



National Institute of Environmental Health Sciences



Celebrating 50 1966-2016

Years of Environmental Health Research at NIH
N I E H S H I S T O R Y A N D M I L E S T O N E S

1966

1970

1975

1980

1985

1990

1995

2000

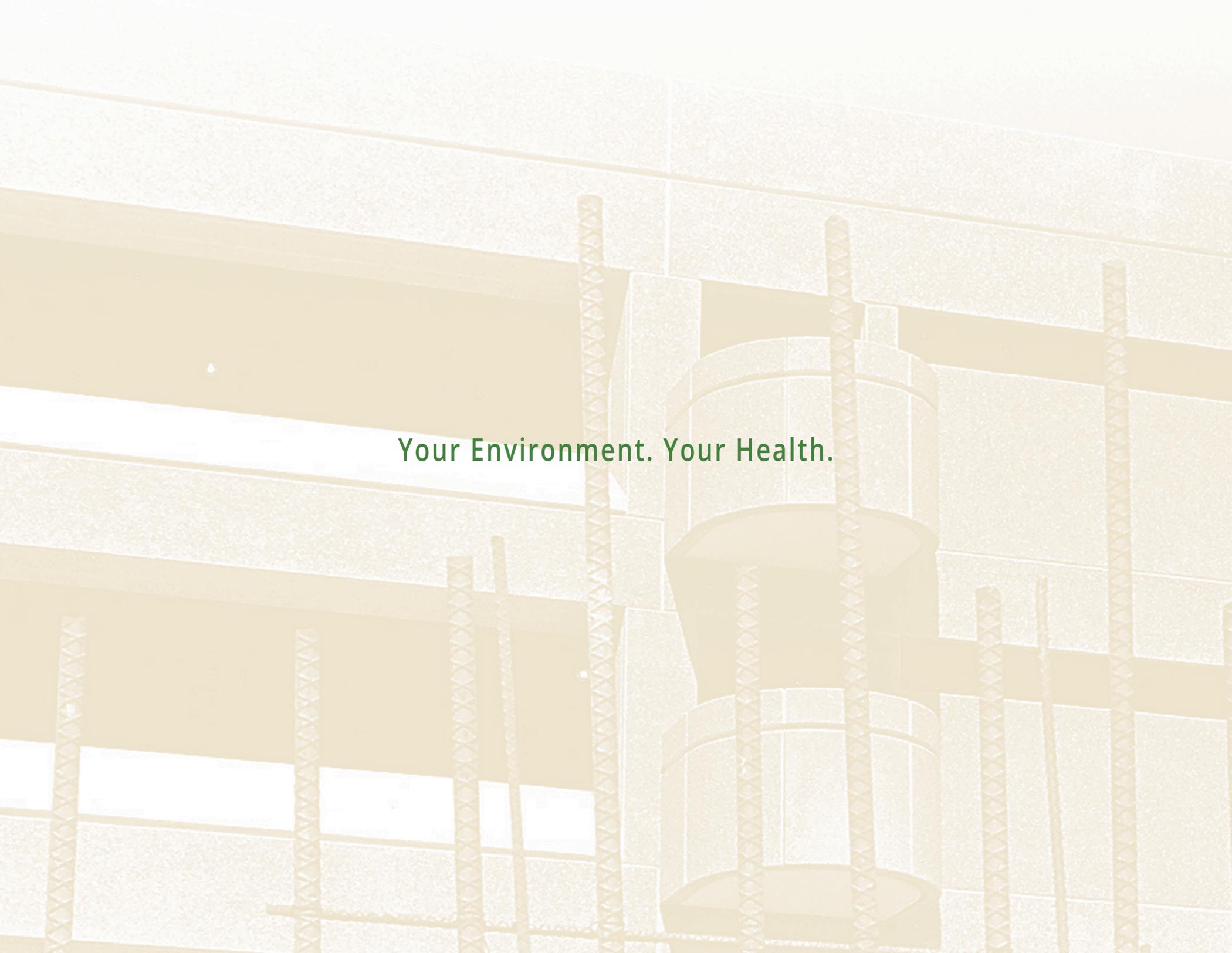
2005

2010

2016

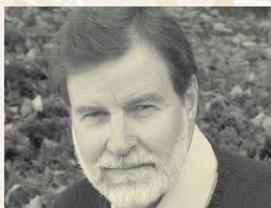
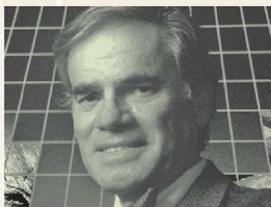


National Institutes of Health • U.S. Department of Health and Human Services

The image features a stylized, monochromatic illustration of a modern building facade. The central focus is a tall, cylindrical tower with several horizontal bands or balconies. This tower is flanked by several vertical columns, each with a repeating diamond-shaped pattern. The background consists of horizontal bands and rectangular panels, suggesting a grid-like architectural structure. The entire scene is rendered in a light, muted green color against a white background. Centered over the middle of the image is the text "Your Environment. Your Health." in a dark green, sans-serif font.

Your Environment. Your Health.

Celebrating **50** 1966-2016 *Years* of Environmental Health Research at NIH **NIEHS HISTORY AND MILESTONES**



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HISTORY

Historical Overview of the National Institute of Environmental Health Sciences 1966-2016

The National Institute of Environmental Health Sciences (NIEHS) has come a long way in making environmental health research responsive to the needs and concerns of the American people, and making environment part of the public health debate. Environmental justice is an everlasting core value for NIEHS research. Preventing disease by acknowledging and managing our environment continues to be a source of motivation and purpose for NIEHS staff and our research partners.

In 2016, as we celebrate 50 years of environmental health research at the National Institutes of Health (NIH), past achievements are acknowledged as a light shining on the future. Exposure science, sensor devices, bioinformatics, and predictive toxicology are all tools of modern research only imagined by NIEHS pioneers. New approaches in epigenetics, exposure phenotyping, and interdisciplinary and translational research promise to leverage 50 years of scientific rigor into heightened awareness and fresh understanding.

As the institute moves forward, our overall goal is to make NIEHS, including the National Toxicology Program, the foremost trusted source of environmental health knowledge, leading the field in innovation and the application of research to solve health problems.

And so it began

Established November 1, 1966, as the Division of Environmental Health Sciences, NIEHS became the 10th NIH institute on January 12, 1969. The division was also known by some as the National Environmental Health Sciences Center.

In December 1965, early advocates, Douglas Lee, M.D., and Earl Arnold, described their vision for the center, in an article in the Transactions of the New York Academy of Sciences. The article noted, "The mission may be summarized as the determination, study, and evaluation of the effects of environmental factors, singly and in the aggregate, upon the health of man." Lee was a renowned public health leader, who served on the NIEHS executive team from the 1966 founding of the division until his retirement from NIEHS in 1973.

1958

MILESTONES

June 27, 1958 – Bayne-Jones calls for agency on health effects of the environment

The report, "The Advancement of Medical Research and Education Through the Department of Health, Education, and Welfare," by Stanhope Bayne-Jones, M.D., laid the groundwork for the creation of an agency specifically charged with addressing the health effects of environmental exposures, reflecting more than a decade of studies calling for the integration of existing federal environmental health programs.



1962



1962 – Rachel Carson publishes "Silent Spring"

Rachel Carson's book, "Silent Spring," energized the environmental movement. Her portrayal of a world so poisoned that no birds remained in spring added to a call to arms for protecting environmental health. It sold more than 6 million copies in 30 languages.

1965

1965 – NIEHS comes to North Carolina

Terry Sanford, the 65th governor of North Carolina, announced NIEHS would be located in his state, making it the first major tenant to announce they were coming to Research Triangle Park (RTP), and the only NIH institute not located in Bethesda, Maryland. RTP has become one of the leading and largest research and science parks in the country.



1966



November 1, 1966 – Kotin chosen as first director

Paul Kotin, M.D., was chosen as director of the newly established Division of Environmental Health Sciences (DEHS), later to become NIEHS, within the National Institutes of Health. DEHS leased space in Research Triangle Park, North Carolina, as leaders looked forward to a permanent facility nearby.

1967

August 1967– Research links asbestos to mesothelioma

NIEHS-funded research linked asbestos exposure to lung tumors and mesothelioma. The study, published in the Journal of the American Medical Association, also found that smokers exposed to asbestos had a 10 times greater risk of developing lung cancer than nonsmokers.¹



Asbestos insulation

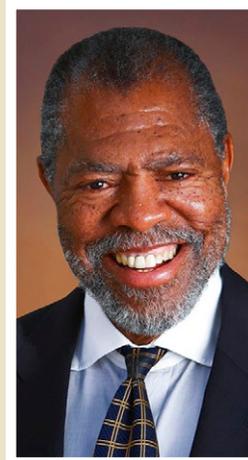
NIEHS DIRECTORS



Paul Kotin, M.D. • 1966-1971



David Rall, M.D., Ph.D. • 1971-1990



Kenneth Olden, Ph.D. • 1991-2005



David Schwartz, M.D. • 2005-2007



Linda Birnbaum, Ph.D. • 2009-Present

1969

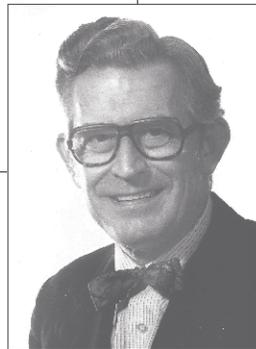


From left, Robert Marston, M.D., NIH director; Wilbur Cohen, HEW secretary; and Paul Kotin, M.D., NIEHS director, signing document elevating DEHS to NIEHS

January 12, 1969 – The division becomes an institute

The secretary of the U.S. Department of Health, Education, and Welfare (HEW) elevated the Division of Environmental Health Sciences (DEHS), making it the 10th institute of the National Institutes of Health (NIH), establishing environmental health as a biomedical research priority.

1971



March 1, 1971 – Rall becomes NIEHS director

David Rall, M.D., Ph.D., began his tenure as director. Over the course of the next 19 years, Rall led NIEHS into increasingly sophisticated molecular research, promoted the public health applications of toxicologic research, and expanded the institute's international presence in the field of environmental health sciences.

1972



April 1972 – NIEHS starts a science journal

Environmental Health Perspectives, a scientific journal supported by NIEHS, published its first issue. It evolved into a top-ranking, open-access, monthly journal in the fields of toxicology, environmental sciences, and public, environmental, and occupational health.



