National Institute of Environmental Health Sciences

CONGRESSIONAL JUSTIFICATION
FY 2022

Department of Health and Human Services
National Institutes of Health

NIH National Institute of Environmental Health Sciences

DEPARTMENT OF HEALTH AND HUMAN SERVICES

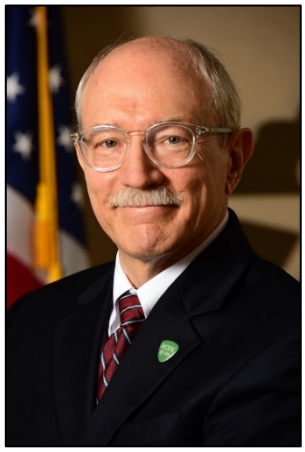
NATIONAL INSTITUTES OF HEALTH

National Institute of Environmental Health Sciences (NIEHS)

FY 2022 Budget Table of Contents Page No.

Director's Overview

Environmental Health Sciences in Service to Society



Rick Woychik, Ph.D.,
NIEHS Director

Mission

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

Answering the Call

Public health emergencies and disasters occur at the nexus of humans and our environments, making them a natural focus of environmental health sciences. NIEHS has a long history of responding to the need for answers to health concerns during and in the immediate aftermath of such events, as well as continued investigation of health impacts that may arise in the months and years following. NIEHS researchers led investigations following the attacks on 9/11 that confirmed health effects in first responders from dust and other contaminants at the site; determined the impacts of the Deepwater Horizon oil spill on the safety of cleanup workers and long-term health of fishing and other communities in the Gulf; described and quantified some of the myriad health consequences wreaked on communities in the aftermath of Hurricanes Katrina, Harvey, Maria, and others; and contributed research expertise and resources to the urgent races to prevent Ebola's spread to the United States and halt Zika's outbreak and its devastating impacts on infants. In all these events, society's most vulnerable and those with the least capacity and resources to avoid or overcome the consequences of disasters and public health emergencies are often the people most profoundly affected by them Effects of climate change are no exception. NIEHS is poised to work collaboratively with other Institutes and Centers (ICs) across the National Institutes of Health (NIH) and with other federal agencies to ramp up efforts to understand climate change impacts, such as severe weather events, flooding, and excess heat, and their effects on human health. As this devastating list continues, now including the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, NIEHS continues to answer the call, bringing our decades of experience to efforts to understand the virus and its transmission, as well as factors that determine people's susceptibility and response, including underlying health conditions which are experienced disproportionately by minority and underserved populations.

The NIH funding support is helping NIEHS to capitalize on our expertise in fundamental research across a number of areas to respond to the coronavirus disease 2019 (COVID-19) pandemic; seven NIEHS research proposals were among the 40 chosen for funding by the Intramural Targeted Anti-COVID-19 Program out of more than 160 submissions from across the NIH. For example, functional genomics is being combined with molecular visualization technology to better understand the structure and function of the virus; genetic studies are working to determine underlying factors that may increase a person's susceptibility to

developing severe respiratory illness; single cell dynamics is being used to investigate how the virus enters a cell; and structural biology is helping to determine how the virus affects gene expression resulting in neurological and cardiovascular damage. Other projects are exploring therapies to block the virus from attaching to the cell and to disrupt the inflammation associated with severe COVID-19 lung infections. NIEHS is also working closely with our sister ICs through the Rapid Acceleration of Diagnostics (RADx) Program, a suite of research funding initiatives aimed at bringing the full might of the NIH biomedical and biotechnological communities to bear on COVID-19 testing during this crisis. NIEHS intramural scientists are working to perfect a method for testing thousands of biological samples for SARS-CoV-2 in a single run, adding efficiency and saving time to identify the infection.

Decades of environmental health research have shown that effective disaster and public health emergency responses require targeted, appropriate—and most importantly, timely—collection of data, including data on affected populations, potential and actual environmental exposures, and factors such as underlying genetics, stress, and social determinants of health that may impact a person's vulnerability and resilience. Enabling timely and successful data collection—and the research it informs—is the focus of the NIEHS-led Disaster Research Response (DR2) Program. This innovative program provides researchers with immediate access to data collection tools appropriate for disaster situations, works to ensure necessary trust between researchers and communities by building on existing relationships, and develops and deploys time-sensitive funding mechanisms and other tools that give researchers the support needed to get into the field quickly. The DR2 website currently hosts a COVID-19 Collection of surveys and resources from across scientific disciplines to assist researchers in data collection. NIEHS researchers have also developed a Pandemic Vulnerability Index dashboard for researchers and decision-makers that integrates key indicators, such as population demographics, hospital capacity, and environmental factors, that contribute to localities' vulnerability to COVID-19 infection and ability to respond.

Closing the Gap in Health Disparities

More than two decades ago, NIEHS began the work of establishing the scientific evidence base for environmental health disparities that people and communities had long known intrinsically were real, and set addressing such disparities as a priority and achieving environmental justice as a goal. Our work toward this goal has established NIEHS as a leader in identifying, understanding, and addressing differences related to race, ethnicity, age, gender, economics, and other characteristics in how communities are exposed to and affected by factors in our environments. NIEHS has led development of frameworks for community-engaged research, research cores focused on community outreach and education, and programs such as the landmark Partnerships for Environmental Public Health and the Sister Study that actively engage under-represented populations in research through community-academic collaborations. Since 2016, NIEHS has collaborated in funding Centers of Excellence on Environmental Health Disparities Research that support investigations of diseases known to be a significant burden in low socioeconomic and health disparate populations. Work from these Centers has demonstrated associations between asthma and obesity in Hispanic schoolchildren in Southern California, developed a method for mapping the risk of contamination from abandoned uranium mines on the Navajo Nation, and revealed that living in a rural area is an independent risk factor for

chronic obstructive pulmonary disease in the United States, among other findings. We have built strong and lasting trust among minority and underserved communities that enable our work on health disparities to continue unabated. Such longstanding relationships also well position us to conduct such research in crisis situations. NIEHS is participating in the RADx Underserved Population (RADx-UP), a trans-NIH initiative to understand factors related to disparities in COVID-19 in underserved and vulnerable populations and to partner with the communities to develop testing strategies. NIEHS is also contributing funds to the trans-NIH project on Community Interventions to Address the Consequences of the COVID-19 Pandemic for Health Disparity and Vulnerable Populations.

Another lesson learned from our experience studying health disparities is the need for diverse perspectives of scientists from different backgrounds, including that of the particular study population, to inform this research. Ongoing NIEHS efforts in this area include research supplements to promote diversity in the Environmental Influences on Child Health Outcomes (ECHO) Program and co-funding with the National Institute of General Medical Sciences (NIGMS) of the Lakota Center for Health Research, which aims to build research capacity among Native American partners.

Capitalizing on Foundational Investments and Beyond

Building the nation's biomedical research capacity—and potential for groundbreaking discoveries—has been at the core of NIEHS's mission for more than 50 years. The progression of science and technology has brought vast improvements in our ability to understand and treat diseases, but at the same time has revealed the increasing complexity of the world we live in and the problems we face. Our current ongoing pandemic has made all too apparent the need to integrate our understanding of the environments in which we live with knowledge of the components of life within us, including our DNA, our epigenomes, and the mechanisms by which they act. NIEHS is working across a broad range of collaborations to provide the research needed to inform the "environment" factor in the GxE, or genes by environment, equation.

