effects including cancer and diabetes later in life. The current research demonstrates an association between chemicals that girls are exposed to on a frequent basis and early puberty. While the researchers conclude that more research is needed, these data are an important first step in evaluating the effects of these common agents and future health risks.

Citation: [Wolff MS, Teitelbaum SL, Pinney SM, Windham G, Liao L, Biro F, Kushi LH, Erdmann C, Hiatt RA, Rybak ME, Calafat AM;](#) Breast Cancer and Environment Research Centers. 2010. Investigation of Relationships between Urinary Biomarkers of Phytoestrogens, Phthalates, and Phenols and Pubertal Stages in Girls. *Environ Health Perspect.* Mar 22. [Epub ahead of print]

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Mother's Exposure to Urban Air Pollutants Affects Children's Cognitive Abilities

An NIEHS-supported study carried out in Krakow, Poland reports prenatal exposure to air pollutants adversely affected the cognitive development of children at age five. These findings confirm a similar study conducted earlier in New York City.

The study was conducted in a cohort of 214 children born to healthy non-smoking women in Krakow, Poland between 2001 and 2006. During pregnancy, the mothers wore small backpack mounted personal air monitors to estimate their babies' exposures to polycyclic aromatic hydrocarbons (PAHs). PAHs are released into the air as fossil fuels are burned for purposes such as transportation, heating, and energy production. Exposure to these compounds is widespread in urban environments throughout the world.

At age five, the children took a standard intelligence examination. They were divided into two groups: children with exposures higher and lower than the median prenatal exposure to PAHs (17.96 nanograms/cubic meter of air). Children in the high exposure group scored worse on the intelligence exam by about 4 IQ points. This effect was comparable to the study conducted with the New York City children and is similar to studies on lead poisoning. The finding is of concern because IQ is an important predictor of future academic and economic performance.

Citation: [Edwards SC, Jedrychowski W, Butscher M, Camann D, Kieltyka A, Mroz E, et al.](#) 2010. Prenatal Exposure to Airborne Polycyclic Aromatic Hydrocarbons and Children's Intelligence at Age 5 in a Prospective Cohort Study in Poland. *Environ Health Perspect.* Apr 14. [Epub ahead of print]

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Key to Hormone-Resistant Prostate Tumors Discovered

NIEHS-supported researchers at the University of California San Diego have found that prostate cancer treatments designed to suppress or block the production of male hormones trigger an inflammatory response that could be partly responsible for the development of resistance to these therapies within 12-18 months. These findings make a strong case for combining androgen ablation therapy with drugs already commercially available that block lymphotoxin signaling in B cells.

Androgen suppression can be achieved by surgical removal of the testicles, by taking female sex hormones, or by taking other androgen suppressors. Using a mouse model of prostate cancer, the researchers demonstrated that androgen deprivation killed tumor cells but caused them to release proinflammatory factors. This release led to the infiltration of the tumor by leukocytes. Further studies implicated B cells and the lymphotoxin they produced as promoters of castration-resistance prostate cancer.

Several strategies to deplete B cells in mice all delayed the growth of castration-resistant prostate cancer, which is the most malignant and aggressive form of the disease. The current study used two mouse models, but the investigators have already confirmed their finding with human prostate cancer tissues. The researchers note that extrapolation of their findings to humans suggests that castration-resistant prostate cancer could be delayed by about three years when the B cell depletion therapy is incorporated into standard treatments.

Citation: [Ammirante M, Luo JL, Grivennikov S, Nedospasov S, Karin M.](#) 2010. B-cell-derived lymphotoxin promotes castration-resistant prostate cancer. *Nature* 11:464(7286):302-305.

(Jerry Phelps is a program analyst in the NIEHS Division of Extramural Research and Training.)

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Intramural Papers of the Month

By *Laura Hall and Emily Zhou*

- [PPAR gamma Protects Lungs Against Inflammation and Oxidative Stress](#)
- [Dust Mite Allergen Der p 7 Is Structurally Similar to Innate Immune Proteins](#)
- [Early-life Exposures Are Linked to Development of Uterine Fibroids](#)
- [Orphan G Protein-coupled Receptor Mediates the Regulation of ERR \$\alpha\$ Gene Expression in Breast Cancer Cells](#)

PPAR gamma Protects Lungs Against Inflammation and Oxidative Stress

NIEHS scientists and a collaborator from John Hopkins University have demonstrated that lung peroxisome proliferator activated receptor-gamma (PPAR γ) has an essential role in protecting the lung against inflammation and oxidative injury. In this role, PPAR γ is regulated by nuclear factor erythroid derived 2-like 2 (Nrf2).