1972 – Pioneering studies show dangers of lead

Herbert Needleman, M.D., NIEHS grantee, led pioneering studies providing first clear evidence that lead, even at very low levels, could affect a child's IQ. Studies by other researchers established the role of low levels of lead in behavioral and neurological disorders. Institute support for continued research on the effects was key to establishing limits and, ultimately, bans on lead in gasoline for on-road vehicles and paint.²



"This newly created center, free of past encumbrances, could develop a new and imaginative pattern of university-government relations in the conduct of federal laboratories," predicted the National Environmental Health Advisory Committee, led by Rockefeller University President Detlev Bronk, Ph.D., in its April 1965 report.

Today, NIEHS integrates basic and clinical research, with a wide range of grant programs worldwide. Lee and other early advocates of environmental science might have found some of these initiatives novel and even surprising, but still entirely consistent with their perceptions of advancing medical research and education through a truly integrated, interdisciplinary approach to environmental health sciences.

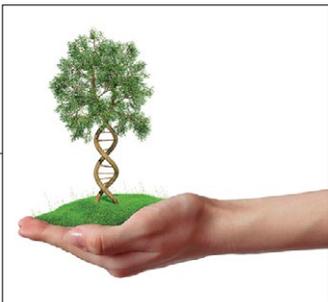
NIEHS programs support a broad range of basic and public health research, from noncommunicable chronic diseases, water quality, environmental justice, health disparities, genome stability, epigenetic mechanisms, development of cutting-edge personal exposure monitoring devices, and global climate change, to nurturing a diverse biomedical workforce and worker health and safety training program.

As different as these programs may seem, they have the common goal of understanding how the environment, in the broadest sense, impacts human health and well-being. It is easy to see how the diversity of research supported by NIEHS fits into the mission statement that appeared in the October 1965 Research Triangle Institute blueprint for the center.

1974

1974 – New research focuses on environmental mutagenesis

NIEHS established the Environmental Mutagenesis Branch, signaling the growing importance of research into the genetic variability and environmental interactions involved in the development of human cancers.



1975



1975 – Synthetic estrogen is linked to generational cancer

A study by NIEHS researchers found association between the synthetic estrogen diethylstilbestrol (DES) and cancer, as well as other health effects that have the potential to be passed down to future generations. DES was prescribed from 1938 to 1971 to prevent miscarriages and premature deliveries.³

1977



April 1977 – NIEHS gets a permanent facility

Construction of the permanent facility began on 509 acres in Research Triangle Park, North Carolina, and was completed in November 1982. Construction on an addition, housing another 245 labs and magnetic resonance imaging facility, began in 1992, and was dedicated October 29, 1996, as part of the NIEHS 30th anniversary celebration.

1978



November 15, 1978 – National Toxicology Program starts at NIEHS

The U.S. Department of Health, Education, and Welfare announced the establishment of the National Toxicology Program (NTP), an interagency program headquartered at NIEHS. NTP became the federal government's center for toxicology testing, and an information hub for potentially toxic chemicals.

“Its program will be directed to a better understanding of the complex, interrelated phenomena underlying the human body’s reaction to the increasingly wide range of chemical, physical, biological, and social environmental influences imposed by modern living, with the objective of developing the knowledge necessary for devising effective measures to protect man from environmental factors found to be harmful.”

Over the past half-century, each NIEHS director helped shape what the institute is today — the world’s premier environmental health sciences research center.

Because of a congressional mandate to locate the new environmental health sciences center at least 50 miles from the Washington-Baltimore Corridor, the Public

Health Service (PHS) narrowed its choices to the states of Ohio, West Virginia, and North Carolina. After a series of negotiations and compromises, a story that is interesting in its own right, in September 1967, PHS accepted a donation of 509.25 acres within the new Research Triangle Park in North Carolina.



Founding Director Paul Kotin, M.D., and his longtime colleague and then Associate Director for Laboratory Research Hans Falk, Ph.D., began assembling a scientific and administrative workforce, and planning for the construction of a temporary headquarters that would house some of the NIEHS programs for the next 30 years.

It is impressive how much was accomplished by a skeleton staff working from rented space and trailers at the original North Campus.

The division annual report for fiscal year 1968, which ran from July 1, 1967, to June 30, 1968, reported on startup efforts, including creating liaisons with universities in the Triangle — Raleigh, Durham, Chapel Hill, and the areas that surround them — and conducting some 31 research projects. Kotin and then Associate Director for Extramural Research Samuel Herman, D.D.S., Ph.D., developed the university-based environmental health center model that has anchored the institute’s grant-funded research ever since.

The next three years under Kotin’s direction saw the institute expand its grants fivefold and its internal research projects more than fourfold. By fiscal year 1971, the annual budget had grown to more than \$20 million.

1980



May 1980 – Collaborations with the World Health Organization

NIEHS hosted the first meeting of the Programme Advisory Committee of the World Health Organization (WHO) International Programme on Chemical Safety, reflecting the institute’s long-standing interest in global health and international collaborations. In 1981, WHO established an Interregional Research Unit at NIEHS.

1980 – NIEHS scientists earn toxicology diplomate certifications

Four NIEHS scientists were among the first group of toxicologists to achieve Diplomate of the American Board of Toxicology (DABT) certification, a high honor in the field of toxicology. The board was established to advance standards and confer recognition upon those members



of the profession who have shown exemplary knowledge and competence in the field.

1980 – NTP issues first Report on Carcinogens

In 1978, Congress mandated that the Secretary of the U.S. Department of Health and Human Services publish a report of all substances known, or reasonably anticipated, to be a hazard to people residing in the U.S. The first report was published by the National Toxicology Program (NTP) in 1980 and included 26 substances. In 2014, the 13th report was released with 243 listings.



1981



1981 – New grants for new researchers

NIEHS initiated the New Investigator Research Award program. It was the first in a long series of efforts to promote the advancement of early-career environmental health scientists. The most recent initiative, the Outstanding New Environmental Scientist (ONES) program, made its first awards in 2006.

1982

1982 – Pregnancy study gives insights on human fertility

The Early Pregnancy Study was launched, to determine how often pregnancy loss occurs before women know they are pregnant. The study provided a number of key insights into human fertility, and set the groundwork for studying the effects of environmental factors on human reproduction.



Establishing the credibility of NIEHS worldwide

After five years at the helm, in 1971, Kotin was succeeded by David Rall, M.D., Ph.D. Rall would spend 19 years as the head of the institute, building on the foundations established by Kotin, Falk, and other pioneers, while expanding the focus of NIEHS research scientifically and globally.

In 1972, NIEHS published the first issue of its journal Environmental Health Perspectives. The journal has become one of the leading environmental health journals in the world, with a Chinese edition and ties to scientific journals in South America and Central America.

That same year, Rall participated in the first United Nations Conference on the Human Environment, foreshadowing

the international collaborations he and his staff would form in the years to come. These global initiatives led to the World Health Organization designating NIEHS a Collaborative Centre for Environmental Health Effects in 1975.

One of Rall's premier accomplishments came in 1978, with the establishment of the National Toxicology Program (NTP) at NIEHS, with Rall as director. NTP brought together a collaboration of scientists at NIEHS, the National Cancer Institute, National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention, and U.S. Food and Drug Administration National Center for Toxicological Research.



1984

May 1984 – New grants to spur innovation

The first Small Business Innovation Research (SBIR) grant awards were issued. SBIR awards are used to fund research and development of innovative technologies, products, or services that improve public health.



1985



1985 – Research links secondhand smoke to cancer

NIEHS-funded studies explored the respiratory health effects of exposure to secondhand smoke, ultimately linking it to cancer. Subsequent National Toxicology Program studies led to listing it, along with tobacco smoking and use of smokeless tobacco products, in the 9th Report on Carcinogens.⁴

1987

1987 – Superfunding comes to NIEHS for hazard research and worker training

Congress directed Superfund money to NIEHS for the Superfund Basic Research Program, now Superfund Research Program (SRP), and Worker Education and Training Program, now Worker Training Program (WTP). SRP funding supports research on human health effects of hazardous substances and clean up of hazardous waste sites. WTP grants fund training of workers involved in handling hazardous waste or responding to emergency releases of hazardous materials. NIEHS works cooperatively with the U.S. Environmental Protection Agency, which also receives Superfund support.



1989



1989 – Genetically modified mouse models advance research

Since the first genetically modified mouse was created in 1989, researchers have used mouse models to investigate diseases. In 1993, NIEHS developed the estrogen receptor alpha knockout mouse, to better understand how natural estrogens work in the body and study endocrine disruption. In 2002, the cyclooxygenase knockout mouse helped advance cancer research. In 2014, National Toxicology Program scientists used the Diversity Outbred mouse to predict the range of responses to chemicals likely observed in human populations.

Under Rall, the planning and construction of a permanent headquarters for NIEHS got underway in 1977, and the first occupants moved into the building in 1982.

Building on the institute's earliest research efforts to identify and quantify chemical hazards in the environment, NIEHS scientific research began to influence regulatory decisions, such as restricting or banning the use of chemical pesticides.

The first congressionally mandated National Toxicology Program Report on Carcinogens was published in 1980, and included 26 substances known, or reasonably anticipated, to cause cancer in humans.

In 1987, what is now the Superfund Research Program was established at NIEHS, under the Superfund Amendments and

Reauthorization Act of 1986, as part of the Division of Extramural Research and Training, to support research on human health effects of hazardous substances and clean up of hazardous waste sites.

Also in 1987, the now Worker Training Program was initiated, to fund training of workers involved in handling hazardous waste and responding to emergency releases of hazardous materials.

When Rall retired in 1990, the NIEHS budget had grown to more than \$240 million, and the institute had earned international recognition as a leader in environmental health science research.

(continued on page 9)



David Rall and Congressman L.H. Fountain

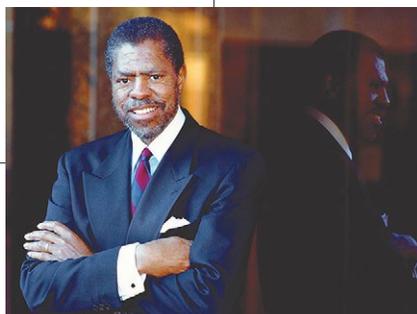
1990

1990 – NIEHS leads climate change efforts

The Global Change Research Act of 1990 designated the institute as a member of the U.S. Global Change Research Program Committee on Earth and Environmental Sciences, representing the U.S. Department of Health and Human Services. Over the years, institute scientists have played leading roles in better understanding the health effects of climate change.



