



PLENARY AND CONCURRENT SESSION DESCRIPTIONS

(as of December 1, 2016)

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Key Words

Here are some common words that appear in many different abstracts. The bulleted text link to the session abstracts.

Air Pollution

- [Leading the Way: From Harvard Six Cities Study to Global Environmental Health](#)
- [Chemical Exposure-Induced Host Susceptibility: What Do We Know and Where is Science Leading Us?](#)
- [G x E Success Stories and Lessons Learned](#)
- [Emerging Topics in Air Pollution and Its Impact on Human Health](#)
- [Tools to Support Research and Communication on Health Impacts of Climate Change](#)
- [New Frontiers in Brain Research: The Immune System and Brain Health](#)
- [Climate Change Tools](#)

Asthma

- [Leading the Way: From Harvard Six Cities Study to Global Environmental Health](#)
- [G x E Success Stories and Lessons Learned](#)
- [Environmental Epigenomics – Mechanisms, Pathways, Disease Outcomes](#)

Autism

- [Leading the Way: From Harvard Six Cities Study to Global Environmental Health](#)
- [Emerging Topics in Air Pollution and Its Impact on Human Health](#)
- [New Frontiers in Brain Research: The Immune System and Brain Health](#)

Neurodevelopment/Neurodegeneration

- [New Frontiers in Brain Research: The Immune System and Brain Health](#)
- [Windows of Susceptibility to Environmental Exposures: A Deeper Look across Multiple Health Endpoints](#)
- [Sex Differences and Environmental Exposure: Latest Research Advances and Impact of New NIH Policy](#)
- [Emerging Topics in Air Pollution and Its Impact on Human Health](#)

Breast Cancer

- [Windows of Susceptibility to Environmental Exposures: A Deeper Look across Multiple Health Endpoints](#)
- [Plenary 4: Translational Research](#)

Children

- [Exposures across the Lifespan](#)
- [Leading the Way: From Harvard Six Cities Study to Global Environmental Health](#)
- [Chemical Exposure Induced Host Susceptibility: What Do We Know and Where is the Science Leading Us?](#)
- [The Children's Health Exposure Analysis Resource \(CHEAR\)](#)
- [Emerging Topics in Air Pollution and Its Impact on Human Health](#)
- [The Impact of Chemical Mixtures on the Environment and Health: Research Highlights across Various Disciplines](#)



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- Advances in Neurological Assessment in Response to Environmental Exposures

Citizen Science

- Stories from the Field on Community-Engaged Research and Citizen Science: From Current Challenges to Future Possibilities
- Plenary 1: 50 Years and Going Strong
- From the Bench to the Field: Technology-Based Solutions to Reduce Environmental Exposures
- Validation of Sensors for Personal Exposure 1 (Particulates)
- Validation of Sensors for Personal Exposure 2 (VOCs, gases, and metals)

Community engagement

- Disseminations and Implementation Science: Reducing Risk through Effective Communication and Application of Scientific Findings
- Diversity and the NIEHS – Opportunities and Challenges
- Stories from the Field on Community-Engaged Research and Citizen Science: From Current Challenges to Future Possibilities
- Creating a Culture of Health: The Role of Community Engagement Cores in Tackling 21st Century Environmental Health Challenges
- Disaster Research Response and the Environmental Health Sciences Community: Building a National Research Response Capacity
- Plenary 1: 50 Years and Going Strong
- Tools to Support Research and Communication on Health Impacts of Climate Change
- Climate Change Tools

Data Science

- Perspectives on Data across the Research Lifecycle
- The What and How of Data Management: Resources and Tips for Meeting NIH Data Requirements
- Stories from the Field on Community-Engaged Research and Citizen Science: From Current Challenges to Future Possibilities

Epidemiology

- Plenary 1: 50 Years and Going Strong
- Plenary 3: Exposures Across the Lifespan
- The Impact of Chemical Mixtures on the Environment and Health: Research Highlights Across Various Disciplines
- Validation of Sensors for Personal Exposure 1 (Particulates)
- Validation of Sensors for Personal Exposure 2 (VOCs, gases, and metals)
- Plenary 5: Emerging Technologies, novel approaches, and new opportunities for Environmental Health Sciences
- GxE Success Stories and Lessons Learned
- Important Contributions to Environmental Health from Special Populations
- Emerging Topics in Air Pollution and its Impact on Human Health

Global

- Leading the Way: From Harvard Six Cities Study to Global Environmental Health
- From the Bench to the Field: Technology-Based Solutions to Reduce Environmental Exposures
- Disaster Research Response and the Environmental Health Sciences Community: Building a National Research Response Capacity



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- Tools to Support Research and Communication on Health Impacts of Climate Change
- Climate Change Tools

Microbiome

- Microbiome- The Emerging Role of the Microbiome in Environmental Health
- Emerging Basic Research Opportunities in Environmental Health Sciences
- Interactions between Environmental Toxicants and Food: Mechanisms, Interventions, and Risk Communication

Nano

- Chemical Exposure-Induced Host Susceptibility: What do we know and Where the Science is Leading Us?
- From the Bench to the Field: Technology-Based Solutions to Reduce Environmental Exposures

Sensor

- Validation of Sensors for Personal Exposure 1 (Particulates)
- Validation of Sensors for Personal Exposure 2 (VOCs, gases, and metals)
- Sensor Fair #1 & Climate Change Tools
- Sensor Fair # 2
- Toxicant Transport through the Environment: Mechanisms and Interventions to Prevent Exposures

Toxicology

- A Toxicology User's Guide to the Roadmap Epigenomics and ENCODE Data Resources
- The Impact of Chemical Mixtures on the Environment and Health: Research Highlights across Various Disciplines
- Interactions between Environmental Toxicants and Food: Mechanisms, Interventions, and Risk Communication
- Toxicant Transport through the Environment: Mechanisms and Interventions to Prevent Exposures
- Plenary 1: 50 Years and Going Strong
- Sex Differences and Environmental Exposure: Latest Research Advances and Impact of New NIH Policy

Translational

- Plenary 1: 50 Years and Going Strong
- Plenary 4: Translational Research
- Translational and Interdisciplinary Collaborations: Impact and Lessons Learned from VICTER
- NIEHS Translational Research Framework - Opportunity for Comment and Feedback



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Plenary Sessions

Plenary 1: 50 Years and Going Strong

Tuesday, December 6, 9:00 – 11:00 a.m. **Grand Ballroom**

Abstract

Over the last 50 years, the NIEHS has supported innovative projects that have used diverse research approaches to answer questions about the influence of environmental exposures on health and corresponding training and outreach programs that informed policy decisions to prevent and reduce potentially harmful exposures. Furthermore, since 2012, the NIEHS has implemented a bold, integrative 5-year strategic plan. This meeting provides us a unique opportunity to think about 2017 and beyond. In this opening plenary, dynamic and visionary leaders will explore future challenges and opportunities for environmental health science research, the role of the institute in terms of supporting and guiding research and training, and the role of the extramural community. Presenters will share insights on exposure research successes while delineating the importance of the full spectrum of science, research, and translational approaches, highlighting the value of multi-directional communication. These presentations will introduce topics for subsequent plenary sessions and challenge attendees to consider the future of environmental health science research and new opportunities for the next 50 years.

Speakers

- **Environmental Health Science: Remembering Our Past to Inform Our Future**

Linda Birnbaum, NIEHS

The NIEHS has been celebrating 50 years of accomplishments this year. Now is the time to begin thinking about the next 50 years and the new opportunities and challenges; however, such planning must be built upon lessons learned as well as our past accomplishments. The EHS FEST presents an excellent opportunity to engage in cross-disciplinary discussions and consider the many different ways in which NIEHS can continue to advance research, engagement, and training.

- **G x E: Dichotomy or Synergy?**

Gary Miller, Emory University

While major advances have been made in environmental health sciences over the past 50 years, the progress in the field of genetics has been nothing short of revolutionary. Environmental health science is on the cusp of a similarly transformational epoch as it capitalizes on recent and emerging technologies. Studying the environment on an –omic scale, such as that captured in the concept of the exposome, will drive discovery and help balance and solve the G x E equation.

- **The Evolution of Community-Driven Research and Its Impact on Community Health**

Beverly Wright, Dillard University

This presentation will delve into the how community-based participatory research evolved from



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environmental justice issues and the important contributions made by community groups in the research process to address environmental health disparities. It will highlight the role of citizen science in translational research and the future direction of community engagement as it relates to environmental and occupational health research.

- **Toxicology, Environmental Health and Precision Medicine – Looking Ahead**

Shuk-Mei Ho, University of Cincinnati

Over the past five decades, significant progress has been made in our understanding of how chemicals, drugs, and pollutants affect human health. Research has broadened to focus on adult-life to multiple developmental stages, genomic to epigenomic alterations, and accessing acute lethality to address inter- and trans-generational effects of chronic low doses. The use of high throughput *in silico* screening, systemic *in vitro* profiling, transgenic animal models, stem/progenitor cells, and bioprinted human materials have greatly expanded our understanding of mechanism-based toxicology. The emergency of reliable, readily measurable biomarkers and surrogate endpoints paves the way for precision environmental medicine and self-management of health by the public.

- **Environmental Epidemiology and Clinical Research: Translating Environmental Health Science to Practice**

Joel Kaufman, University of Washington

The environments where communities live, work, and play impact health in ways that require integrated action by environmental health professionals and scientists, health care professionals, epidemiologists, and community leaders. This talk will focus on the translation of environmental health science and environmental epidemiologic research to health care professionals and public health practice. Using air pollution research as an example, the interplay between public health and clinical practice will be discussed.

Plenary 2: Linking Chemical Exposures, Biological Pathways, and Disease

Tuesday, December 6, 2:00 – 3:30 p.m. **Grand Ballroom**

Abstract

Over the past 50 years, research efforts supported by NIEHS have contributed to our advanced understanding of interactions between exposures and health outcomes. These findings led to a deeper molecular understanding of exposure response relationships. Multiple pathways found to be involved in response to environmental chemicals include: endocrine signaling, epigenetic modifications, inflammation and oxidative stress response, DNA damage response (DDR), mitochondrial dysfunction, endoplasmic reticulum stress, as well as autophagy and apoptosis responses. NIEHS investments in DDR, inflammation and oxidative stress response, and endocrine disrupting chemical (EDC) pathways have led to significant groundbreaking discoveries in environmental health science. This sets the stage for understanding how these separate pathways might coincide to increase the risk for disease from environmental exposures, especially given that with the exception of a couple of cases, it is difficult to attribute most complex diseases to one exposure alone. This session will highlight some of these common, parallel pathways, using examples



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from the exposures that elicit a DDR, inflammation and oxidative response, or EDC signaling pathway. When considered together, the findings in these research areas are pointing to the likelihood that it is the unique interplay of many factors that determine the probability and severity of cellular dysfunction and thus a disease outcome. We will also provide a framework for future research directions that integrate common pathways across multiple diseases.

Speakers

- **Introduction**

NIEHS Division of Extramural Research and Training (DERT) Staff

This introduction will provide context for the three grantee presentations. The introduction will provide a summary of how the research of grantee presenters demonstrates the role of the environment in initiating and/or exacerbating disease. The introduction will also emphasize that the three presentations in this session only include a snapshot of how the pathways can each lead to multiple levels of cellular dysfunction and how they are implicated in other diseases.

- **How Novel Technologies Help Us to See Mutant Cells within Intact Tissues, and Reveal the Role of Environment on DNA Damage, Repair, and Genomic Instability**

Bevin Engelward, Massachusetts Institute of Technology

Engelward from MIT will present research from her laboratory related to key developmental and physiological conditions that sensitize mammals to environmentally-induced mutations. She will focus primarily on work done in her laboratory to develop and apply mouse models whereby mutant cells (that result from homologous recombination events) can be visualized within intact tissues by fluorescence. She will also describe technology developed in her laboratory in collaboration with R. Sobol and Trevigen, Inc, for increasing the throughput of genotoxicity testing, as well as summarizing key advances in the field relevant to application of novel technologies for revealing the impact of the environment on DNA damage, repair, and genomic instability.

- **Environmental Exposures and Inflammation: Impact on Mitochondrial Dysfunction and Signaling through Extracellular Vesicles**

Irfan Rahman, University of Rochester Medical Center

Environmental airborne pollutants and inhaled toxicants exposures are involved in pathogenesis of several debilitating diseases and their exacerbations. These exposures can cause oxidant and antioxidant imbalance leading to inflammatory responses, which is associated with cascades of cellular signaling and damaging effects. This presentation will provide the key elements in toxicants/inhaled agents mediated oxidative stress and redox regulation of inflammation, chromatin remodeling in inflammation, DNA damage and cellular senescence (premature aging), mitochondria-nuclear signaling, and how exosomes/extracellular vesicles transfer signaling to distant cells in the context of environmental health and disease.



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- **Epigenomic Targets of Environmental Exposures**

Cheryl Walker, Baylor College of Medicine

The epigenome, the “software” that operationalizes the genome, has emerged as a major target for environmental exposures. Unlike the genome, the epigenome is quite plastic, and can be perturbed by many environmental exposures. Environmentally-induced epigenetic alterations can persist long after the initial exposure, and in the case of developmental exposures, reprogram patterns of gene expression across the life course. Understanding the underlying mechanisms responsible for epigenomic reprogramming, and their associated adverse health outcomes, is an important area in environmental health research, as is the identification of interventions that prevent or reverse the adverse effects of epigenomic reprogramming.

- **Future Perspectives**

DEPT Program Staff

Building off the previous presentation, future perspectives will attempt to present all three presentations in the larger context of how environmental exposures and the pathways they elicit have the potential for dynamic interplay that can exacerbate cellular dysfunction. Related concurrent sessions will provide more detail for each of the research areas presented in this plenary session.

Plenary 3: Exposures across the Lifespan

Wednesday, December 7, 9:00 – 10:30 a.m. Grand Ballroom

Abstract

Environmental exposures have the potential to influence human health across the lifespan. A strategic goal of the NIEHS is to understand individual susceptibility to chronic, complex diseases resulting from environmental factors. A variety of approaches are being taken to explore dose-response relationships, identify individual susceptibility and critical windows of exposure. This plenary will highlight research examining these issues.

Speakers

- **Introduction**

Mike Humble, NIEHS

- **Paternal Preconception Exposure to BPA Has Consequences on Offspring**

Emilie Rissman, North Carolina State University

Spermatogenesis is an ongoing process in adult males that can be influenced by the environment. Several studies have shown that the nutritional status of the father can lead to obesity in human and rodent infants and children. Rissman will present new experimental data testing the hypothesis that preconception consumption of the endocrine disruptor, BPA, by sires affects body weight and metabolism in offspring.



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- **Early Development: Windows of Susceptibility and Opportunity**
Ami Zota, George Washington University
Zota will discuss what is known about cumulative chemical exposures during pregnancy and early development, their consequent adverse health effects across the life course, and pathways to prevention.
- **Puberty – A Lifecourse Period of Heightened Susceptibility to Environmental Exposures?**
Karin Michels, University of California, Los Angeles
The period of sexual development is associated with rapid change in several cell and organ systems. Reproductive organs and reproductive function may be particularly vulnerable to environmental stressors during this developmental stage. Animal and epidemiologic data support these associations.
- **Adult Risks of Acute and Chronic Exposures**
Janet Hall, NIEHS Division of Intramural Research
This presentation will discuss evidence concerning the potential effects of exposures, including those associated with endocrine disrupting chemicals, on reproductive, thyroid, and metabolic disorders, as well as cancers.

Plenary 4: Beyond Bench to Bedside: Stories of Translation

Wednesday, December 7, 1:30 – 3:00 p.m. **Grand Ballroom**

Abstract

The NIEHS supports translational research through many programs, including the Environmental Health Science Core Centers Program, the Superfund Research Program, the Outstanding New Environmental Scientist (ONES) program, and the Virtual Consortium for Translational/Transdisciplinary Environmental Research (ViCTER) program. Although translational research is at the heart of NIEHS's mission to discover how the environment affects people in order to promote healthier lives, NIEHS has never put forth a framework that clarifies what is meant by translational research. To assess the impact of these programs and use the findings to improve how NIEHS manages its scientific portfolio, NIEHS has identified a need to develop a translational research framework that represents the full spectrum of grantees' research. In this plenary, presenters unveil a translational research framework and highlight key aspects of the model through four stories that celebrate NIEHS's investments in translational research over the years.

Speakers

- **Tracey Woodruff, University of California, San Francisco**
The effects of environmental exposures on reproductive and developmental health are well documented. The path we took to translate that information into actionable steps for health care providers is a winding one that ultimately resulted in the leading health professional societies for OB/Gyns both in the US and internationally to public opinions recognizing how important it is for



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their members to address environmental exposures to advance the health of women and their families. The opinion included recommendations that reproductive and other health professionals advocate for policies to prevent exposure to toxic environmental chemicals, work to ensure a healthy food system for all, make environmental health part of health care, and champion environmental justice.