For example, we are working closely with the NIH *All of Us* Initiative to incorporate data such as that collected by our Environmental Polymorphisms Registry, as well as other environmental health indicators, to help move the goals of precision medicine forward. Similarly, we've joined with the International Common Disease Alliance in its Maps to Mechanisms to Medicine project to provide environmental science data and knowledge in support of precision medicine. Were also continually working to develop new resources for the scientific community to make incorporating environmental health endpoints into their work more feasible. Two examples include the Environmental Epigenomics Data Coordination Center, part of the NIH Toxicant Exposures and Responses by Genomic and Epigenomic Regulators of Transcription (TaRGET) II Program, and the Human Health Exposure Analysis Resource (HHEAR), which provides NIH researchers with environmental health analysis expertise of human samples to supplement existing studies. These kinds of investments are already paying off: NIEHS grantees have been contributing to the Pan-Cancer Project, which recently announced it had analyzed the whole genome sequences of every publicly available cancer genome to create "genetic fingerprints" of various cancers. This data will be of enormous value in understanding how cancer develops and

how to intervene to cure it, both around the world and in the United States, where an estimated 38 percent of people will be diagnosed with cancer in their lifetime.

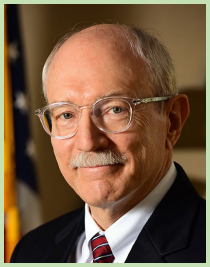
NIEHS continues to answer society's call for response—to both chronic and acute environmental threats—by developing unique programs, funding mechanisms, and science and technology approaches. Such efforts remain critical to building our knowledge base and translating it into diagnostics and treatments, as well as policies and interventions, that will help us achieve our mission of improving the health of the American people and all others around the globe.

Overall Budget Policy: The FY 2022 President's Budget request is $937.1 million, an increase of $122.4 million or 15.0 percent compared with the FY 2021 Enacted level. The FY 2022 request includes $100.0 million to support research on the human health impacts of climate change, allowing NIEHS to lead new research efforts, together with other ICs at the NIH and with other federal and non-federal partners, to investigate the impact of climate on human health.

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

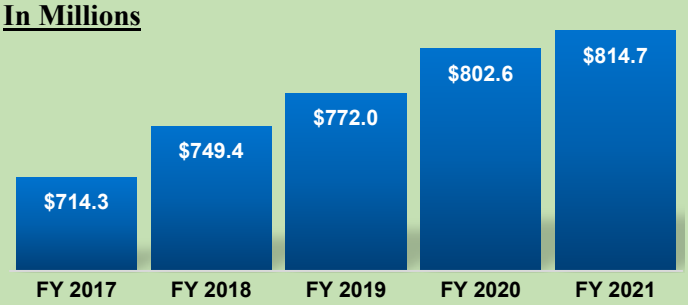
History of NIEHS Research

For over 50 years, NIEHS has been making environmental health research responsive to the needs and concerns of the American people. NIEHS's statutory purpose is to conduct and support research, training, health information dissemination, and other programs with respect to factors in the environment that affect human health, directly or indirectly. NIEHS research thus covers all diseases and conditions that could be caused or affected by exposure to environmental agents, defined broadly. This research is used to inform policy and help people in America and worldwide live healthier lives through prevention and diagnosis of environmentally related adverse health outcomes.



Rick Woychik, Ph.D., was named Director of NIEHS and NTP in June 2020. He received his Ph.D. from Case Western University and postdoctoral training at Harvard Medical School. He previously served as president and CEO of Jackson Laboratory in Bar Harbor, Maine.

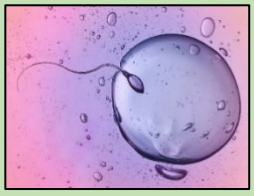
NIEHS Appropriations History
In Millions



FY 2022 President's Budget: $937.1 million

NIEHS Research Highlights

- Discovery of how the APE2 protein acts as backup for tumor suppression for BRCA1/BRCA2 genes holds promise for treatment of cancers arising from damage to these genes.
- Molecular research revealed how exposure to diesel exhaust damages brain cells, leading to behavioral deficits common in conditions such as Parkinson's disease.
- Gulf Long-term Follow-up (GuLF) Study findings showed that decreased lung function in people engaged in cleanup of the Deepwater Horizon oil spill returned to normal four to six years after the spill.
- A novel in vitro model of human spermatogenesis was used to demonstrate that exposure to a type of brominated flame retardant changes the expression of genes in sperm critical to normal human development.



Facts and Figures

FY17-20

Employment & Funding

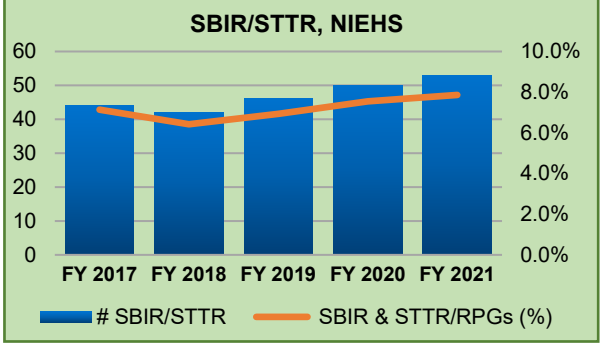
- 631 Full-Time Equivalents (FTEs) (avg./yr.)
- 509 competing Research Project Grants awarded (total FY17-19)
- 637 Principal Investigators (total FY17-19)
- 72 Early Stage Investigators (total)
- 15.3 percent funding success rate (avg./yr.)
- 182 Small Business Innovation Research (SBIR)/ Small Business Technology Transfer (STTR) awards (total)

Training

- 422 Extramural Postdocs (total)
- 255 Intramural Postdocs; 4 with outside funding (total)

Outreach & Education

- 45 community engagement cores across four programs
- Five podcast and three webinar series



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

Current Activities

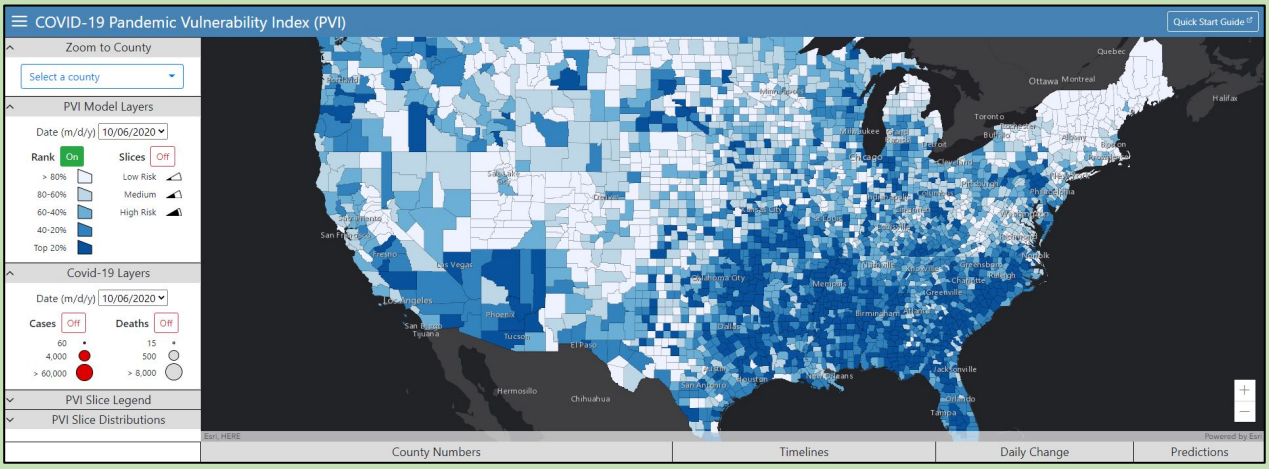
NIEHS supports environmental health sciences (EHS) to understand how our environment affects us, in order to promote healthier lives. The NIEHS research portfolio is broad, and spans the life course from the womb through aging. EHS aims to discover and explain how factors, including chemical, physical, synthetic, and infectious agents; social stressors; diet and medications; and our own microbiomes, among others, affect biological systems. EHS also generates knowledge on interactions between humans, animals, and the natural and built environments. NIEHS efforts advance EHS, promote translation of data to knowledge to action, and enhance research through stewardship and support to provide critical understanding of human health and disease.