1991



June 18, 1991 – Olden appointed NIEHS and NTP director

Kenneth Olden, Ph.D., began his 14-year tenure as director. Under his leadership, NIEHS developed programs in environmental justice, minority health and health disparities, toxicogenomics, environmental genomics, and children's environmental health. He also promoted alternative testing, as well as the development of a more diverse biomedical research workforce. As NIEHS director, Olden also served as director of the National Toxicology Program (NTP).

1993

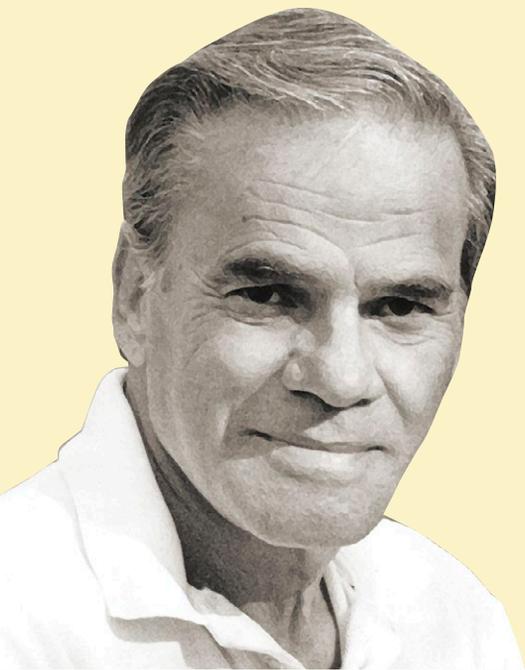
1993 – NIEHS begins clinical research, partners with local universities

In collaboration with the University of North Carolina at Chapel Hill and Duke University, Clinical Center South was formed, to support local clinical research and training in environmental health. In 2001, the NIEHS Environmental Autoimmunity Group was established at the National Institutes of Health Clinical Research Center in Bethesda, Maryland, and in 2009, NIEHS opened its own Clinical Research Unit on the NIEHS campus.



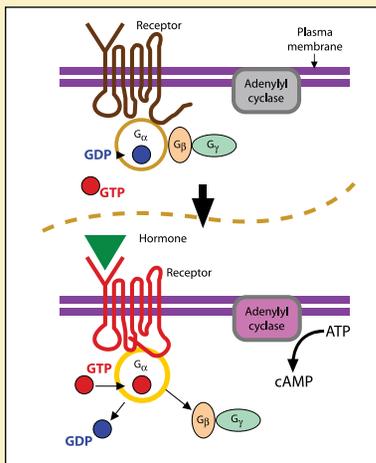
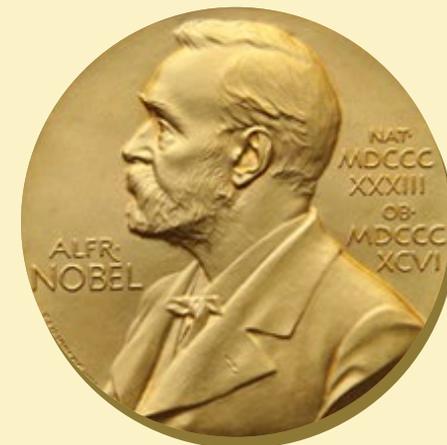
1993 – NIEHS-Harvard Six Cities Study prompts changes in Clean Air Act

The NIEHS-funded Harvard Six Cities Study found a strong association between exposure to fine particle air pollution and mortality in communities where air quality was within the U.S. Environmental Protection Agency standards. The findings led to other studies on the effects of air pollution on health, culminating in 1997 with new Clean Air Act regulations on fine particle pollution.⁵



Nobel Prize recipient Martin Rodbell

In 1994, Martin Rodbell, Ph.D., an NIEHS scientist emeritus and former scientific director, was awarded the highest honor a scientist can receive — the Nobel Prize in physiology or medicine. Rodbell and his colleagues discovered G-proteins and their role in signal transduction, which regulates the human body's cellular communication activities. The discovery informed us about hormone function. It also played a role in demonstrating how light and odors are perceived, how signals travel between neurons in the brain, and how some diseases affect the function of our vital organs.



1993

1993 – NIEHS leads committee to reduce animal testing

The Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) was established by congressional mandate, to reduce animal testing. ICCVAM is comprised of 15 U.S. federal agencies that use, generate, or disseminate toxicological and safety testing information. The National Toxicology Program (NTP) Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM) was created in 1998 to support ICCVAM.



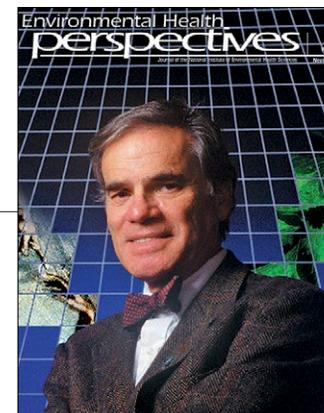
1993 – Agricultural Health Study begins

The Agricultural Health Study (AHS) began in 1993 to understand health impacts related to farming and, ultimately, to protect the health of farm families. More than 89,000 farmers and their spouses in Iowa and North Carolina have participated in the study. AHS found that farmers have a higher risk for developing some cancers, including prostate cancer, and that two pesticides, rotenone and paraquat, are linked to increased risk of developing Parkinson's disease. It was also found that chemically resistant gloves can reduce pesticide exposure 50-80 percent.⁶

1994

1994 – BRCA1 breast cancer gene is discovered

NIEHS and collaborators at the University of Utah pinpointed the BRCA1 gene, a gene that, when defective, is believed to be responsible for inheriting breast or ovarian cancer. BRCA1 produces tumor suppressor proteins, which help repair DNA damage. If the gene is mutated or altered, it may not function correctly, potentially leading to cancer.⁷



1994 – Rodbell wins Nobel Prize

Martin Rodbell, Ph.D., former NIEHS scientific director, was named co-recipient of the 1994 Nobel Prize in physiology or medicine, for discovery of G-proteins, which transmit signals between cells and regulate cellular communication.



Training the next generation of environmental health scientists

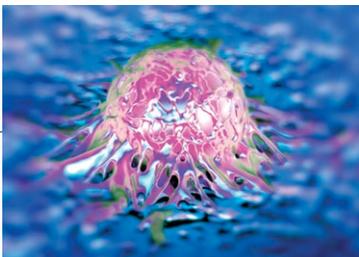
Training students and scientists in the field of environmental health sciences has always been a priority for NIEHS. Training is offered at all levels, from high school to mid-career, both on-site at NIEHS and at universities across the country.

- The institute has supported more than 6,000 individuals through its grants program since the late 1970s.
- Thousands of postdocs have been trained in NIEHS laboratories, with nearly 1,000 trained since 2000.
- Postdocs and other trainees rate NIEHS as the best place to work.
- The Superfund Research Program has trained approximately 1,800 environmental scientists.

1995

1995 – Prostate cancer suppressor gene is cloned

Researchers isolated and cloned a gene that suppresses the spread of prostate cancer. The KA11 gene is expressed in many human tissues. Gene expression is the process by which the information contained within a gene becomes a useful product. Decreased expression of the KA11 gene may be involved in the progression of prostate and other cancers.⁸

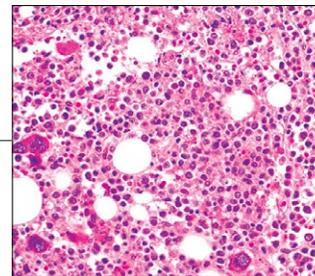


Prostate cancer cells

1996

1996 – Missing GSTT1 gene is linked to bone marrow disease

Scientists reported that people who are missing GSTT1, a form of the glutathione S-transferase gene, are more likely to develop myelodysplastic syndrome, a serious, often fatal, bone marrow disease. Researchers concluded that people missing the gene may be more susceptible to a variety of chemical-related diseases.¹⁰

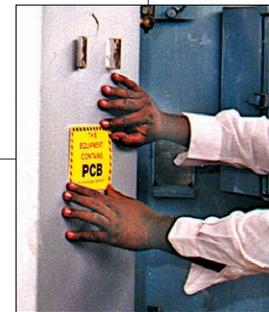


Microscopic view of bone marrow biopsy showing myelodysplastic condition



1996 – Laxative ingredient causes cancer

Phenolphthalein, a main component in over-the-counter laxatives, was found to cause ovarian and other cancers in laboratory rats and mice. Due to these findings, the compound was listed in the 9th Report on Carcinogens in 2000, and manufacturers removed it from their laxatives.⁹



1996 – Prebirth PCBs increase cognitive deficits

NIEHS-funded researchers found that children exposed to relatively small amounts of polychlorinated biphenyls (PCBs) before birth have higher rates of cognitive deficits, including lower IQ scores, poor reading comprehension, and memory problems.¹¹

1997

1997 – Methylmercury in seafood leads to developmental delays

Researchers reported children, whose mothers consumed methylmercury in seafood while pregnant, had developmental delays at age 7. Follow-up research found the effects were still present at ages 14 and 22.¹²





(continued from page 6)

Pushing for change and inclusion

Biostatistician David Hoel, Ph.D., left, served as acting director of NIEHS and the National Toxicology Program between the departure of Rall and the selection of cancer biologist Kenneth Olden, Ph.D., the first African-American to serve as the head of a National Institutes of Health (NIH) institute, in June 1991. Olden, who had been a lead researcher at the National Cancer Institute in the 1970s, was director of the Howard University Cancer Center, prior to his appointment as director of NIEHS.

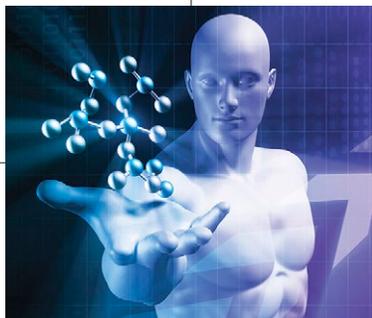
With a solid base of support from the leadership at NIH and the U.S. Department of Health and Human Services, Olden moved with determination to implement change at NIEHS and raise its profile within NIH. He talked of environmental justice and increased inclusion of programs

for women, children, and minorities. Olden advocated partnerships with industry for developing safer and more effective pharmaceuticals, and increased collaboration with the U.S. Environmental Protection Agency, which led to the creation of the first federal research centers for children's environmental health.