- ***Bruce Hammock, University of California, Davis***
Universities were doing a wonderful job of technology transfer through our students and other routes long before the Bayh - Dole act and long before the technology transfer offices this legislation inadvertently created. Technology transfer occurs by many paths and for most of them an open source mentality is critical. I will emphasize keeping an open source mentality while developing IP through the SBIR, STTR, and Blueprint programs.
- ***Julia Brody, Silent Spring Institute***
As breast cancer activists raised questions about why risk is higher in some regions than others and higher today than years ago, they inspired research into environmental factors and prevention. Because factors early in life and up to diagnosis affect this disease, prevention research must draw on biological studies and exposure science, as well as epidemiology. The results revealed that consumer products and indoor environments are a major source of exposure to endocrine disrupting compounds and generated transdisciplinary evidence for better decisions by consumers, companies, and state and federal policy.
- ***Carl White, University of Colorado Denver***
Our work spans the translational research process from the development of a rescue countermeasure for sulfur mustard (SM) inhalation based on field observations by a future trainee, to studies of pathogenesis in a rat model using a chemical analog of SM (half-mustard), to a series of studies of airway and systemic coagulation after SM, to trials of a 'clot buster' (tPA, apro-fibrinolytic drug) in half-mustard inhalation, to the critical trial of tPA rescue in the rat authentic SM vapor inhalation model, to development of a second species large animal model of SM vapor inhalation (pig), to testing airway-delivered tPA as a rescue agent for human children with complex congenital heart disease, Fontan procedure, and 'plastic bronchitis,' to development of models of chronic lung disease that develop in human survivors of SM inhalation. As part of the context for this translational story, this presentation will touch on the treatment strategies that did not work or worked less effectively, the successful (and unsuccessful) grant applications attempted and/or achieved for funding, and all the agencies (granting, regulatory, safety and security etc.) that require interaction to sustain this work.

Plenary 5: Placing NIEHS in the Broader Research Landscape

Thursday, December 8, 10:45 a.m. – 12:15 p.m. **Grand Ballroom**

Abstract:



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The Environmental Health Sciences, as shown by the breadth of topics covered in the EHS FEST, is a highly interdisciplinary and evolving field which has a rich history of embracing innovation and pushing scientific boundaries. As NIEHS embarks on the next fifty years, we will continue to integrate developmental, mechanistic, and applied research to not only understand the health effects of environmental exposures but to continue to use that understanding to improve the health of the individual and the community. The closing plenary of the EHS FEST will bring together themes from the meeting and place them in the context of major programs at NIH and the broader context of research relevant to the environmental health sciences in the US and around the world. This session will highlight the future of the environmental health sciences and new opportunities for around four key elements of NIEHS over the next 50 years:

- Developing novel technologies for the environmental health sciences,
- Understanding the mechanisms of the effects of the environment on biological systems,
- Advancing our understanding of the impact of exposures on human health through environmental epidemiology, and
- Actively engaging individuals and communities in the research enterprise at all levels.

Speakers

- ***Matthew Gillman, NIH Environmental Influences on Children's Health Outcomes Program***
- ***Deborah Winn, NIH Precision Medicine Initiative***
- ***Elizabeth Wilder, NIH Office of Scientific Coordination and the NIH Common Fund***

Panel of Professional Societies

- The International Society for Environmental Epidemiology
Francine Laden, Harvard University
- The International Society of Exposure Science
Lesliam Quiros-Alcala, University of Maryland
- The American Public Health Association
Surili Patel, American Public Health Association
- The Society of Toxicology
John Morris, University of Connecticut
- The American Thoracic Society
Veena Antony, University of Alabama at Birmingham
- The Environmental Mutagenesis and Genomics Society
Tom Wilson, University of Michigan



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Concurrent Sessions: Tuesday morning

1. Interactions between Environmental Toxicants and Food: Mechanisms, Interventions, and Risk Communication

Grand Ballroom

This session explores interactions between food and environmental toxicants looking at both mechanisms of toxicant transport into the food chain as well as how nutrition can mitigate toxicity of hazardous substances. NIEHS has funded a variety of work in this arena, including arsenic and other metals' transport into plants and food products; uptake of mercury (Hg), polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDTs), and polycyclic aromatic hydrocarbons (PAHs) into fish and seafood; risk communication for best practices from urban gardening to food preparation; mechanisms of bioavailability; and nutritional interventions that reduce the impact of exposure to hazardous substances. Research featured in this session will include recent work, such as mechanisms of arsenic uptake into rice; research showing how nutrition reverses negative effects of PCB exposures; novel approaches to estimate risk of toxicant bioaccumulation in fish in an ocean ecosystem; and results from a partnership with a Native American community weighing the risks and benefits of fish consumption.

Format: Brief session introduction followed by four 20-minute presentations and a brief discussion period

Speakers

- **Introduction**
Heather Henry, NIEHS
- **From the Soil to the Seed: Arsenic in Rice**
Mary Lou Guerinot, Dartmouth College
Guerinot and her research team combine genetics, high-throughput elemental analysis via ICP-MS, and high-resolution imaging via synchrotron X-ray fluorescence to determine how arsenic, a non-threshold, Class 1 human carcinogen, accumulates in rice, a staple food for over half the world's population. Guerinot and her team have been screening a large collection of rice cultivars and have identified several QTLs for arsenic. Rice cultivars, restricting arsenic accumulation in the grain, offer one of the simplest, fastest, and most cost-effective approaches to solving the problem of arsenic contamination of rice and rice-based products.
- **Interactions between Diet and Toxicant Exposure Lead to Increased Circulating Levels of the Cardiometabolic Disease Biomarker TMAO**
Michael Petriello, University of Kentucky
Per recent publication in preclinical models, exposure to dioxin-like polychlorinated biphenyls (PCBs) can increase circulating levels of a diet-derived biomarker of cardiovascular disease, trimethylamine-



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N-oxide (TMAO). Plasma TMAO levels are strongly associated with coronary artery disease and diabetes risk in humans. We have now begun to investigate if these associations between pollutant exposure and TMAO are evident in the highly exposed Anniston, Alabama population. Researchers used mass spectrometry methods to quantitate TMAO in archived plasma samples, and have determined that higher body burden of dioxin-like pollutants is significantly associated with increased circulating TMAO levels in humans.

- **A Novel Approach for Estimating the Bioavailability and Human Health Risk of DDT-contaminated Sediments off Palos Verdes, California**

Daniel Schlenk, University of California, Riverside

Dichlorodiphenyltrichloroethane (DDT) and its primary metabolites are a major source of concern in the Palos Verdes Shelf. Estimates of bioavailability and trophic transfer to fish were estimated using a novel analytical method, Isotope Dilution (IDM), and confirmed in laboratory experiments consisting of the benthic polychaete worm, *Neanthes arenaceodentata* and the demersal flatfish, *Pleuronichthys verticalis* as a model species for benthic fish that are targeted for human consumption, such as California halibut (*Paralichthys californicus*). Using human seafood-consumption data specific to anglers in the Palos Verdes area, cancer and non-cancer risks were calculated and compared to tissue-based assessments in the field. Risk estimates for cancer and non-cancer from fish consumption were within the same order of magnitude comparing IDM with tissue based assessment conducted in the field.

- **Are These Fish Safe to Eat? The Namaus (All Things Fish) Project**

Marcella Thompson, University of Rhode Island

It is important to weigh the risks and benefits when deciding if fish are safe to eat. Fish are heart healthy, offering an important source of protein, vitamins, trace nutrients (Se), and omega-3 polyunsaturated fatty acids (n-3 PUFAs). Consuming fish has the potential of increased risk for health impacts from mercury (Hg) and polychlorinated biphenyls (PCBs). This study analyzed tissues taken from fish living in Schoolhouse and Deep Ponds on the Narragansett Tribal Reservation in Charlestown, Rhode Island. Preliminary results indicate elevated levels of mercury and PCBs with largemouth bass and chain pickerel; Se:Hg molar ratios were highest among yellow perch and pumpkinseed; and American eel was highest in n-3 PUFAs. These results along with information gleaned from Talking Circles and heritage fish consumption rate estimates will guide Tribal leaders with respect to fish advisories and future health studies.

Keywords: indigenous, fish, mercury (Hg), polychlorinated biphenyls (PCBs), omega-3 polyunsaturated fatty acids, selenium (Se), Arsenic, rice, metal uptake, synchrotron, food security, polychlorinated biphenyls (PCBs), persistent organic pollutants (POPs), trimethylamine-N-oxide (TMAO), Anniston, nutrient, biomarker, cardiovascular disease, dichlorodiphenyltrichloroethane (DDT), Superfund Site, fish, bioavailability, trophic transfer, isotopic dilution method (IDM)

Planning Team: Mary Lou Guerinot, Danielle Carlin, Michelle Heacock, Heather Henry, Brittany Trottier



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2. Leading the Way: From Harvard Six Cities Study to Global Environmental Health

Junior Ballroom A

Epidemiological studies carried out in the 1970s and 1980s show well-documented associations between mortality and morbidity to ambient particulate matter (PM) at extreme air pollution episodes. As the first multicity study supported by the NIEHS, the Harvard Six Cities study reported associations between daily changes in ambient PM and daily mortality across cities with varying levels of PM. Another significant outcome from this study is the initial recognition of cardiopulmonary mortality in adults and association with fine PM. This study and the American Cancer Society prospective study in the U.S. and additional epidemiological studies from Canada, Germany, and Finland contributed to the recognition of health effects at low to moderate ambient levels of PM and reevaluation of the U.S. EPA National Ambient Air Quality Standards (NAAQS) for coarse and fine PM by 2000s. Over the last two decades, the scientific data from numerous laboratories in the U.S. and Europe suggest a role for ambient PM in the development of specific health effects, ranging from asthma, COPD, atherosclerosis, hypertension, diabetes, autism, and reproductive and developmental outcomes, as well as their overall contributions to mortality and morbidity. This continued commitment, interest, and support for air pollution research has positioned the NIEHS as a leader, providing the needed expertise and direction to address air pollution health issues across the globe. This session will also provide an historic overview on the NIEHS-supported research in air pollution over the past five decades and identify potential gaps. A panel discussion will aim to identify what are the missing links and what future research focus should be.

Speakers

- **Introduction**
Sri Nadadur, NIEHS
- **Foundational Population Studies of Air Pollution Health Effects**
Doug Dockery, Harvard University
The creation of NIEHS in 1966 and EPA in 1970 were signature events in reversing the degradation of the environment in the U.S. and in providing international leadership in translational environmental health research. Early on, the NIEHS called for and funded innovative population-based studies of the health effects of air pollution. These foundational studies transformed air pollution health effects science, identified specific air pollutants linked to health effects, quantified exposure-response functions, and provided the basis for policies and regulations to protect public health. In addition, these studies fostered the development of new methods, possessing broad applications for environmental health problems.
- **The Southern California Children's Health Study: Synthesis of Results from the First Twenty Years**
Rob McConnell, University of Southern California



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The Children's Health Study has identified novel associations of asthma exacerbation, lung function growth across adolescence, and attained lung function in early adult life with particulate matter and a correlated mixture of particle-associated regional pollutants at concentrations common across the United States. Asthma prevalence and incidence, in addition to lung function and attained level, have been associated with exposure to the complex near-roadway pollution mixture at homes and schools. The sustained research effort has provided evidence for (a) causality and mechanistic insights into these effects through hypothesis-driven and exploratory genetic and epigenetic analysis, (b) benefits of regulatory policy that have resulted in reduction in exposure and improvements in symptoms and lung function across multiple cohorts, and (c) a basis for estimating the burden and economic cost of disease on a spatial scale of interest to local as well as national stakeholders.

- **50 years of Progress: From 7 Countries to 6 Cities, Pathways of Air Pollution Mediated CV Risk**
Sanjay Rajagopalan, Case Western University

Globally, cardiovascular and metabolic diseases (diabetes) have surpassed infectious causes of mortality and disability. This epidemiologic transition has had profound implications for health. The seven countries and six city studies have been influential in providing evidence for the importance of risk factors in the genesis of cardiovascular disease and have spurred fundamental and translational research. Support from the NIEHS and other organizations has been critical for enhanced understanding of the mechanisms by which inhaled particles modulate cardiovascular and metabolic susceptibility. The talk will explore the implications of these findings for regional and global public health.

- **Developmental Neurotoxicity of Inhaled Ambient Ultrafine Particles: Parallels with Neuropathological and Behavioral Features of Neurodevelopmental Disorder**
Deborah Cory-Slechta, University of Rochester Medical Center

This talk will describe the neuropathological, neurochemical, and behavioral impacts of early postnatal exposures of mice to concentrated ambient, ultrafine particles during the human third trimester equivalent period. In addition, neuropathological consequences of gestational exposures of mice to fine particles will be described. Sex dependence of effects and the overlap of the adverse consequences in relation to neurodevelopmental disorders, such as autism and attention-deficit hyperactivity disorder, will be discussed.



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3. Dissemination and Implementation Science: Reducing Risk through Effective Communication and Application of Scientific Findings

Junior Ballroom B

One of the major challenges faced in reducing risks associated with environmental exposures is effectively conveying the meaning and implications of research findings to relevant stakeholders and communities such that the results are successfully implemented. Dissemination and implementation (D&I) science focuses on optimizing methods used to communicate the results of scientific research and how best to put it into practice. The session will open with an overview of D&I by an expert in the field of communications research and will include talks by basic and social scientists with expertise in dissemination of complex scientific information to mixed audiences. The speakers will focus on using lessons from D&I science to increase the reach and impact of work on education and subsequent reduction of environmental exposures and will highlight the value of D&I across the full spectrum of environmental health science research. Specific topics addressed will include: (1) strategies for the development of messages for specific audiences, (2) early engagement of community partners in designing and testing of interventions, (3) multi-site testing to assess the effectiveness of interventions, (4) adapting effective interventions prior to dissemination to increase the likelihood of adoption, (5) strategies to improve both the rate of adoption as well as implementation success, and (6) sustaining effective interventions in practice. This session will help the audience better understand the importance of identifying the target audience, adapting the scientific information to that audience, testing the effectiveness of the message and potential intervention, and communicating the message so that interventions, through enhanced understanding, are readily accepted and integrated.

Speakers

- **Applying Dissemination & Implementation Science across the NIEHS Mission**
James Dearing, Michigan State University

The mission of NIEHS is to discover how the environment affects people in order to promote healthier lives. This purpose implies considerable translation activity among researchers and between researchers and practitioners, so that healthier lives can be achieved. There is considerable evidence on dissemination, diffusion, and implementation science that can facilitate effective translation. The present talk will provide an orientation to this translational spectrum, while suggesting strategies for using this knowledge to support the NIEHS mission.

- **Effectively Communicating Risk with Diverse Populations**
Marilyn Howarth, University of Pennsylvania

Community-based participatory research has been used effectively in a variety of settings to design and carry out research that is relevant and meaningful to community members. In ethnically and racially diverse communities, full community engagement is particularly important to tailor communication strategies that will be trusted and lead to improved health behaviors and outcomes. This presentation will describe strategies that have been employed in post-disaster settings to engage diverse subpopulations in communities. It will describe the role that full participation plays



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in enhancing environmental health literacy and the design of effective messaging regarding risks and risk reduction.

- **Communicating the Complexities of Scientific Research**

Susan Murphy, Duke University

Murphy will discuss the influences that shape how the public perceives complex scientific research findings and barriers to effective communication. She will give examples of initiatives to communicate complex topics to the public, and how to counteract misperceptions and misinformation frequently disseminated by mass media (e.g., newspaper articles, advertisements, films, and other expressions of popular culture).

Keywords: dissemination, implementation, diffusion, health literacy/environmental health literacy communications/risk communications, community engagement, research translation

Session Co-Leads: Symma Finn, NIEHS, and James Dearing, Michigan State University

Planning team: Shuk-mei Ho, University of Cincinnati; Brian Mayer, University of Arizona; Susan Murphy, Duke University

4. New Frontiers in Brain Research: The Immune System and Brain Health

Junior Ballroom D

It has become increasingly clear that the brain and immune system are intricately linked. Evidence suggests that neurodevelopmental and neurodegenerative diseases can be linked to dysregulation of the immune system. This session will explore the impact of inflammation and immune dysregulation on the pathogenesis and ontogeny of neurological disorders, and how various environmental exposures might play a role in such dysregulation, including mechanisms of toxicity. The overarching goal is to improve our understanding of how changes in immune function, both peripherally and in the central nervous system (CNS), can affect brain health from the prenatal period throughout the lifespan.

Format: Platform presentations followed by discussion

Moderators: Cindy Lawler and Judy Van de Water

Speakers

- **Immune Regulation during Gestation**

Judy Van de Water, University of California, Davis

This presentation will cover the relationship between the immune system and the developing brain. It will provide an overview of the basic immune molecules involved in neurodevelopment, and how perturbation of the maternal immune system can alter developmental trajectory.



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- **Prenatal Air Pollution and Maternal Stress Alters Early Communication and Social Behavior in Developing Offspring**

Carina Block, Duke University

Environmental risk factors can have synergistic effects in utero, resulting in changes in brain development and behavior. Based upon this knowledge, researchers used a mouse model to determine whether prenatal air pollution combined with maternal stress (DEP/MS) during the last trimester of pregnancy induces deficits in communication and social behavior in developing offspring. We find that DEP/MS acts synergistically on male, but not female offspring to promote changes in communication, as well as changes in social exploratory behavior and anxiety in both male and female offspring.

- **Novel Inflammasome Signaling in Environmental Neurotoxicology**

Anumantha Kanthasamy, Iowa State University

This presentation will describe the effect of certain environmental neurotoxic chemical exposures on NLRP3 inflammasome activation in microglia and its role in neuroinflammatory and neurodegenerative processes. The work will also highlight the amplification of inflammasome activation by upregulation of a kinase signaling in microglia and its contribution to persistent chronic inflammatory stress induced by environmental neurochemical exposure.