Future Initiatives

NIEHS will continue to answer society's call and respond to both chronic and acute environmental health threats, including a new, expanded investment on the impacts of climate change on human health. NIEHS will develop unique programs, funding mechanisms, and scientific and technology approaches to build our knowledge base and translate it into measures to improve health. NIEHS will work with national and international partners to integrate EHS data into precision medicine. NIEHS will advance the study of the exposome, or totality of environmental exposures, and integrate it into the biomedical research enterprise. NIEHS will continue to prioritize efforts to understand, intervene, and prevent environmental health disparities due to race, ethnicity, age, gender, and other factors, with the goal of environmental health equity for all.

NIEHS Research Accomplishment: COVID-19 Pandemic Vulnerability Index Dashboard

NIEHS intramural scientists and their collaborators developed a COVID-19 Pandemic Vulnerability Index (PVI) dashboard that synthesizes population-level data and environmental variables across multiple sources to describe a U.S. county's vulnerability to COVID-19 in a visual profile. This tool is accessible to scientists, policy makers, and the public through an online dashboard that uses pie charts and other data visualizations to indicate the relative vulnerability to COVID-19. Data for each county also are depicted in a PVI Scorecard that provides more detail on the data, such as factors that are contributing to increased vulnerability, and how a given county's vulnerability ranks compared to the rest of the United States. Access at: https://covid19pvi.niehs.nih.gov/



Major Changes in the Fiscal Year 2022 President's Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. The FY 2022 President's Budget for NIEHS is $937.1 million, which is $122.4 million above the FY 2021 Enacted level. The increase includes $100 million to support research on the human health impacts of climate change, the majority of which has been applied to research project grants.

Research Project Grants (RPGs) (+$97.5 million; total $398.9 million):
NIEHS plans to support a total of 897 RPG awards in FY 2022. Noncompeting RPGs will increase by 4 awards and $5.6 million from the FY 2021 Enacted level. The number of competing RPG awards will increase by 210 awards from the FY 2021 levels while the amount allocated will increase by $86.4 million. NIEHS will continue to support new investigators in FY 2022

Other Research (+$7.0 million; total $36.2 million):
Other Research will increase by $7.0 million, or 24.0 percent, to support the Institute's new "Collaborative Centers in Children's Environmental Health Research and Translation" and "Pediatric and Reproductive Environmental Health Scholars Program" initiatives.

Intramural Research (+$9.5 million; total $242.9 million):
Intramural funding will increase by $9.5 million, or 4.1 percent, covering expected pay and benefit increases for intramural staff and allowing a modest expansion of research efforts.

Research Management and Support (+$5.8 million; total $36.6 million):
Funding for research management and support will increase by $5.8 million, or 18.8 percent, accommodating a planned increase in RMS staff and supporting management of the increased funding for research on human health impacts of climate change.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Budget Mechanism - Total[1]

(Dollars in Thousands)

MECHANISM	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects:								
Noncompeting	446	$199,909	468	$215,395	472	$220,953	4	$5,559
Administrative Supplements	*(43)*	9,350	*(20)*	2,000	*(40)*	4,000	*(20)*	2,000
Competing:								
Renewal	10	4,234	5	2,117	10	21,170	5	19,053
New	160	66,100	148	60,923	353	128,312	205	67,389
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	170	$70,334	153	$63,040	363	$149,482	210	$86,442
Subtotal, RPGs	616	$279,594	621	$280,435	835	$374,436	214	$94,001
SBIR/STTR	51	20,269	53	20,930	62	24,418	9	3,487
Research Project Grants	667	$299,863	674	$301,365	897	$398,854	223	$97,488
Research Centers:								
Specialized/Comprehensive	26	$39,583	25	$38,194	25	$38,443	0	$249
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
Comparative Medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	26	$39,583	25	$38,194	25	$38,443	0	$249
Other Research:								
Research Careers	48	$6,870	47	$6,682	53	$8,838	6	$2,157
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	0	0	0	0	0	0	0	0
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	196	0	0	0	400	0	400
Other	64	20,060	72	22,518	80	26,961	8	4,444
Other Research	112	$27,126	119	$29,199	133	$36,200	14	$7,000
Total Research Grants	805	$366,572	818	$368,759	1,055	$473,496	237	$104,737
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	43	$1,845	43	$1,906	43	$1,944	0	$38
Institutional Awards	382	15,705	382	16,223	382	16,548	0	324
Total Research Training	425	$17,550	425	$18,129	425	$18,492	0	$363
Research & Develop. Contracts	59	$158,814	63	$163,496	65	$165,553	2	$2,057
(SBIR/STTR) (non-add)	*(0)*	*(237)*	*(0)*	*(245)*	*(0)*	*(253)*	*(0)*	*(8)*
Intramural Research	497	230,132	527	233,428	529	242,923	2	9,495
Res. Management & Support	128	29,530	135	30,856	143	36,643	8	5,787
SBIR Admin. (non-add)	*(0)*	*(196)*	*(0)*	*(204)*	*(0)*	*(210)*	*(0)*	*(6)*
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIEHS	625	$802,598	662	$814,668	672	$937,107	10	$122,439

[1] All items in italics and brackets are non-add entries.

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

For carrying out section 301 and title IV of the PHS Act with respect to environmental health sciences, [$814,675,000]$937,107,000.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Summary of Changes

(Dollars in Thousands)

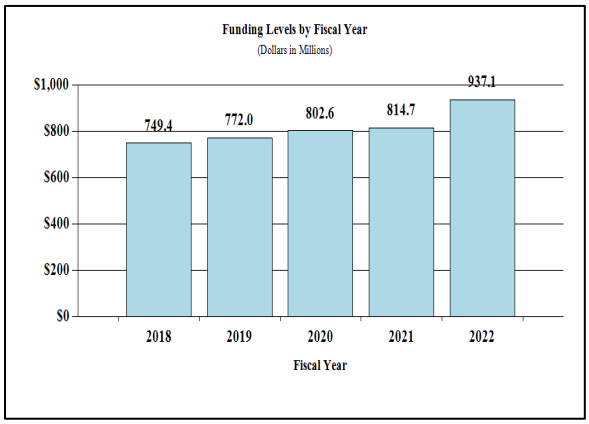
FY 2021 Enacted	$814,668
FY 2022 President's Budget	$937,107
Net change	$122,439

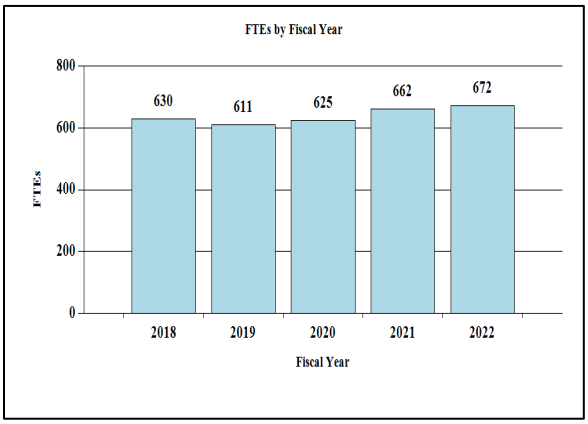
CHANGES	FY2021 Enacted		FY 2022 President's Budget		Built-In Change from FY 2021 Enacted	
	FTEs	Budget Authority	FTEs	Budget Authority	FTEs	Budget Authority
A. Built-in:						
1. Intramural Research:						
a. Annualization of January 2021 pay increase & benefits		$90,741		$93,718		$245
b. January FY 2022 pay increase & benefits		90,741		93,718		2,507
c. Paid days adjustment		90,741		93,718		0
d. Differences attributable to change in FTE		90,741		93,718		346
e. Payment for centrally furnished services		29,811		31,302		1,491
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		112,876		117,903		2,983
Subtotal						$7,571
2. Research Management and Support:						
a. Annualization of January 2021 pay increase & benefits		$18,696		$20,949		$50
b. January FY 2022 pay increase & benefits		18,696		20,949		524
c. Paid days adjustment		18,696		20,949		0
d. Differences attributable to change in FTE		18,696		20,949		1,125
e. Payment for centrally furnished services		3,188		3,347		159
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		8,973		12,347		264
Subtotal						$2,122
Subtotal, Built-in						$9,693