During the Olden years, NIEHS scientists made important strides in refining models for chemical testing and developing alternatives to the use of animals in testing. In late 1993, he was the keynote speaker at the first World Congress on Alternatives and Animal Use in the Life Sciences.

With these steps, NIEHS was laying the foundation for high-throughput, predictive toxicology testing, using automation and greater volumes of data, and refining models through genetic engineering. These efforts would also lead to two major initiatives — the Environmental Genome Project,

1997



1997 – Environmental Genome Project

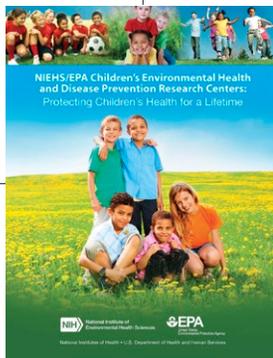
The Environmental Genome Project (EGP) advanced understanding of the influence of gene variations, or polymorphisms, on susceptibility to diseases from environmental exposures. The ultimate goal of EGP was to improve human health, by using the gene variations to identify at-risk populations.¹³

1997 – Bladder cancer is linked to IGF-1 hormone

Grantees found that low-calorie diets could slow the development of bladder cancer in mice, by reducing a key hormone, insulin-like growth factor 1 (IGF-1). The research established the role of caloric restriction in the prevention of certain cancers, and identified IGF-1 as a key risk factor in the development and progression of bladder cancer.¹⁴



1998



1998 – NIEHS-EPA start Children's Environmental Health Centers

NIEHS and the U.S. Environmental Protection Agency (EPA) announced joint funding for the establishment of Children's Environmental Health Centers. The program connects basic scientists, social scientists, pediatricians, public health professionals, and community organizations for research to improve the health and environment of children.¹⁵

1998 – Researchers find lead in breast milk

An NIEHS-funded, long-term study of mothers and their babies found that lead, accumulated in women's bones, can be released during pregnancy and contaminate breast milk during lactation, putting the infant at risk.¹⁶



1999



1999 – Teen smoking alters DNA, increases lung cancer

A grant-funded study determined that smoking during adolescence may alter DNA, increasing the risk of lung cancer years later, even after smokers quit.¹⁷

with its focus on gene-environment interactions and mixtures, and the National Center for Toxicogenomics, with its focus on gene expression.

Olden also led a reorganization of the NIEHS Division of Intramural [internal] Research and Division of Extramural [grants] Research and Training, to encourage greater interdisciplinary collaboration. Under his leadership, the institute began work on a strategic plan, Vision for the Future, released in January 1994. It was the first complete strategic plan since the original 1965 document outlining the mission and function of the first national center for environmental health sciences.

Important elements of the strategic plan included outreach, communication, bioethics, a greater commitment to global environmental health, and a broader definition of what the environment entails.



From left, Kenneth Olden, Carl Barrett, Roger Wiseman, and Andrew Futreal after the BRCA1 breast cancer gene discovery.

Olden's management style of outreach led to town hall meetings and community forums. His strong commitment to environmental justice dovetailed nicely with former President Bill Clinton's 1994 executive order directing federal agencies to develop an environmental justice strategy. Also, addressing minority needs led to promoting diversity in the scientific workforce.

As NIEHS developed programs addressing health and environmental inequities, scientists affiliated with, and funded by, the institute were making important discoveries. These included the discovery of a breast and ovarian cancer gene, identifying a prostate cancer suppressor gene, cloning of DNA in yeast cells, linking a combination of two pesticides to Parkinson-like symptoms, and unraveling the effects of the protein beta-amyloid peptide on brain signaling in Alzheimer's disease.

In 2001, the NIEHS role in disaster response made news in the wake of the World Trade Center attack. The response included a mobilization of Worker Training Program resources, initiation of long-range studies, and follow-up research by the Superfund Research Program and NIEHS grant-funded Environmental Health Sciences Research Centers.

By the end of Olden's tenure, the NIEHS budget had more than doubled.

1999

1999 – Aflatoxin causes liver cancer

NIEHS-funded researchers identified the mechanism by which aflatoxin causes liver cancer. Aflatoxin is a toxin produced by certain molds found on crops, such as corn and peanuts.¹⁸



2000

2000 – National Center for Toxicogenomics provides gene expression data

NIEHS launched the National Center for Toxicogenomics (NCT). The mission of the center was to develop a genome-wide gene expression data reference system and knowledge base of chemical effects in the body. To reach the NCT goals, the Toxicogenomics Research Consortium was established in 2001.²⁰



2000 – Air pollution is linked to many causes of death

Grantee research added to the growing body of evidence that exposure to air pollution is associated with death from all causes, including cardiovascular and respiratory diseases. The research strengthened the argument for maintaining air quality standards.¹⁹

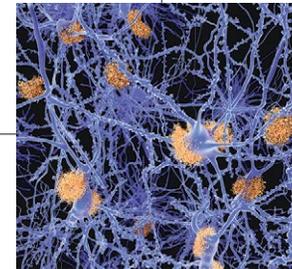


DNA microarray

2001

2001 – Dust mites in bedding cause allergies and asthma

The NIEHS-sponsored National Survey of Lead and Allergens in Housing, conducted in collaboration with the U.S. Department of Housing and Urban Development, found that about 23 million homes had bedding that contained dust mite allergen at levels associated with the development of allergies or asthma. Subsequent studies led to preventive strategies to reduce symptom severity.²²



Neuron network with amyloid plaque, seen in Alzheimer's disease

2001 – Alzheimer's protein disrupts brain signals

NIEHS researchers discovered that a protein, beta-amyloid peptide, found in people with Alzheimer's disease, can disrupt brain signals that may contribute to memory loss.²¹



Illustration of dust mite, as if seen through a microscope



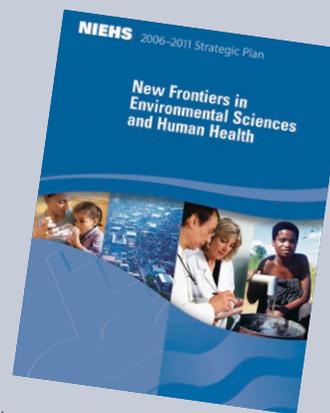
Refining the NIEHS focus on environmental health

When Olden decided to resign in 2003, the National Institutes of Health launched a search that resulted in the appointment of David Schwartz, M.D., then director of the Division of Pulmonary, Allergy, and Critical Care Medicine at Duke University.

Schwartz had been an NIEHS grantee since 1990, and played a major role in the development of three interdisciplinary centers at Duke University. He was a widely respected physician-scientist and, unlike his predecessors, a practicing medical doctor with a strong commitment to expanding clinical research at NIEHS.

Shortly after his arrival, Schwartz began the process of creating a strategic plan that reflected emphasis on basic science, disease-oriented research, global environmental health, and training the next generation of environmental health scientists.

During his tenure as director, Schwartz promoted new programs to support early-career environmental scientists, expanded clinical research, increased the scope of respiratory biology research, advanced exposure biology and the study of gene-environment



interactions, and strengthened efforts to understand epigenetics, as well as the health effects of nanotechnology.

An obstacle to implementing the strategic plan vision was a decline in budget for fiscal years 2006 and 2007, following a significant increase in fiscal year 2005. In August 2007, Schwartz left NIEHS to take a position at National Jewish Health in Denver.

2001

September 11, 2001 – Research becomes a disaster response

NIEHS responded to the World Trade Center attack with funding for training workers, assessing exposures, and conducting outreach. The lessons learned from the disaster helped shape later responses by NIEHS, following Hurricane Katrina, Superstorm Sandy, and the Gulf oil spill.



2001 – Fathers' birth defects can pass to their kids

After analyzing more than 450,000 birth records, researchers discovered that men with birth defects had a higher risk of passing that defect on to their children.²³

2002

2002 – Research refutes suspected link between DDT, PCBs, and breast cancer

Data from five large studies of women in the northeastern U.S. revealed no link between exposure to the pesticide DDT and the widespread industrial chemical polychlorinated biphenyls (PCBs), and elevated rates of breast cancer.²⁴



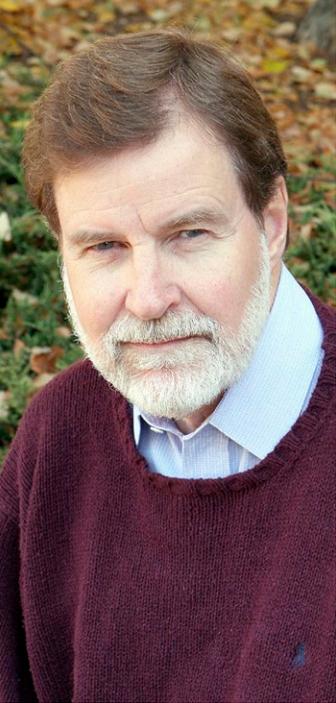
2002 – NIH creates an autism research network

In response to the Children's Health Act of 2000, the Studies to Advance Autism Research and Treatment network was established. Comprised of five National Institutes of Health (NIH) institutes, including NIEHS, each center contributes to the autism research base in the areas of causes, diagnosis, early detection, prevention, and treatment.

2002 – Sister Study starts, enrolls 50,000 sisters of breast cancer victims

Recruitment began for the Sister Study, a long-term study of women whose sisters had breast cancer. The study focused on uncovering environmental and genetic factors that influence breast cancer risk. Because of shared environment, genes, and experiences, studying sisters provides a greater chance of identifying risk factors for breast cancer. More than 50,000 women had joined the study by 2009.²⁵





Interim leadership

NIEHS Deputy Director Samuel Wilson, M.D., was named acting director twice, after Kenneth Olden and David Schwartz stepped down.

Wilson provided strong support for NIEHS programs in genomics and environmental public health. During his tenure, he increased support for basic research in the NIEHS Division of Intramural Research and strengthened ties with the NIEHS extramural community through a series of site visits to grantees throughout the U.S.

During the winter of 2007-2008, Wilson increased NIEHS participation in global environmental health and climate change partnerships at the national and

international levels, and represented NIEHS leadership at a special annual meeting of the NIEHS Superfund Research Program, marking its 20th anniversary, in December 2007.

