



National Institute of Environmental Health Sciences
Your Environment. Your Health.



Emerging Science for Environmental Health Decisions

Personal Environmental Exposure Measurements: Making Sense and Making Use of Emerging Capabilities

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Linda S. Birnbaum, PhD, ATS, DABT

Director

National Institute of Environmental Health Sciences

National Toxicology Program

The National Institute of Environmental Health Sciences

- One of the 27 National Institutes of Health, but located in RTP, N.C.
- Wide variety of programs supporting our mission of environmental health
 - Intramural laboratories
 - Clinical research program
 - Extramural funding programs
 - National Toxicology Program
 - Disease prevention
 - Public health focus



NIEHS Strategic Plan

Mission

The mission of the National Institute of Environmental Health Sciences is to discover how the environment affects people in order to promote healthier lives.

Strategic Themes for Environmental Health Sciences

Vision

The vision of the National Institute of Environmental Health Sciences is to provide global leadership for innovative research that improves public health by preventing disease and disability.



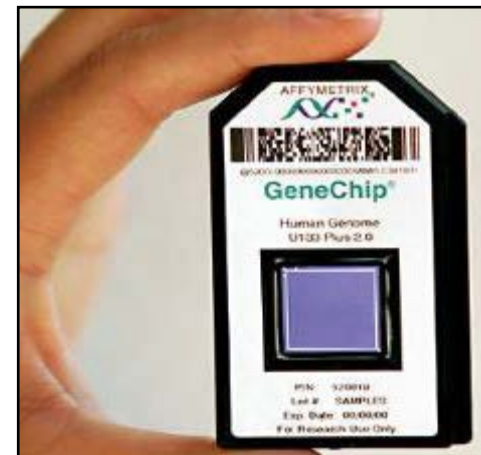
Key themes of prior ESEHD workshops

- Applications of in vitro technologies
- Emerging concept of the microbiome
- Interindividual variability and susceptibility
- Characterizing the human exposome



Strategic Goal #1:

Identify and understand fundamental shared mechanisms or common biological pathways (e.g., inflammation, epigenetic changes, oxidative stress, mutagenesis) underlying a broad range of complex diseases, in order to enable the development of broadly applicable prevention and intervention strategies.



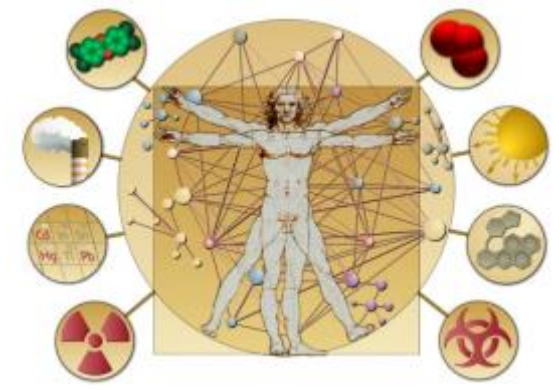
Strategic Goal #2:

Understand individual susceptibility across the life span to chronic, complex diseases resulting from environmental factors, in basic and population-based studies, to facilitate prevention and decrease public health burden.



Strategic Goal #3:

Transform exposure science by enabling consideration of the totality of human exposures and links to biological pathways and create a blueprint for incorporating exposure science into human health studies.



Strategic Goal #4:

Understand how **combined environmental exposures** affect disease pathogenesis.



Strategic Goal #5:

Identify and respond to **emerging environmental threats** to human health on both a local and global scale.



Strategic Goal #6:

Establish an **environmental health disparities** research agenda to understand the disproportionate risks of disease and to define and support public health and prevention solutions in affected populations.



Strategic Goal #7:

Use **knowledge management** techniques to create a **collaborative environment** for the EHS community to encourage an **interdisciplinary approach** to investigate, analyze, and disseminate findings.