CHANGES	FY2021 Enacted		FY 2022 President's Budget		Program Change from FY 2021 Enacted	
	No.	Amount	No.	Amount	No.	Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	468	$217,395	472	$224,953	4	$7,559
b. Competing	153	63,040	363	149,482	210	86,442
c. SBIR/STTR	53	20,930	62	24,418	9	3,487
Subtotal, RPGs	674	$301,365	897	$398,854	223	$97,488
2. Research Centers	25	$38,194	25	$38,443	0	$249
3. Other Research	119	29,199	133	36,200	14	7,000
4. Research Training	425	18,129	425	18,492	0	363
5. Research and development contracts	63	163,496	65	165,553	2	2,057
Subtotal, Extramural		$550,384		$657,541		$107,157
	FTEs		FTEs		FTEs	
6. Intramural Research	527	$233,428	529	$242,923	2	$1,924
7. Research Management and Support	135	30,856	143	36,643	8	3,665
8. Construction		0		0		0
9. Buildings and Facilities		0		0		0
Subtotal, Program	662	$814,668	672	$937,107	10	$112,746
Total built-in and program changes						$122,439

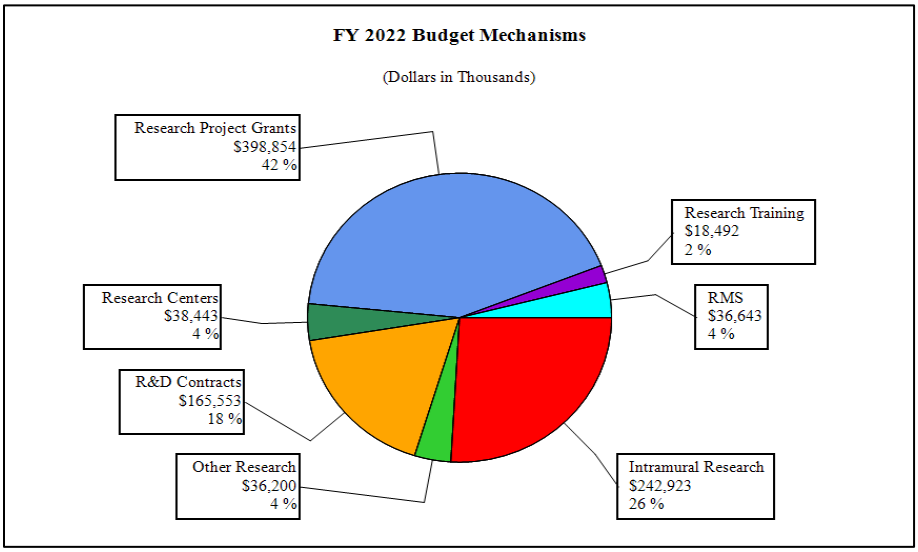
Fiscal Year 2022 Budget Graphs

History of Budget Authority and FTEs:

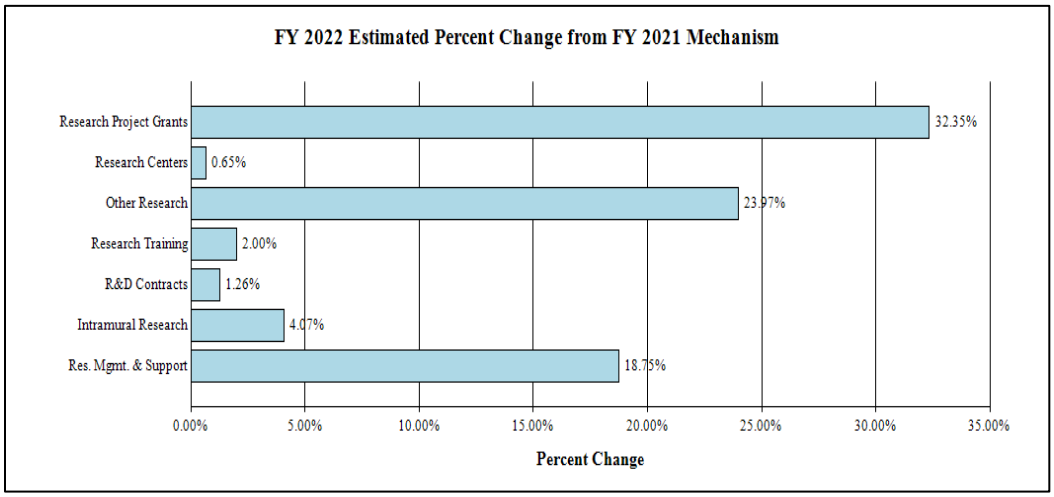




Distribution by Mechanism (dollars in thousands):



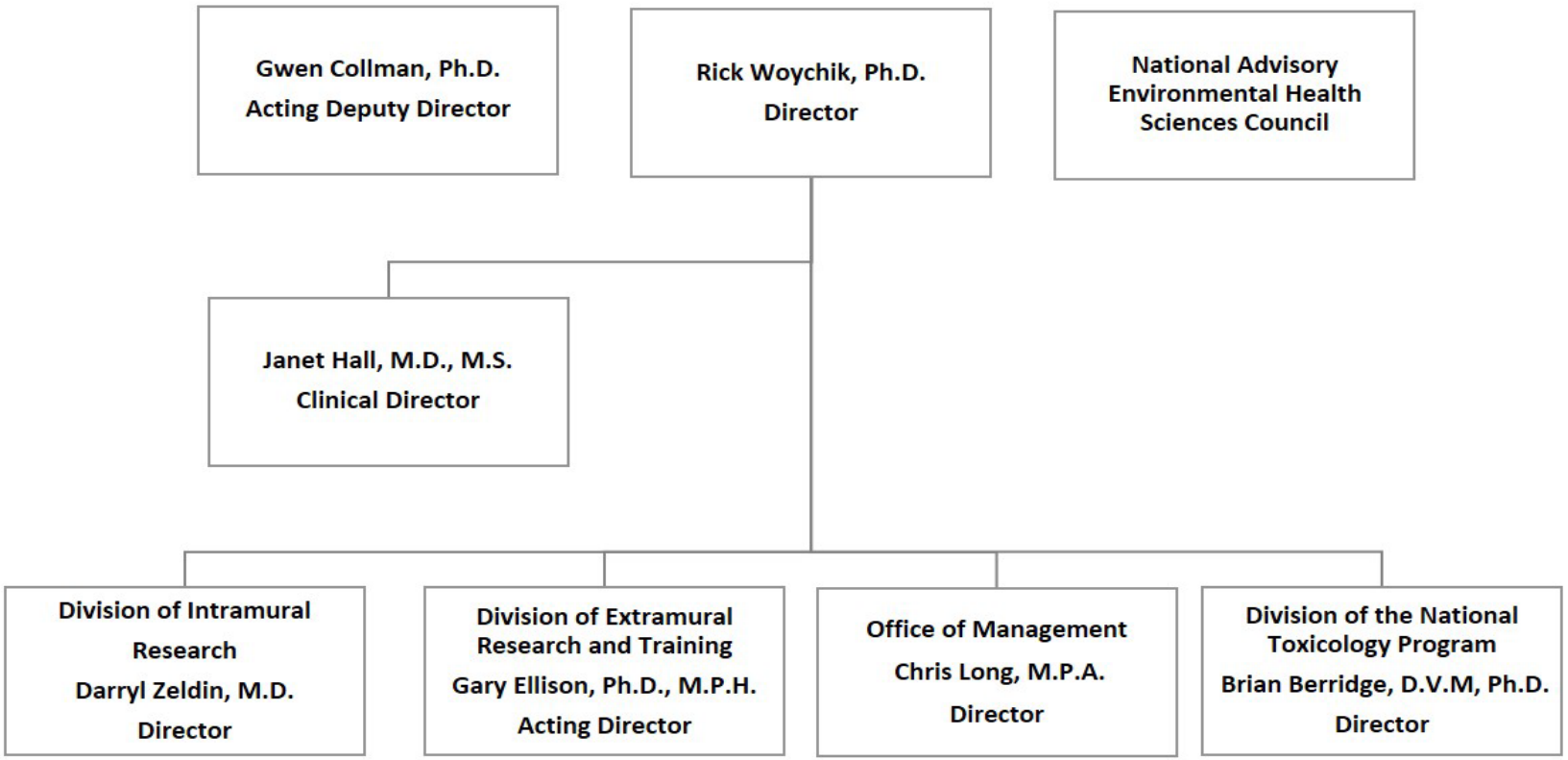
Change by Selected Mechanism:



NATIONAL INSTITUTES OF HEALTH

National Institute of Environmental Health Sciences

Organization Structure



NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Budget Authority by Activity[1]

(Dollars in Thousands)

	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Fundamental Research		$206,661		$210,908		$214,115		$3,207
Exposure Research		111,956		106,703		108,977		2,275
Translational Research and Special Populations		112,197		114,328		117,119		2,791
Human Health Impacts of Climate Change		0		0		95,000		95,000
Predictive Toxicology		91,091		97,234		100,641		3,406
Training and Education		21,030		21,211		21,689		478
Subtotal, Extramural		**$542,936**		**$550,384**		**$657,541**		**$107,157**
Intramural Research	**497**	**$230,132**	**527**	**$233,428**	**529**	**$242,923**	**2**	**$9,495**
Research Management & Support	**128**	**$29,530**	**135**	**$30,856**	**143**	**$36,643**	**8**	**$5,787**
TOTAL	**625**	**$802,598**	**662**	**$814,668**	**672**	**$937,107**	**10**	**$122,439**

[1] Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

Justification of Budget Request

NIEHS

Authorizing Legislation: Section 301 and title IV of the Public Health Service Act, as amended.

Budget Authority (BA):

	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
BA	$802,598,000	$814,668,000	$937,107,000	+$122,439,000
FTE	625	662	672	10

Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

Program Descriptions

Fundamental Research

Research in this program investigates the basic biological processes of how our bodies function, and the pathways and systems that are susceptible to the effects of environmental stressors. Fundamental research addresses all levels of biological organization—molecular, biochemical pathway, cellular, tissue, organ, model organism, human, and population; and uses new tools and techniques to explore complex questions and build the knowledge base on the effects of the environment on biological systems.

Studies by an NIEHS-funded group have revealed previously unknown mechanisms of N^6-methyladenosine (m^6A), which regulates stability and translation of messenger RNA (mRNA) in various biological processes. In experiments in mice embryonic stem cells, the researchers discovered that m^6A acts as a switch in a type of RNA called chromosome-associated regulatory RNAs (carRNAs) to affect their abundance, with resulting impacts on chromatin accessibility and downstream gene transcription. They found that m^6A mediation has implications for embryonic development, and confirmed the regulatory functions of m^6A-marked carRNAs in the progression of endometrial cancer.

Budget Policy: The FY 2022 President's Budget request is $214.1 million, an increase of $3.2 million or 1.5 percent compared with the FY 2021 Enacted level.

Exposure Research

Research in this program focuses on identifying and studying the exposome—the totality of exposures experienced over an individual's lifespan—and how those exposures affect health. Exposures to

Pregnancy as a Vulnerable Time for Women's Health

During pregnancy, childbirth, and the postpartum periods women undergo dramatic metabolic, hormonal, and physical changes. Many studies have linked maternal environmental exposures with increased susceptibility to adverse health effects in their children, such as increased risk of miscarriage, intrauterine growth restriction, low birth weight, preterm birth, birth defects, and motor and cognitive delays. However, few studies have focused on the impact of exposures during pregnancy on the short- and long-term health of the mother.

Rates of maternal death and disorders such as pre-eclampsia and high blood pressure are rising in the United States. These conditions are associated with long-term risk of heart disease, the leading cause of death for U.S. women. Emerging research suggests that mothers' exposure to environmental toxicants during pregnancy may play a role. New research studies are maximizing use of existing epidemiological cohorts and laboratory models to explore "Pregnancy as a Vulnerable Time Period for Women's Health."

Researchers will look at pregnancy exposures and women's short-term (post-partum to 1 year after childbirth) and long-term (3 to 12 years later) health outcomes. Outcomes include metabolic changes related to chemical mixtures, changes in immune cell function from breathing air pollutants, and long-term consequences on metabolism and bone health. They will also explore risk of diabetes and cardiovascular disease from exposure to endocrine-disrupting phthalates, pesticides and flame retardants, and a wide variety of metals including lead and arsenic.

Functional Genomics:
Combining the Who with the How

Functional genomics is an emerging field of science that examines the complex relationship between genotype—a person or other organism's genetic makeup, and phenotype—their observable characteristics. A new NIEHS program will expand the use of functional genomics technologies to study how environmental exposures can affect gene function in the body to cause different disease phenotypes.

One of the most powerful functional genomics advances is the gene editing tool, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR). This "game-changing" technology allows scientists to make very specific alterations in particular genes and study the effects of those changes in different cell types inside the body. NIEHS grantees are leading an international, multidisciplinary team that is using CRISPR and other functional genomics tools to screen 10 environmental toxicants using a Medaka (Japanese rice paddy) fish model. CRISPR allows the researchers to manipulate the fish, which have been bred to be nearly homozygous, in order to identify genetic loci for biological responses to the various chemicals including effects on the heart and skeleton, and other developmental impacts.

Researchers are using CRISPR and other gene editing tools with induced pluripotent stem cells (iPSCs) and other specialized organoid models, tissue-chip platforms, and innovative culture systems that more accurately model disease systems outside the body. Scientists can take iPSCs from patients with different diseases and turn them into specialized cells that can be used to study these diseases in the lab, such as neurons for neurodevelopmental diseases or cardiomyocytes for heart conditions. They can then explore correcting genetic defects by using CRISPR technology and exploring specific gene-environment interactions for many complex human diseases.

mixtures of chemical and non-chemical environmental pollution, diet, and other external agents impact the microbiome and other biological systems within the body. The program goals are to develop improved methods for detecting and measuring the totality of exposures in humans or other organisms; generate data on such measures using state of the art methods and technologies such as biomarkers, personal exposure sensors, and new complex analytical methods; and mine this data using new statistical and informatics tools and approaches to inform prevention and interventions of disease.

The Safe and Just Cleaners/Limpeza Sana y Justa Project, a five-year grant by NIEHS, is set to incorporate many of these goals. The project, a collaboration with the Icahn School of Medicine at Mount Sinai, the National Domestic Worker Alliance, and others, will survey Latina immigrant domestic workers about work practices, knowledge of potential hazards, and health problems associated with use of chemical cleaning products. Researchers will also collect exposure samples of chemical compounds for comparison to self-reports. This work will be paired with a public health campaign about safer alternatives. During the ongoing COVID-19 pandemic, questions have been raised about the potential for essential workers—large numbers of whom are Latinx or other minorities—to have higher exposures to hazardous chemicals in cleaning and disinfection activities. This work will help to lay the basis for efforts to monitor, understand, and improve health conditions for cleaning workers.

An ongoing study is investigating impacts on the placenta of prescribed opioid use during pregnancy. As the number of pregnant women diagnosed with an opioid disorder quadrupled in the last 20 years, studies like

this are needed to shed light on impacts to children born to mothers who use these drugs. The researchers examined mouse placentas exposed to oxycodone for their cellular similarity to humans, and found use of the drug during pregnancy can kill placental cells that produce proteins necessary for fetal brain development. They also found differences in gene expression between female (upregulated) and male placentas (downregulated), and suggest that such changes may protect female offspring from health impacts later in life related to prenatal opioid exposures.