In February 2008, Wilson signed a memorandum of understanding between NIEHS/National Toxicology Program (NTP), the U.S. Environmental Protection Agency, and the National Institutes of Health (NIH) Chemical Genomics Center at the National Human Genome Research Institute, establishing Tox21, a program aimed at improving toxicity testing methods to enable faster and more efficient evaluation of a chemical's effects on human health.

Also in 2008, with his encouragement, the NIEHS Division of Extramural Research and Training initiated

the innovative Partnerships for Environmental Public Health program, a network of scientists, community members, educators, health care providers, public health officials, and policymakers who share the goal of increasing the impact of environmental public health research at the local, regional, and national levels.

In November 2008, Wilson joined leaders of NTP to celebrate the program's 30 years of accomplishments.

Wilson was widely respected for his leadership and scientific research among colleagues, stakeholders, and leaders at NIH.

When Linda Birnbaum, Ph.D., was chosen as the new NIEHS director in 2009, Wilson decided to devote himself to research full time, instead of returning to his role as deputy director.

2002

2002 – High ozone leads to more asthma in children

Grantee research found that children who played outdoor sports in areas with high levels of ozone may be three times more likely to develop asthma.²⁶

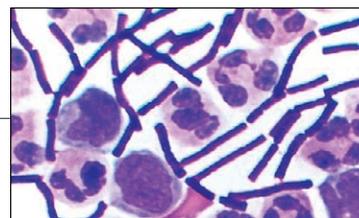


2002 – Liver enzyme variants can hinder drug metabolism

NIEHS scientists linked genetic variants in human liver enzymes with poor metabolism of some therapeutic drugs. Two of the variants were later linked to decreases in metabolism of drugs used to prevent blood clots. This sometimes caused dangerous or fatal bleeding in patients, leading to a boxed warning on Plavix (clopidogrel), an anti-clotting medication.²⁷

2002 – Anthrax destroys protective cells

Grantee research, spurred by anthrax attacks in late 2001, found that anthrax secretes a protein called lethal factor that quickly spreads throughout the body destroying cells that help protect the immune system. Anthrax prevents the secretion of signaling proteins that alert the immune system to the presence of the pathogen, promoting its undisturbed spread toward systemic infection. This may explain why anthrax infections proceed nearly undetected until the patient is very sick and near death.²⁸



Anthrax bacteria (purple rods) in cerebrospinal fluid



2002 – Agent Orange agreement signed with Vietnam

NIEHS signed a joint agreement with Vietnam outlining the framework for research into the health effects of exposure to the herbicide Agent Orange.²⁹



2002 – Small particle air pollution is linked to secondhand smoke

NIEHS-funded researchers found that long-term exposure to high concentrations of small particle air pollution, common to many metropolitan areas, increased risk of death from cardiopulmonary disease and lung cancer. The risk was comparable to prolonged exposure of nonsmokers to secondhand tobacco smoke.³⁰



Leading from a fresh perspective

Linda Birnbaum, Ph.D., is the first toxicologist and first woman to serve as director of NIEHS and the National Toxicology Program. A veteran federal employee, she previously worked at NIEHS as a fellow and lead researcher, before moving to the U.S. Environmental Protection Agency in 1989, where she served as director of the Experimental Toxicology Division.

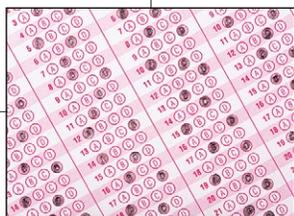
Birnbaum was welcomed enthusiastically by staff during her first all-hands meeting in February 2009. Many in the audience had known her during her early years at NIEHS, and others had collaborated with her as she studied environmental exposures and endocrine-disrupting chemicals, especially those found in fire retardant compounds.

Birnbaum enjoyed an influx of additional money for grants funding later that year, with the passage of the American Recovery and Reinvestment Act, an economic stimulus package aimed at helping the country rebound from the recession of 2008. With the additional money, NIEHS was able to fund the first awards for research on the health impacts of climate change, make supplemental awards to existing grantees, and support programs in the areas of bisphenol A and nanomaterial safety.

One of Birnbaum's first priorities as director involved replacing acting members of the institute's leadership team with permanent appointments. These key positions included the director of the Division of Extramural Research and Training, deputy director of NIEHS, and NIEHS scientific director. Birnbaum also opened a new clinical research unit in 2009.

2003

2004



2003 – Lead lowers IQ

NIEHS grantees found that IQ scores were lower for children with blood lead levels at 10 micrograms/deciliter (ug/dl) than children with levels at 1 ug/dl. The study also found that as blood lead increased from 10 to 30 ug/dl, there was less of a decline in IQ scores, indicating that more damage occurred near the 10 ug/dl level. Continuing research has shown that there is no safe level for lead.³¹

2003 – Dietary supplements change developing epigenome

Grantees found that folic acid, vitamin B12, choline, and betaine, long presumed to be beneficial dietary supplements for pregnant women, may impair development of epigenetic gene regulation in humans.³²



2003 – New research centers focus on breast cancer and the environment

NIEHS and the National Cancer Institute established the Breast Cancer and the Environment Research Program, which funded grantees to study how environmental exposures may predispose a woman to breast cancer.³³

2003 – Cadmium inactivates cell repair

Researchers determined that the heavy metal cadmium, found in food, tobacco smoke, batteries, and other products, can inactivate an important cellular repair system, leading to mutations that can alter DNA, potentially leading to disease.³⁴



2004 – DNA collection starts new registry

NIEHS launched the Environmental Polymorphisms Registry, a long-term research project to collect DNA samples from up to 20,000 individuals in the North Carolina Triangle region. The samples are still used by scientists to look for genes that may be linked to common diseases.³⁵

Additionally, Birnbaum expanded the NIEHS presence at the National Institutes of Health (NIH) headquarters in Bethesda, Maryland, with the appointment of a senior advisor for public health, senior medical advisor, and toxicology liaison.

Addressing concerns of an NIH audit, Birnbaum also recruited a nationally respected ethics officer, who revitalized the NIEHS ethics program and helped it become an award-winning model for ethical compliance.

In an important organizational move, Birnbaum elevated the National Toxicology Program (NTP) to division status in 2011, clarifying the relationship between NTP, the Division of Intramural Research, and the Division of Extramural Research

and Training. Under her leadership, NTP has significantly advanced predictive toxicology through involvement in the Tox21 partnership with the U.S. Environmental Protection Agency, National Center for Advancing Translational Sciences, and U.S. Food and Drug Administration, its newest member. NTP also expanded international partnerships to promote alternatives to animal testing for product safety.

In 2011 and 2012, Birnbaum led the development of the 2012-2017 NIEHS Strategic Plan — Advancing Science, Improving Health: A Plan for Environmental Health Research — a collaborative effort with stakeholders to map the future direction of NIEHS.



From her first day on the job, Birnbaum was a high-profile leader and recognized authority on environmental health science, traveling throughout the world, forging global alliances, and promoting environmental public health.

She used international forums to showcase NIEHS research on endocrine disruption, sustainability, indoor air pollution, climate change, and dioxins, among others.

2004



2004 – Leg bone lead indicates high risk for cataracts

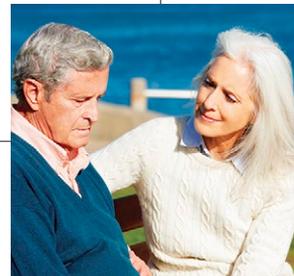
Grant-funded research found that men with high levels of lead in the tibia, or shinbone, had a 2.5-fold increased risk for cataracts. Lead is a naturally occurring element that can remain in the body for long periods of time and is often stored in bones.³⁶

2004 – Red tide compounds clear airways

Grantees discovered two compounds, derived from red tide, that improve the flow of mucus through the respiratory tract, allowing airways to clear more quickly and efficiently. The discovery may lead to treatments for cystic fibrosis and other similar lung conditions.³⁷



Red tide (courtesy of NOAA)



2004 – Brain protein blocks progression of Alzheimer's

NIEHS-funded researchers identified a brain protein, transthyretin, which may block the progression of Alzheimer's disease by inhibiting the effects of another protein, beta-amyloid peptide.³⁸

2004 – Stress hormones and signaling proteins work jointly as inflammation regulator

Researchers identified a unique cooperative role for glucocorticoids, hormones that produce an array of effects in response to stress, and tumor necrosis factor alpha, proteins involved in cell signaling, in regulating adaptive immunity and inflammation. Inflammation has been implicated as a contributing factor in several human cancers.³⁹

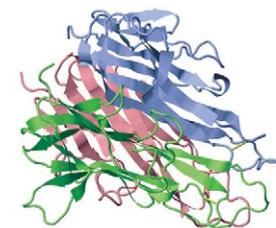
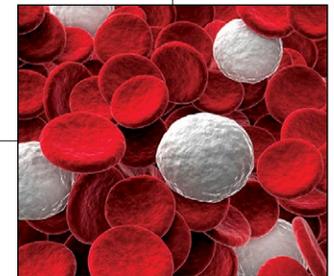


Illustration of tumor necrosis factor alpha



2004 – Benzene reduces blood cell counts

Grantees found that benzene, at or below the U.S. occupational standard, can significantly reduce white blood cell and platelet counts. Benzene is used to make consumer products, such as plastics, detergents, drugs, and pesticides. Benzene-exposed workers with certain genetic variants may be especially susceptible to benzene toxicity.⁴⁰

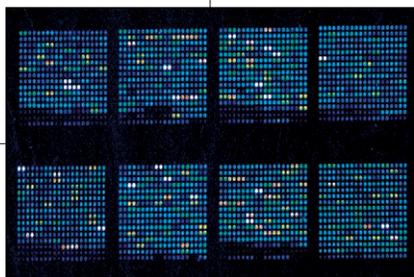


Domestically, Birnbaum increased the number of community forums around the country, and made special efforts to reach out to tribal groups. She testified before congressional committees and subcommittees on the pressing need to reform government regulation of chemicals. She hosted visits to NIEHS by directors of other institutes, and widened the scope of collaborations at the National Institutes of Health and across the government.

Within NIEHS, Birnbaum was known for her environmental advocacy, celebration of the accomplishments of women and minorities, and efforts to attend as many lectures and grantee meetings as her busy schedule would allow. Following her example, NIEHS has become even more public health-oriented, prevention-conscious, and interdisciplinary-focused. One of her major efforts within the institute was encouraging One NIEHS, where all divisions work together in a more collaborative and coordinated approach toward a common goal.

