



NIEHS

National Institute of
Environmental Health Sciences



NIEHS Exposure Biology Program

A component
of the NIH Genes,
Environment and
Health Initiative (GEI)



U.S. Department of Health and Human Services
National Institutes of Health



Exposure Biology Program

The Exposure Biology Program funds grants aimed at the development of new technologies for bridging the knowledge gap between environmental exposures and human disease. Teams of basic scientists, bioengineers, and others are working on innovative projects to:

- Develop tools for measuring personal exposure to chemicals, diet, physical activity, psychosocial stressors, and addictive substances;
- Identify molecular signatures of the body's response that indicate activation of disease-related pathways such as oxidative stress, inflammation, DNA damage response, and epigenetic changes.

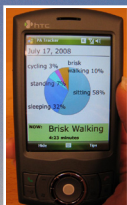
The Exposure Biology Program is part of the Genes, Environment, and Health Initiative of the National Institutes of Health.

For more information, visit:

<http://www.gei.nih.gov>



The mobile phone food record will reduce the burden on study volunteers when collecting dietary intake. Images before and after a meal can be used to estimate amounts of food consumed.



Tools are being developed to measure physical activity type, duration, and intensity using sensor-enabled mobile phones. The phone may provide real-time feedback on patterns of activity, such as how someone has spent his or her day as depicted here.

Some units to detect chemical exposures will be designed to have extensive user interfaces, providing immediate feedback to study participants.



Wearable Sensor units will be relatively non-obtrusive so that they can be used to assess exposures in vulnerable populations such as children .

Ongoing Projects —

Grants have been awarded
in the following areas:

Environmental Sensors for Personal Exposure Assessment



- Smart Miniaturized Personal Monitors for Black Carbon and Multiple Air Pollutants
Steven Chillrud, Ph.D., Columbia University, NY
- Enzyme Based Wearable Environmental Sensor Badge for Personal Exposure Assessment
Markus Erbeidinger, ICx Agentase, Pittsburgh, PA
- Wearable Nanosensor Array for Real-time Monitoring of Diesel and Gasoline Exhaust
Ashok Mulchandani, Ph.D.,
University of California – Riverside, CA
- Personal Aerosol Sensor Platform to Link Children's Exposures to Asthma Severity
Charles Rodes, Ph.D., Research Triangle Institute,
Research Triangle Park, NC
- Rapid Allergenic Particle Identification (RAPID)
Ken Shepard, Ph.D., Columbia University, NY
- Development and Field Test of a Positional Tagging Miniature Personal Sensor for PM 1.0
Sang Young Son, Ph.D., University
of Cincinnati, Cincinnati, OH
- A VOC Dosimeter Based on a Colorimetric Sensor Array
Ken Suslick, Ph.D., University of Illinois at
Urbana-Champaign, Urbana-Champaign, IL
- A Wearable Wireless System for Real-Time Monitoring of Chemical Toxicants
Nongjian Tao, Ph.D.,
Arizona State University, Tempe, AZ

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Tools to Measure Exposure to Psychosocial Stress and Addictive Substances



- Computer-assisted Technologies for Tracking Exposure to Psychosocial Stress
Thomas W. Kamarck, Ph.D.,
University of Pittsburgh, Pittsburgh, PA
- Real-time Assessment of Individual and Neighborhood Exposure to Drugs and Stress Using Hand-held Electronic Diaries and Position Technology
Gregory D. Kirk, M.D., Ph.D.,
Johns Hopkins University, Baltimore, MD
Kenzie L. Preston, Ph.D.,
National Institute on Drug Abuse
- Wireless Skin Patch Sensors to Detect and Transmit Addiction and Psychosocial Stress Data
Santosh Kumar, Ph.D.,
University of Memphis, Memphis, TN
- A Personal Light-monitoring Device for Reducing Psychosocial Stress
Mark S. Rea, Ph.D.,
Rensselaer Polytechnic Institute, Troy, NY
- Handheld Salivary Biosensor of Psychosocial Stress
Vivek Shetty, D.D.S., Dr. Med. Dent.,
University of California, Los Angeles, CA