Another NIEHS-supported study is the first to use an exposome-wide approach to comprehensively and systematically profile all of the environmental exposures known to be associated with childhood obesity. This health threat has steadily increased in the United States and around the world, increases the risk of a variety of diseases later in life including cancer, heart disease, and diabetes, and has implications for reproductive health, mental health, and response to infectious agents such as COVID-19. The research, which looked at 173 factors in 1,300 children, showed that higher body mass index (BMI) is linked to exposure to maternal smoking, air pollution, a variety of heavy metals and pesticides, and residential characteristics such as lack of access to green space. Uncovering the exact relationship of these exposures to childhood obesity is critical to targeting early-life interventions.

Studies of air pollution exposures point to the need to intervene across the lifespan, and describe new potential drug therapeutics and technologies to mitigate health impacts. Researchers at Colorado State University have developed and validated an algorithm that combines real-time data from wearable GPS, temperature, light, and motion sensors to determine a person's "microenvironment" (home, work, or other) with a high level of accuracy (between 97 and 99 percent). By enabling more precise measurement of exposure, this work will help to reduce uncertainty in associations between air pollution and disease outcomes.

Another report provides strong evidence that the use of nonsteroidal anti-inflammatory drugs (NSAIDs) may protect against adverse effects of short-term spikes in outdoor air pollution including chronic obstructive pulmonary disease and emphysema. The research, which analyzed data from the Normative Aging Study, showed that the use of NSAIDs, especially aspirin, nearly halved the acute effect of particulate matter on people's lung function by decreasing inflammation in the lungs. This is the first study to demonstrate subclinical preventive effects of NSAIDs against harmful effects of air pollution on lung function.

Budget Policy: The FY 2022 President's Budget request is $109.0 million, an increase of $2.3 million or 2.1 percent compared with the FY 2021 Enacted level.

Translational Research and Special Populations

This program includes a wide range of research activities that encourage the integration of clinical, population, and community-based research and translation of findings into improved public health practice and disease prevention strategies. These activities include research investments targeted at understanding environmental risks to special populations (e.g., elderly people, children, and underserved populations) with the goal of understanding environmental health and health disparities in real-world settings, and developing solutions that consider social determinants of health.

With the National Institute of Aging, NIEHS is supporting a number of new grants investigating the influence of extreme weather events on aging populations. Of particular relevance to recent events are several projects investigating health effects of exposure to wildfires, including possible acceleration of circulatory and neurological aging, and exacerbation of Alzheimer's Disease and other dementias.

Other researchers are investigating wildfire-related chemical exposures through the Women Firefighter Biomonitoring Collaborative. This long-term study by researchers in California has found that women firefighters are exposed to higher levels of per- and polyfluoroalkyl substances (PFAS) than women in other occupations. PFAS, which are used in firefighting foam and gear, have been linked to cancer, immune dysfunction, and reproductive problems. To further translate the findings of these and other studies into policy and interventions, NIEHS is helping to support a study by the National Academies of Science, Engineering, and Medicine (NASEM) of the chemical constituents of wildfires.

For more than a decade, NIEHS has led efforts at NIH and across the Federal government to identify potential and actual impacts of a changing environment on human health, and this work continues to grow in urgency. A knowledge management tool developed and newly updated by NIEHS is aimed at facilitating such research across a spectrum of health questions and populations, including those especially at risk due to age, gender, geographic location, socioeconomic status, access to care, and other factors. The Climate Change and Human Health Literature Portal combines access to biomedical and geosciences literature in one publicly available, searchable database. Information in the Portal, which is regularly updated, is curated with more than 300 keywords in categories such as exposure, health impact, and geographic location/feature to enable targeted search results that link directly to publications.

Budget Policy: The FY 2022 President's Budget request is $117.1 million, an increase of $2.8 million or 2.4 percent compared with the FY 2021 Enacted level.

Climate Change Impacts on Human Health

Major scientific assessments document a wide range of human health outcomes associated with climate change. These include non-communicable diseases, such as cardiovascular and respiratory disease, digestive and kidney diseases, autoimmune and rheumatologic ailments, cancer, and mental health disorders. In many instances, climate and meteorological factors are causal. In other cases, these factors exacerbate or cause flares of chronic disease, such as with digestive and autoimmune diseases. A wide range of infectious diseases are also associated with climate change and climate variability, including food and water-borne diseases, vector borne diseases, and seasonal respiratory viral diseases. The analyses also document how climate change affects populations differently, depending on life stage, underlying chronic diseases, and socioeconomic disadvantages that contribute to greater exposures and lesser adaptive capabilities. Specific vulnerable populations that have been identified include infants and children, pregnant women, the elderly, indigenous peoples, and communities of color.

NIEHS is poised to lead new research efforts, together with other ICs at the NIH and with other federal and non-federal partners, to investigate the impact of climate on human health. The goal will be to understand all aspects of health-related climate vulnerability; analyze mechanisms of susceptibility to climate factors, with special attention to the impact on vulnerable health disparities populations; incorporate new tools and methods to assess short- and long-term climate change and weather extremes (and associated exposures) into research on gene-environment interactions; and design and test interventions to build health resilience and protect public health.

Budget Policy: The FY 2022 President's Budget request is $95.0 million, an increase of $95.0 million compared with the FY 2021 Enacted level. Additional funding is also included in the Research Management and Support program below to support management of this initiative.

Predictive Toxicology

NIEHS provides headquarters and research support for the interagency National Toxicology Program (NTP). The goal of NTP is to evaluate environmental agents of public health concern and generate information that can be used by health regulatory agencies to make informed decisions that safeguard public health. NTP also works to develop improved test methods and models of toxicity that can be used to predict risk of cancer and other adverse health outcomes that may result from environmental exposures.

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PFAS are a large, complex, and widely applied group of manufactured chemicals used to make various everyday products. For example, they keep food from sticking to cookware, make clothes and carpets resistant to stains, and are used in firefighting foam. PFAS are used by industries such as aerospace, automotive, construction, electronics, and the military. These chemicals leach and are found in soil, air, and water.

NIEHS is actively studying PFAS and coordinating efforts with other government agencies and research entities to understand how these chemicals might affect human health. Recent findings from rodent cancer studies conducted by the National Toxicology Program showed increases in liver and pancreatic tumors associated with exposure to perfluorooctanoic acid, a certain type of PFAS. In 2021, NIEHS, in partnership with the Agency for Toxic Substances and Disease Registry at the Centers for Disease Control and Prevention (CDC), will support NASEM review of the human health effects of PFAS, with the goal of gaining a better understanding of knowledge gaps that will enable PFAS researchers to focus their investigations on the most impactful efforts and inform clinical guidance for communities and individuals exposed to PFAS.

Budget Policy: The FY 2022 President's Budget request is $100.6 million, an increase of $3.4 million or 3.5 percent compared with the FY 2021 Enacted level.

Training and Education

NIEHS seeks to attract the best students and scientists into the field of environmental health sciences and to provide state of the science training to enable the interdisciplinary research necessary to solve complex environmental health problems. This program includes opportunities for laboratory-based training at the undergraduate levels, institutional training grants and individual fellowships at the graduate level, and support for early-career investigators at the postgraduate level.

NIEHS also supports a range of international training efforts, including through the Global Environmental and Occupational Health (GEOHealth) program, in which institutions in low- and middle-income countries serve as regional hubs for research and training. This program provides training in the form of advanced graduate degrees at U.S. schools of public health, short courses, and more intensive trainings in-country to create a knowledgeable and informed work force to conduct research on a wide range of environmental health

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problems. These include heat stress among sugarcane workers in Thailand, exposure of pregnant women to methylmercury in Suriname, impacts of household air pollution in Peru, air pollution modeling approaches in India, and hazards faced by e-waste workers in Ghana, among others.

