The National Institute of Environmental Health Sciences

What is Environmental Health Research?
NIEHS seeks to comprehensively understand the role of environmental factors in human health and disease. In addition to analyzing chemicals in the air you breathe, the water you drink, and the things you touch, environmental health research considers what happens inside your body as chemicals are processed. Environmental factors can be external to your body such as sunlight, mold, and pollutants, or internal such as diet choices, metabolism, and stress. This research covers all lifespan periods.

As we learn more about how factors in the environment affect health, we enhance our ability to create a healthier environment and prevent disease and disability.

NIEHS Priority Research Areas
For more than 50 years, NIEHS has built a solid scientific foundation for the environmental health sciences, which are conducted by researchers across many disciplines. This research improves societal understanding of how the environment affects health and of benefits from reducing exposure to contaminants. NIEHS staff collaborate with partners in other NIH institutes, government agencies, private research firms, and academia.

Autism. This complex brain and nervous system disorder may result from an interaction of certain genes and environmental factors. Factors studied by NIEHS include infections, pesticides, air pollution, metals, and parental age.

Asthma. NIEHS conducts and supports asthma research from basic studies in laboratories to human clinical trials. This research focuses on complex relationships among environmental factors, such as air pollution, and people’s genetics and immune systems.

Breast Cancer. Most women who develop breast cancer have no family history of the disease, suggesting an environmental link. Researchers study chemical and physical risk factors, collaborate across scientific disciplines and with community organizations, and communicate scientific findings to the public. NIEHS believes prevention is key to reducing the emotional, physical, and financial burden of breast cancer.
Children’s Health. We all want our children to thrive where they live, learn, and play. But anything unsafe to touch, breath, or swallow affects children more than adults because, pound for pound, their contact with harmful chemicals is greater. Therefore, children are more likely to have health problems triggered by exposure to harmful environmental factors, like smog. Discoveries from scientific research are a basis for strategies to help us protect children from harmful environmental exposures.

Developmental Origins of Health and Disease. Exposure to environmental chemicals during development (in utero and early childhood) can alter normal development and function of cells and tissues. Such changes may result in an increased chance of delays in neurological development, asthma and other respiratory problems, reproductive effects, obesity and metabolic disorders, and cancer over a person’s lifetime.

Disaster Research. NIEHS researches human health effects associated with environmental disasters such as hurricanes, wildfires, and oil spills. Resulting information helps develop ways to reduce health risks, illnesses, and injuries among emergency response workers and within communities.

Endocrine Disruptors. Whether naturally occurring or man-made, these chemicals mimic or interfere with the function of hormones by turning on, shutting off, or modifying signals that hormones carry. Such actions affect the body’s normal functions and are linked with developmental, reproductive, neurological, immune system, and other problems. Endocrine disrupting chemicals include bisphenol A (BPA), a chemical that makes plastics clear and tough; dioxins, which come from improperly burning garbage or are byproducts in the manufacture of herbicides and disinfectants; and some flame retardants.

Mixtures. Because people are exposed to many chemicals simultaneously, NIEHS studies the health risks of chemical mixtures. Scientists develop novel methods to study exposures in ways that represent the mixtures experienced in modern life and to assess health effects.

Pesticides. Widespread use of agricultural chemicals in food production exposes people to low pesticide residues through their diets. Additionally, people may also be exposed to pesticides in homes, schools, hospitals, and workplaces. Scientists want to better understand the health effects of these chemicals. NIEHS, with other federal agencies, supports the Agricultural Health Study and other research on pesticide exposures.

PFAS (Perfluoroalkyl and Polyfluoroalkyl Substances). A group of about 5,000 different chemicals, PFAS are manufactured for everyday products. For example, they keep food from sticking to cookware, make carpets resistant to stains, and are in firefighting foam. NIEHS has a leading program of research on PFAS and their potential to affect cognitive and neurobehavioral development, immune system dysfunction, endocrine disruption, obesity, diabetes, lipid metabolism, and certain cancers.

Predictive Toxicology. The Tox21 program, a collaborative effort among federal agencies, tests the safety of chemicals using state-of-the-art robotic technology to reduce reliance on animal testing.

Translational Research. NIEHS continually looks to ensure science findings are useful in areas such as public health practice, therapeutics, environmental engineering, public policy, and regulation. NIEHS develops practical ways to determine how the environment is linked to—and affects—health across different population groups. It also promotes community engagement in research to identify and report on environmental conditions in order to better understand potential health effects.
What is Meant by Gene and Environment Interaction?

