

The National Institute of Environmental Health Sciences

The National Institute of Environmental Health Sciences (NIEHS), in Research Triangle Park, North Carolina, is part of the National Institutes of Health (NIH) within the U.S. Department of Health and Human Services.



What is NIEHS doing?

For more than 50 years, NIEHS has been a global leader in the field of environmental health sciences.

NIEHS scientists and research grant recipients seek to improve lives by studying how human biology, health, and disease are influenced by exposure to different environmental factors.

This research is varied in approach and scope. Some studies analyze external factors, like chemicals, pollutants, and mold in the air you breathe, the water you drink, and the things you touch. Others consider what happens to the body as it processes chemicals or reacts to influences like diet and stress.

NIEHS research covers all stages of life as well, documenting the benefits of reduced exposure to contaminants and devising ways to promote health and prevent disease and disability.

Public health impact

NIEHS conducts research that offers hope for the prevention of disease and disability. Discoveries of institute scientists include:

- Evidence of a link between lead exposures and developmental impairment in children.
- Associations between asbestos and lung disease and cancer.
- Identification of the first breast cancer susceptibility gene, BRCA1.
- A connection between air pollution and many health effects, including respiratory, cardiovascular, and neurodegenerative diseases, cancers, and adverse pregnancy outcomes.
- Evidence that exposure to high levels of radio frequency radiation, emitted by 2G and 3G cellphones, resulted in tumors in the hearts of male rats.
- Indications that autoimmunity — a condition in which the body's immune system reacts with its own cells — may be increasing in the U.S.
- Signals that exposure to phthalates — hormone-disrupting chemicals commonly used in some personal care and household products — increases the chance that women will give birth preterm.
- An association between sleeping with artificial light at night and weight gain or obesity in women.
- Development of a sophisticated biosensor that can be deployed following natural disasters to help classify contaminants and health risks.

Tackling current scientific and public health challenges

NIEHS develops targeted research programs, innovative technologies, robust community partnerships, and timely funding opportunities. The institute's strategic plan prioritizes these research efforts and establishes a framework for internal staff collaboration as well as partnerships with other government agencies, academia, nonprofits, and private organizations.

Weather and health

Weather-related events like floods, heat waves, hurricanes, tornados, and wildfires can have a significant effect on air, water, and food quality. Severe weather events also may influence the spread of infectious diseases, promote growth of toxic molds, and increase mental stress.

For decades, NIEHS has supported research of weather-related exposures. Subjects of study include the health effects of wildfire smoke and the impact of increased rainfall and extreme heat on toxic chemical runoff into drinking water.

NIEHS also leads a collaboration of multiple NIH institutes and centers that pursues research to alleviate the impact of severe weather on human health. Funded research focuses on strengthening disaster resiliency at home and globally through science-based interventions. It also emphasizes the importance of community-engaged research.

Additionally, NIEHS leads the NIH Disaster Research Response (DR2) Program, which supports timely data collection in response to natural disasters, many of which are the product of severe weather events.



Computational biology and data science

Massive datasets generated by environmental health research can create analytic challenges. NIEHS built a robust data science infrastructure to help researchers transform collected information into knowledge. Staff take the lead in the planning and development of strategies to process, store, and retrieve data, provide critical training and resources, and develop computational tools to solve data sharing and analysis issues.

Reducing environmental health problems

The quality of the environment and associated health effects can vary significantly across the nation. Some groups and communities experience greater incidences of disease and higher levels of health issues because of the environmental conditions in the places they live, work, learn, and play.

NIEHS seeks to reduce or prevent these environmental health differences and promote scientific advances that improve both environmental quality and human health.

This work progresses on three fronts:

Research: NIEHS supports research centers that seek to improve environmental health at the community level. For example, an NIEHS-funded project at the University of New Mexico is mapping abandoned uranium mines on the Navaho Nation to provide a better understanding of contamination risks to the surrounding population.

Community action: The Partnerships for Environmental Public Health (PEPH) is a collaborative network of scientists, community members, educators, health care providers, public health officials, and policymakers who put NIEHS research findings into action at local, regional, and national levels.

Training: The NIEHS Environmental Career Worker Training Program provides opportunities for individuals from disadvantaged and underserved communities to obtain careers in environmental restoration, construction, hazardous waste removal, and emergency response.

What is gene and environment interaction?

Most diseases are complex and arise from an interaction between your genes and your environment. Subtle differences in genes can cause one person to respond differently to the same environmental exposure as another person. You may develop bad health after being exposed to something in the environment while others may not.