Budget Policy: The FY 2022 President's Budget request is $21.7 million, an increase of $0.5 million or 2.3 percent compared with the FY 2021 Enacted level.

Intramural Research

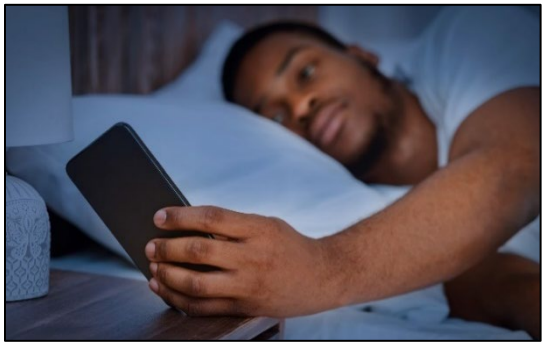
The NIEHS intramural research program provides an arena for high-caliber science with potential for high-impact breakthroughs. Intramural research studies are often conducted over the long-term and among large cohorts, including epidemiological studies of environmentally associated diseases, as well as intervention and prevention studies to reduce the effects of exposures to environmental hazards. NIEHS clinical research studies provide opportunities for clinical and basic scientists to collaborate.

As the COVID-19 pandemic has continued, the role of inflammation in the disease and how individuals respond to it has emerged as an important area of study. NIEHS intramural scientists have a deep bench of expertise in inflammation and are bringing it to bear on our understanding of a wide range of environmentally mediated diseases. Recent work in mice offers new insight into how inflammation occurs in lungs following exposure to respiratory pathogens, which has particular relevance to COVID-19. The study discovered that a protein in the epithelial cells that line the airspaces of lungs called EMP2 is critical in supporting the transport of white blood cells from the bloodstream into the airspaces. While this mechanism is part of the body's immune response, it also results in inflammation that can damage surrounding lung tissues. In the study, which used mice bred to be deficient in EMP2 and which were inoculated with bacterial pneumonia, the ability of white blood cells to move across the respiratory epithelial barrier into the airspaces was impaired, resulting in decreased inflammation, reduced lung injury, and enhanced survival. This research suggests that EMP2 is potentially a novel therapeutic target for inflammatory airway disease.

Immune function is the focus of work of scientists in the NIEHS Clinical Research Branch as well. More than 23 million Americans suffer from autoimmune disease (a group of more than 100 chronic, debilitating conditions). In a recent first-of-its-kind study, NIEHS researchers found that the prevalence of a common biomarker of autoimmune disease called antinuclear

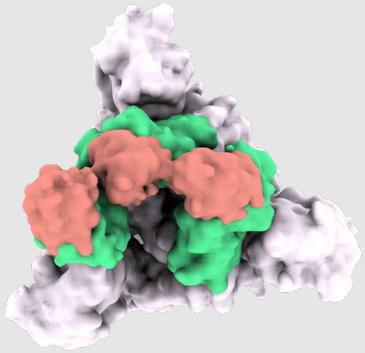
antibodies (ANA) is significantly increasing in the United States, particularly among males, non-Hispanic whites, adults 50 years and older, and adolescents. The increase was greatest among adolescents. The reasons for this increase are unclear but concerning, as it may indicate an increase in autoimmune disease overall. NIEHS researchers are overcoming some of this complexity of studying autoimmune diseases by using mice strains called the Collaborative Cross. Because these strains are bred to have genome-wide genetic variation across a large, diverse population, they enable an experimental approach to identify the genetic variants that participate in autoimmunity. Researchers can then work to connect these variants to specific phenotypes to gain a more complete predictive picture.

The challenge of studying complex environmental exposures among diverse populations and identifying the underlying causes of health disparities that arise from them has been taken up by NIEHS scientists looking at differences in sleep, and how it can interact with and be affected by environmental factors, to cause negative health impacts. Inadequate sleep is related to poorer cognition, social interactions, and emotional functioning, and has been linked with increased risk of health problems, including injuries at work and while driving, obesity, high blood pressure, diabetes, heart disease, and death.



Cryo-EM Helps Scientists See New Paths to Discovery

A Nobel Prize-winning technology called cryogenic electron microscopy, or Cryo-EM, allows scientists to "see" the shape of molecular machines made up of proteins, DNA, RNA, lipids, and carbohydrates in previously unattainable detail and in record time—allowing visualizations that formerly took years of analyses to create to be done in just days through the use of powerful computers that combine thousands of 2-D molecular images to create new 3-D maps.



Cryo-EM image of the spike of the SARS-CoV-2 virus showing receptor binding domain (green) and nanobodies that block infection (red)

Structural biologists are using Cryo-EM to understand how these molecular machines work in healthy and diseased cells. This understanding will enable interventions to prevent cellular damage or mechanistic disruption caused by environmental exposures, as well as advance drug design by helping researchers to identify precise sites in molecular targets.

Scientists at NIEHS, which houses the first Cryo-EM instrument in the region, are leading a molecular microscopy research consortium including NIH and academic researchers. The use of molecular microscopy in a variety of environmental health areas is leading to breakthrough discoveries. One recent breakthrough was made by NIEHS scientists who used Cryo-EM to solve the structure of certain SARS-CoV-2 related proteins, providing critical information to the development of diagnostics, treatments, and vaccines to fight the COVID-19 pandemic.

Past research shows that Black people are less likely to get adequate sleep than Whites. Researchers in the Social and Environmental Determinants of Health Equity Group are leading a major effort to study how attributes of neighborhood, housing, and work conditions affect sleep health (insufficient amounts and poor quality) and rates of cardiometabolic dysfunction (obesity, type 2 diabetes, and cardiovascular disease) in under-resourced populations.

Budget Policy: The FY 2022 President's Budget request for intramural research is $242.9 million, an increase of $9.5 million or 4.1 percent compared with the FY 2021 Enacted level.

Research Management and Support

Efforts under Research Management and Support (RMS) include administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants and training awards. Other RMS functions include strategic planning, coordination, and evaluation of NIEHS programs; facilities administration and maintenance; regulatory and ethics training and compliance; and liaising with other Federal agencies, Congress, stakeholders, and the general public.

In the past year, NIEHS has provided input to the NIH-wide strategic planning, as well as the strategic plans of a number of NIH Institutes, Centers, and Offices. This input is part of an ongoing effort to demonstrate intersections of environmental health sciences (EHS) across the mission of NIH and create greater opportunities for collaboration, such as in studies exploring multifactorial diseases that result from a combination of genetics and environmental exposures.

The goal of translating EHS findings to a broader scientific audience and extending their integration into the work of other disciplines underpins NIEHS support of efforts through the NASEM. Convening experts and contributing to explorations of the evidence base across disciplines increases the potential for solving complex scientific and public health problems. Recent supported workshops explored topics including the health effects of microplastics, the use of artificial intelligence (AI) to advance research, understanding and preventing human exposure to PFAS, disaster research, and the state of the science on airborne transmission of SARS-CoV-2 (coronavirus). Future supported activities include an investigation of the chemistry of wildfires, and workshop on the use of companion animals (dogs and cats) to inform what we know about how humans develop cancer, particularly as we age.