- **Glia in the CNS as a Target of Environmental Inflammagens**

Ronald Tjalkens, Colorado State University

Neuroinflammation remains a daunting challenge for treatment for degenerative disorders of the central nervous system. Microglia and astrocytes can activate an inflammatory phenotype following exposure to neurotoxic agents, such as heavy metals, pesticides, and infectious pathogens, resulting in damage to neurons. This talk will explore the molecular regulation of inflammatory genes in glia in the context of manganese neurotoxicity and infection with neurotropic viruses, and will discuss the implications for the pathogenesis and progression of chronic neurodegenerative diseases associated with these agents.

Keywords: neuroinflammation, microglia, neurotoxicity, neurodegenerative diseases, immune system, neurodevelopment, autism, developmental delay, schizophrenia, air pollution, maternal stress, immune activation, communication, inflammasome

Planning team: Cindy Lawler, Astrid Haugen, Mike Humble, Jon Hollander, and Judy Van de Water



5. Grantsmanship and Managing Grants for New Grantees

Meeting Room 1-2

Environmental health research often engages people and organizations, which have not previously managed large federal research grants. In this session, a panel of experts will discuss tips to help navigate the challenges of managing a grant. Some highlighted topics include: negotiating responsibilities and roles amongst collaborators and consortia, crafting an application, understanding the scientific review process, and responding to unexpected changes in your grant. The session format will provide an hour for presentations by experts at NIEHS and in the NIEHS community, followed by roundtable discussions – with each table diving deeper into a different case study or issue. Sample case studies may include, but are not limited to: determining if your community engagement activity contains human subjects research and/or a clinical trial, changing animal models used in the project, adding a foreign consortium, rebudgeting among collaborators when funds are cut, and adjusting to changes in a multi-PI managed award. While primarily geared to new investigators, anyone can gain new insights into managing their award.

Format: Panel presentation followed by case study table discussions

Speakers

- **Grantsmanship from the NIH Perspective**
Jonathan Hollander, Janice Allen, and Molly Puente, NIEHS
- **So You Want to be a PI? Grantsmanship from the Investigator's Perspective**
Maureen Lichtveld, Tulane University

Case Study Leaders: Martha Barnes, Barbara Gittleman, Mike Humble, NIEHS

Keywords: grantsmanship, review, program, grants administration, collaborations/team science, funding

6. Tools to Support Research and Communication on Health Impacts of Climate Change

Meeting Room 3

This interactive, computer-based session will showcase research and communication tools for climate change and health including: the U.S. Global Change Research Program's Climate and Health Assessment website, the NIEHS Climate Change and Human Health Literature Portal, the U.S. Climate Resilience Toolkit, and winning tools of the NIEHS Climate Change and Environmental Exposures Challenge. Participants are encouraged to bring their own laptop computer, tablet, or smartphone to explore the tools in real time, as they are being demonstrated (Wi-Fi provided). At the end of the session, participants will have greater



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awareness of the available tools that may be most relevant to their specific research or communication interests or most useful to their community.

Format: Demonstrations and hands-on exploration, as well as 60 minutes of presentations and 30-minute individualized Q&A

Speakers

- **Climate and Health Assessment: Using the State of the Science**

John Balbus, NIEHS

In 2016, the U.S. Global Change Research Program released *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, which reports the state of the science on a wide range of impacts such as air pollution, heat, extreme weather events, mental health, vectorborne disease and others, as well as a special focus on Populations of Concern. This interactive website provides a range of communication tools for using the report findings to inform communities and decision makers. Health2016@globalchange.gov

- **Announcing the NIEHS Climate Change and Human Health Literature Portal**

Kimberly Thigpen Tart, NIEHS

The Climate Change and Human Health Literature Portal is a knowledge management tool for locating the most relevant scientific literature on the health implications of climate change. This online tool collects the world's scientific literature on the impacts of climate change and related exposures on a wide range of human health outcomes, and enables users to search and refine results using an intuitive list of relevant facets. <http://tools.niehs.nih.gov/climatehealthlit>

- **U.S. Climate Resilience Toolkit: Ready Resources**

Trisha Castranio, NIEHS

For many Americans, adapting to new climate conditions means developing new expertise. Decision makers across the nation are using data and tools to confront their climate threats, identify vulnerabilities, and reduce their risks from the impacts of climate variability and change. The U.S. Climate Resilience Toolkit gathers such tools in a publicly available, curated, constantly-evolving website. <https://toolkit.climate.gov>

- **NIEHS Climate Change and Environmental Exposures Challenge Winners**

Jason West, University of North Carolina, Chapel Hill

In an effort to help decision makers around the country understand and address potential changes in environmental health risks due to a changing climate, the NIEHS sponsored the Climate Change and Environmental Exposures Challenge. Winners focused on creating data visualization tools and maps that connect current science on climate change to the exposure pathways for environmental hazards, in order to help decision makers and communities identify areas and people at greatest risk and help to prioritize protective actions.

http://www.niehs.nih.gov/funding/challenges/climate_change/index.cfm



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Keywords: climate change, human health, heat, air pollution, community engagement, data, tools, global change, resources, environment, vectorborne disease, mental health, populations of concern, children's health, occupational health, mapping, indigenous populations, elderly

7. NIH Resource Room

Meeting Room 4

This session will allow EHS Fest attendees to meet one-on-one with NIEHS staff. Opportunities will be available to talk to individuals from the following NIEHS Offices and Branches:

- Office of Acquisitions, Procurement, and Policy Analysis Branch
- Office of Science Education and Diversity
- Office of Communications & Public Liaison
- NIEHS Library Services
- Division of Intramural Research
- Division of the National Toxicology Program
- Division of Extramural Research and Training, including:
 - Grants Management Branch
 - Scientific Review Branch
 - Program Analysis Branch
 - Exposure, Response & Technology Branch
 - Genes, Environment & Health Branch
 - Hazardous Substances & Research Branch
 - Population Health Branch
 - Worker Education & Training Branch
 - PEPH Resource Center & Worker Training Program Clearinghouse

Please stop by the Resource Room for a full schedule of when staff are available for discussions.

Note: This room will be repeated during other concurrent sessions as space is available.



Concurrent Sessions: Tuesday afternoon

8. Chemical Exposure-Induced Host Susceptibility: What do we Know and Where the Science is Leading Us?

Grand Ballroom

Over the past two decades we recognized the need to understand how people are pre-disposed to influence of exposure to environmental chemicals based on their genetic and disease phenotypes. The observation of increased incidence of community acquired infections in elderly with chronic exposure to high levels of air pollution and increased frequency and incidence of upper air way infections in children suggest how exposure to environmental agents can predispose humans for secondary health outcomes, such as bacterial or viral infections. There is increased evidence from experimental data using either ultrafine PM and engineered nanomaterials showed exposure-induced difference in bacterial clearance by macrophages. This session will showcase recent findings from NIEHS grantees efforts to address this issue. A panel discussion will explore to identify possible common or unique mechanisms that may contribute to infection susceptibility across different exposures. It's our hope that these discussions will shed light on the gaps and future research needs to address this evolving health issue.

Speakers

- **Adverse Effects of Arsenic on the Immune Response of the Lungs to Pseudomonas Infection**
Bruce Stanton, Dartmouth College
Stanton's research examines the effects of low doses of arsenic (iAs, MMA and DMA, 0.5 to 10 ug/L) on the innate immune response of human lung epithelial cells and macrophages to infection by the opportunistic pathogen *Pseudomonas aeruginosa*. RNAseq of gene expression and cytokine analysis reveal that arsenic suppresses the expression of genes coding for cytokines, antimicrobial peptides, and genes involved in antigen presentation, all of which are essential for clearing bacterial lung infections. Studies provide a mechanistic basis for the observation in epidemiological studies that arsenic is associated with increased lung infections.
- **Exposure to Radical-Containing Particulates Alters Respiratory Viral Infection Morbidity and Mortality**
Stephanie Cormier, University of Tennessee Health Science Center
Epidemiological data demonstrate that exposure to elevated levels of combustion derived particulate matter, which contain environmentally persistent free radicals (EPFRs), is associated with increased morbidity and mortality due to respiratory tract viral infections; however, the reasons for this remain unclear. This research team demonstrates that exposure to EPFRs during early life not only alters lung barrier function but also induces T-regulatory cells that suppress protective immune responses against respiratory viruses. Such active suppression of the adaptive immune response



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prevents protective immune responses from developing and allows for enhanced influenza disease severity and mortality in infant mice. Data elucidates how exposure to radical-containing particulates influences infectious disease severity in exposed populations.

- **Key Events in Modulating Innate Immune Susceptibility Mechanisms by Engineered Nanomaterial Exposures**

Brian Thrall, Pacific Northwest National Laboratory

Studies using nanoscale materials from both engineered and ambient sources indicate that exposures to these particles can enhance susceptibility to bacterial pathogens such as *Streptococcus pneumoniae*, the major cause of community-acquired pneumonia. Studies using integrated omics based approaches suggest oxidative stress as an underlying mechanism, and that redox modification of selected proteins involved in regulation of normal macrophage phagocytic clearance and innate immune pathways may be early events that contribute to dysregulated immune functions after nanoparticle exposure. Identifying the early molecular targets of redox stress will advance predictive hazard assessment capabilities, help guide safe nanotechnology development, and provide new insights into fundamental mechanisms of susceptibility associated with ambient particulate matter exposures of broad importance to human health.

- **Long-term effects of early-life arsenic exposure on immunity and tuberculosis risk**

Fenna Sille, Johns Hopkins University

Observations in Chile suggest that arsenic impacts critical processes that occur in early life, such as the developing immune system, thereby contributing to increased mortality risk from cancer, bronchiectasis and tuberculosis (TB) later in life. As part of these studies, the team observed metabolic and immunogenic alterations in arsenic exposed macrophages and mice as well as effects on TB pathogenicity in vivo. Together, this data elucidates how arsenic influences infectious disease risk in exposed populations.

9. From the Bench to the Field: Technology-Based Solutions to Reduce Environmental Exposures

Junior Ballroom A

NIEHS has invested in engineering technologies that reduce contaminants in drinking water, sediments, and soils. These research approaches bring solutions to communities impacted by hazardous substances, and in some cases, are being tested in the field for effectiveness. This session will highlight NIEHS-funded remediation technologies that are transitioning into the field to prevent and reduce exposures to environmental hazardous substances. As appropriate, presenters will not only demonstrate effective exposure reductions, but also report sustainability, economic, and capacity building benefits resulting from implementing these solutions.



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Format: Brief session introduction followed by four 20-minute presentations and a brief discussion

Speakers:

- **Introduction**
Helen Hsu-Kim, Duke University
- **New Advances in Contaminated Sediment Remediation by Controlling Bioavailability**
Upal Ghosh, University of Maryland Baltimore County
Recent advances in our understanding of geochemical controls of pollutant bioavailability has greatly improved our ability to predict exposure from contaminated soils and sediments. This new knowledge has also led to a novel remediation technology of controlling exposure through in-situ geochemical alteration. This talk will present work performed through NIEHS projects that advanced the exposure science modeling and pilot-testing at a field site, followed by technology translation and full-scale implementation at multiple contaminated sediment sites.
Keywords: sediment, remediation, bioavailability, exposure
- **Nano-Enabled Technologies for Environmental Health**
Robert Hurt, Brown University
Over a decade of basic research in nanoscience has led to a toolkit of new materials that now serve as building blocks for a wide variety of advanced technologies. This talk gives examples of basic and translational research in the Brown SRP that seeks to draw from this nanomaterial tool kit to develop technologies relevant to environmental health challenges. The talk will discuss nanomaterial sorbents for mercury capture and sequestration, and 2D graphene materials as components in vapor barriers and multifunctional breathable layers in personal protective equipment.
Keywords: mercury, vapor intrusion, graphene, personal protective equipment
- **Unraveling the Specific Environmental Conditions that Sustain In Situ Microbial Reductive Dechlorination and Detoxification of Priority Pollutants**
Frank Loeffler, University of Tennessee Knoxville
Corrinoids are essential cofactors of reductive dehalogenases that break carbon-chlorine bonds, and the availability of the correct corrinoid type is crucial to sustain the activity of organohalide-respiring bacteria involved in priority pollutant detoxification. Through the integrated application of cultivation, genetic engineering and detailed corrinoid analytical approaches, this work links specific environmental conditions with effective contaminant detoxification, and reveals strategies for enhancing in situ reductive dechlorination activity in sediments and aquifers impacted by chloroorganic pollutants such as trichloroethylene (TCE).
Keywords: bioremediation, dechlorination, dehalogenase, trichloroethylene (TCE)
- **Lessons Learned from a Compost-Assisted Direct Planting Revegetation Field Trial: Six Years at the Iron King Mine Superfund Site**
Raina Maier, University of Arizona



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We present results from the first six years of a field study at the Iron King Mine and Humboldt Smelter Superfund site demonstrating the feasibility of compost-assisted direct planting. Parameters measured during the field study included: canopy cover, pH, nutrient content, plant metal uptake, metal(loid) speciation, mineral analysis, microbiome analysis, and plant root-metal-microbe interactions. Integrated analysis of these parameters suggests that even in this “worst-case scenario” mine tailings site, we have created a sustainable system. The results of this research will be put into the context of a larger topic- that of management of mine tailings sites to reduce the risks of human and ecosystem exposure to contaminants associated with the tailings.

Keywords: sustainable remediation, phytostabilization, arsenic, lead, mine tailings, superfund site

Planning Team: Helen Hsu-Kim (Duke University), Michelle Heacock (NIEHS), Heather Henry (NIEHS), Brittany Trottier (NIEHS)

10. From the Cell to the Street: Multidisciplinary Perspectives on the Science of Environmental Health Disparities

Junior Ballroom B

Researchers and regulatory scientists have sought to better understand and address the origins and persistence of environmental health disparities. However, addressing this scientific and public health challenge requires multidisciplinary thinking, novel approaches, and new data that characterizes the combined effects of social and environmental “stressogens,” with particular attention to how both intrinsic biological and physiological factors as well extrinsic social factors may amplify the adverse health effects of environmental hazards among diverse population groups. The Institute of Medicine has referred to the cumulative impacts and potential interaction of elevated exposures to environmental and social stressors as a form of “double jeopardy.” This session features the diverse disciplinary perspectives of researchers on how the lens of health inequity informs their scientific work and shapes their analytical approaches for understanding environmental and structural drivers of health and well-being in diverse communities. Discussion will explore future prospects for advancing the rigor, relevance, and reach of the emerging and multi-disciplinary science of environmental health disparities.

Format: Three (3) presentations followed by roundtable discussions moderated by experts in the field of environmental health disparities

Speakers:

- **Analytical Approaches Used to Characterize and Address Environmental Health Disparities**
Jonathan Levy, Boston University

Jonathan Levy will introduce the session and provide an overview that defines Environmental Health Disparities (EHDs), discusses the circumstances that contribute to EHDs, and describes approaches that are foundational to disparities research, while having applications elsewhere. He will discuss his



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own experiences and research in this area, including his current involvement in the Center for Research on Environmental and Social Stressors in Housing across the Life Course (CRESSH, an NIH-EPA EHD Center), his prior work on cumulative risk assessment, and how to apply quantitative measures to characterize exposure or risk inequities. He will focus on approaches to incorporate both the physical and social environment within a quantitative modeling framework, emphasizing how EHD research ideally involves multidisciplinary teams working collaboratively with community members and community organizations.

- **Integrative Health Disparities Research**

Charmaine Royal, Duke University

Charmaine Royal will focus on the intersection of genomics and health disparities and discuss some of the ethical, psychosocial, and societal issues as well as the biological dimensions of “race” in humans that often underlie health disparities or the conduct of EHD research. She will discuss her own experiences exploring health disparities based on the interplay of biological and non-biological factors in global health, and the implementation of policies intended to address EHDs that have race-based implications. She will provide examples of her own research in Africa, Jamaica, and the U.S. to understand the separate and combined influences of social, environmental, behavioral, and genetic factors on phenotypic diversity in sickle cell disease.

- **Southwest Tribally-Driven Community Based Education, Engagement, and Research Principles and Practices**

Marti Lindsey, University of Arizona

Marti Lindsey will highlight the research and outreach/educational activities at the University of Arizona Environmental Health Sciences Core Center and best practices in the development and implementation of culturally appropriate educational materials for specific audiences that address the lifelong environmental and social disparities experienced by southwestern communities. She will discuss her experiences in the translation of information to local tribal communities and with the K-12 educational community resulting from toxicological and environmental health science research and highlight best practices in cultivating and maintaining research partnerships between local community members and researchers, a key component of effective EHD research. She will also address the importance of raising environmental health literacy as an associated factor for addressing environmental health disparities of community partners in research and approaches the Center has used to improve EHL and general health literacy related to the lifelong combined exposures these communities face in order to empower community members.

Keywords: environmental health disparities, social determinants of health/social stressors, environmental justice, cumulative risk

Planning team: Symma Finn, NIEHS; Rachel Morello-Frosch, UC Berkeley; Melissa Gonzalez, University of New Mexico; Jonathan Levy, Boston University; Nishadi Rajapakse, NIMHD



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11. Diversity and the NIEHS – Opportunities and Challenges

Junior Ballroom D

The NIEHS and NIH currently provide multiple opportunities to develop research careers and improve participation for individuals from groups with low representation in the biomedical and behavioral sciences. NIEHS has several strategic plan goals that seek to address issues of diversity among trainees and researchers. The goal of this session is to showcase and discuss approaches to diversity and inclusion in the environmental health sciences. Speakers will highlight findings from an analysis of trainee and PI diversity. Speakers will also discuss different mechanisms and approaches to growing a diverse cadre of trainees and researchers through both intramural and extramural programs. Participants will have the opportunity to hear from organizers of training programs and trainees who have been through the program as well as ask questions during a moderated panel discussion.