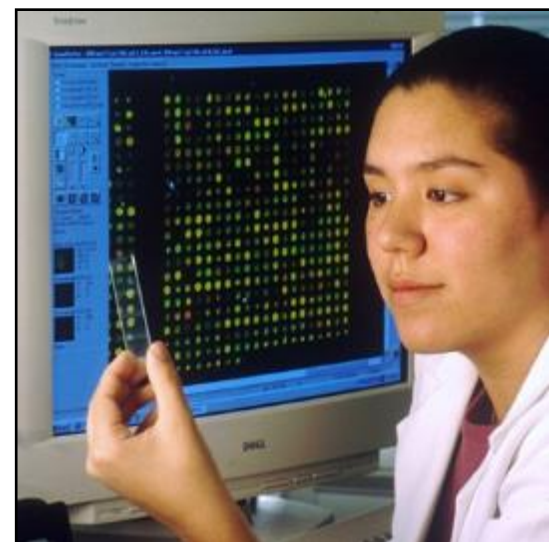
Strategic Goal #8:

Enhance the teaching of EHS at all levels of education and training (K-professional) to **increase scientific literacy** and **generate awareness of the health consequences** of environmental exposures.



Strategic Goal #9:

Inspire a diverse and well-trained cadre of scientists to move our transformative environmental health science forward; **train the next generation of EHS leaders** from a wider range of scientific disciplines and diverse backgrounds.



Strategic Goal #10:

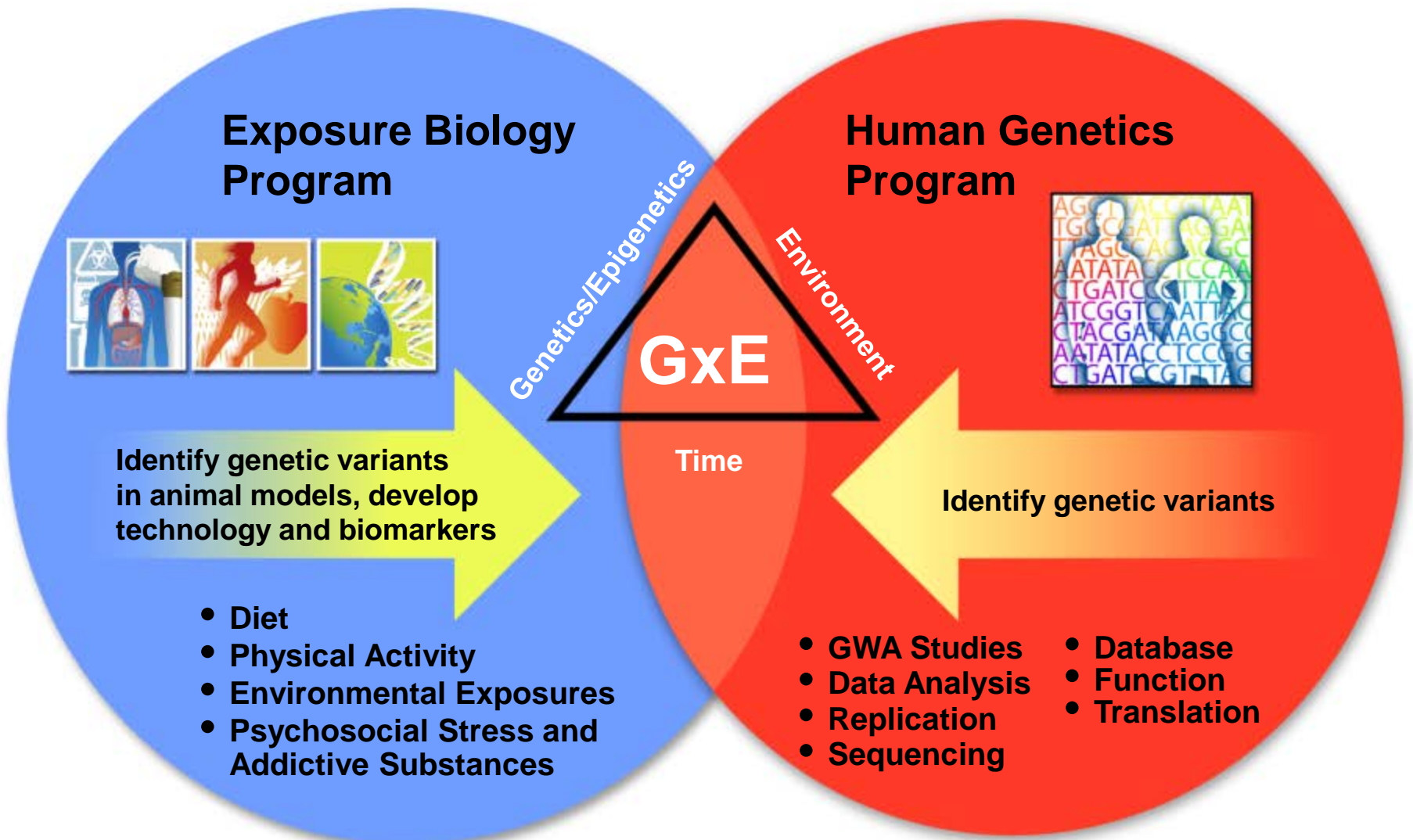
Evaluate the **economic impact of policies, practices, and behaviors** that reduce exposure to environmental toxicants through prevention of disease and disabilities; invest in **research programs to test how prevention improves public health and minimizes economic burden.**