Budget Policy: The FY 2022 President's Budget request for RMS is $36.6 million, an increase of $5.8 million or 18.8 percent compared with the FY 2021 Enacted level. This increase includes funds for management of the increased funding for research on human health impacts of climate change, as described earlier in this narrative.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2013	$684,030,000		$686,103,000	$685,570,818
Rescission				$1,371,142
Sequestration				($34,410,941)
2014	$691,348,000		$686,753,000	$665,439,000
Rescission				$0
2015	$665,080,000			$667,502,000
Rescission				$0
2016	$681,782,000	$675,783,000	$695,900,000	$693,702,000
Rescission				$0
2017[1]	$693,533,000	$710,387,000	$722,301,000	$714,261,000
Rescission				$0
2018	$533,537,000	$725,387,000	$737,727,000	$751,143,000
Rescission				$0
2019	$693,199,000	$760,113,000	$775,115,000	$774,707,000
Rescission				$0
2020	$666,854,000	$812,570,000	$815,729,000	$802,598,000
Rescission				$0
2021	$730,147,000	$809,501,000	$828,733,000	$814,675,000
Rescission				$0
2022	$937,107,000			

[1] Budget Estimate to Congress includes mandatory financing.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2021 Amount Authorized	FY 2021 Enacted	2022 Amount Authorized	FY 2022 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$814,668,000	Indefinite	$937,107,000
National Institute of Environmental Health Sciences	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$814,668,000		$937,107,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Amounts Available for Obligation[1]
(Dollars in Thousands)

Source of Funding	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Appropriation	$802,598	$814,675	$937,107
Secretary's Transfer	0	0	0
OAR HIV/AIDS Transfers	0	-7	0
Subtotal, adjusted budget authority	$802,598	$814,668	$937,107
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	$802,598	$814,668	$937,107
Unobligated balance lapsing	-139	0	0
Total obligations	$802,459	$814,668	$937,107

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2020 - $7,420 FY 2021 - $18,000 FY 2022 - $12,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Budget Authority by Object Class[1]

(Dollars in Thousands)

		FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021 Enacted
Total compensable workyears:				
	Full-time equivalent	662	672	10
	Full-time equivalent of overtime and holiday hours	1	1	0
	Average ES salary	$200	$205	$5
	Average GM/GS grade	12.1	12.1	0.0
	Average GM/GS salary	$104	$106	$2
	Average salary, Commissioned Corps (42 U.S.C. 207)	$118	$121	$3
	Average salary of ungraded positions	$159	$163	$4
	OBJECT CLASSES	**FY 2021 Enacted**	**FY 2022 President's Budget**	**FY 2022 +/- FY 2021**
	Personnel Compensation			
11.1	Full-Time Permanent	46,150	48,628	2,478
11.3	Other Than Full-Time Permanent	24,554	25,113	559
11.5	Other Personnel Compensation	1,602	1,639	36
11.7	Military Personnel	709	728	20
11.8	Special Personnel Services Payments	8,634	8,830	196
11.9	**Subtotal Personnel Compensation**	**$81,649**	**$84,939**	**$3,290**
12.1	Civilian Personnel Benefits	27,388	29,318	1,930
12.2	Military Personnel Benefits	400	411	11
13.0	Benefits to Former Personnel	0	0	0
	Subtotal Pay Costs	**$109,436**	**$114,667**	**$5,231**
21.0	Travel & Transportation of Persons	786	801	14
22.0	Transportation of Things	397	404	7
23.1	Rental Payments to GSA	4	4	0
23.2	Rental Payments to Others	120	122	2
23.3	Communications, Utilities & Misc. Charges	741	755	13
24.0	Printing & Reproduction	0	0	0
25.1	Consulting Services	37,245	38,937	1,693
25.2	Other Services	40,078	42,340	2,262
25.3	Purchase of goods and services from government accounts	84,810	89,689	4,880
25.4	Operation & Maintenance of Facilities	7,155	7,155	0
25.5	R&D Contracts	118,892	121,032	2,140
25.6	Medical Care	285	295	10
25.7	Operation & Maintenance of Equipment	7,004	7,130	126
25.8	Subsistence & Support of Persons	2	2	0
25.0	**Subtotal Other Contractual Services**	**$295,471**	**$306,582**	**$11,111**
26.0	Supplies & Materials	12,873	13,075	203
31.0	Equipment	12,149	12,360	211
32.0	Land and Structures	1,872	1,906	34
33.0	Investments & Loans	0	0	0
41.0	Grants, Subsidies & Contributions	380,818	486,430	105,612
42.0	Insurance Claims & Indemnities	0	0	0
43.0	Interest & Dividends	1	1	0
44.0	Refunds	0	0	0
	Subtotal Non-Pay Costs	**$705,232**	**$822,440**	**$117,208**
	Total Budget Authority by Object Class	**$814,668**	**$937,107**	**$122,439**

[1] Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Salaries and Expenses

(Dollars in Thousands)

OBJECT CLASSES	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
Personnel Compensation			
Full-Time Permanent (11.1)	$46,150	$48,628	$2,478
Other Than Full-Time Permanent (11.3)	24,554	25,113	559
Other Personnel Compensation (11.5)	1,602	1,639	36
Military Personnel (11.7)	709	728	20
Special Personnel Services Payments (11.8)	8,634	8,830	196
Subtotal Personnel Compensation (11.9)	**$81,649**	**$84,939**	**$3,290**
Civilian Personnel Benefits (12.1)	$27,388	$29,318	$1,930
Military Personnel Benefits (12.2)	400	411	11
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	**$109,436**	**$114,667**	**$5,231**
Travel & Transportation of Persons (21.0)	$786	$801	$14
Transportation of Things (22.0)	397	404	7
Rental Payments to Others (23.2)	120	122	2
Communications, Utilities & Misc. Charges (23.3)	741	755	13
Printing & Reproduction (24.0)	0	0	0
Other Contractual Services:			
Consultant Services (25.1)	37,245	38,937	1,693
Other Services (25.2)	40,078	42,340	2,262
Purchases from government accounts (25.3)	51,111	55,681	4,570
Operation & Maintenance of Facilities (25.4)	7,155	7,155	0
Operation & Maintenance of Equipment (25.7)	7,004	7,130	126
Subsistence & Support of Persons (25.8)	2	2	0
Subtotal Other Contractual Services	**$142,595**	**$151,247**	**$8,651**
Supplies & Materials (26.0)	$12,873	$13,075	$203
Subtotal Non-Pay Costs	**$157,513**	**$166,404**	**$8,891**
Total Administrative Costs	**$266,949**	**$281,071**	**$14,122**

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2020 Final			FY 2021 Enacted			FY 2022 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Extramural Research									
Direct:	74	-	74	74	-	74	80	-	80
Reimbursable:	2	-	2	2	-	2	2	-	2
Total:	76	-	76	76	-	76	82	-	82
Division of Intramural Research									
Direct:	301	2	303	313	2	315	313	2	315
Reimbursable:	2	-	2	2	-	2	2	-	2
Total:	303	2	305	315	2	317	315	2	317
Division of National Toxicology Program									
Direct:	107	1	108	108	2	110	108	2	110
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	107	1	108	108	2	110	108	2	110
Office of Management									
Direct:	69	2	71	80	2	82	80	2	82
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	69	2	71	80	2	82	80	2	82
Office of the Director									
Direct:	64	1	65	75	2	77	79	2	81
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	64	1	65	75	2	77	79	2	81
Total	619	6	625	654	8	662	664	8	672
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.	0	0	0	0	0	0	0	0	0

FISCAL YEAR	Average GS Grade
2018	12.0
2019	12.0
2020	12.1
2021	12.1
2022	12.1

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Detail of Positions[1]

GRADE	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	197,300	200,319	204,906
General Schedule			
GM/GS-15	33	35	36
GM/GS-14	65	66	67
GM/GS-13	123	125	126
GS-12	116	118	121
GS-11	75	85	87
GS-10	0	0	0
GS-9	40	40	42
GS-8	8	10	10
GS-7	13	23	23
GS-6	3	3	3
GS-5	0	0	0
GS-4	0	0	0
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	476	505	515
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	2	2	2
Senior Grade	3	4	4
Full Grade	1	2	2
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	6	8	8
Ungraded	175	185	185
Total permanent positions	481	509	519
Total positions, end of year	658	699	709
Total full-time equivalent (FTE) employment, end of year	625	662	672
Average ES salary	197,300	200,319	204,906
Average GM/GS grade	12.1	12.1	12.1
Average GM/GS salary	102,322	103,888	106,267

[1] Includes FTEs whose payroll obligations are supported by the NIH Common Fund.