Nrf2, a transcription factor, binds to antioxidant response elements (AREs) in the promoter regions of genes to induce antioxidant enzymes and defense proteins. Results from a microarray expression profiling study revealed that PPAR γ induction in hyperoxia-susceptible Nrf2-deficient mice was decreased relative to that in wild-type mice. The researchers used a computational bioinformatic method to screen the promoter region of the PPAR γ gene, *Pparg*, to find potential AREs for Nrf2 binding.

The researchers focused on the ARE that is 784 bases upstream of the PPAR γ transcriptional start site (-784 ARE). Deletion or mutation of this ARE site suppressed hyperoxia-induced *Pparg* promoter activity in airway epithelial cells overexpressing Nrf2. They determined that Nrf2 binding at the -784 promoter region is critical for hyperoxia-induced PPAR γ expression

Animals dosed with PPAR γ -specific interference RNA (siRNA) had increased hyperoxia-induced lung inflammation. In wild-type, but not Nrf2-deficient mice, dosing with a PPAR γ ligand decreased hyperoxia-induced lung inflammation. The results show that PPAR γ activation protects against pulmonary oxidative injury.

Citation: [Cho HY, Gladwell W, Wang X, Chorley B, Bell D, Reddy SP, Kleeberger SR](#). 2010. Nrf2-regulated PPAR{gamma} expression is critical to protection against acute lung injury in mice. *Am J Respir Crit Care Med* March 11. [Epub ahead of print] doi:10.1164/rccm.200907-1047OC.

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Dust Mite Allergen Der p 7 Is Structurally Similar to Innate Immune Proteins

NIEHS researchers have determined the X-ray crystal structure and studied ligand binding of Der p 7, one of the allergenic proteins that comes from the house dust mite *Dermatophagoides pteronyssinus*. The Der p 7 structure shows distant homology to a family of proteins involved in human immune recognition of bacterial lipid products.

Over 80 percent of asthmatic patients show hypersensitivity to house dust mite allergens. Greater than 50 percent of patients with dust mite allergy react specifically to Der p 7. However, how Der p 7 functions in the dust mite, why it causes allergic reaction in humans, and why it is associated with asthma are unknown.

The Der p 7 protein fold pattern of two four-stranded antiparallel beta-sheets that wrap around a long C-terminal helix is similar to that of lipopolysaccharide-binding protein (LBP). LBP promotes innate immune responses by transferring bacterially derived lipids to Toll-like receptors on the surface of immune cells.

The scientists demonstrated that Der p 7 does not bind lipopolysaccharide but does bind the bacterial lipopeptide polymyxin B (PB). PB binds with weak affinity in Der p 7's predicted binding site. Many other allergens are known or predicted to bind lipid-like molecules.

The authors suggest that Der p 7 may act similarly to another dust mite allergen, Der p 2, and potentially interfere with normal innate host defense signaling through Toll-like receptors.

Citation: [Mueller GA](#), [Edwards LL](#), [Aloor JJ](#), [Fessler MB](#), [Glesner J](#), [Pomes A](#), et al. 2010. The structure of the dust mite allergen Der p 7 reveals similarities to innate immune proteins *J Allergy Clin Immunol* 125(4):909-917.e4.

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Early-life Exposures Are Linked to Development of Uterine Fibroids

Epidemiologists at NIEHS have, for the first time, linked soy formula during infancy, maternal prepregnancy diabetes, low childhood socioeconomic status, and early gestational age at birth to greater risk of early diagnosis of uterine leiomyomata (fibroids) in women.

Fibroids are benign smooth-muscle tumors, associated with pelvic pain, heavy bleeding, and reproductive problems. Fibroids are the most common indication for hysterectomies in the United States.

This study associated increased risk of fibroids diagnosed by age 35 with being fed soy formula during infancy. Infants fed only soy formula consume higher levels of isoflavones (predominantly genistein, which is estrogenically active) per unit body weight than adults consuming soy-based food. Neonatal treatment with genistein has been shown in animal studies to lead to development of uterine adenocarcinoma, abnormal mammary gland development and abnormal levels of estrogen and progesterone receptors in mammary glands, reduced fertility, and early reproductive senescence.