In 2016, Birnbaum will have served as a federal employee for 37 years, and as the NIEHS and National Toxicology Program director for more than seven, leaving a lasting impression on the institute and the field of toxicology.

2005



2005 – Microarrays yield better results

Researchers found that using a standardized process and commercially manufactured microarrays, or gene chips, yielded the best reproducible testing results for seeing how differences in gene expression are linked to specific conditions. This may allow for earlier detection of diseases, such as cancer.⁴¹

2005 – Altered TLR4 gene produces more tumors

Researchers found that mice prone to lung cancer, and with an altered or deleted gene known as toll-like receptor 4 (TLR4), had about 60 percent more tumors than mice with an intact receptor. TLR4 plays an important role in immune function and may also suppress chronic lung inflammation and tumor development.⁴²



2005 – Artificial light stimulates breast tumor growth

NIEHS-funded research showed that nighttime exposure to artificial light can stimulate breast tumor growth by suppressing the hormone melatonin. Extended periods of nighttime darkness were shown to greatly slow the growth of these tumors.⁴³

2005 – Fertility drugs need estrogen receptor gene

Researchers found that fertility drugs may be ineffective for women who lack a gene called estrogen receptor beta. The study showed that the drugs did not improve ovulation rates in mice that lacked the gene, indicating women who do not have this receptor may benefit more from alternative infertility treatments.⁴⁴



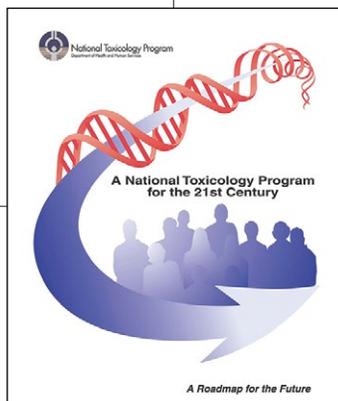


Early-life exposure and windows of susceptibility

Research supported by NIEHS has found that environmental exposures while in the womb, and diet or stress levels of pregnant mothers, may make individuals more susceptible to diseases later in life. It has also been discovered that there are critical periods of vulnerability in the developmental process. This is when there is rapid cell and tissue growth, and the body is still without a fully working immune system, blood-brain barrier, DNA repair system, or detoxification system to rid the body of contaminants, making the timing and duration of environmental exposures critical. Other developmental windows of susceptibility, such as puberty, are being studied as potential contributors to diseases, such as breast cancer. NIEHS is committed to further research, to fully understand the links between early environmental exposures and adult diseases.

2005

2006



2005 – NTP announces plan to maximize impact on public health

A plan to maximize the NTP impact on public health, “A National Toxicology Program (NTP) for the 21st Century: A Roadmap for the Future,” was released. It outlined a strategy to move toxicology from an observational science to a predictive science.⁴⁵

2005 – NIEHS hosts obesity conference

A conference sponsored by NIEHS, Environmental Solutions to Obesity in America’s Youth, brought together more than 700 national and community leaders and researchers to determine how a child’s environment can increase the risk for obesity, and to identify ways the environment can be changed to address this health epidemic.⁴⁶



May 22, 2005 – Schwartz is named director

David Schwartz, M.D., began his tenure as director. Under his direction, NIEHS made its first Outstanding New Environmental Scientist (ONES) awards to promising early-career researchers. Other new programs were also launched, including the Exposure Biology Program and the Disease Investigation Through Specialized Clinically Oriented Ventures in Environmental Research (DISCOVER).

2006 – PON1 gene breaks down insecticides

NIEHS-funded research found that a gene known as paraoxonase 1 (PON1) plays a critical role in breaking down organophosphate insecticides. The activity level of PON1 during pregnancy and early-life development may influence the risk associated with pesticide exposure.⁴⁷





Disaster research response

Biomedical research can play a critical role in the response to public health emergencies, such as natural disasters, disease epidemics, or terrorism. Based on lessons learned from the World Trade Center attack, the Gulf oil spill, Hurricane Katrina, Superstorm Sandy, and other similar disasters, NIEHS and the National Library of Medicine established the National Institutes of Health Disaster Research Response (DR2) program, to enhance the timely collection of human data during disasters. During a disaster, data needs to be gathered as soon as possible, often under difficult circumstances.

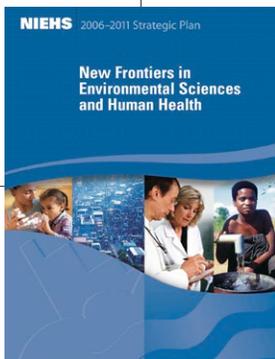
The DR2 program includes more than 165 tools and other information to help disaster science researchers safely carry out an immediate research response. It includes ready-to-go research data collection tools, research protocols, and a network of trained responders.

Also, as part of this effort, NIEHS conducts tabletop disaster response exercises in communities around the country that bring together public health and preparedness officials, scientists, community leaders, law enforcement, and others, to train for disaster events. Exercises have been held in Los Angeles, Houston, and Boston, and more will be conducted.

2006

2006 – Mouse genome sequencing is completed

NIEHS and other researchers sequenced, or mapped, the DNA of 15 mouse strains most commonly used in biomedical research. More than 8.3 million genetic variations, or single nucleotide polymorphisms, were discovered among the genomes of the 15 strains. The data was made available to the public and is still being used today.⁴⁸

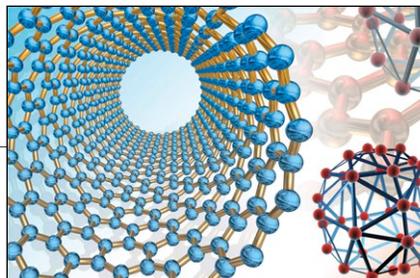


2006 – NIEHS releases strategic plan

The institute released a five-year strategic plan, “New Frontiers in Environmental Sciences and Human Health,” aimed at challenging and energizing the scientific community to use environmental health sciences to understand the causes of disease and improve human health.⁴⁹

2006 – Nanomaterials task force starts with NIH support

The National Institutes of Health (NIH) launched the NIH Nano Task Force, with NIEHS taking a lead role. Nanomaterials are about 100,000 times smaller than a single strand of hair and are used in many consumer and medical products. In 2009, NIEHS provided significant grantee funding to study the health effects and safety of nanomaterials. NIEHS continues to play a leadership role in the National Nanotechnology Initiative and oversees a nanohealth-focused consortium of researchers.^{50, 51}



2007



BPA is found in many products, including #7 plastics

2007 – Researchers announce consensus on bisphenol A

An expert panel of NIEHS scientists, grantees, and collaborators issued the Chapel Hill consensus statement on potential health effects of exposure to bisphenol A (BPA), sparking an increase in research on its endocrine-disrupting effects. The panel concluded that current levels of BPA in people, which average 1-2 nanograms/milliliter, are higher than what is needed to cause harm in animals, and that the safe dose established by the U.S. Environmental Protection Agency needs to be lowered.⁵²

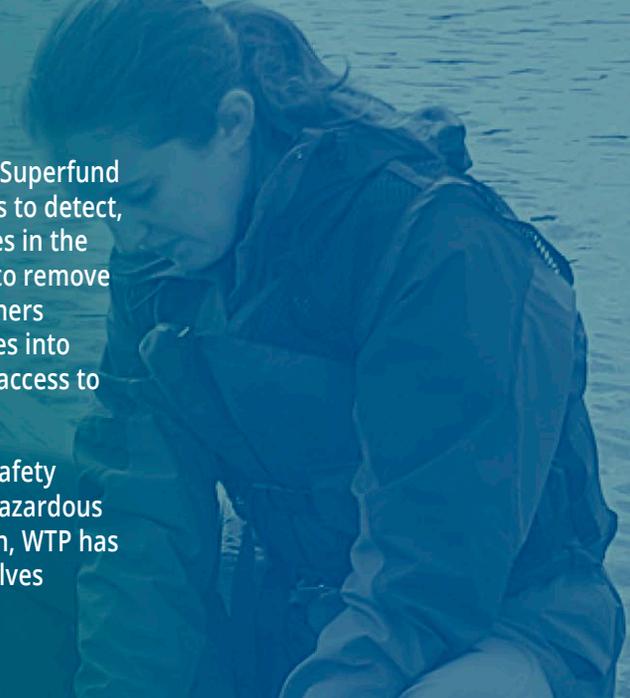
Superfund Research and Worker Training Programs

Recognizing the threat posed by dangerous chemicals and other pollutants left in toxic waste dumps nationwide, Congress created the landmark Superfund program in 1980 to clean up waste sites. In 1987, the NIEHS Superfund Research Program (SRP) and the Worker Training Program (WTP) were created under the Superfund Amendments and Reauthorization Act of 1986, to develop innovative tools for cleaning up harmful waste faster, cheaper, and more effectively, and to provide safety training to workers who do the cleanup.

SRP funds grants on basic biological, environmental, and engineering processes, to find real solutions to hazardous waste, such as industrial solvents, arsenic, lead, and mercury,

which can cause death, disease, and birth defects. Superfund grantees have developed cost-effective approaches to detect, remove, and reduce the amount of toxic substances in the environment. Some grantees have used microbes to remove uranium from nuclear waste and groundwater. Others have been able to transform vacant brownfield sites into community gardens that are helping families gain access to fresh fruits and vegetables.

WTP provides health education and occupational safety training to workers who are involved in handling hazardous waste or responding to emergencies. Since it began, WTP has trained nearly 3 million workers to protect themselves and communities.