Format: Didactic presentation and panel discussion with participants

Speakers/Panelists

- **Akram Alshawabkeh, Northeastern University**
Akram Alshawabkeh is the PI of the recently awarded “Research Opportunities for Undergraduates: Training in Environmental Health Sciences (ROUTES)” undergraduate training program to enhance diversity in the environmental health sciences.
- **Christopher Bradfield, University of Wisconsin-Madison**
Bradfield will discuss the experiences, successes, and failures of the Summer Research Opportunities Program at the University of Wisconsin at Madison.
- **Christie Drew, NIEHS**
Drew is the Chief of the Program Analysis Branch and supports efforts throughout the division to track, monitor, evaluate, and communicate the returns on our investments in environmental health science research. She heads efforts to track and monitor trainee accomplishments with CareerTrac.
- **Kelly Harris, Food and Drug Administration**
Harris graduated from Meharry Medical College, where she completed a dissertation project focused on the interaction of benzo(a)pyrene and high fat diets in the initiation and progression of colorectal cancer under the mentorship of Dr. Aramandla Ramesh. She is currently an ORISE Postdoctoral Fellow at the National Center for Toxicological Research under the mentorship of Dr. Barbara Parsons.
- **Ericka Reid, NIEHS**
Reid directs the Office of Science Education & Diversity (OSED) at the National Institute of Environmental Health Sciences (NIEHS) in Research Triangle Park, NC. Through community outreach, information sharing, and professional development activities, the office strives to ensure the



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opportunity to explore a career in the interdisciplinary field of environmental health science, and that its workforce is representative of our country's diverse population.

- **Carol Shreffler, NIEHS**
Shreffler is the NIEHS program officer for the T32 training program.
- **Sally Thurston, University of Rochester**
Thurston is an Associate Professor in the Department of Biostatistics and Computational Biology at the University of Rochester Medical Center. Her statistical research is motivated by collaborations in environmental and occupational health. She became the PI of her department's T32 training grant "Training in Environmental Health Biostatistics" in fall 2015.

Keywords: training, diversity

12. Perspectives on Data across the Research Lifecycle

Meeting Room 1-2

Today, a growing number of funding agencies and journals require researchers to share, archive, and plan for the management of their data. NIH began this trend in the United States with the release of their Data Sharing Policy in 2003 and a 2013 Office of Science and Technology Policy Memo further highlighted the importance of providing open access to datasets and scholarly publications as a method of promoting innovation, accountability, transparency, and efficiency. Within the context of scholarly communications and the open data landscape, different stakeholders can affect data sharing through policies, infrastructure, tools, and resources. This panel session will discuss data management and sharing policies, stewardship of data across the research data lifecycle, and the benefits and challenges of sharing data from the perspective of repositories, funders, publishers, and researchers.

Format: Platform overview presentation followed by panel presentations and discussion

Moderator: Cindy Lawler, NIEHS

- **Perspectives on Data across the Research Lifecycle**
Jonathan Crabtree, University of North Carolina, Chapel Hill
This session overview talk will introduce Data Management and the Data Lifecycle as well as lead into the discussion on the benefits and challenges of managing and sharing data.



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Panel Members	Perspective
Fred Wright <i>North Carolina State University</i>	Training
Susan Pinney <i>University of Cincinnati</i>	Consortium
Dan Hall <i>National Institute of Mental Health</i>	Repository
Deborah McGuinness <i>Research Center Rensselaer Polytechnic Institute</i>	Semantics and Data Integration
Gary Miller <i>Emory University</i>	Publishing
Astrid Haugen <i>NIEHS</i>	Funder

Keywords: data management, data lifecycle, data sharing

Planning team: Cindy Lawler, Astrid Haugen, Stephanie Holmgren, and Kristi Pettibone

13. A Toxicology User's Guide to the Roadmap Epigenomics and ENCODE Data Resources

Meeting Room 3

Improvements in DNA sequencing technologies have resulted in an exponential increase in the amount of genomic and epigenomic data available. Some of these data have been generated as part of large-scale, focused mapping efforts aimed at understanding how genes are regulated, such as the NIH Roadmap Epigenomics Program, and ENCODE (Encyclopedia of DNA Elements). Efforts such as these can be extremely valuable for hypothesis generation and data mining, but can only be useful if one knows what is available and how to use it. This session will provide toxicology researchers with an overview of these two NIH-funded programs, introduce attendees to the informatics tools that have been developed to help navigate these large datasets, and walk through several use cases. The session will be of broad interest to researchers interested in learning more about how environmental exposure might impact gene regulation.

Format: Hands-on training

Speakers:

- **A Field Guide to Public Epigenomic Data Resources**
Lisa Chadwick, NIEHS



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This talk will provide a broad overview of several large consortium efforts focused on gaining a better understanding of how the human genome functions in the context of human health and disease, including the Roadmap Epigenomics Program, ENCODE, and the 4D Nucleome Program.

- **Engaging the Reference Human Epigenome Map**

Ting Wang, Washington University in St. Louis

This interactive workshop will introduce The WashU Human Epigenome Browser and associated tools (<http://epigenomegateway.wustl.edu/>). The Epigenome Browser hosts ENCODE data and Human Epigenome Atlas data produced by the Roadmap Epigenomics project, and support navigation of the data and its interactive visualization, integration, comparison, and analysis. Attendees will gain hands-on experience with exploring the most current epigenomic resources, and with advanced visual-bioinformatics tools including gene set view, genome juxtaposition, and chromatin-interaction display, inventions unique to the WashU Epigenome Browser.

Keywords: epigenetics, epigenomics, roadmap, ENCODE, chromatin, computational biology, data visualization

Planning team: Lisa Chadwick (NIEHS), Ting Wang (Washington University)

14. NIH Resource Room

Meeting Room 4

This is a recurring session.

This session will allow EHS Fest attendees to meet one-on-one with NIEHS staff. Opportunities will be available to talk to individuals from the following NIEHS Offices and Branches:

[Link to NIEHS Offices and Branches](#)



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Poster Session #1

90-minute poster session

Grand Ballroom and Junior Ballroom C

See poster abstract document for more details

Climate Change Tools

Meeting Room 3

Tools Climate Change and Health: Existing Tools to Support Research and Communication

This display will provide users the opportunity to discover research and communication tools for climate change and health including: The U.S. Global Change Research Program's Climate and Health Assessment website, the NIEHS Climate Change and Human Health Literature Portal, the U.S. Climate Resilience Toolkit, and winning tools of the NIEHS Climate Change and Environmental Exposures Challenge. This hands-on opportunity will provide greater awareness of the available tools that may be most relevant to their specific research or communication interests or most useful to their community.

Keywords: climate change, human health, heat, air pollution, community engagement, data, tools, global change, resources, environment, vector borne disease, mental health, populations of concern, children's health, occupational health, mapping, indigenous populations, elderly

Sensors and Technologies Fair #1

Foyer

The EHS Sensors and Technologies Fair is aimed at providing a great opportunity for sensor and technology developers funded by NIEHS and other agencies to showcase their cutting-edge technologies and meet with leading scientists and end-users in exposure science, environmental epidemiology, community research, and citizen science. The event is divided into two sessions, the first session on Tuesday, December 6 includes a broad range of sensors and technologies capable of measuring physical, chemical, and biological targets in a variety of environmental matrices and online tools for research and education.



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Night Out in Durham

In 2013, Southern Living magazine declared Durham the “[Tastiest Town in the South](#).” Durham is no stranger to great accolades, and the community was proud to add this one to the list. Our Contributing Sponsor, the Durham Convention Visitors Bureau invites you to explore and celebrate the people, places, and food that make Durham unique on the global food scene. Durham’s culinary community is an amazing asset to visitors, and is a major reason to come and explore here. We have fun activities scheduled for Tuesday, December 6 after the meeting wraps up for the day, to provide you with additional opportunities to socialize, rekindle friendships, spark collaborations, and meet new people. Space is limited.

Three Minute Science Talk

Starting at 8:00 p.m. and ending at 10:00 p.m.

**Motorco Music Hall Showroom, 723 Rigsbee Ave,
Durham**



**Environmental
Mutagenesis and
Genomics Society**

Synergistic Interactions for a Better World

Because squeezing your research application into 12 pages isn’t bad enough!

Join us for an entertaining evening of Three Minute Science Talks. Competitors will have three minutes to sum up their life’s work, or at least a key piece of a current research project. Contestants will be judged for how clearly they can present their ideas to a non-specialist audience. A panel of approximately five judges will include PIs, NIEHS staff, and community members. Audience members will select a winner of the People’s Choice Award. Contest will be limited to 30 participants!

Downtown Durham History Walking Tour: From Tobacco to Technology

Starting at 6:30 p.m.

Meet across the street from the Marriott’s front doors

Come along and learn about the history of Durham while walking the streets and alleys of downtown. Walking tour will review local history, while also discussing environmental justice issues and the rapidly changing landscape of downtown today.

Local history lover and NIEHS colleague John Schelp will narrate along the way. Join Schelp after the tour at Motorco for the Three Minute Science Talk Competition or he can point out nearby watering holes and coffee shops.

Join the walking tour to learn:

- Why did the creek run red on Monday, blue on Wednesday, and green on Friday?
- Who wrote the song, Tobacco Road, and was "born on a kitchen table" near Duke?
- Where did “Bull Pen” get its name? (Hint: has something to do with Bull Durham Tobacco.)



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- Was Duke Hospital really built on top of Durham's old bone yard?
- Where did Madonna take early dance lessons?
- Who wrote "The Gambler" for Kenny Rogers and lived in an old mill house?
- What do Sputnik, Silent Spring, and a governor have to do with NIEHS being in North Carolina?
- What performing arts center sells more tickets each year than all but three other theaters in the country?



Concurrent Sessions: Wednesday Early Morning

15. Translational and Interdisciplinary Collaborations: Impact and Lessons Learned from ViCTER

Grand Ballroom

Environmental health sciences research has traditionally taken place within specific areas of interest, but partnerships among scientists, who might not normally work together, can help quicken the pace at which research moves forward. NIEHS established the Virtual Consortium for Translational/Transdisciplinary Environmental Research (ViCTER) program to foster and promote transdisciplinary collaborations and/or translational research efforts among basic (technology and mechanism oriented), clinical (patient-oriented) and population-based researchers and other individuals with expertise relevant to environmental health, who have come together to study particular environmental stressor(s). The goal of this seminar is two-fold: (1) current/former ViCTER grantees will present research findings, highlighting how this award "pushed" their science beyond their initial investigation, and (2) panel discussion will focus on best practices for fostering collaborations across multiple investigative teams.

Format: Seminar presentation and panel discussion

Speakers:

- **A Digital Method to Help Researchers Report Personal Exposure Results for Emerging Contaminants**

Julia Brody, Silent Spring Institute

The return of personal results to study participants is becoming ethical best practice across many domains of science and medicine, and it is a foundation of the Precision Medicine Initiative. In order to make it more practical to return personalized exposure results in studies of any size, we developed a partnership of researchers in environmental health science, communications, and computer science to develop DERBI, the Digital Exposure Report-Back Interface. In collaboration with the CDC Green Housing Study and the Child Health and Development Studies cohort, we used DERBI to report personal exposures for pesticides, phthalates, PFASs, PAHs, flame retardants, and other contaminants in blood and urine.

- **Manganese Exposure Promotes Protein Misfolding and Exosome-Mediated Release of Protein Aggregates: Relevance to Translational Research in Environmental Metal Neurotoxicology**
Anumantha Kanthasamy, Iowa State University

This presentation will provide an example of NIEHS ViCTER interdisciplinary research on the effect of manganese exposure on protein misfolding and cell-to-cell transfer of protein aggregates through exosomal release to induce the proinflammatory signaling cascade. Potential translational relevance



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of the protein misfolding mechanism in environmentally-linked neurodegenerative processes will also be presented.

Panelists:

- **Ronald Tjalkens, Colorado State University**
Research projects focus on neuroinflammatory mechanisms in neurodegenerative disorders, particularly disorders of the basal ganglia such as manganism and Parkinson's disease. Specific areas of interest include inflammatory activation of microglia and astrocytes, astrocyte biology and calcium signaling, mitochondrial dysfunction, and molecular regulation of neuro-inflammatory genes. Approaches emphasize multi-dimensional fluorescence imaging, transgenic models, and molecular approaches to modulate gene expression in neural cells.
- **Ilona Jaspers, University of North Carolina, Chapel Hill**
Using the clinical and exposure infrastructure available at UNC-Chapel Hill, research in the Jaspers laboratory focuses on mechanisms by which factors such as nutrition, pre-existing diseases, and co-exposures to environmental agents modify mucosal host defense responses.
- **Aaron Bowman, Vanderbilt University**
The Bowman lab studies toxicological interactions between metals (e.g. manganese and methyl mercury) and genetic factors that contribute to selective neuropathology via neurodevelopmental and neuronal lineage-specific vulnerabilities. A diverse range of model systems are employed including patient-derived induced pluripotent stem cells (iPSCs), neuronal cultures and mouse models as well as a multifaceted approach including molecular genetics, pharmacology, biochemistry, and cell and developmental biology.

Keywords: biomonitoring, research ethics, endocrine disruptors, digital technology, exposure science, manganese, protein aggregation, neuroinflammation, neurodevelopment, Parkinson's disease, collaboration

16. Fs & Ks – Grantsmanship and Administration

Junior Ballroom A

This session on NIH Fellowship and Career Development awards will shed some light on grantsmanship and administrative issues for young investigators, mentors, and grant administrators. The session will introduce the participants to the nuances of F and K funding mechanisms; discuss the components that make up these applications; explore "best practices" for writing successful, competitive applications while avoiding common missteps; and explain post-award details.

Format: Presentation and Q&A Panel

Speakers: NIEHS DERT Program, Grants Management, and Review Staff: Mike Humble, Carol Shreffler, Lisa Edwards, Linda Bass



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Keywords: training, fellowship, career development, K99/R00, grant Administration, grant review

17. The What and How of Data Management: Resources and Tips for Meeting NIH Data Requirements

Junior Ballroom B

The NIH Data Sharing Policy requires researchers to manage, archive, and share their data to ensure publicly funded data are available for reuse and verification. Knowledge of data management best practices and available tools and resources can help researchers comply with these policies. This training session will provide an overview of the NIH data sharing policy as well as some tips for caring for research data in a way that facilitates the effective management, long-term preservation, and reuse of data. Topics will include data storage and back-up strategies, documentation and metadata, protecting confidentiality, data access and embargos, data citation, and archiving and sharing data within a trusted repository.

Format: Overview presentation followed by question & answer period

Moderator: Astrid Haugen

Speakers:

- **Jonathan Crabtree, University of North Carolina, Chapel Hill**
- **Sophia Lafferty-Hess, University of North Carolina, Chapel Hill**

Planning team: Cindy Lawler, Astrid Haugen, Stephanie Holmgren, and Kristi Pettibone

18. Environmental Health Economic Analysis Resources

Junior Ballroom D

In 2012, NIEHS released a set of strategic plan goals that will help achieve an updated environmental health science mission and vision. Goal 10 focuses on evaluating the economic impact of policies, practices, and behaviors that reduce exposure to environmental toxicants, through prevention of disease and disabilities, and investing in research programs to test how prevention improves public health and minimizes economic burden. NIEHS has a growing portfolio of supported research that uses health care data to understand the impact of environmental exposures on health outcomes. To encourage grantees to incorporate environmental health economic analyses into their research proposals, this Environmental Health Economic Analysis Resources session will help promote resources available to support and facilitate environmental health economic analysis. This session will provide participants with an overview of basic economic analysis



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methods and resources. PIs who have successfully included economic analyses in their research will provide examples of their research and talk about challenges they experienced, resources they used, and tips for being successful. Colleagues from EPA and NSF will provide ideas for partnerships, collaboration, and other resources to support economic analyses. PIs who have research that might be extended to include an economic analysis component are encouraged to attend and provide thoughts on what support they might need to incorporate these kinds of questions into their research. Additionally, PIs with training programs might want to attend to see how they might be able to train students to do this kind of analysis, and how they might be able to recruit students with economic backgrounds to support PIs doing this kind of work.

Format: Panel discussion with participants

Speakers:

- ***Bryan Hubbel, U.S. Environmental Protection Agency***
Bryan Hubbell is the Senior Advisor for Science and Policy Analysis for the Health and Environmental Impacts Division in the Office of Air Quality Planning and Standards. He has written and presented extensively in the U.S. and internationally on the health and environmental impacts of air pollution and economic benefits and costs of air quality regulations, serving as the principal benefits analyst for many of EPA's regulatory analyses, and led the project team that developed the environmental Benefits Mapping and Analysis Program (BenMAP).
- ***Bruce Lanphear, Simon Fraser University***
Bruce Lanphear, MD, MPH, is a Professor in the Faculty of Health Sciences at Simon Fraser University in Vancouver, British Columbia. Over the past decade, Lanphear has become increasingly vexed by our inability to control the “pandemic of consumption” – the largely preventable, worldwide epidemic of chronic disease and disability due to industrial pollutants, toxic chemicals, and excess consumption. He is leading an effort to produce videos to enhance public understanding of how environmental influences impact human health.
- ***Leonardo Trasande, New York University School of Medicine***
Leonardo Trasande is an Associate Professor of Pediatrics, Environmental Medicine, and Population Health at NYU School of Medicine. Trasande's research focuses on identifying the role of environmental exposures in childhood obesity and cardiovascular risks, and documenting the economic costs for policymakers of failing to prevent diseases of environmental origin in children proactively.