In addition, this is the first study to associate fibroids with maternal prepregnancy diabetes. The authors suggested that “one mechanism by which *in utero* exposure to diabetes would affect fibroid pathogenesis is the alteration of methylation patterns in regions that affect expression of relevant genes.” One such gene is *IGF2*, whose expression levels were elevated in fibroids relative to normal myometrium in several microarray studies.

Citation: [D'Aloisio AA](#), [Baird DD](#), [DeRoo LA](#), [Sandler DP](#). 2010. Association of intrauterine and early-life exposures with diagnosis of uterine leiomyomata by 35 years of age in the sister study. *Environ Health Perspect* 118(3):375-81.

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Orphan G Protein-coupled Receptor Mediates the Regulation of ERR α Gene Expression in Breast Cancer Cells

NIEHS researchers have demonstrated that activation of G protein-coupled estrogen receptor-1 (GPER-1) induces estrogen-related receptor alpha (ERR α) gene expression in an estrogen receptor (ER)-null breast cancer cell line. This induction causes modification of the chromatin structure of the ERR α promoter and recruitment of different transcription factors.

The ERRs share a high degree of sequence homology with ERs but do not bind estrogens or any other known natural ligand. ERR α belongs to a nuclear receptor subfamily that is ubiquitously and highly expressed in metabolically active tissues, suggesting a functional role in energy homeostasis. ERR α expression increases dramatically in ER-negative tumors and correlates with expression of a known marker for aggressive tumors. Deregulation of ERR α expression results in energy imbalance, leading to cancer, osteoporosis, and metabolic disorders.

This study shows the molecular mechanism underpinning the regulation of ERR α expression. ER agonists or antagonists activate GPER-1 to stimulate the pertussis toxin-sensitive G α_i subfamily of G proteins. This signaling event further triggers mitogen-activated protein kinase cascade, resulting in histone acetylation and transcription factor recruitment at the ERR α gene promoter.

The authors established a molecular mechanism that involves ERR α expression in aggressive breast cancers and provides insight into potential development of future therapeutic intervention for breast cancer progression.

Citation: Li, Y, Birnbaumer L, Teng CT. 2010. Regulation of ERR α gene expression by estrogen receptor agonists and antagonists in SKBR3 breast cancer cells: Differential molecular mechanisms mediated by G Protein-Coupled Receptor GPR30/GPER-1. Mol Endocrinol 2010 March 8. [Epub ahead of print] doi:10.1210/me.2009-0148

(Laura Hall is a biologist in the NIEHS Laboratory of Toxicology and Pharmacology currently on detail as a writer for the Environmental Factor and Xixing (Emily) Zhou, Ph.D., is a postdoctoral research fellow in the NIEHS Laboratory of Signal Transduction.)

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Inside the Institute

Lab Staff Group Gets Promotions Update

By Eddy Ball

Members of the Assembly of Laboratory Staff (AoLS) heard some welcome news about promotions during their spring meeting on April 14. For the approximately 80 biologists employed at NIEHS, efforts by AoLS officers and members of the NIEHS Office of the Scientific Director (OSD) will mean a more systematic and transparent process for making the big decision.

Guest speakers at the meeting were [John Pritchard, Ph.D.](#), NIEHS acting scientific director and former chief of the NIEHS Laboratory of Pharmacology, and NIEHS Drosophila Chromosome Structure Group head [James Mason, Ph.D.](#), chair of the NIEHS Committee on Promotion III (COPIII). They were on hand to discuss revised guidelines and procedures for deciding on promotions to GS-12 for scientists working as biologists and chemists at the Institute.

Following a welcome by AoLS President Paula Brown, Pritchard prefaced his remarks by describing the occasion as “really a pleasure for me” because of his appreciation for the important role that laboratory technicians play in the Institute’s scientific research. The revised guidelines, he explained, “won’t open the flood gates... [but they] will give people who are doing an outstanding job an opportunity to advance.”

Before turning the program over to Mason for a more detailed look at promotion guidelines and procedures, Brown and AoLS past President Gina Goulding joined Pritchard at the podium to honor a special member of the guidelines revision team — Emily Starnes, of the NIEHS Office of Management.

As a token of OSD and AoLS appreciation, Goulding presented Starnes with an NIEHS “On the Spot” Award in recognition of her day-to-day extra efforts and contributions outside her normal duties and responsibilities. Pritchard and Brown echoed Goulding’s assessment that “without Emily, it would never have happened.”