2007

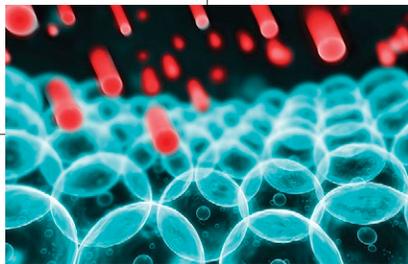


Illustration of free radicals

2007 – Free radicals bond and persist

Grantees found that environmentally persistent free radicals can be formed during combustion and bond to the surface of fine air pollution particles, allowing them to persist almost indefinitely in the environment. Fine particle air pollution has been linked to lung, cardiovascular, and other diseases.⁵³

2007 – Hexavalent chromium causes cancer

A National Toxicology Program study found that hexavalent chromium in drinking water caused cancer in lab animals. Hexavalent chromium is used in electroplating, leather tanning, textile manufacturing, and other processes, and can be found in water, air, and soil.⁵⁴



2008



February 2008 – Tox21 robots do high-speed screening

NIEHS/National Toxicology Program and the National Institutes of Health Chemical Genomics Center, now the National Center for Advancing Translational Sciences, formed a partnership with the U.S. Environmental Protection Agency to advance the state of toxicity testing using high-speed, automated screening robots. The U.S. Food and Drug Administration became a member of the Tox21 partnership in July 2010.⁵⁵

2008 – NTP has some concern for health effects of bisphenol A

The National Toxicology Program (NTP) report on bisphenol A (BPA), a chemical used to make plastics, found some concern for effects on development of the prostate gland and brain, and for behavioral effects in infants and children. The NTP report was part of a larger review of scientific literature on the then current human exposures to BPA.⁵⁶





Engaging communities in environmental health

NIEHS recognizes that communities across the country have concerns about environmental hazards in their neighborhoods, and how those hazards affect their health and the health of their children. For these reasons, NIEHS has had a long history of making sure communities play an integral part in the research process.

A community-based approach allows residents to share their knowledge on local environmental health issues.

There are many examples that illustrate the NIEHS commitment to supporting this collaborative approach,

from the community forums held across the country, to efforts encouraging communities and scientists to work together on environmental public health research. The Partnerships for Environmental Public Health (PEPH) program, which began in 2008, provides opportunities for scientists, community members, educators, health care providers, public health officials, and policymakers to work together in all stages of research, including evaluation of research discoveries and dissemination of information to the public.

2009

January 18, 2009 – Birnbaum is first female director

Linda Birnbaum, Ph.D., began her tenure as director. She was the first female scientist and toxicologist to serve as director of NIEHS and the National Toxicology Program (NTP). She was also the first director who completed a fellowship at NIEHS and worked as a scientist in NTP.

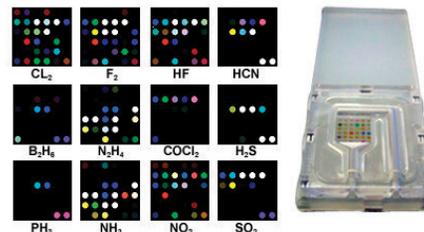


2009 – Air with PAHs can result in kids with lower IQs

NIEHS-funded research found that a mother exposed to polycyclic aromatic hydrocarbons (PAHs) while pregnant may result in children with lower IQs, a deficit that could affect success in school. PAHs are released into the air from incomplete burning of oil, gas, garbage, or other organic substances.⁵⁷

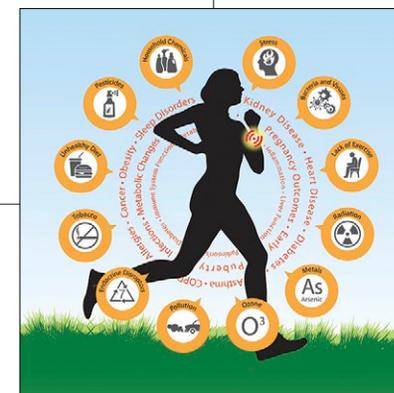
2009 – Personal sensors detect toxicants

As part of the National Institutes of Health Genes, Environment, and Health Initiative, researchers were tasked to develop small, wearable electronic sensors that could detect high exposures to toxic chemicals that pose serious health risks in the workplace or through accidental exposure. As part of the effort, grantees developed a disposable 36-dye sensor array that changes colors when exposed to different chemicals.⁵⁸



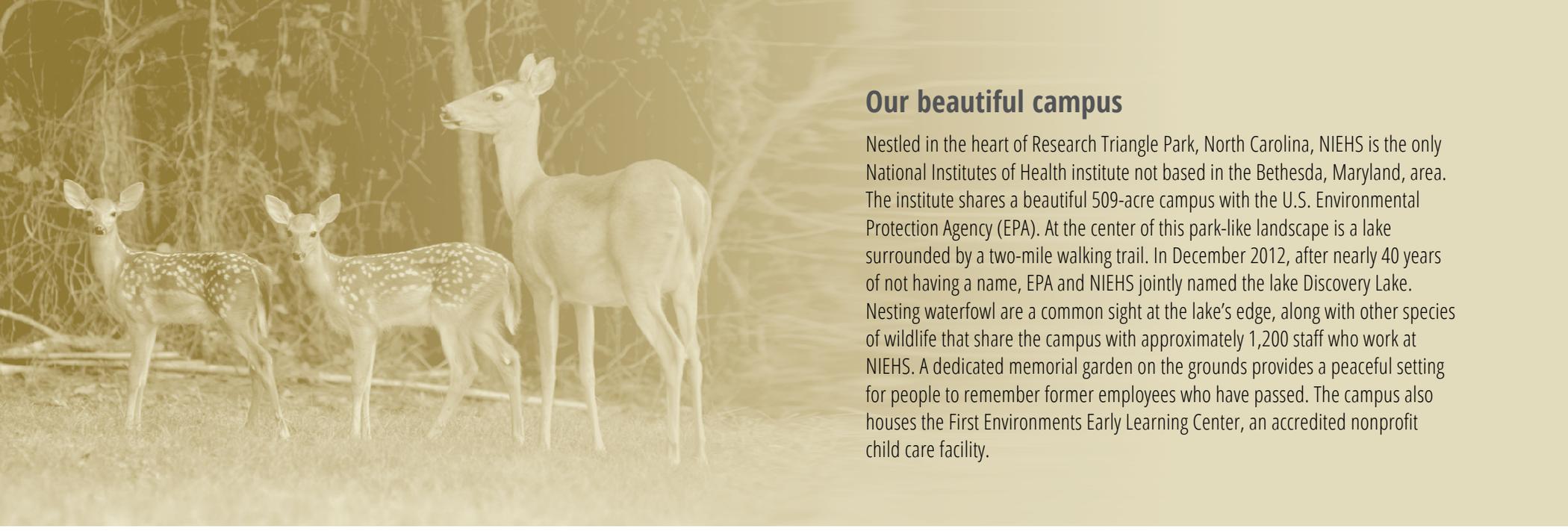
A postage stamp-sized optical sensor array for toxic gases, showing the color changes associated with a few representative poison gases

2010



2010 – Exposome research leads to new approaches

Grantees published a paper on a new research approach, using blood samples, for evaluating the exposome, the total of all exposures over a lifetime. Studying the exposome may lead to improved understanding of how complex mixtures impact human health and discovery of key exposures responsible for chronic diseases.⁵⁹



Our beautiful campus

Nestled in the heart of Research Triangle Park, North Carolina, NIEHS is the only National Institutes of Health institute not based in the Bethesda, Maryland, area. The institute shares a beautiful 509-acre campus with the U.S. Environmental Protection Agency (EPA). At the center of this park-like landscape is a lake surrounded by a two-mile walking trail. In December 2012, after nearly 40 years of not having a name, EPA and NIEHS jointly named the lake Discovery Lake. Nesting waterfowl are a common sight at the lake's edge, along with other species of wildlife that share the campus with approximately 1,200 staff who work at NIEHS. A dedicated memorial garden on the grounds provides a peaceful setting for people to remember former employees who have passed. The campus also houses the First Environments Early Learning Center, an accredited nonprofit child care facility.

2010

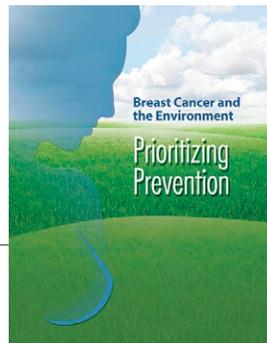


2010 – Climate change emerges as a health concern

An NIEHS-led interagency report, “A Human Health Perspective on Climate Change,” was released, identifying 11 broad human health categories likely to be affected by climate change. The report emphasized the need for research on human health outcomes, rather than the environmental impacts of climate change.⁶⁰

2010 – Breast cancer report makes seven recommendations

In response to the Breast Cancer and Environmental Research Act of 2008, the Interagency Breast Cancer and Environmental Research Coordinating Committee was established, in collaboration with the National Cancer Institute, to review all federally funded breast cancer research efforts. In 2013, the group made seven recommendations for addressing the environmental causes of breast cancer, with prevention being the number one priority.^{61, 62}



2012



April 4, 2010 – NIEHS responds to Gulf oil spill

The Deepwater Horizon oil rig exploded, spilling millions of barrels of oil into the Gulf of Mexico. An immediate response was launched by the NIEHS Worker Training Program, which trained about 150,000 workers on safe cleanup procedures. Within months, NIEHS initiated the GULF STUDY to learn more about the health effects on thousands of cleanup workers and volunteers exposed during the spill.⁶³

2012 – Arsenic cancer cells recruit stem cells

Researchers discovered that arsenic-induced cancer cells can recruit nearby healthy stem cells, transforming them into cancer stem cells. In 2014, the researchers also found that low doses of arsenic can cause lung tumors. In 2015, another group of researchers found low-level arsenic was associated with early puberty and obesity.⁶⁴



History of the NIEHS logo

Former NIEHS and National Toxicology Program Director Kenneth Olden, Ph.D., was a driving force behind a number of important changes at the institute during his 14-year tenure from 1991 to 2005. One of the most visible was the development of the first consistent NIEHS logo in 1993. The logo depicted an individual surrounded by air, water, earth, and the built environment — all part of the NIEHS research mission.

Olden said he was motivated by a desire to increase the institute's visibility in both the scientific community and among the public. He asked the National Institutes of Health (NIH) Medical Arts and Photography Branch to create several concepts

for the logo, which were voted on by the NIEHS Executive Committee. The winning concept was created by Linda Brown, then head of the NIH Medical Arts Design Section. The logo was used on official publications, business cards, posters, and slides for two decades.

In 2013, a new logo was created to strengthen public recognition of NIH and its many contributions.

Interestingly, NIH did not have a logo until 1969, as the result of a 1965 President's NIH Study Committee recommendation to increase visibility with the public. Prior to then, NIH had been viewed as the laboratory arm of the U.S. Public Health Service (PHS), and NIH publications used the PHS seal or logo of the U.S. Department of Health, Education, and Welfare.