Keywords: economic analysis



19. Meet the Federal Partners

Meeting Room 1-2

There are a variety of federal government offices that deal with environmental health issues. This "Meet the Federal Partners" session brings together representatives of these offices and institutes in a forum that will allow stakeholders to meet federal representatives and hear about agency missions and the work they support.

Format: Roundtable discussion

Federal Representatives:

- Gary Ellison, National Cancer Institute
- Nishadi Rajapakse, National Institute of Minority Health and Health Disparities
- Nigel Walker, National Toxicology Program
- Mary Wolfe, National Toxicology Program
- William Cibulas, Centers for Disease Control and Prevention
- Celia Byrne, Uniformed Services University of Health Sciences
- David Jackson, US Army Center for Environmental Health Research
- Michelle Lorah, U.S. Geologic Survey
- Nica Louie, Environmental Protection Agency
- Andrew Geller, Environmental Protection Agency
- Kathleen Raffaele, Environmental Protection Agency
- Jeff Heimerman, Environmental Protection Agency
- Dan Powell, Environmental Protection Agency
- Mike Scazzafava, Environmental Protection Agency

20. Population-Based Mouse Resource Uses for Environmental Health Sciences

Meeting Room 3

The majority of human diseases result from a complex interplay of multiple genetic, epigenetic, and environmental factors, yet studies of complex trait associations are inherently difficult in human populations. Until now, most laboratory mouse strains were inbred or outbred from a small group of founder animals. Thus, mapping complex traits in mice was also very challenging. New emerging population-based rodent resources, particularly the Collaborative Cross (CC) and Diversity Outbred (DO), have been developed to simulate the genetic diversity found in human populations and overcome many of the limitations of linkage mapping in the human population in an experimental model system. These mouse reference populations have the potential to be powerful tools for performing controlled exposure studies to



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understand the differential responses in humans for susceptibility or resistance to environmental exposures and identifying gene variants that influence sensitivity to toxicity and disease states. Furthermore, it is now possible to develop a complementary resource of induced pluripotent stem cells derived from the recombinant inbred CC strains, enabling researchers to perform population-level studies in vitro. These unique resources have proven to be powerful tools for identifying individual quantitative trait loci (QTL) and candidate genes for validation for hypothesis generation related to gene-environment interactions in human disease. This session will highlight the many opportunities available to environmental health scientists for beginning to utilize some of the emerging population-based mouse resources to model environmental exposures and gene-environment interactions in human disease.

Format: Short talks highlighting proof of principle examples of using the CC/DO in the environmental health sciences field

Speakers:

- **Population-Based Models: From Strain Pairs to Structured Populations**
David Threadgill, Texas A & M
Over the last few decades the use of mouse models have evolved from simple contrasts of inbred lines with divergent responses to environmental perturbation to high structured population-based models. New models have revealed the tremendous variation in phenotypes that result by altering genetic context and offer new insights into translating animal studies to humans.
- **Is Epigenetics the Mechanistic Link between the Environment and Health?**
Andrew Feinberg, Johns Hopkins University
Epidemiological studies in humans have shown that environmental exposures can have profound impacts on human health. However, the mechanism by which the environment alters health is not as clear, particularly for those expressed with long-lasting effects. Epigenetics can change how the genome functions without altering its primary sequence and is opening new avenues to understand mechanisms by which the environment can alter health during and long-after exposures.
- **Identifying Genes that Control Environmentally-Induced Airway Disease Using the Collaborative Cross**
Samir Kelada, University of North Carolina, Chapel Hill
There is considerable evidence that genetic variants modify the impact of environmental exposures on pulmonary inflammation or lung disease per se, but comprehensive genome-wide searches are extremely difficult in human studies. The speaker will present two to three examples demonstrating the utility of the Collaborative Cross resource to identify novel genetic loci that mediate the response to exposures that cause lung injury or allergic inflammation. In particular, the use of gene expression and protein QTL to illuminate disease pathways will be highlighted.



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- **Genetic Susceptibility to Diethylstilbestrol Exposure in Mice**

David Aylor, North Carolina State University

Diethylstilbestrol (DES) is a drug that caused infertility and vaginal cancer in some adults who were exposed prenatally. Some DES-exposed mouse strains also display reproductive defects (male and female) and cancer; yet other mouse strains are unaffected. This indicates a strong genetic component to susceptibility. The research team aims to identify the gene x environment interactions (GxE) associated with reproductive traits and gene expression in DES-exposed inbred mouse strains.

Keywords: collaborative cross, diversity outbred, population-based rodent resources, G x E, genetic susceptibility, model organisms, epigenetics, QTLs

21. NIH Resource Room

Meeting Room 4

This is a recurring session.

This session will allow EHS Fest attendees to meet one-on-one with NIEHS staff. Opportunities will be available to talk to individuals from the following NIEHS Offices and Branches:

[Link to NIEHS Offices and Branches](#)



Concurrent Sessions: Wednesday Late Morning

22. Environmental Epigenomics – Mechanisms, Pathways, Disease Outcomes

Grand Ballroom

Epigenomes regulate the way that genetic information is expressed without directly changing the genetic code stored in DNA. Epigenomic programming plays important roles in development and aging, but environmental health scientists are most concerned with understanding how environmental factors induce epigenetic changes associated with adverse health outcomes and disease. Evidence is accumulating that environmentally-induced epigenomic reprogramming is involved in a wide range of diseases and disorders, including autoimmune and neurodevelopmental disorders, cardiovascular disease, and cancer. Combined efforts in epigenetics and epigenomics research may profoundly alter the way we understand, diagnose, and treat disease by enhancing our understanding of the influence of environmental factors on epigenetic processes and their subsequent involvement in human health and disease. This session will highlight research supported by NIEHS to better understand the link between environmental exposures and epigenetic regulation of gene expression and how these interactions may affect human health and disease.

Format: Didactic presentations

Moderator: Fred Tyson, NIEHS

Speakers:

- **Genome-wide Studies of Toxic Chemical Impacts on Chromatin State**

Terry Furey UNC

Epigenetic reprogramming has been proposed as an integral part of the "genome instability" enabling characteristic of cancer cells. This presentation will discuss data that supports the hypothesis that genetic variability-associated chromatin remodeling events affect the genotoxic potential of butadiene.

- **Oxidative Stress, DNA Hydroxymethylation, and Asthma: How Are They Linked?**

Winnie Tang, Johns Hopkins

This presentation focuses on the role of TET1-mediated DNA hydroxymethylation in regulating asthma phenotypes in mice. The investigators explore how regulation of redox-cycling and TCA cycle can modulate TET1-mediated hydroxymethylation and ultimately reverse aberrant lung cell functions in both mouse and human asthmatics.



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- **Nickel Exposure Induces Persistent Epithelial-Mesenchymal Transition through Epigenetic Reprogramming**

Suresh Cuddapah, NYU School of Medicine

This presentation will discuss how nickel (Ni) interferes with the chromatin domain maintenance mechanism, which results in alterations to the fundamental chromatin structure leading to aberrant transcriptional silencing. This work may lead to a better understanding of the mechanisms whereby environmental toxicants, such as Ni, can alter the epigenome and lead to carcinogenesis.

- **Novel Insights of DNA Methylation Patterns and Their Vulnerability to Environmental Exposure**

Zhibin Wang, Johns Hopkins

The central hypothesis of this research is that differentially methylated regions control histone modifications at promoters of imprinted genes via the allele-specific binding of the CTCF insulators. This presentation will address the effects of developmental reprogramming by BPA on differentially methylated regions (DMRs) associated with imprinted loci.

Keywords: genetic sequence, differential methylated regions (DMRs), epigenome, histone modification, methylation, hydroxymethylation, Tet, EMT, reprogramming, DNA damage response (DDR), adducts, 1,3 butadiene, HDM (house dust mite allergen), nickel, BPA, CHIP-seq, ATAC-seq, chromatin, transcription, promoters, allele-specific methylation, cancer, asthma, DoHAD

23. Windows of Susceptibility to Environmental Exposures: A Deeper Look across Multiple Health Endpoints

Junior Ballroom A

There is substantial evidence suggesting that chemical exposures during certain periods of development can disrupt normal biological patterns and alter disease susceptibility. While the prenatal period is commonly known to be particularly sensitive to chemical insult, the preconception period, adolescence, pregnancy, menopause, and older age are also periods when individuals may be more susceptible to chemical exposure. Transgenerational effects may also play a role. The relative importance of each of these windows likely depends on the exposure and health outcome of interest. This session, which will follow immediately after the “Exposures across the Lifespan” plenary session, will entail a guided group discussion to take a deeper dive into what is known about windows of susceptibility. Discussants from different research areas (such as breast cancer, neurological disorders, immune function, reproductive health, epigenetics) will present their viewpoint on key questions, such as: What is the most important window(s) (and why)? How do we show that we have actually increased susceptibility, or altered a set point for a disease by developmental programming by environmental chemicals? What can be done in animal or human studies to approach these question and move the field forward?

Format: 90-minutes session, including three oral presentations (20-minutes each) followed by a 30-minute panel discussion



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Speakers:

- **Conception to Puberty – The Most Susceptible Lifecourse Period for Breast Cancer?**
Karin Michaels, University of California, Los Angeles
The mammary gland experiences rapid development and changes during the period between conception and Tanner Stage 5 when it is capable to fulfill its reproductive destiny. Accumulating evidence from animal and human research suggest that this lifecourse period makes the developing breast particularly susceptible to environmental influences. Several mechanisms, including epigenetics, morphologic changes, and hormonal fluctuations, may facilitate the plasticity of the mammary gland in response to environmental stressors.
- **Breast Cancer Risk and Resistance: The Balancing Act of Estrogen Signaling**
Joe Jerry, University of Massachusetts, Amherst
StartFragmentEstrogens increase risk of breast cancer, but also contribute to the long-term resistance conferred by pregnancy. These duplicitous roles of estrogens may be mediated by estrogen receptors alpha and beta. Jerry's research team is investigating how protective pathways engaged during pregnancy may be perturbed or eroded by chronic exposures to xenoestrogens in both mice and primary breast tissues.
- **Building a Brain: Critical Windows Extend Well Beyond Birth**
Heather Patisaul, NC State University
Identifying how and when the brain is vulnerable to toxicants and other environmental factors is a rapidly evolving landscape, because the fine tuning of neural systems continues well into early adulthood. Patisaul and her research team are working to identify when and how endocrine disruptors alter sexually dimorphic pathways and behaviors, as well as exploring how exposures at the level of the placenta can influence the developing brain.
- **General Discussion and Debate on Sensitives Windows of Susceptibility,**
Moderated by Session Speakers and Thad Schug, NIEHS

Keywords: windows of susceptibility, preconception, prenatal, puberty, childhood, pregnancy, adolescence, adulthood, menopause



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24. Stories from the Field on Community-Engaged Research and Citizen Science: From Current Challenges to Future Possibilities

Junior Ballroom B

The use of community-engaged research approaches in environmental health sciences has grown and matured since the mid-1990s. Recently, the federal government has been highlighting the value of citizen science approaches in research. The NIEHS and the EPA have been working together to coordinate and advance efforts and understanding of the interface between community-engaged research and citizen science in the context of exposure science. In this session, participants will hear stories from the field that highlight novel approaches, successful implementation, benefits, limitations, and opportunities for future research and application in environmental public health. The session will be organized around topics, such as: research motivation and culture, technology, ELSI, institutional support, and evaluation. Participants will engage in small group and round table discussions on these topics to further explore the opportunities and benefits for advancing these approaches and applying them to various issues such as disasters, climate change, health disparities, and data science.

Format:

Introduction	5 minutes – set the stage for the session
Flash Talks	15 minutes – 5 talks x 3 min each
Round table discussion	20 minutes
Flash Talks	15 minutes – 5 talks x 3 min each
Round table discussion	20 minutes
Synthesis	10 minutes – to the whole group

Goal: Hear stories highlighting ways teams have worked with community groups and/or used citizen science approaches. There are many stories to share and people have a great deal of knowledge. This format is designed to stimulate conversations at small tables after hearing short stories from the field.

Speakers:

The following individuals will give 3-minute Flash Talks as part of this session.

- Motivation & Culture
Ana Orozco, UPROSE
- Motivation & Culture
Erin Haynes, University of Cincinnati
- Capacity/Capability
Omega Wilson, WERA
- Capacity/Capability
Laura Stewart, U.S. EPA/OSP ORISE Fellow



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- Evaluation
Tina Phillips, Cornell University
- Evaluation
Gretchen Gehrke, Public Lab
- Technology
Amanda Kaufman, U.S. EPA
- Technology
John Birks, 2B Technologies
- ELSI
Kelly Edwards, University of Washington
- ELSI
David Chang, WEACT

Keywords: community-engaged research, citizen science, ethics, motivation, sustainability, EJ, environmental health disparities, STEM education, policy, climate change, air pollution, tools, evaluation, civic science

Planning Team: Steve Wing (UNC), Sara Wylie (NEU), Erin Haynes (UC), Elizabeth Yeampierre & Ryan Chavez (UPROSE), Edward Washburn (EPA), Liam O’Fallon, Joan Pakenham, Sharon Beard, Chip Hughes, Aubrey Miller, Kimberly Thigpen-Tart

25. Advances in Neurological Assessment in Response to Environmental Exposures

Junior Ballroom D

Neurological symptoms of environmental exposure can be subtle, progressive, yet irreversible, making early diagnosis crucial for prevention efforts in both occupational and environmental settings. The purpose of this workshop is to discuss the latest advances of tools to assess nervous system dysfunction, following chemical and non-chemical exposure, as well as brain areas impacted by short- and long-term toxic insult in humans. NIEHS investigators will present the latest diagnostic tools for the early detection of neurological changes/diseases in humans.

Format: Presentation



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Speakers:

- **PET Biomarkers of Manganese Neurotoxicity**
Brad Racette, Washington University School of Medicine
This talk will discuss the use of PET to investigate the pre- and post-synaptic dopaminergic system in manganese (Mn) exposed welders. Through these studies, researchers have demonstrated that Mn exposure is associated with pre-synaptic dopaminergic dysfunction and compensatory upregulation of D2 receptors in the striatum, midbrain, and cortex. These and future studies incorporate novel radioligands selective for dopaminergic neuron enzymes, dopamine receptors, cholinergic receptors, and activated microglia.
- **Use of Eye-Tracking to Assess the Impact of Prenatal Exposures on Cognitive Function in Infancy**
Susan Schantz, University of Illinois at Urbana-Champaign
The eyes are a window to the world; thus, looking at the behavior of young infants can tell us a great deal about how they attend to, process, and remember information. This talk will describe approaches developed to measure attention, information processing speed, and recognition memory in young infants using eye-tracking.
- **Virginia Rauh, Columbia University**

Keywords: manganese, parkinsonism, dopamine, infants, cognition, attention, information processing, visual recognition memory, eye-tracking, prenatal exposures.

<http://www.chla.org/press-release/inaugural-director-institute-the-developing-mind-named-children%E2%80%99s-hospital-los-angeles>

26. G x E Success Stories and Lessons Learned

Meeting Room 1-2

Gene-environment (GxE) interactions are increasingly a focus of studies addressing chronic diseases, such as neurodegenerative outcomes, cancers, asthma, diabetes, and heart disease. Many complex diseases have multifactorial etiologies, with most cases occurring due to interactions between an individual's lifetime of multiple environmental exposures and particular combinations of susceptibility genes. The identification of gene-environment interactions can help identify biological pathways or susceptible individuals in human populations. In recent years, there has been an emergence of many new approaches and study designs being utilized for exploring gene-environment interactions (GxE) in large-scale human population studies. Current challenges and opportunities in this field include how to best incorporate -omics and next-generation sequencing data, and how to better measure key environmental exposures implicated in complex disease outcomes. This session will highlight G x E interactions that have emerged from using either hypothesis-driven or agnostic approaches and will emphasize some of the important lessons learned from these successful identifications of gene-environment interactions.



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Format: Short talks highlighting G x E success stories and lessons learned relating to study designs and approaches for G x E interaction identification

Speakers:

- **Lessons Learned from Past Gene-Environment (GxE) Interaction Successes**
Beate Ritz, University of California, Los Angeles
Select examples of GxE from the literature will highlight different approaches and underlying principles including: the success of studying exposure metabolism, the importance of high quality exposure assessment and longitudinal measures, the effectiveness of studying populations with a wide range of exposure levels, and the inclusion of ethnically and geographically diverse populations. The importance of large population sizes, replication of findings in independent study populations, and usefulness of model systems and functional approaches will also be emphasized.
- **Children with Higher FeNO Have Increased Genetic and Epigenetic Susceptibility to PM_{2.5}**
Yue Zhang, University of Utah
Striking differences in the joint effects of short-term PM_{2.5} exposure, *NOS2* haplotypes, and methylation across the FeNO distribution were found to be significantly larger in the upper tail of the FeNO distribution, with little association in its lower tail, especially among children with asthma and Hispanic white children. These findings from the application of novel quantile regression implied that school children with high FeNO and certain genetic and epigenetic risk variants are more vulnerable to short-term PM_{2.5} exposure, highlighting the utility of investigating effects across the entire distribution of FeNO.
- **PON Story: Genetic and Epigenetic Determinants of Health Outcomes in Children with Prenatal Pesticide Exposure**
Nina Holland, University of California, Berkeley
The CHAMACOS cohort examined the relationship between prenatal exposure to pesticides, functional genomics of Paraoxonase 1 (PON1), and health outcomes in children. The broad variability of PON1 levels in humans can confer differential susceptibility to the effects of pesticides with genetics, age, and epigenetic factors being particularly strong determinants of PON1 variability and varying susceptibility to pesticide exposure.
- **Arsenic Metabolism Genetics and Gene-Arsenic Interaction**
Brandon Pierce, University of Chicago
Inherited genetic variation near the AS3MT gene is known to influence individuals' capacity to metabolize inorganic arsenic and their susceptibility to arsenic toxicity. This talk will describe a) our work characterizing gene-arsenic interaction for the AS3MT locus in a Bangladeshi cohort, b) potential biological mechanisms underlying these effects, and c) our efforts to identify additional arsenic susceptibility genes.