Pritchard told the audience that he’d long felt that the old promotion guidelines were too inflexible and forced technical staff to meet unrealistic criteria. (Photo courtesy of Steve McCaw)



Starnes, left, joined Goulding, center, and Pritchard at the podium to receive her NIEHS “On the Spot” Award for the extra effort she put in to make the new guidelines a reality. (Photo courtesy of Steve McCaw)

From the beginning, efforts by AoLS and OSD to revise promotion guidelines have enjoyed the support of NIEHS/NTP Director Linda Birnbaum, Ph.D. Birnbaum addressed attendees at the AoLS organizing meeting in March 2009, telling the audience that the promotion issue is “something that’s already on my radar screen” (see [related story](#)).

Shortly afterwards, when Pritchard took the helm at OSD, one of his priorities was working with members of the lab staff to address their concerns about top-of-range promotions, core competencies, training opportunities, and procedures for reassigning displaced workers when labs close or are merged.

As the meeting came to a close, the subject turned to the next challenge for AoLS — professional development. Brown urged her colleagues to make their needs known because, she said, “Better training for lab staff is really to help the Institute, not just you.”



Although getting that top-of-range promotion will still require outstanding performance, the process will be much easier to master for NIEHS lab staff, such as Maggie Humble, left, and Andrea Moon, center. (Photo courtesy of Steve McCaw)

Negotiating the Promotions Process

Mason, the keynote speaker at the meeting, took attendees step by step through the revised guidelines and offered lab staff pointers on presenting their case to the COPIII Promotions Committee. He explained that the new guidelines offer more flexibility because they require candidates to meet a majority of equally important benchmarks — rather than all the criteria, as they had to previously.

Although candidates still must submit three letters from referees — at least one of them from outside NIEHS — interviews are no longer required. Mason said he meets with the principal investigators ahead of time to encourage them to address promotion criteria clearly and directly. He urged members of the lab staff to take a proactive role in the process and make sure they are familiar with the benchmarks they need to address in the promotion package.

With everything in place, Mason explained, the committee can schedule a meeting and reach its decision in as few as two weeks. Historically, the committee has reached a near consensus, rarely with more than one dissenting vote.

The nine-member committee, he said, “represents a balance of principal investigators and staff scientists” with a GS-12 level biologist participating on petitions for a promotion from GS-11 to GS-12. He reminded the audience that the committee votes on recommendations to the scientific director, who is the official in charge of making the final decision.

Speaking from the audience, NTP Toxicology Branch Biologist Dori Germolec, Ph.D., reinforced Mason’s advice. “You really are the most important piece in the process,” she told the audience. “Take a proactive role to help your supervisor write a better letter.”

For her part, as the Assembly of Scientists secretary and liaison to AoLS, Germolec promised to remind her colleagues that it is critical to support of lab staff up for promotion.



Even though the business of promotion is a serious matter, Mason and his audience could also appreciate the lighter side of some of the stories he shared. (Photo courtesy of Steve McCaw)



Never ones to rest on their laurels, members of AoLS listened to David Goulding, shown above in the audience, talk about a survey of members' professional development needs. Goulding is part of a six-member subcommittee gathering data on member demographics and training preferences. (Photo courtesy of Steve McCaw)



The officers of AoLS gathered for a group photo after their election last year. In the front row, left to right, are Paula Brown, Gina Goulding, Toni Ward, Julie Foley and Stella Sieber. In the back row are, left to right, Page Myers and Laura Miller DeGraff. (Photo courtesy of Steve McCaw)

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Trainees Assembly Holds Spring Meeting

By Laura Hall

In the NIEHS Trainees Assembly (NTA) spring meeting April 19, trainees learned about how NTA functions, new programs, and upcoming events. Division of Intramural Research (DIR) Acting Scientific Director John Pritchard, Ph.D., welcomed the trainees and told them that providing a good training experience for them is a really important activity. “You are our product every bit as much as our research itself is,” he said.

Postdoctoral Fellow Allison Schorzman, Ph.D., who is co-chair of the NTA Steering Committee, opened the meeting and gave an overview of the NTA mission. She explained the opportunities within the NTA for participation in planning activities and becoming a liaison for the NTA to the NIEHS administration.