Most diseases are complex and arise from an interaction between your genes and your environment. Subtle differences in one person’s genes can cause them to respond differently to the same environmental exposure as another person. As a result, some people may develop a disease after being exposed to something in the environment while others may not.

NIEHS at Work

A global leader in the field of environmental health sciences, NIEHS’ success requires the highest standards of stewardship, and a solid foundation of supportive strategies, resources, and training.

Extramural Research and Training

Recipients of NIEHS grants conduct basic laboratory research, applied research, population-based studies, and community engagement. Through internships and fellowships, NIEHS provides scientific learning opportunities for higher education students.

Intramural Research

In-house research includes epidemiology, biostatistics, molecular genetics, signal transduction, reproductive and developmental toxicology, respiratory biology, molecular carcinogenesis, and other areas.

In the Clinical Research Unit, NIEHS and local North Carolina universities collaborate to move laboratory science toward disease prevention and treatment. There are studies on asthma, calcinosis, electronic cigarette use, myositis, and puberty.

Visit joinastudy.niehs.nih.gov to learn more. Consider helping us find new ways to prevent, diagnose, and treat a variety of diseases associated with environmental factors.

Congressionally Authorized Programs at NIEHS

National Toxicology Program

NIEHS is home to the National Toxicology Program (NTP), a federal, interagency program of the Public Health Service, U.S. Department of Health and Human Services. NTP’s goal is to safeguard the public by identifying substances in the environment that may affect human health. NTP partner organizations are NIEHS, National Center for Toxicological Research of the U.S. Food and Drug Administration, and National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention. Over the past 40 years, NTP has studied and shared information on the health effects of more than 2,800 substances.

Superfund Research Program

Created by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Superfund Research Program conducts research to discover practical solutions for protecting the public from hazardous substances, such as arsenic, lead, and mercury. It funds university-based and small business grants, which aid in the reuse of water and land in communities, formation of university–industry partnerships, and creation of “green” technologies.

Worker Training Program

The Worker Training Program, also established by SARA, funds a network of nonprofit organizations that conduct safety and health training for hazardous waste workers and emergency responders across the country. In many types of jobs, hazards that workers may encounter include solvents and other products made with toxic chemicals or heavy metals, mold, and physical risks, such as loud noises, vibrations, and dangerous machinery.
Communication
The institute shares information about how the environment may affect health with the public, other scientists, health professionals, and decision-makers. We have a lot of different materials to help you find out about exciting scientific discoveries made at NIEHS.

Visit our website (www.niehs.nih.gov) to learn about environmental health topics and the research that will help improve public health and prevent disease and disability.

Our website contains news releases, program descriptions and newsletters, grant funding information, and our strategic plan.

Under the Health & Education section, you’ll find brochures, fact sheets, and science education materials you can download.

Public Health Impact
NIEHS’ mission is to discover how the environment affects people in order to promote healthier lives. To meet this mission, NIEHS research is unique because it offers hope for preventing disease and disability.

Among many pioneering research findings, NIEHS scientists:

• Discovered evidence for developmental impairment in children exposed to lead.
• Found associations between asbestos and lung disease and cancer.
• Played a lead role in discovering the first breast cancer susceptibility gene, BRCA1.
• Led an interagency effort that identified 11 categories of diseases and other health effects related to climate.
• Developed small, wearable electronic sensor technologies that can detect exposures to toxic chemicals.
• Connected environmental health and toxicology research to the microbiome, an important component of the human ecosystem consisting of bacteria, fungi, viruses, and other microbes.
• Found a wide range of health effects associated with air pollution exposure, including respiratory diseases, cardiovascular diseases, and adverse pregnancy outcomes (such as preterm birth).
• Discovered clear evidence that exposure to radio frequency radiation, as in 2G and 3G cell phones, resulted in tumors in the hearts of male rats. They found some evidence of tumors in the brains and adrenal glands of male rats.

Monthly Publications
The Environmental Factor is the award-winning NIEHS newsletter available online or by email. factor.niehs.nih.gov

Environmental Health Perspectives is an open-access, peer-reviewed journal published by NIEHS. This journal, with an 8.05 impact factor, publishes original research, reviews, and commentaries on the relationship between the environment and human health. It uses a continuous publication schedule to distribute content to readers as quickly as possible. www.ehponline.org

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