Keywords: gene-environment interaction, genetic susceptibility, genetic epidemiology, children's health, arsenic toxicity, air pollution.



27. Validation of Sensors for Personal Exposure I (Particulates)

Meeting Room 3

One of the challenges in environmental health is the ability to accurately characterize an individual's environmental exposure in time and space. In recent years, numerous sensor technologies have been developed that offer the capability of improved exposure estimates at the personal level. Several obstacles to the wide-spread use of these new technologies still exist that limit the application of these tools in population studies at a larger scale. In short, these include demonstration of the validity of the measures, the burden they place on study investigators and participants, and the unclear added value these technologies make to an epidemiological study. The NIEHS Sensor Development and Validation program focuses on the translation of prototype devices for personal exposure assessment into field use by supporting interdisciplinary partnerships between sensor developers and environmental epidemiologists. Grantees from the Validation program will present progress updates on efforts to develop and demonstrate sensor systems in epidemiological and citizen science research. This, the first of two sessions on our validation efforts, will be focused on tools for the assessment of exposures to particulate matter.

Format: Brief session introduction followed by four 20-minute presentations

Speakers:

- **Using Novel Sensor Technology to Study Ultrafine Particles and Children's Health**
Patrick Ryan, Cincinnati Children's Hospital Medical Center, University of Cincinnati
Accurately assessing children's exposure to ultrafine particles (UFP) is difficult due to the high spatiotemporal variability of UFP and the time-activity patterns of children. Here, we describe the development, validation, and field test of a novel sensor for UFPs.
- **Validation and Application of Portable Particulate Device in the UW Twin Registry**
Edmund Seto, University of Washington
The overarching goal of the project is to validate the Portable University of Washington Particle (PUWP) Monitor, a novel tool for measuring environmental toxicants in real time for future use in a community-based twin cohort and in other epidemiologic studies. More specifically, the feasibility and usability of the PUWP will be assessed using feedback from users, capacity to manufacture sufficient quantities of the PUWP at reasonable cost for large studies will be evaluated, and the validity of the PUWP will be determined by comparison with gold standard methods.
- **Wearable Devices for PM Exposure and Composition Analysis in Microenvironments**
Charles Henry, Colorado State University
Existing methods for assessing personal exposure to particulate matter (PM) are cumbersome and relatively expensive, especially in the context of large-scale epidemiological studies. To address these limitations, the research team developed a suite of wearable devices, including an ultrasonic personal aerosol sampler (UPAS) and an automated microenvironmental aerosol sampler (AMAS). In



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conjunction with these devices, this group has developed low-cost chemical analysis techniques for reactive oxygen species and metals using paper microfluidics.

- **Biking, Potential Inhaled Dose and Cardiovascular Indicators: Pilot Testing of Methods for PM2.5, Black Carbon and Minute Ventilation Measurements**

Steven Chillrud, Lamont-Doherty Earth Observatory of Columbia University

Personal exposure has long focused on the concentration of air pollutants in the breathing zone. Modern advances in microelectronics enable the combination of methods for measuring in real-time the volume of air one breathes and the personal level external concentration to estimate potential inhaled dose. The potential inhaled dose metric is being validated in the context of a cohort of NYC residents who bike to work, asking the health question of whether short term exposures to particles are associated with indicators of cardiovascular health.

Keywords: sensor, particulate matter (PM), exposure science, epidemiology

Moderators: David Balshaw and Yuxia Cui, NIEHS

28. NIH Resource Room

Meeting Room 4

This is a recurring session.

This session will allow EHS Fest attendees to meet one-on-one with NIEHS staff. Opportunities will be available to talk to individuals from the following NIEHS Offices and Branches:

[Link to NIEHS Offices and Branches](#)



Concurrent Sessions: Wednesday Afternoon

29. The Impact of Chemical Mixtures on the Environment and Health: Research Highlights across Various Disciplines

Grand Ballroom

Living organisms are exposed to a mixture of chemicals in the environment; yet, the focus of our understanding of environmental chemicals has been mainly placed on single chemicals. There are several major considerations in the research field of mixtures, which challenge predictive approaches used to estimate mixture toxicity in toxicological studies or association in epidemiological studies. These include: the large number of possible mixtures to be evaluated, how chemicals can enhance the effect(s) of other chemicals, how mixture toxicity can arise from the combined effects of chemicals present at very low concentrations (i.e., below their individual no-effect concentrations), or how cumulative complex exposures influence disease susceptibility. Understanding the behavior and toxicity of mixtures poses unique challenges for incorporating various concepts (e.g., bioavailability and chemical speciation) and approaches (e.g., experimental design and statistical analysis) in multiple chemical exposures. This session will highlight a variety of NIEHS grantees from the Superfund Research Program and from the NIEHS mixtures grant portfolio that share an interest in the study of chemical mixtures. Presentations will include discussion of environmental sources of mixtures, toxicological perspectives, statistical methodology for data analysis, and human health effects described in epidemiological studies. The session will be followed by a panel discussion to address relevant questions, notable data/knowledge gaps related to mixtures research, and future directions for the field.

Format: 90-minute session, including four oral presentations (15 minutes each) followed by a 30-minute panel discussion

Speakers:

- **Assessing the Ecotoxicity of Metal Mixtures Using *Daphnia Magna***
James Ranville, Colorado School of Mines

Uncertainties in the dose-response relationship for individual metals in mixtures can potentially confound the interpretation of additive or non-additive behavior of a mixture. Examining the inflection points of mixture dose-response data can provide a means of quantitative assessment of additivity. Experimental factors, such as organism age at the time of the test, must also be accounted for, if small non-additive effects are to be observed. This presentation will cover the use of *Daphnia magna* to detect, characterize, and assess the bioavailability of contaminant metal mixtures in the environment.

- **Approaches to Studying Multifaceted Exposures to Nuclear Receptor Ligands**
Jennifer Schlezinger, Boston University

Current practices emphasize the use of concentration addition to predict joint effects of endocrine



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disrupting chemicals in co-exposures. Generalized Concentration Addition (GCA) is one such method for predicting joint effects of co-exposures and has the advantage of allowing for mixture components to have differences in efficacy. We developed GCA to characterize the activation of the aryl hydrocarbon receptor by mixtures of full and partial ligands and extended its use to characterize the activation of peroxisome proliferator activated receptor gamma. Each of these receptors can be modeled as a system with a single binding site, and GCA was tested using data derived from reporter assays, an endpoint proximal to receptor activation. Now we are extending GCA to accommodate receptor systems with two binding sites (e.g. estrogen receptor and retinoid X receptor) and examining whether downstream physiological events obey GCA.

- **A New Epidemiological Method to Estimate the Health Impact of Mixtures of Fine Particulate Matter Components**

Jia Coco Liu, Johns Hopkins Bloomberg School of Public Health

The key challenge in estimating the health effect of PM_{2.5} components as mixtures is to quantify combinations of different levels of components in one metric. We developed a new method to address this challenge. We then demonstrated this method in a study estimating the health impact of PM_{2.5} components related with wildfires in the Western US.

- **Estimating Effects of Metal Mixtures in Children's Environmental Health**

Birgit Claus Henn, Boston University

Though still scant, the epidemiological evidence of interactive and joint effects of metals on neurological function is growing. The development and application of statistical approaches designed to address methodological challenges of analyzing mixtures data has helped advance this research. We have applied novel approaches including Bayesian kernel machine regression and weighted quantile sum regression to estimate associations between multiple metals and neurodevelopment. These methods are also being extended to accommodate other important aspects of children's environmental health including critical developmental windows.

Session Co-Chairs: Danielle Carlin (NIEHS) and Bonnie Joubert (NIEHS)

30. Sex Differences and Environmental Exposure: Latest Research Advances and Impact of New NIH Policy

Junior Ballroom A

Historically basic, preclinical, and clinical biomedical research has focused on studies using male humans, animal, models and cells. However, overwhelming evidence suggests that sex and gender are critical variables in health and disease processes, including cancers, disorders of the endocrine, nervous, and immune systems. Determining how environmental exposures impact biologic processes differently in males and females is critical for advancing effective intervention and prevention efforts in many diseases and disorders. This session will explore the new NIH policy on consideration of sex as a biological variable in



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research and include presentations highlighting exposure-related research on sex differences in neurodevelopment and the endocrine systems in basic and population studies.

Format: Seminar presentation

Speakers:

- **Neurotoxic Impacts of Developmental Exposures to Metals and/or Stress Consistently Differ by Sex: Implications for Defining Mechanisms and Experimental Designs**
Deborah Cory-Slechta, University of Rochester Medical Center
Sex differences in the behavioral and neurobiological consequences of developmental exposures to lead and to methylmercury alone or in conjunction with prenatal stress will be presented, along with differential changes in the subsequent effects of early behavioral adversity. The consistency of sex differences no doubt reflects corresponding differences in brain development and neuroendocrine systems. The implications of such differences include the conclusion that mechanisms of toxicity may also be sex-dependent, and that experimental designs based on a single sex or combined sexes may ultimately be of limited utility for understanding human health risks.
- **Sex Differences in Toxic Effects and Toxic Effects on Sex Differences: Persisting Neurobehavioral Consequences of Organophosphate Pesticide and Nicotine Exposure during Development**
Edward Levin, Duke University
Organophosphate pesticides and nicotine have long been known to cause persisting developmental neurobehavioral toxicity by their actions on acetylcholine and other neural systems. Sex differences in the neurobehavioral toxicity to these chemicals are seen in cognitive and emotional function, including diminution of normal sex differences.
- **Sex-Specific Accumulation of Polybrominated Diphenyl Ether Flame Retardants in Human Placenta and Their Associations with Thyroid Hormone Levels**
Heather Stapleton, Duke University
Brominated flame retardants were quantified in archived human placental tissues, along with thyroid hormone levels, thyroid deiodinase activity, and thyroid sulfotransferase activity. Results suggest that several flame retardants accumulate to a greater degree in placental tissues associated with male fetuses. Furthermore, associations between flame retardants and thyroid hormones appears to be dependent on infant-sex.
- **Effects of Phthalates on Reproduction**
Jody Flaws, University of Illinois Urbana-Champaign
Phthalates are a large class of ubiquitous synthetic chemicals, which are used as plasticizers and stabilizers in a myriad of consumer products. Despite the widespread use of phthalates, little is known about their effects on the reproductive system. This presentation will focus on our recent data indicating that phthalate exposure adversely impacts both female and male reproduction. Further, this presentation will highlight sex-specific differences in phthalate-induced reproductive toxicity.



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- **The New Sex As a Biological Variable (SABV) Policy and Other Opportunities from the Office of Research in Women's Health (ORWH)**
Elena Gorodetsky, Office of Research in Women's Health

Keywords: sex, lead, methylmercury, prenatal stress, behavior, catecholamines, corticosterone, organophosphate pesticides; nicotine; cognition; emotional function; rats; neurobehavioral toxicology

31. Creating a Culture of Health: The Role of Community Engagement Cores in Tackling 21st Century Environmental Health Challenges

Junior Ballroom B

Community engagement is a central element to the NIEHS Strategic Plan that is carried out through a variety of its grant programs, especially its larger Center programs. While the scientific focus of the Center program may differ, they all have a shared commitment to making healthier communities through their community engagement cores, which foster bi-directional communication with their target audience – community residents, healthcare professionals, educators, policy makers, tribal communities, and workers. These cores face common challenges and concerns as they engage with their audiences, translate research, and facilitate Center responses to environmental public health issues identified by the communities they serve. This session will touch upon current best approaches to address cross-cutting issues of individual and institutional capacity, environmental health literacy, uncertainty, and explore ways in which community engagement cores are well-suited to foster cross-sector efforts to make healthier communities for the next 50 years. After a short introductory presentation to set the stage for this session, participants will engage in active round table discussions about these approaches in the context of different audiences and case studies.

Format: After a short introductory presentation to set the stage for this session, participants will engage in active round table discussions about these approaches in the context of six different audiences. There will be a short report back at the end of the session. Participants should come prepared to share best practices and resources.

Speakers:

- **Introduction**
Liam O'Fallon, NIEHS
- **Community & Environmental Justice Organizations**
Table Leads: Peggy Shepard, WEACTION and Jill Johnston, University of Southern California
This table will focus on best practices and future directions for fostering bidirectional communication between environmental health scientists and on-the-ground community



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organizations, with a focus to those communities disproportionately burdened by pollution. Specifically, we will discuss methods to translate research into community action.

- **Healthcare Professionals**

Table Leads: Patrice Sutton, University of California, San Francisco and Susan Buchanan, University of Illinois at Chicago

Health professional engagement on environmental health dates back to the 1950s when the American Academy of Pediatrics first issued a call to action on the health impacts of children's exposure to ionizing radiation from nuclear weapons fallout. Today, reproductive and other health professionals from around the world formally recognize the science linking our environment to health and are actively working in clinical and policy arenas to translate the science into healthy children, healthy adults, and healthy future generations. Participants in this session will discuss best practices and future strategic directions for advancing health professional engagement, including addressing challenges related to moving seamlessly between individual and population health, acting on the science in a timely manner in the face of scientific uncertainty, communicating uncertainty and risk to individuals and to decision-makers, and incorporating patient values and preferences into decision-making.

- **Tribal Communities**

Table Leads: Ingriquet Salt, University of Arizona, Tribal Liaison, Rose James, University of Washington and Marti Lindsey, University of Arizona

This table presentation-discussion, about research and outreach with tribes, consists of discussions about a scenario describing a specific tribal-academic EH research project. An objective of the discussion is to address how to clarify common ground for a research partnership agreement that meets both campus and community priorities and holds value for both tribal EH interests and those of the academic faculty. Additionally, participants will use this format to explore ways to promote the interests of both parties and co-learning to enrich the quality of the research and ensure that all groups involved benefit meaningfully from the work (and doesn't introduce unnecessary harms).

- **Educators**

Table Leads: Kathleen Gray, University of North Carolina, Chapel Hill and Celia Chen, Dartmouth College

The educator work group will discuss both formal (K-12) and informal science education (also referred to as free-choice learning, which can include experiences in science centers, museums, festivals and after-school clubs or camps, among others). For the K-12 portion of the discussion, we anticipate focusing conversation on how we teach the concepts of uncertainty and variation in data and opportunities to engage diverse groups of students in our efforts. For the free-choice learning portion of the discussion, we will focus on how we can inform personal decisions in the context of uncertainty, particularly when the implications for health are unclear. We will also discuss the issue of framing for different audiences.



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- **Policy Makers**

Table Leads: *Robin Fuchs-Young, Texas A&M University and Karen Miller, Huntington Breast Cancer Action Coalition, Inc.*

This roundtable will discuss approaches and parameters for enhancing bidirectional communication with state, local and policy makers in order to identify EHS topics of interest and translate current science. The goal of these interactions is to provide objective, evidence based information that may guide policy decisions. The session will explore how emerging educational/informational needs are identified, optimal ways for communicating effectively with policy makers and timelines.

Participants will be encouraged to discuss examples of their educational activities with policy makers, including outcomes and particular challenges, and how this target audience is similar or different from others. A common thread is the issues of providing useful information while dealing with the uncertainty of the scientific process. A goal of the session will be to assemble a “working group” that could share materials, insights and best practices relevant to the broad legislative audience.

- **Workers**

Table Leads: *Mitchel Rosen, Rutgers University and Sharon Beard, NIEHS*

The roundtable on worker health and safety will provide a context for examination of community engagement in workplace settings. The session will explore emerging needs, barriers and facilitators, and partnerships that enhance and promote community engagement activities.

Participants will be encouraged to share examples of existing collaborative and cooperative community workplace programs.

Keywords: toxic chemicals, workplace setting, curricula, training, American Indian, capacity, environmental health literacy, uncertainty, health disparities, vulnerable population, evidence based decision making

Planning Team: Celia Chen (SRP), Karen Miller (BCERP), Kathleen Gray (SRP/EHSCC), Patrice Sutton (CEHC), Robin Fuchs-Young (EHSCC), Jill Johnston (EHD/CEHC/EHSCC), Peggy Shepard (EHSCC/CEHC), Rose James (EHSCC), Marti Lindsey (EHSCC), Susan Buchanan (CEHC), Mitchell Rosen (Rutgers), Liam O’Fallon, Sharon Beard, Michelle Heacock, and Kimberly Gray

32. Validation of Sensors for Personal Exposure II (VOCs, gases, and metals)

Junior Ballroom D

One of the challenges in environmental health is the ability to accurately characterize an individual's environmental exposure in time and space. In recent years, numerous sensor technologies have been developed that offer the capability of improved exposure estimates at the personal level. Several obstacles to the wide-spread use of these new technologies still exist that limit the application of these tools in



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population studies at a larger scale; in short, these include demonstration of the validity of the measures, the burden they place on study investigators and participants, and the unclear added value these technologies make to an epidemiological study. The NIEHS Sensor Development and Validation program focuses on the translation of prototype devices for personal exposure assessment into field use by supporting interdisciplinary partnerships between sensor developers and environmental epidemiologists. Grantees from the Validation program will present progress updates on efforts to develop and demonstrate sensor systems in epidemiological and citizen science research. This, the second of two sessions on our validation efforts, will be focused on tools for the assessment of exposures to analytes other than particulate matter, including volatile organic compounds, gases such as ozone and carbon monoxide, and metals.