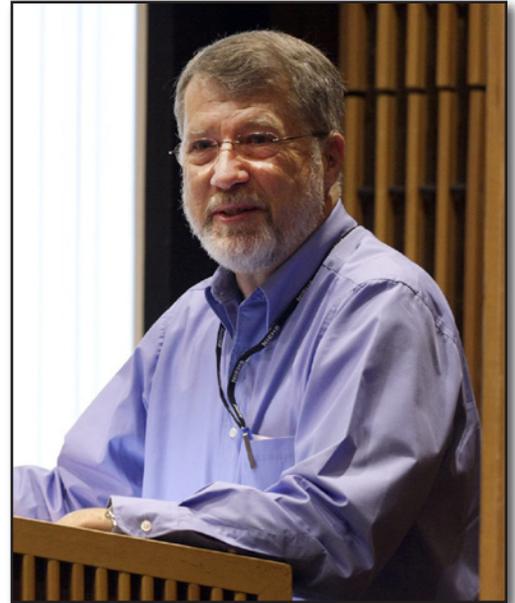
Schorzman also explained about two new upcoming programs — a networking lunch and a trainee-mentor program in which a senior trainee agrees to mentor a new trainee. The mentor will advise the junior trainee and answer those newcomer questions. The program is benefits both parties — giving the senior experience in mentoring and helping the newcomer to settle in.

In the networking lunch program, trainees can sign up for a brown bag lunch with outstanding scientists in different fields to learn more about different career paths. “Currently, we’re planning to invite tenure-track principal investigators, individuals from regulatory affairs, communications, science writing, and possibly people from industry,” said Schorzman.

Schorzman pointed out the need for a steering committee representative from the Laboratory of Neurobiology and requested volunteers to form an International Fellows subcommittee to be led by Visiting Fellow Raj Gosavi, Ph.D., who is the NTA International Fellows Liaison for NIEHS.

The meeting continued with Office of Fellows’ Career Development (OFCD) Director Diane Klotz, Ph.D., giving an overview of the many kinds of training that NIEHS offers its trainees. We want you to have those “translatable, transferable” skills as well as scientific training, she said.

Klotz explained how NIEHS is committed to help prepare the trainees to make the transition to independence in their chosen career path. The OFCD provides opportunities for self-assessment and career development, as well as training in communication skills, leadership, and management.



“You folks are just absolutely critical to the success of this organization of NIEHS and DIR, in particular,” Pritchard said to the trainees. “It’s good to know that we’re in good hands.” (Photo courtesy of Steve McCaw)



“The NTA is run by the trainees for the trainees with the mission to foster the professional development of its members,” said NTA Steering Committee Co-chair Schorzman. (Photo courtesy of Steve McCaw)

Some of the previous NTA courses were so well received that they will be repeated and expanded in the near future. Upcoming training includes a financial workshop, a 10-week course, “Teaching at the College Level,” a five-day grant-writing workshop, and a one-day personality and behavioral assessment workshop. This assessment workshop will be followed up with individual training sessions on leadership and management issues tailored to the trainee’s planned career path. Klotz also informed the trainees of a new upcoming online system that will help track the training they have taken.

Deputy Scientific Director Bill Schrader, Ph.D., urged the trainees to take advantage of the NIH videocast seminars, particularly the bioinformatics seminars and the Demystifying Medicine series on clinical medicine. “If you’re going to be in the health sciences, it’s more and more important that you have some understanding of how your work fits into the context of disease,” said Schrader.

The meeting ended with answers for trainees’ questions, snacks, prizes, and a request for volunteers at the Career Fair on April 30.

(Laura Hall is a biologist in the NIEHS Laboratory of Toxicology and Pharmacology currently on detail as a writer for the Environmental Factor.)



“I’m not trying to take you away from your science when I encourage you to go to our workshops,” said Klotz. “My philosophy is that spending one hour in a workshop learning to do something is worth the time to avoid the weeks you would otherwise have to spend surfing the internet or making phone calls to find out the same information.” (Photo courtesy of Steve McCaw)



Trainees came to the Spring NTA meeting to learn about the NTA, the training available to them, and the upcoming events. (Photo Courtesy of Steve McCaw)



Visiting Fellow Juan Xing, Ph.D., (left) and Sungyong Hwang, Ph.D., (right) a postdoctoral fellow, are trainees of the Calcium Regulation Group. “In addition to getting updated on the upcoming training events, it was fun to get a door prize for the first time,” said Hwang. (Photo courtesy of Steve McCaw)

Upcoming NTA Events

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> • May 19 • May 28 • August 14 • October • November 4 | <ul style="list-style-type: none"> Next Steering Committee Meeting Next Fellows Coffee Hour Trainees’ Summer Family Picnic Next General Assembly Meeting NIEHS Science Awards Day* | <ul style="list-style-type: none"> Executive Dining Room Module F-2 Break Room Lake Crabtree County Park To be announced Rodbell Auditorium |
|--|---|--|
- *The NTA Steering Committee will select the Mentor of the Year

NIEHS Recognizes Administrative Staff

By Eddy Ball

NIEHS celebrated Administrative Professionals Day on April 20 with a day of events dedicated to honoring the Institute’s clerical, administrative, secretarial, and technical (CAST) employees. Individual supervisors expressed their appreciation for their staff, and the Institute scheduled a special morning motivational seminar and an afternoon cake and ice cream reception as what was billed “a special thanks to the administrative staff for all you do.”