Mechanistic and translational toxicology

NIEHS seeks to better predict human health outcomes of environmental exposures by developing scientific approaches that are efficient, cost-effective, translationally relevant, and less dependent on animal studies. A broad portfolio of research includes:

- Devising techniques to assess the hazards of real-world mixtures of chemicals.
- Modeling nonchemical stressors that contribute to health disparities in underserved communities.
- Developing new ways to evaluate broad classes of chemicals, like flame retardants and PFAS.
- Evaluating military personnel with service-related exposures for biomarkers of health effects.

Precision environmental health and the exposome

Many NIEHS scientists and grant recipients emphasize the importance of precision environmental health — the understanding of a person's genes and their personal health risks associated with environmental exposures. This involves study of the exposome — the totality of an individual's environmental exposures from birth to death.

NIEHS continues to advance research in this area. The NIEHS Personalized Environment and Genes Study (PEGS) has collected data from 20,000 people to learn more about genetic and environmental risk factors for many health conditions. Additionally, NIEHS grant recipients in the Pan-Cancer Project created “genetic fingerprints” of various cancers — data that can be used to clarify how cancer develops and identify potential therapies.

NIEHS at work

NIEHS research is conducted within three divisions.

Division of Extramural Research and Training

This division assesses, plans, directs, awards, and evaluates the institute's grant-based research program. Recipients of NIEHS grants across the country conduct basic laboratory research, applied research, and population-based studies. Some engage communities in their research efforts. Through its grantees, NIEHS also provides educational opportunities and environmental health training.

Division of Intramural Research

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

The Clinical Research Unit is a collaboration of NIEHS and North Carolina universities to move laboratory science toward disease prevention and treatment. The unit conducts studies of asthma, reproductive disorders, puberty, and other topics. Learn more at joinastudy.niehs.nih.gov.

Division of Translational Toxicology

This division focuses on producing data, capabilities, methods, and products that are efficient, cost-effective, human health-relevant, and less dependent on animal studies. Much of its work is carried out by multidisciplinary teams in support of the National Toxicology Program.

National Toxicology Program

NIEHS is the administrative home to the National Toxicology Program (NTP). It is a federal, interagency partnership of the Food and Drug Administration, National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention, and NIEHS, all within the U.S. Department of Health and Human Services. The mission is to build knowledge and advance toxicological sciences to protect and promote public health.

Congressionally authorized programs at NIEHS

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, PFAS, and mercury. It funds university-based and small business grants that aid the reuse of water and land in communities, formation of scientific partnerships, and creation of innovative environmental cleanup technologies.

Worker Training Program

Workers on many job sites encounter hazards like solvents, products made with toxic chemicals, heavy metals, and mold. Others experience physical risks, such as loud noises, vibrations, and dangerous machinery. 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.



Communication

NIEHS shares information about how the environment may affect health with the public, other scientists, health professionals, and decision-makers.

Visit our website (<https://www.niehs.nih.gov>) to find news, events, program descriptions, grant funding information, and our strategic plan.

The “Health & Education” section of the website provides informative materials on environmental health topics that you can download or order. See how our research is helping improve public health and prevent disease and disability.

Digital publications

The **Environmental Factor**, the award-winning, monthly newsletter of NIEHS, is available online (<https://factor.niehs.nih.gov>) or by email subscription. NIEHS also offers other special interest newsletters.

Environmental Health Perspectives

(<https://ehp.niehs.nih.gov>) is an open-access, peer-reviewed journal supported by NIEHS. This journal 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.

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Leadership values

Core values guide NIEHS in its internal operations and its engagements across NIH and with the broader scientific community.

- **Collaboration:** A tradition of teamwork that encourages transparent and respectful partnerships to drive ambitious projects aligned with a common mission.
- **Communication:** A transparent, two-way exchange of information between the institute and the public built on mutual trust, respect, and inclusion.
- **Distributive leadership:** A culture that inspires and empowers the entire workforce to use its talents, strengths, and expertise to assume leadership responsibilities and accountability.
- **Innovation:** An environment where forward-thinking, cutting-edge, and diverse ideas are fostered and applied to solve current and emerging challenges.
- **Workforce:** An inclusive, diverse, and well-equipped pipeline of scientists, staff, and other stakeholders whose perspectives are respected and valued.



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Find his bio and monthly Director’s Corner columns at
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