Format: Brief session introduction followed by four 20-minute presentations

Speakers:

- **Fundamentals of Passive Personal Wristband Samplers and Applications**

Kim Anderson, Oregon State University

Wristband were infused with organic phosphate and PBDE flame retardants, polycyclic aromatic hydrocarbons, oxygenated polycyclic aromatic hydrocarbons, volatile aromatic compounds, volatile alkanes, polychlorinated biphenyls, fragrance and other consumer products, fungicides, herbicides, insecticides, pesticide bi-products and precursors, and phthalates in a series of recovery, transport and storage conditions, including 0, 2 days, 1 week, 4 weeks, 3 months, and 6 months at -20, 4, and +30C. Comparisons and limitations with other technology/approaches will be presented and suggests the wristband is a good indicator of exposure.

- **Personal Ozone Monitor (POM) and Personal Air Monitor (PAM) with Multiple Sensors for Real Time Display of Air Pollutant Concentrations on Smart Phones**

John Birks, 2B Technologies, Inc.; University of Colorado

The Personal Ozone Monitor (POM), weighing only 340 g and consuming only 3 watts of power, is the first “sensor” to become an EPA Federal Equivalent Method (FEM). A new Personal Air Monitor (PAM) developed for GO3 Treks accommodates sensors for multiple pollutants (e.g., O₃, CO, CO₂, NO₂, SO₂, PM_{1.0}, PM_{2.5}, PM₁₀, etc.) and broadcasts data in real time to any number of smart phones for real time mapping and comparison with the most current measurements made at the nearest air monitoring stations.

- **Real-Time Methodology for Manganese Analysis in Blood and Water**

Ian Papautsky, University of Illinois at Chicago and Erin Haynes, University of Cincinnati

We developed a sensor concept that integrates stripping voltammetry electroanalytical technique with microfluidics, with detection limits in the low ug/L range as well as ~90% accuracy and >97% precision compared with ICP-MS “gold standard” based on our pilot validation study.



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- **Non-invasive In Vivo Quantification of Metals in Human Tissue**

Linda Nie, Purdue University

Metal concentration in bone provides unique information regarding long term chronic exposure for many metals such as Pb, Mn, and Al. X-ray fluorescence (XRF) and Neutron activation analysis (NAA) are two powerful noninvasive techniques for in vivo quantification of metals. In this presentation, I will talk about two XRF systems and one NAA system developed in our laboratory to measure metals in bone in vivo.

Keywords: sensor, VOCs, metal, ozone, exposure science, epidemiology

Moderators: David Balshaw and Yuxia Cui, NIEHS

33. Sharing NIEHS Training Strategies: Evaluation Methods, Outcomes, and Impacts

Meeting Room 1-2

NIEHS makes significant investments in training, not only through specific programs such as the Worker Training Program; R25, T32, and K99/R00 programs; fellowships; and the ONES program, but also as components of larger programs such as the Superfund Research Program, the Children's Health Centers, and the Environmental Health Disparities program. There are a wide variety of training recipients in these programs, including hazardous material workers, research fellows, graduate students, and community members. Training may include preparation and education to work in the field, laboratory, or professional development. During this session we will discuss how NIEHS and grantees assess their training programs, to understand outcomes such as gains in skills and knowledge, job placement, economic value, and social value. This session will bring people together from both the extramural and intramural aspects of training to share the metrics they use, data sources for these metrics, and strategies for following-up with trainees months and years after completing a training, including the use of social media. The session will also include how NIEHS and grantees use data to inform their training programs and future efforts, and how tools and frameworks such as social media platforms, social network analysis, logic models and Kirkpatrick's four levels of training evaluation can be applied, measuring reaction, learning, behavior change, and results from training. Small group discussion will allow participants to share their own strategies and reflect on the presentations.

Format: Panel presentations followed by roundtable discussions and question & answer session



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Speakers:

- **Overview of Training Programs and Training Evaluation at NIEHS**
Demia Wright and Sharon Beard, NIEHS Worker Training Program
This overview describe how training is broadly defined and implemented for NIEHS. The various training programs will be discussed, and highlights of evaluative work for these programs will be presented.
- **Dynamite Impact through Social Media**
Mollie Dowling and Sean Phillips, OAI, Inc.
OAI will introduce the Environmental Career Worker Training Program, funded by NIEHS, and describe its impact and outcomes. OAI will share strategies for using various social media platforms for tracking data and measuring the ongoing economic impact of the program as well as blended learning classroom strategies for measuring student engagement and content retention.
- **Where Are Postdocs Employed? Looking Back 15 Years—Visualizing the Career Outcomes of NIEHS Postdoctoral Fellows**
Tammy Collins, NIEHS Office of Fellows' Career Development
We have accomplished one of the most thorough analyses of postdoctoral alumni career outcomes at a single institution, notably identifying the career outcomes of 95% of all fellows within the past fifteen years, as well as factors associated with different career outcomes. We discuss possible causes of these differences, and also describe key aspects of our methodology for identifying individuals as well as standardizing their career outcomes. We also demonstrate creative methods of visualizing these outcomes that can be readily adopted by others.
- **Innovative Approaches to Improving Effectiveness and Impact of Occupational Health and Safety Training Programs**
Sue Ann Sarpy, Sarpy and Associates, LLC
The comprehensive multiple stakeholder approach developed to evaluate the Environmental Career Worker Training Program for the CPWR will be highlighted including longitudinal results and related processes for continuous quality improvement. In addition, innovative methods that are currently being developed to supplement this evaluation effort will be presented including the use of social network analysis.

Keywords: Training, evaluation, social media, social network analysis, fellowships, worker training, occupational health and safety, outcomes, impact



34. NIEHS Translational Research Framework - Opportunity for Comment and Feedback

Meeting Room 3

This session will complement the Translational Research Plenary Session. Participants will review a proposed Translational Research Framework that the Division of Extramural Research and Training has been working on this year. A Request for Information was published for initial public comment in early Fall 2016 (see <http://partners.niehs.nih.gov/trf/index.htm> to review materials). Participants will be invited to provide feedback on the components of the proposed translational research framework – including the names and characteristics of the rings, as well as whether additional rings are needed. We will work in groups to map translational research stories using the framework. Participants will be encouraged to describe the timeframe of the translational work and the collaborations that helped make the work possible. Working through these case studies will provide an opportunity to see how applicable the framework is for the research community and identify opportunities to improve or clarify the framework. Feedback obtained at the session will be used to inform further development of the translational research framework.

Format: Interactive group discussion

Speakers:

- **Kristi Pettibone, NIEHS, Program Analysis Branch**
Kristi Pettibone is an evaluator in the Program Analysis Branch and has been working with a group of DERT staff to develop a translational research framework that provides the opportunity to capture more nuance throughout the translational research process.
- **Christie Drew, NIEHS, Program Analysis Branch**
Christie Drew is the Chief of the Program Analysis Branch and supports efforts throughout the division to track, monitor, evaluate and communicate the returns on our investments in environmental health science research.

Keywords: Translation, Evaluation, Impacts

35. NIH Resource Room

Meeting Room 4

This is a recurring session.

This session will allow EHS Fest attendees to meet one-on-one with NIEHS staff. Opportunities will be available to talk to individuals from the following NIEHS Offices and Branches:

[Link to NIEHS Offices and Branches](#)



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Poster Session #2

90-minute poster session

Grand Ballroom and Junior Ballroom C

See poster abstract document for more details

Sensors and Technologies Fair #2

Foyer

The EHS Sensors and Technologies Fair is aimed at providing a great opportunity for sensor and technology developers funded by NIEHS and other agencies to showcase their cutting-edge technologies and meet with leading scientists and end-users in exposure science, environmental epidemiology, community research, and citizen science. The event is divided into two sessions. The second session on Wednesday, December 7 emphasizes wearable technologies for personal environmental exposure monitoring.



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Film Festival

6:30 to 9:30 p.m.

Carolina Theatre (adjacent to the Durham Convention Center) at 309 West Morgan Street

The Film Festival is a venue to showcase environmental health focused films developed by grantees, community partners, federal partners, and NIEHS staff.

Eighteen films will be featured over the course of the evening. These films raise awareness of a variety of environmental health topics and serve as a unique opportunity to share environmental health messages with meeting participants and the community. The films represent a range of environmental health topics relevant to NIEHS and were selected to showcase many different geographic regions and communities in the U.S. In addition, the films chosen exemplify the power of visual formats to convey key findings from research and environmental health risk messages as well as give us the opportunity to hear the voices and perspectives of both researchers and their community partners in research.

6:45 p.m.	Opening Remarks	Symma Finn, NIEHS
6:50 – 7:55 p.m.	NIEHS History & Research: 50 Years of Progress <i>NIEHS Office of Communications & Public Liaison (OCPL)</i>	8:00 minutes
	Zebrafish Biosensor <i>Robert Tanguay, Oregon State University</i>	3:29 minutes
	From Mineral Springs to Toxic Town <i>Jane Keon, Pine River Superfund Citizen Task Force</i>	10:35 minutes
	Arsenic in Well Water: Treatment Options <i>Steve Chillrud, Columbia University</i>	6:08 minutes
	ECU Town Creek Project <i>Jo Anne Balanay, East Carolina University</i>	4:35 minutes
	The Deadly Impact of Airborne Particles <i>Bruce Lanphear, Simon Fraser University</i>	4:13 minutes
	University of Kentucky Superfund Research Center <i>Bernhard Hennig, University of Kentucky</i>	15:00 minutes
	Firefighter Safety Alert <i>Erin Haynes, University of Cincinnati</i>	3:04 minutes



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	When Duty Calls <i>Chip Hughes, NIEHS Worker Training Program</i>	5:00 minutes
7:55 – 8:05 p.m.	Break	
8:05 – 9:05 p.m.	REACH Ambler: Manufacturing Ambler; From Factory to Future; Imagining Ambler <i>Frances Barg, University of Pennsylvania</i>	6:45 minutes
	Mercury: From Source to Seafood <i>Celia Chen, Dartmouth College</i>	11:00 minutes
	Disrupt the Disruptors <i>Brenda Koester, University of Illinois at Urbana-Campaign</i>	1:00 minutes
	Overworked & Under Spray: Young Farm Workers' Pesticide Stories <i>Abigail Warmack, Student Action with Farmworkers</i>	6:00 minutes
	Project TENDR (Targeting Environmental Neurodevelopment Risks) Goes to Congress <i>Irva Hertz-Picciotto, University of California, Davis</i>	6:10 minutes
	Stakeholders <i>Haguerenesh Woldeyohannes, Emory School of Nursing</i>	15:00 minutes
	Red Talk 004: Native EH Equity <i>Johnnye Lewis, University of New Mexico</i>	4:00 minutes
	Mayah's Lot <i>Rebecca Bratspies, City University of New York</i>	5:00 minutes
	Years of Living Dangerously – Episode 8: A Dangerous Future <i>Sabrina McCormick, George Washington University</i>	5:52 minutes
9:05 – 9:25 p.m.	Discussion/Q&A Session	
9:30 p.m.	FEST Adjourns for the day	



Concurrent Sessions: Thursday Early Morning

36. Emerging Basic Research Opportunities in Environmental Health Sciences

Grand Ballroom

This session will feature new and emerging opportunities in environmental health sciences relevant to basic mechanistic research that DERT funds. With recognition that not all new areas of basic science that DERT staff is excited about can be showcased in the current limited time available at this meeting, this session is meant to allow program staff to briefly highlight many of these developing themes and interests related to some of the most promising recent emerging basic research opportunities in environmental health sciences. The format of this session will be a panel discussion with each DERT program staff member showcasing new emerging areas from their basic research portfolio or potential new areas of interest based on incoming trends in grants, scientific meetings, and publications. Some of these new rapidly evolving opportunities that have enormous potential for contributing to the basic understanding of environmentally relevant diseases include: placental biology, genome plasticity (encompassing structural alterations, telomere biology, transposons, and non-coding RNAs/RNA modifications), new functional genomic screening tools like CRISPR and RNAi, role of classic environmental exposures in psychiatric disorders, the microbiome and interaction with environmental exposures, transgenerational inheritance, the use of population-based model organism resources for environmental health science research, higher order chromatin dynamics and nuclear organization, and mitochondrial dysfunction and bioenergetics' impact from exposures.

Format: Panel Discussion

Panelists: Kim McAllister, Fred Tyson, Les Reinlib, Michelle Heacock, Lisa Chadwick, Jonathan Hollander, Mike Humble, and Thad Schug, NIEHS

Keywords: basic mechanistic research, placental biology, genome plasticity, microbiome, chromatin dynamics, mitochondrial dysfunction

37. The Children's Health Exposure Analysis Resource (CHEAR)

Junior Ballroom A

The Children's Health Exposure Analysis Resource (CHEAR) is an NIEHS led resource to provide access to analytical capabilities to support the inclusion and expansion of environmental exposures in NIH funded research on children's health and development. CHEAR includes a range of laboratory capabilities in targeted biomonitoring analysis, untargeted metabolomics, and biological response assessment as well as



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data analysis and sharing. This session will present CHEAR capabilities as well as a discussion of how to access the resource.

Format: Didactic presentations

Speakers:

- **What Is CHEAR and Why Should I Care?**
David Balshaw, NIEHS
- **How to Access CHEAR Services**
Barbara O'Brien, Westat
- **How to Make Use of CHEAR Laboratory Analyses**
John Meeker, University of Michigan
- **Title: CHEAR Data Analysis: Mixtures and Combinability of Data**
Chris Gennings, Icahn School of Medicine at Mount Sinai

Keywords: Children's Health, Biomonitoring, Exposome

38. Current Events and Late Breaking

Junior Ballroom D

This session has been cancelled.

39. Reporting Your Successes - Writing an Effective RPPR and More

Meeting Room 1-2

Do you want to find out how you can use the new RRPR to best highlight your accomplishments? Do you want to know what your program officer really wants to hear about? Do you want to learn how NIEHS uses the information in your progress reports? Attend this session to hear the kinds of outputs, products, and impacts we are interested in – and how to best describe these. NIEHS staff will tell you what program officers look for in the RPPR, describe the categories of products and impacts we track, and we'll gather suggestions from you about other categories we should be tracking. Finally, we'll cover some details about how to cite your NIEHS grant number and how to cite your actual data so that we can track these impacts over time. As there are increased calls for NIH to demonstrate the value of our investments in biomedical research, it is crucial for us to be able to report on the accomplishments of our grantees and the impacts of their research on human health. Participants are also encouraged to bring drafts of their progress report narratives to share so that we can provide guidance based on real-life examples. This session will be geared to junior investigators, but seasoned PIs may also find the discussion useful.



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Format: Didactic presentation with audience participation

Speakers:

- **Christie Drew, NIEHS, Program Analysis Branch**
Christie Drew is the Chief of the Program Analysis Branch and supports efforts throughout the division to track, monitor, evaluate and communicate the returns on our investments in environmental health science research.
- **Lisa Chadwick, NIEHS, Genes, Environment, and Health Branch**
Lisa Chadwick is a program officer involved in the leadership of several NIH Common Fund efforts, including the 4D Nucleome Program and the NIH Roadmap Epigenomics Program. In addition, she directs extramural research programs in transgenerational inheritance, aryl hydrocarbon receptor biology, microbiome/environment interaction, and is one of the scientific contacts for NIEHS-funded epigenetics studies.

Keywords: Evaluation, Impacts

40. Meet the Editors

Meeting Room 3

Bring your coffee to this informal session with the editors of *Environmental Health Perspectives*, and *Toxicological Sciences*. After providing updates for each journal, they will answer your questions about such topics as: peer review practices, data access and sharing tools, article types, and emerging trends in toxicology and environmental health research.

Format: Short presentations followed by Q&A

Editors:

- **Sally Darney, NIEHS**
- **Gary Miller, Emory University**



Concurrent Sessions: Thursday Late Morning

41. Microbiome - The Emerging Role of the Microbiome in Environmental Health

Grand Ballroom

Humans are colonized by a variety of microorganisms, known collectively as the microbiome. The microbiome has emerged as a key player in human health, and plays a variety of important roles in the body, including helping to digest foods, synthesizing certain vitamins, and helping to train the developing immune system. The microbiome stands at the interface between organism and environment, and represents our first point of contact with environmental chemicals. In recent years, researchers have begun to investigate the complex, bidirectional interaction, between the microbiome and the environment. The microbiome is known to directly act upon and modify environmental chemicals, such as arsenic. In addition, the microbiome itself can be modified by exposure, as evidenced by changes to both its community structure and functional capacity. This session will highlight recent research in this area, and discuss the implications for human health and how individuals respond to exposure.