The morning presentation featured inspirational speaker [Jewel Diamond Taylor](#) for a talk sponsored by NIEHS Employee Services and hosted by Employee Services Program Specialist Cynthia Radford. Known to her audiences as “The Minister of Motivation” and “The Self-Esteem Doctor,” Taylor has spoken to thousands of people worldwide at corporate headquarters, conferences, churches, campuses, and government agencies, delivering a message of hope and personal transformation.

NIEHS/NTP Director Linda Birnbaum, Ph.D., welcomed attendees to the morning presentation, telling the employees there, “We could never run the institute without you.” She also thanked the administrative professionals “for being you and for being here.”

During the main part of the program, Taylor, who looks and acts much younger than her sixty years, interacted directly with her audience nonstop, from the beginning of her talk right up to the end. She delivered on her promise that “today we’re all going to another level” as she shared her “pearls of wisdom.” At the beginning of her narrative, Taylor admitted that what she would say wasn’t anything the audience hadn’t heard before, “But you just haven’t applied it yet.”

Over the 90 minutes she was on the floor working the crowd, Taylor joked with her audience and challenged them to “aim to be above average” by taking control of their lives and accepting responsibility for how they play out. “We have to like who are... [and] quit blaming others for our disappointments,” she said.

During the afternoon reception, members of the NIEHS leadership turned the tables on themselves by rolling up their sleeves and serving cake and ice cream to CAST employees.



Taylor endeared herself to her audience and worked the crowd like the revivalist preacher she often is in the course of her motivational ministry. (Photo courtesy of Steve McCaw)



Like her colleagues in the audience, NIEHS Administrative Specialist Fran Wagstaff, center, stayed engaged as Taylor described her personal search for meaning and satisfaction in her life. Seated beside Wagstaff are Purchasing Agent Valarie Sims, left, and Extramural Support Assistant Kate Ryan, right. (Photo courtesy of Steve McCaw)

Birnbaum took her place behind the serving table with a group of familiar figures — NIEHS Office of Management Deputy Associate Director Chris Long, Acting Scientific Director John Pritchard, Ph.D., NTP Associate Director John Bucher, Ph.D., and Deputy Ethics Counselor Bruce Androphy, Ph.D.



Following the talk, Taylor, center, posed with NIEHS admirers Biological Aid Essie Jones, left, and Project Officer Jennie Foushee, right. (Photo courtesy of Steve McCaw)



Taylor stood with Radford, right, as the two looked back on a successful event to celebrate the people who make the wheels turn at NIEHS. (Photo courtesy of Steve McCaw)

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Going Green at the EPA Green Vendor Fair

By Laura Hall

The sun was shining, the music was playing, and the vendors had information galore for increasing sustainability in daily living at the Environmental Protection Agency (EPA) Green Vendor Fair on April 20. The NIEHS family was invited to attend this fair as well as the other EPA events celebrating the 40th anniversary of Earth Day.

There were local and organic food, earth friendly products, and handcrafted gifts. Several businesses in solar power, electronic recycling, green homebuilding, water collection, and green lawncare presented information on their products and answered questions. Alternative transportation was represented at booths with hybrid vehicles, SmartCommute@rtp information, and folding bicycles.



EPA and NIEHS employees took advantage of the beautiful weather to enjoy their lunch outside and browse at the booths to learn more about environmentally friendly products. (Photo courtesy of Ed Kang)

Technology has improved greatly since the first Earth Day, surprisingly so. “I plan to recycle an old computer next week,” said NIEHS Program Specialist Michelle Owens. “I was impressed at how efficient the electronic recycling is now — they can reuse 97 percent of every pound recycled.”



Melon Director of Sales Holly Colson shows off the 25 pound folding bicycle at the Green Vendor Fair. When folded, the bicycle can be carried on a bus and stored under a desk. Test rides were encouraged. (Photo courtesy of Ed Kang)

(Laura Hall is a biologist in the NIEHS Laboratory of Toxicology and Pharmacology currently on detail as a writer for the Environmental Factor.)