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Program Administrator, OBSSR
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Improved Measures of Diet and Physical Activity



- Food Intake Recording Software System: Version 4
Tom Baranowski, Ph.D.,
Baylor College of Medicine, Houston, TX
- Improving Dietary Assessment Methods Using the Cell Phone and Digital Imaging
Carol Boushey, Ph.D.,
Purdue University, West Lafayette, IN
- Development of an Integrated Measurement System to Assess Physical Activity
Patty Freedson, Ph.D.,
University of Massachusetts, Amherst, MA
- Enabling Population-scale Physical Activity Measurement on Common Mobile Phones
Stephen Intille, Ph.D.,
Massachusetts Institute of Technology, Cambridge, MA
- A Tool for Geospatial Analysis of Physical Activity
Kevin Patrick, M.D.,
University of California, San Diego, CA
- A Unified Sensor System for Ubiquitous Assessment of Diet and Physical Activity
Mingui Sun, Ph.D.,
University of Pittsburgh, Pittsburgh, PA
- Mobile Food Intake Visualization and Voice Recognizer (FIVR)
Rick Weiss, M.S.,
Princeton Multimedia Technologies Corporation,
Princeton, NJ

Jill Reedy,
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Catherine Loria,
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Biological Response Indicators of Environmental Stress and Centers



- Exposure and Biological Response Biomarkers of Cigarette Smoke
Ian Blair, Ph.D., University of Pennsylvania, Philadelphia, PA
- Early Disease Biomarkers of PCB-exposed Human Populations
Sisir Dutta, Ph.D., Howard University, Washington, D.C.
- Comet-Chip: A High-Throughput DNA Damage Sensor for Environmental Health Studies
Bevin Engelward, Ph.D., Sc.D., Massachusetts Institute of Technology, Cambridge, MA
- Genomic and Metabolomic Responses to Alcohol-induced Liver Damage
Albert Fornace, M.D., Georgetown University, Washington, D.C.
Frank Gonzalez, Ph.D., National Cancer Institute, Bethesda, MD
- Environmental Epigenetics and Stem/Progenitor Cell Injury
Tim Huang, Ph.D., The Ohio State University, Columbus, OH
- Macronutrients, Mitochondria and Blood Metabolome/Proteome Disease Risk Profiles
Bruce Kristal, Ph.D., Brigham and Women's Hospital, Boston, MA
- Genomic and Proteomic Biomarkers of Biological Responses to Exposure
Coral Lamartiniere, Ph.D., University of Alabama at Birmingham
- Biomarker Signatures of Biological, Chemical, or Psychological Stress
David Lawrence, Ph.D., Wadsworth Center, Albany, N.Y.
- A Non-invasive Gene Expression Biomarker of Airway Response to Tobacco Smoke
Avrum Spira, M.D., Boston University, Boston
- Biomarkers of Organophosphate-Adducted Proteins
Charles Thompson, Ph.D., University of Montana, Missoula

- Protein Biomarkers of Oxidative Stress and Inflammation Associated with Tobacco Smoke and Obesity

Joel Pounds, Ph.D.,

Battelle Pacific Northwest Laboratory, Richland, Wash.

- Biomarkers and Biosensors for Studies of Blood Cancer Risks

Stephen Rappaport, Ph.D.,

University of California, Berkeley

Daniel Shaughnessy,

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The Exposure Biology Program is coordinated by the National Institute of Environmental Health Sciences (NIEHS), as part of the National Institutes of Health (NIH) Genes, Environment and Health Initiative (GEI).

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Other sponsoring institutes include:

The National Cancer Institute (NCI)

The National Heart, Lung, and Blood Institute (NHLBI)

The National Institute on Drug Abuse (NIDA).

The NIEHS vision is to use environmental sciences to understand human biology and prevent disease. We simply need better measures to understand complex human diseases that are caused by the combination of environmental exposures and genetic changes.

This new approach will more rapidly move NIH research into advances for the patient and the public.



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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health

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