Strategic Goal #11:

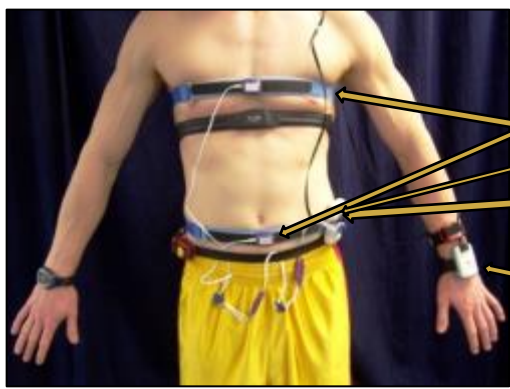
Promote bidirectional communication and collaboration between researchers and stakeholders (policy makers, clinicians, intervention/prevention practitioners, and the public) in order to advance research translation in the environmental health sciences.



The Genes, Environment, and Health Initiative



New Tools for Exposure Science and the Exposome

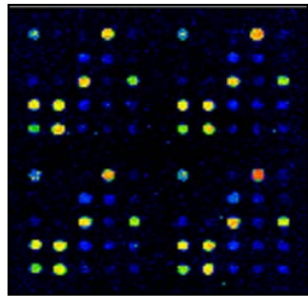


Diet & Physical Activity

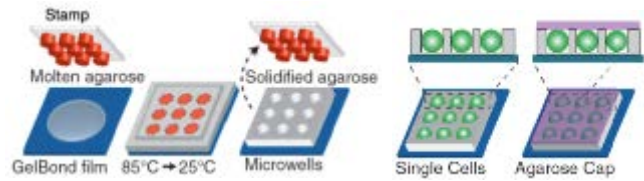
Psychosocial Stress and Addictive Substances



Sensors for Analysis of Chemical Exposures

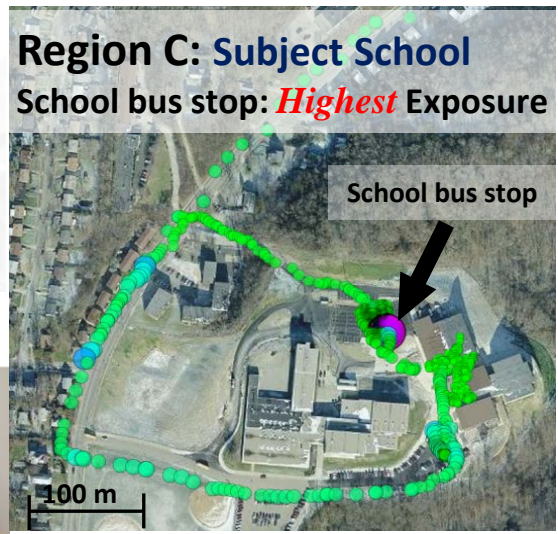
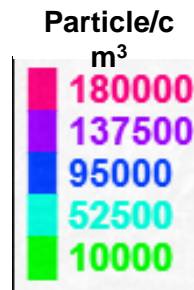


Biological Response Indicators



Better tools for research

- In 2014, researchers at Oregon State University developed a silicone bracelet that monitors a wide range of environmental exposures
- Scientists at University of Cincinnati developing personal ultrafine particle counter
- Field test indicated highest exposures at bus stop when worn by a child



Connections to other Strategic Priorities and Initiatives

- **Personalized Medicine**

<https://www.nih.gov/about-nih/what-we-do/nih-turning-discovery-into-health/personalized-medicine>

- **Big Data to Knowledge (BD2K)**

<https://datascience.nih.gov/bd2k>

- **Citizen Science**

http://www.niehs.nih.gov/research/supported/translational/peph/webinars/citizen_science/



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Thank you!



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Environmental Health Sciences



National Toxicology Program
U.S. Department of Health and Human Services