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The EPA Environmental Management System booth allowed visitors to measure the wattage used by a traditional incandescent bulb compared to a compact fluorescent bulb. The incandescent bulb used five times as much energy. The booth also had information about laboratory energy usage. (Photo courtesy of Ed Kang)



NIEHS Program Analyst Jenny Collins, left, Program Specialist Michelle Owens, middle, and Biologist Laura Hall, right, learn more about sustainability at the Green Vendor Fair. (Photo courtesy of Ed Kang)

Environmental Heroes Speak at EPA

By Laura Hall

Staff of the Environmental Protection Agency (EPA) invited their NIEHS neighbors to celebrate the 40th anniversary of Earth Day April 21-22 at EPA. Highlights included a ribbon-cutting ceremony for a new solar panel installation, a keynote address by Robert F. Kennedy Jr., and a presentation by Hunter Lovins.

Ribbon cutting ceremony

James Turner, president and chief operating officer of the U.S. Franchised Electric and Gas Duke Energy, and EPA Assistant Administrator of the EPA Office of Administration and Resources Management Craig Hooks dedicated the solar panel installation on the First Environments Early Learning Center roof by cutting the ribbon across the representative solar panel at the ceremony.

Duke Energy has supplied 476 solar panels for the roof of the EPA- and NIEHS-supported day care to generate electricity that goes back into the electric grid — making the roof a generating plant. “What an incredible partnership this is,” said Turner. This type of investment “will significantly help us reduce our green house gases over time.”

Kennedy on the true costs of energy

Kennedy, who is chief prosecuting attorney for the Hudson Riverkeeper and president of the Waterkeeper Alliance, is a Time Magazine 1999 Hero of the Planet.

“Ever since I was 9 years old, I have considered environmental pollution a theft,” said Kennedy. “Someone was stealing something from the rest of us and making himself rich by doing it.” Kennedy said he remembered the times before pollution laws were enacted when rivers caught fire and thousands of Americans died every year from smog events.

“These young guys on Capitol Hill who criticize our pollution laws see only the cost to the polluters,” he said. “They don’t see the huge benefits that were gotten from those laws through their implementation to the public at large.”

The true cost of these incumbent energy industries is hidden, Kennedy said. American taxpayers pay trillions of dollars to coal, oil, and nuclear companies in direct tax subsidies and for the cost of cleaning up their waste, paying the resulting health care costs, and protecting their foreign interests.

“[The] 630,000 children born in this country every year who have been exposed to dangerous levels of mercury in their mother’s womb [are] one of the costs of coal that they don’t tell you about when they say it’s only 11 cents a kilowatt,” said Kennedy.

It is the vast subsidies we give the incumbent energy industries that “form the principal impediment for much more efficient forms of energy from entering the marketplace,” he continued. “We know that every nation that has decarbonized their society has experienced instantaneous prosperity.”

Kennedy also warned that “the subversion of American democracy” accompanies “large scale destruction of the environment.” He said, “The first act of tyranny always includes the privatization of the public trust resources.”

Lovins on the economic benefits of sustainability

In her talk, “The Business Case for Environmental Capitalism,” Hunter Lovins, the Time magazine 2000 Hero of the Planet, thanked the EPA staff for staying



A huge crowd gathered on April 22 at the EPA campus plaza for the ribbon-cutting ceremony and speakers. EPA and NIEHS staff attended as well as leaders from the community, businesses, universities, state and local governments, and high school and college students. (Photo courtesy of Steve McCaw)



At the ribbon-cutting ceremony, Turner, left, prepares to cut the ribbon across the representative panel to dedicate the solar photovoltaic panel installation on the day care roof while Hooks looks on. (Photo courtesy of Steve McCaw)

the course and believing “in what a government agency can do to protect the environment.” She added, “What you do matters — now as perhaps at no time in history.”

Lovins, who is the president and founder of [Natural Capitalism Solutions](#), speaks and consults with businesses, governments, and other organizations about the need to bring sustainability into all our policies and practices.

Her message is that sustainability is profitable, doable, and necessary to prevent economic collapse. Lovins gave many examples of monetary savings and job growth gained by municipalities and businesses large and small by instituting sustainable practices.

Changing our way of living and doing business will not be an option, but a necessity, she warned. “What it is that you [EPA] are trying to do in helping businesses, communities, all of us, learn how to live and do business in more sustainable ways is critical to solving the economic problems facing us.”