2012



2012 – NIEHS releases new strategic plan

NIEHS published a five-year strategic plan, "Advancing Science, Improving Health: A Plan for Environmental Health Research." With the help of stakeholders, 11 goals and six strategic themes emerged as priority areas for the institute and field of environmental health research.⁶⁵

2013



September 2013 – NIEHS becomes a WHO Collaborating Centre

NIEHS was designated a World Health Organization (WHO) Collaborating Centre for Environmental Health Sciences, advancing the more than three decades-long collaboration between the two organizations. The centre continues to focus on children's environmental health, climate change and human health, developmental origins of health and disease, e-waste, and indoor air pollution.⁶⁶

2014

January 2014 – NTP does tox testing after chemical spill

About 10,000 gallons of chemicals used to process coal spilled from a storage tank into the Elk River in West Virginia. The river is a municipal water source that serves about 300,000 people in the Charleston area. The National Toxicology Program (NTP) quickly developed a plan for studies to determine potential long-term health effects, which were completed in less than a year.⁶⁷



2014 – NIEHS establishes a research program for disaster response

NIEHS co-led the interagency National Institutes of Health Disaster Research Response (DR2) program, an effort aimed at being better prepared for performing timely disaster research well before future events. Program goals included providing quick access to a wide range of tools and a national environmental health researcher network.⁶⁸

NIEHS — Proud to be part of the NIH family

NIEHS is part of the National Institutes of Health (NIH).

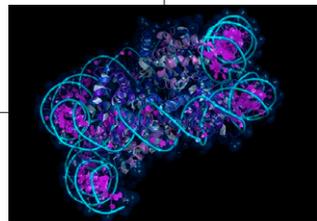
The research priorities of NIEHS reflect the priorities of NIH, from generating knowledge in basic science and developing tools that can be used to turn discoveries into prevention and interventions, to recruiting and training the best minds to engage in these critical efforts.

NIEHS is committed to working with our partners at the 26 other NIH Institutes and Centers, to support research discoveries that will enhance health, lengthen life, and reduce illness and disability.



- National Cancer Institute (NCI)
- National Eye Institute (NEI)
- National Heart, Lung, and Blood Institute (NHLBI)
- National Human Genome Research Institute (NHGRI)
- National Institute on Aging (NIA)
- National Institute on Alcohol Abuse and Alcoholism (NIAAA)
- National Institute of Allergy and Infectious Diseases (NIAID)
- National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
- National Institute of Biomedical Imaging and Bioengineering (NIBIB)
- Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)
- National Institute on Deafness and Other Communication Disorders (NIDCD)
- National Institute of Dental and Craniofacial Research (NIDCR)
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
- National Institute on Drug Abuse (NIDA)
- National Institute of Environmental Health Sciences (NIEHS)**
- National Institute of General Medical Sciences (NIGMS)
- National Institute of Mental Health (NIMH)
- National Institute on Minority Health and Health Disparities (NIMHD)
- National Institute of Neurological Disorders and Stroke (NINDS)
- National Institute of Nursing Research (NINR)
- National Library of Medicine (NLM)
- NIH Clinical Center (CC)
- Center for Information Technology (CIT)
- Center for Scientific Review (CSR)
- Fogarty International Center (FIC)
- National Center for Advancing Translational Sciences (NCATS)
- National Center for Complementary and Integrative Health (NCCIH)

2015



2015 – Cell and tissue epigenomes are mapped

NIEHS co-led the National Institutes of Health Common Fund Roadmap Epigenomics Program, which mapped the epigenomes of more than 100 types of cells and tissues. The epigenome helps direct how genes are turned on and off in different types of cells. The mapping provided new insight into which parts of the genome are used to make a particular type of cell.⁶⁹

2015 – Fire retardants cause cancer in rodents

A National Toxicology Program technical report presented clear evidence that the fire retardant mixture pentabromodiphenyl ether (PBDE) caused cancer in male and female rats and mice exposed to the substance. Although production of PBDE was phased out in 2004, it is still found in many older baby and consumer products.⁷⁰



Courtesy of Max England

2015 – Grantee wins Nobel Prize

NIEHS grantee Aziz Sancar, M.D., Ph.D., shared the 2015 Nobel Prize in chemistry for his discoveries related to DNA mismatch repair. His group mapped the cellular mechanisms that underlie DNA repair, which corrects damage caused by environmental factors, such as ultraviolet radiation, and exposure to cancer-causing substances, including cigarette smoke and air pollution.⁷¹

2015 – NIEHS provides new resources for children’s health exposure analysis

NIEHS announced the launch of the Children’s Health Exposure Analysis Resource (CHEAR), which allowed grantees access to laboratory and data analysis tools, to assess the full range of exposures that may affect children’s health. CHEAR was also designed to implement the exposome concept in studies, create a public resource of children’s exposures, and develop data standards.⁷²



2016



November 1, 2016 – NIEHS celebrates 50 years of environmental health research at NIH

November 1, 2016, marked 50 years of environmental health research at the National Institutes of Health (NIH) and the golden anniversary of NIEHS. The anniversary event highlighted the scientific achievements and advances, along with resulting improvements, to public health. The event brought together researchers supported by NIEHS for training, networking, and research collaboration.

Environmental stewardship at NIEHS

Environmental stewardship is important to everyone at NIEHS. As a federal agency, our reduction and conservation efforts are a top priority. As the National Institutes of Health (NIH) leader for environmental health, it is even more important that we lead by example.

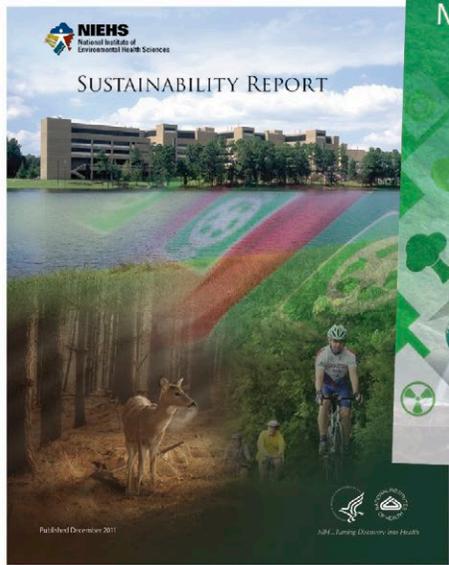
At NIEHS, we continuously seek new opportunities to reduce our environmental impact. In all of our operations, we work together to set measurable goals that focus on reducing harm to human health and the environment, promoting responsible business practices, and improving efficiency.



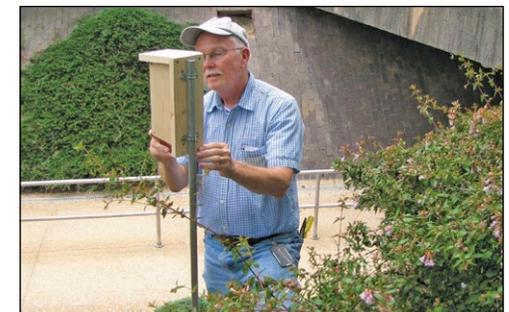
Architect's drawing of the new NIEHS net zero energy warehouse



From left, Dan Wheeland, director of the NIH Office of Research Facilities in Bethesda, Maryland; Cora Cole-McFadden, Durham N.C. Mayor Pro Tempore; Linda Birnbaum, Ph.D., NIEHS and National Toxicology Program director; Congressman David Price, N.C. 4th District; Victor Stanci, NIEHS project officer; and Sepideh Saidi, president and CEO of SEPI Engineering and Construction, at groundbreaking of NIEHS net zero energy warehouse



Energy-saving solar panels installed on top of NIEHS building



Mason bee box being installed on NIEHS campus

Environmental stewardship accomplishments

NIEHS has made significant commitments to environmental stewardship efforts over the years. Following are key highlights from years past.

- 1991 — Environmental Awareness Advisory Committee chartered
- 1993 — Institute-wide, award-winning recycling program began
- 1996 — Preconsumer cafeteria waste vermicomposting (worm) bins installed
- 1997 — Lights Out campaign initiated, to encourage energy saving habits
- 1997 — Governor’s Award for Excellence in Waste Reduction received
- 2001 — Campaign launched to remove mercury-containing materials from NIEHS operations
- 2004 — Named Best Workplace for Commuters for alternative commuting options
- 2004 — Received Environmental Leader Award from Research Triangle Park Foundation
- 2005 — Attained Wildlife and Industry Together (WAIT) certification
- 2008 — Began significant water conservation efforts
- 2009 — Post-consumer cafeteria waste composting began
- 2009 — Published first campus sustainability report
- 2012 — Named Smart Commuter Golden Mode award winner
- 2015 — Printer policy established to reduce printer and paper use
- 2016 — Groundbreaking for new net zero energy warehouse

U.S. Department of Health and Human Services Green Champions Awards

- 2009 — Organization Award for achievements in sustainability initiatives through efficient management practices and implementation of effective low-cost and no-cost programs
- 2009 — Energy and Water Award for conservation initiatives and use of innovative contracting
- 2010 — Environmental Stewardship honorable mention for diverting 15,790 pounds of preconsumer and post-consumer cafeteria waste from the landfill, while reducing greenhouse gases normally produced during waste decomposition
- 2011 — Good Neighbor Award for working with community partners and stakeholders to educate the public on the importance of a healthy environment
- 2013 — Sustainable Design and Facilities Award for exemplary green design and use of repurposed, recycled, and reclaimed building materials in the renovation of the NIEHS basement area
- 2014 — Corporate Responsibility Award for the Transshare and Telework programs, for combining innovation and resourcefulness to create successful alternative commuting
- 2014 — Environmental Stewardship honorable mention for innovative strategies to address invasive species and the ecological threats they pose
- 2015 — Environmental Stewardship Award for creative recycling efforts associated with the Burden’s Creek demolition project
- 2015 — Energy and Fleet Award for NIEHS campus LED lighting and solar array projects leading to energy savings

Statistics

- Reduced water consumption by 54 percent since 2007
- Reduced electricity usage by 24.5 percent since 2007
- Reduced total vehicles in the NIEHS fleet
- Clean sweep to rid labs of more than five tons of aging and unneeded hazardous chemicals
- Increased teleworking by about 20 percent since 2011, reducing both fuel use and air emissions
- About 75 percent of NIEHS fleet was either flex fuel or hybrid (26 out of 35)

Statistics from 2014

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On back:
Groundbreaking for the NIEHS
Magnetic Resonance Imaging building



National Institute of Environmental Health Sciences • National Institutes of Health • U.S. Department of Health and Human Services

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November 1, 2016