Format: Platform presentation

Speakers:

- **Use of Multi-omics to Define Gut Microbiome Toxicity Induced by Environmental Chemicals**
Kun Lu, University of North Carolina
The gut microbiome plays a key role in human health, however, it is not being incorporated as an endpoint for toxicity assessment. The needs and significance to define gut microbiome toxicity, in particular via multi-omics approaches, will be described. We will demonstrate that exposure to environmental chemicals, such as metals and pesticides, leads to gut microbiome toxicity through perturbing its community structures and functions.
- **In Utero and Early Life Arsenic Exposure, Immunity, and the Microbiome: Results from the New Hampshire Birth Cohort Study**
Juliette Madan, Geisel School of Medicine, Dartmouth
Data from studies from SE Asia indicate arsenic exposure alters immunity, increasing disease risk, and model systems demonstrate that arsenic perturbs the gut microbiome, which is intricately linked to nutrient metabolism and immune maturation. In our US prospective cohort of over 1500 maternal-infant dyads, we evaluated fetal exposure to arsenic, microbiome development in infants, and clinical outcomes including respiratory illness. Our findings suggest that arsenic may influence the developing immune system, even at relatively low levels of exposure experienced among US infants.



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- **Zebrafish Models for Investigating Environmental Regulation of Energy Balance**

John Rawls, Duke University

Environmental factors including microbiota and toxins influence human energy balance, and contribute to obesity and other metabolic diseases. This presentation will describe recent progress and new opportunities afforded by the zebrafish model towards an improved understanding of the underlying mechanisms and potential interactions between these environmental factors.

- **Precision Modulation of the GI Microbiome**

Matthew Redinbo, University of North Carolina

The GI microbiota significantly impact mammalian health and therapeutic efficacy. We sought to control the action of specific GI microbiome enzymes with targeted, selective and non-lethal small molecules. We have done so to alleviate the toxic side effects of cancer chemotherapeutics and widely-used NSAIDs, and have extended this work to a characterization of drug targets in the human GI microbiome.

Keywords: microbiota, microbiome, zebrafish, gnotobiotic, adipose tissue, arsenic, metals, birth cohort, immunity, infant, pregnant women, rice, drinking water, respiratory illness, drug discovery, drug design, bioinformatics, animal models

Planning team: Lisa Chadwick, John Rawls (UNC)

42. Emerging Topics in Air Pollution and Its Impact on Human Health

Junior Ballroom A

Long-term exposure to air pollution is known to play a role in the development of lung cancer and cardiopulmonary disease. More recent research from epidemiological studies and animal models have demonstrated that exposure to air pollution may also increase the risk for diabetes, obesity, immune dysregulation, as well as contribute to the etiology of neurodevelopmental disorders, such as autism spectrum disorders. In addition to multiple impacted health outcomes, researchers are examining how exposure to greenspace may counteract the effects of air pollution. This session will focus on the emerging areas, both regarding novel outcomes evaluated and novel exposures explored, in the field of air pollution and health research.

Format: Platform presentations followed by discussion

Moderator: Bonnie Joubert



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Speakers:

- **Air Pollution and Autism: Epidemiology, Mechanism, and Genetic Susceptibility**
Heather Volk, Johns Hopkins Bloomberg School of Public Health
Several epidemiologic studies from the US have reported associations between prenatal air pollution exposure and risk of autism spectrum disorder (ASD). This talk will provide a summary of published work and highlight new findings and future directions for research on ASD incorporating more detailed phenotype data, genomics, and neuroimaging.
- **Adverse Effects of Ambient Air Pollution Exposure on Obesity and Risk Factors for Type 2 Diabetes**
Tanya Alderete, University of Southern California
Epidemiological studies among adults have shown that increased exposure to traffic-related air pollution as well as ambient nitrogen dioxide (NO₂) and particulate matter with aerodynamic diameter less than 2.5 (PM_{2.5}) are associated with greater risk for obesity and type 2 diabetes. Recent studies by our group have found that increased air pollution exposure contributes to childhood obesity as well as adverse effects on glucose concentrations and insulin sensitivity in Mexican American adults. Building on this work, we present the first evidence of longitudinal effects of ambient air pollution exposure on obesity and aspects of glucose homeostasis that are risk factors for type 2 diabetes in high-risk Latino youth.
- **The Clinical and Immunologic Effects of Air Pollution on Tuberculosis**
Robert Blount, University of California, San Francisco
We will first discuss our current understanding of the effects of outdoor and indoor air pollution on tuberculosis risk and treatment outcomes, and potential underlying biological mechanisms such as air pollution mediated immune dysregulation. We will then consider the role of urban forests in mitigating the effects of air pollution on tuberculosis. Finally, we will discuss the future research direction for further examining the link between air pollution and tuberculosis.
- **Novel Environmental Determinants of Aggressive Behaviors in Southern California Adolescents: Role of Neighborhood Greenspace and Temperature**
Diana Younan, University of Southern California
Environments play a significant role in the development of adolescent externalizing behaviors (e.g., aggression), but the influence of the physical environment remains elusive. In a longitudinal study conducted in an urban-dwelling population (9-18 years old) from Southern California, we found neighborhood greenspace and ambient temperature were independently associated with aggressive behaviors. Aggressive behavior decreased among adolescents residing in locations with higher neighborhood greenspace and increased with rising average temperatures, but the adverse temperature effects were nearly abolished in those living in neighborhoods with high greenspace. Our findings may have important implications for future environmental epidemiologic studies investigating the neurotoxic effect of air pollution on externalizing behaviors.

Keywords: aggression, greenspace, temperature, adolescents, epidemiology, environment, Autism Spectrum Disorder, gene-environment interaction, DNA methylation, air pollution, mycobacterium



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tuberculosis, ambient air pollution, indoor air pollution, traffic, urban trees, immune responses, metabolic disease, Type 2 Diabetes, obesity

Planning team: Cindy Lawler, Astrid Haugen, Bonnie Joubert, and Kim Gray

43. Disaster Research Response and the Environmental Health Sciences Community: Building a National Research Response Capacity

Junior Ballroom B

Responses to various disasters and emerging threats including the Gulf Oil Spill, Superstorm Sandy, Flint, climate change, and the Ebola and Zika outbreaks have revealed the need for timely multidisciplinary research for such events. To address this need, the NIH Disaster Research Response Program (DR2) was created to build and promote tools, processes, and relationships to collect vital exposure and health information in response to environmental disasters. DR2 aims to address structural barriers to research, such as the need for rapid funding, IRB approval of protocols and field access, as well as develop network of researchers around the country to provide expertise and conduct research safely in response to a disaster. DR2 has held large-scale tabletop exercises in Los Angeles, Houston, and Boston to new facilitate new EHS networks linking academia, public health officials, and impacted communities to test initiatives and to implement enhanced environmental health and exposure research, including community participation, systematic reviews, and relevant toxicology in response to emergencies. This session will explore: 1) new tools and materials developed by NIH to support research in post-disaster settings, 2) IRB “best practices” for disaster research, 3) lessons learned from past disasters and ongoing efforts by NIEHS, Environmental Health Science (EHS) Centers, and other partners to conduct disaster research, and 4) the path forward to creating a new national EHS research response network and framework for strategic science.

Format

Participants will engage in a series of panel discussions on these topics to explore ongoing activities, strategies, opportunities and benefits for advancing the EHS disaster research response initiative.

Presenters

- **Moderator**
Chip Hughes, NIEHS
- **DR2 Vision Overview**
Linda Birnbaum, NIEHS
- **Flint Lead Contamination Follow-up**
Shawn McElmurry, Wayne State University



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- **DR2 California Exercise and Porter Ranch DR2 Response**
Linda Delp, University of California, Los Angeles
- **IRB's and Vulnerable Communities**
Joan Pakenham, NIEHS
- **Boston DR2 Exercise and Community Involvement**
Madeleine Scammell, Boston University
- **Galveston Exercise and Building Networks**
Sharon Croisant, University of Texas Medical Branch
- **Closing Thoughts and Wrap-up**
Aubrey Miller, NIEHS

Keywords: disaster, community engagement, worker safety, exposure science, IRB, research, response, EJ

44. Toxicant Transport through the Environment: Mechanisms and Interventions to Prevent Exposures

Junior Ballroom D

The session will address the complex field of fate and transport of contaminants in the environment, and will demonstrate how NIEHS grantees have successfully linked the science to the communities and stakeholders impacted by hazardous substances. Presentations will draw from real world examples where research has provided insight to predict and prevent exposures due to the movement of contaminants in air, water, groundwater, soils, and sediments. The session will draw from NIEHS grantees' work in several exposure scenarios such as vapor intrusion, surface-water geochemistry, airborne exposures due to dredging, and emerging contaminants. Presenters will detail mechanisms of fate and transport, explain the tools used to measure contaminant movement, and share experiences communicating research findings to stakeholders and communities.

Format: Brief session introduction followed by four 20 minute presentations and a brief discussion period. These tag-team presentations will cover not only the technical details of fate and transport for various exposure scenarios, but also the activities undertaken to report back to communities and stakeholders.



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Speakers

- **Session Introduction**
Heather Henry, NIEHS
- **Community-based Passive Sampling of Airborne PCBs in New Bedford Harbor, MA**
Andres Martinez, University of Iowa; and Wendy Heiger-Bernays, Boston University
New Bedford Harbor (NBH) is one of the largest polychlorinated biphenyl (PCB) Superfund sites in the US. The Boston University Superfund Research Program (BUSRP) has conducted research in and worked with communities surrounding NBH since 1995. In 2015, BUSRP responded to community concerns regarding airborne PCB exposures that may be increased during sediment dredging with an air quality monitoring project in partnership with University of Iowa SRP (ISRP). Qualitatively and atequantavely we demonstrate that airborne PCB concentrations in the air surrounding NBH are due to its water PCB emissions. Data and information are shared with communication strategies that meet the needs of the community and regulatory stakeholders.
- **Spatial and Temporal Variability of TCE Concentrations in Sewer Gas: Considerations for Vapor Intrusion Exposure Risks**
Kelly Pennell, University of Kentucky; and Bruce Richman, Entanglement Technologies
Classically, vapor intrusion is conceptualized as occurring from soil vapors that migrate upward from contaminated groundwater plumes and enter buildings through foundation cracks. Recently, “alternative pathways” for vapor entry into buildings have complicated this classic conceptual model of vapor intrusion. One alternative pathway, the sewer-gas-to-indoor-air pathway, has been gaining considerable attention as part of vapor intrusion site assessments. To advance the understanding of spatial and temporal variability of trichloroethylene (TCE) concentrations in sanitary sewer systems located near hazardous waste sites, Entanglement Technologies (NIEHS SBIR Grantee) and University of Kentucky (Superfund Research Center Grantee) collaborated to conduct a field study in the California Bay Area. During this presentation, results of the field study and other ongoing research efforts will be presented.
- **Impact of Groundwater-surface Water Dynamics on In Situ Remediation Efficacy and Bioavailability of PAH Contaminants**
Michael Unger, Virginia Institute of Marine Science; Joe Rieger, Elizabeth River Project
New radiological and antibody based biosensor methods were used to evaluate the mechanisms controlling transport of polycyclic aromatic hydrocarbons (PAHs) within sediments at contaminated sites in the Elizabeth River, VA. The biosensor was used to quantify PAH in small volume pore water samples collected with a drive-point piezometer at various depths within contaminated sediments and output from seepage meters was analyzed on an hourly basis to measure small-scale temporal changes in PAH flux. Biosensor measurements were highly correlated to GC-MS analysis in split samples and was also correlated to benthic amphipod toxicity. The resulting data was provided to environmental engineers soon after collection to help define PAH transport at the site and to guide development of the future remediation plans. Future remediation will need to address controlling PAH flux as well as removal and/or capping of contaminated sediments at the site.



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- **The Benefits of Research Translation to Environmental Research: An Example Reaturing Perfluoroalkyl Acid (PFAA) Fate and Transport**

Jennifer Guelfo, Brown University; Thomas Marlow, Brown University

Multiple New England communities have recently discovered the presence of perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) in public drinking water systems at levels greater than the U.S. Environmental Protection Agency (EPA) drinking water advisory of 0.07 µg/L. In response, the Brown University Superfund Research Program (SRP) Research Translation Core and stakeholders held a workshop for regulators in the region as a forum for learning and discussion on perfluoroalkyl acids (PFAAs) and related substances. Key fate and transport knowledge gaps identified during this event have been incorporated into Brown SRP research initiatives that will

provide direct benefits to practitioners and impacted communities and illustrating the advantages provided by bilateral communication established during research translation efforts.

Session Keywords: polychlorinated biphenyl, passive air monitoring, dredging, vapor intrusion, trichloroethylene, contaminated sediments, polycyclic aromatic hydrocarbons, perfluorooctanoic acid, perfluorooctane sulfonic acid, drinking water

45. The NIH Update – New Policies and Procedures for 2017

Meeting Room 1-2

Keeping up with all the NIH rules and systems is a challenge. This presentation provides a condensed digest of recent and upcoming changes impacting NIEHS grants. The NIH Office of Policy for Extramural Research Administration will present a summary of the recent NIH changes, including topics such as new electronic submission forms, changes to human subjects studies/clinical trials management, and post-doctorate stipend levels. The presentation will highlight any hot policy topics where changes are anticipated in 2017 and beyond. A question and answer session will follow the presentation.

Format: Formal presentation with Q&A session to follow

Speakers:

- ***Michelle Bulls, Director, NIH Office of Policy for Extramural Research Administration***
- ***Samuel Ashe, Director, Division of Grants Policy, Office of Policy for Extramural Research Administration***

Keywords: Policy, Administration, Grants Management, Funding, Budgets, Fiscal Year Updates,



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46. Emerging Topics in Genome Integrity and the Environment

Meeting Room 3

Over the past 50 years NIEHS has supported ground-breaking research in the understanding of how cells respond to environmentally-induced DNA damage, supporting world-class investigators in the Division of Intramural Research, and through grants through the Division of Extramural Research and Training. In this session, presenters will discuss exciting trends in genome integrity and response to environmental stress, including the impact of DNA repair functions in human diseases, the role for environment in inducing structural changes in the genome, emerging tools for assessing DNA repair capacity in human studies, and mutational signatures of prior exposures.

Format: Presentations

Speakers:

- **Dan Shaughnessy, NIEHS**
- **BER and Human Disease**
Joann Sweasy, Yale University
- **The Impact of Germline and Somatic Copy Number Variants in Health and Disease**
Thomas Wilson, University of Michigan
- **New Tools for Measuring DNA Repair Capacity in Human Populations**
Zachary Nagel, Harvard School of Public Health
- **Mutational spectra of Aflatoxin B1 in a Mouse Model of Cancer Establish Biomarkers of Exposure for Human Hepatocellular Carcinoma**
John Essigmann, Massachusetts Institute of Technology

Keywords: DNA Repair, Mutagenesis, Genome Stability, Mutational Signatures, DNA Repair Capacity, Copy Number Variation

47. Important Contributions to Environmental Health from Special Populations

Meeting Room 4

This session will highlight the important contributions of unique populations to our understanding of environmental exposures and human health.



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Speakers:

- **Introduction**
Kim Gray, NIEHS
- **The GuLF STUDY: A Long-term Study of Oil Spill Response and Clean-up Workers following the Deepwater Horizon Disaster.**
Richard Kwok, NIEHS
The GuLF STUDY is the largest study of oil spill response and clean-up workers and will provide valuable information on potential exposures and health effects associated with the Deepwater Horizon disaster and future oil-spill clean-up efforts. While participants are nationwide, enhanced data collection efforts along the Gulf Coast Region provide valuable information on an understudied population that has experienced environmental contaminants and socio-economic challenges beyond just the oil spill. <https://gulfstudy.nih.gov/en/index.html>
- **40 Years and Three Generations: Science + Community Engagement + Public Health = Better Science and a Healthier Community**
Michele Marcus, Emory
Forty years ago the Velsicol Chemical Company shipped a brominated flame retardant to grain mills instead of a nutritional supplement. Livestock throughout the state of Michigan consumed contaminated feed and millions of individuals consumed the contaminated meat, milk, eggs, and other farm produce. A cohort of approximately 5,000 individuals and their offspring have been followed and multiple health problems found to be associated with this exposure. They include earlier puberty, more miscarriages, and breast cancer among women and more genitourinary problems among men. Strong partnerships with the affected community have directed current research efforts exploring interventions, multi-generational epigenetics and educational programs. <http://pbbregistry.emory.edu/>
- **The Fernald Community Cohort: Primed Research Resource**
Susan Pinney, University of Cincinnati
The Fernald Community Cohort (FCC) consists of the 9782 persons who participated in the Fernald Medical Monitoring Program (FMMP) from 1990-2008. Although this community cohort was assembled because of their proximity to a uranium processing plant, dose reconstruction using methods developed by the CDC demonstrated that over 60% of the cohort had such minimal exposure to uranium and radon that their cumulative ionizing radiation exposure was less than 3.2% over lifetime background levels. Because of the extensive collection of blood and urine biospecimens (which can be used to measure exposure biomarkers), collected at different time points during follow-up, and the extensive questionnaire and medical examination data, this cohort can be used to study a wide range of exposures. <http://med.uc.edu/eh/research/projects/fcc>

Keywords: prospective cohort, disasters, epidemiology, biospecimens, longitudinal cohort, resource sharing; exposure mixtures; uranium



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Downtown Durham History Walking Tour: From Tobacco to Technology

Starting at 2:00 p.m.

Meet across the street from the Marriott's front doors

This is a recurring session.