(Laura Hall is a biologist in the NIEHS Laboratory of Toxicology and Pharmacology currently on detail as a writer for the Environmental Factor.)



“Iconic American business has melted,” said Lovins in her April 21 speech. “The unsustainability of the way we do business is in large part what has driven this [economic] collapse.” (Photo courtesy of Hunter Lovins)



“Sustainability is our true North,” said Paul Anastas, Ph.D., the EPA Assistant Administrator; Office of Research and Development, who spoke at the ceremony. In 2008, Anastas received a [Heinz Award](#) for his pioneering work in creating “green chemistry.” (Photo courtesy of Steve McCaw)



“It has always been illegal to pollute,” said Kennedy. He explained that the environmental laws enacted after the first Earth Day in 1970 were codifications of ancient laws that had existed for centuries until they were eroded away after the industrial revolution. (Photo courtesy of Steve McCaw)



NIEHS Sustainability Coordinator Trish Castranio, left, and NIEHS Acting Deputy Director Steve Kleeberger, Ph.D., applaud during Kennedy’s speech. “It was truly an exciting and informative talk because he confirmed the necessity of the sustainability program we have here at NIEHS,” said Castranio. (Photo courtesy of Steve McCaw)

Sustaining a Healthy Planet and Healthy People

By Laura Hall

During the month of May, NIEHS will provide many opportunities for staff to learn about what is being done at the institute and what they can do at home for environmental sustainability — and about sustaining a healthy lifestyle.

May is Bike-to-Work Month and there will be NIEHS and local events to encourage alternate transportation. Bike riders who log days and miles cycled will receive prizes for the longest bike ride, the most days cycled, and the most miles cycled.

Audra Foree from Triangle Transit will be on-site on May 4 to promote the [SmartCommute Challenge](#), an annual campaign to encourage Triangle commuters to try alternative transportation to single-occupied vehicles for their commute to work. The Challenge is a commitment to try alternate transportation for one day during the sign-up period, which ends May 15.

Employees will have an opportunity to sign up to take the challenge and enter a pool to win prizes, including iPods and vacations.

In addition, each week in May will have a different focus on sustainability:

- May 3-7 Health and Fitness Week ([see story](#))
- May 10-14 Energy and Water Conservation Week
- May 17-21 Environmental Management System Week
- May 26 Farmer's Fair

One of five areas will be covered each day of the Energy and Water Conservation Week:

- Central utility plant
- Campus-wide projects
- Laboratories, offices, and animal facilities
- Homes, including government and utility efficiency programs available
- Executive Order (E.O.) 13514

E.O. 13514 involves an integrated strategy towards sustainability in the Federal government. NIEHS personnel will learn how they will be impacted by this executive order.

During the Environmental Management System Week, the NIEHS family will have the opportunity to learn more about how their work activities impact the environment. There will be information on how to reduce environmental impacts on air and water of the waste produced and of the travel associated with daily work and facility operations. There will also be tours of the NIEHS waste-handling facility.



Solar panels on the B module at the Institute's main campus supplement electricity to the building. (Photo courtesy of Steve McCaw)

These events were organized by members of the NIEHS Office of Management — the Health and Fitness Organizing Committee, the Operations and Security Branch, the Health and Safety Branch — the Facilities Operations Branch and Office of Research Facilities of the NIH Office of the Director, and the volunteers of the NIEHS Environmental Awareness Advisory Committee. More specific information on these events will be available in flyers and emails to the NIEHS community.

(Laura Hall is a biologist in the NIEHS Laboratory of Toxicology and Pharmacology currently on detail as a writer for the Environmental Factor.)

Highlighted Sustainability Month Events

May

3	“Taking Steps to Your Health Contest Kickoff”	9:00 – 10:00 am	Fitness room
3	NIEHS Bicycle Maintenance Clinic	1:00 – 1:30 pm	Bldg. 101 front patio
4	SmartCommute Challenge Sign-up		Bldg. 101 cafeteria
5	“Rogathan” 5K Run and 2 Mile Nature Walk	9:30 – 10:30 am	
6	Bike to Work Event at NIEHS	7:30 – 8:45 am	Bldg. 101 front entrance
13	Central Utility Plant Tours		
14	NIEHS Rooftop Solar Array Tours		
20	Building 108 Waste Handling Facility Tours		
26	Farmers’ Fair	11:00 am – 1:00 pm	Bldg. 101 lakeside patio

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