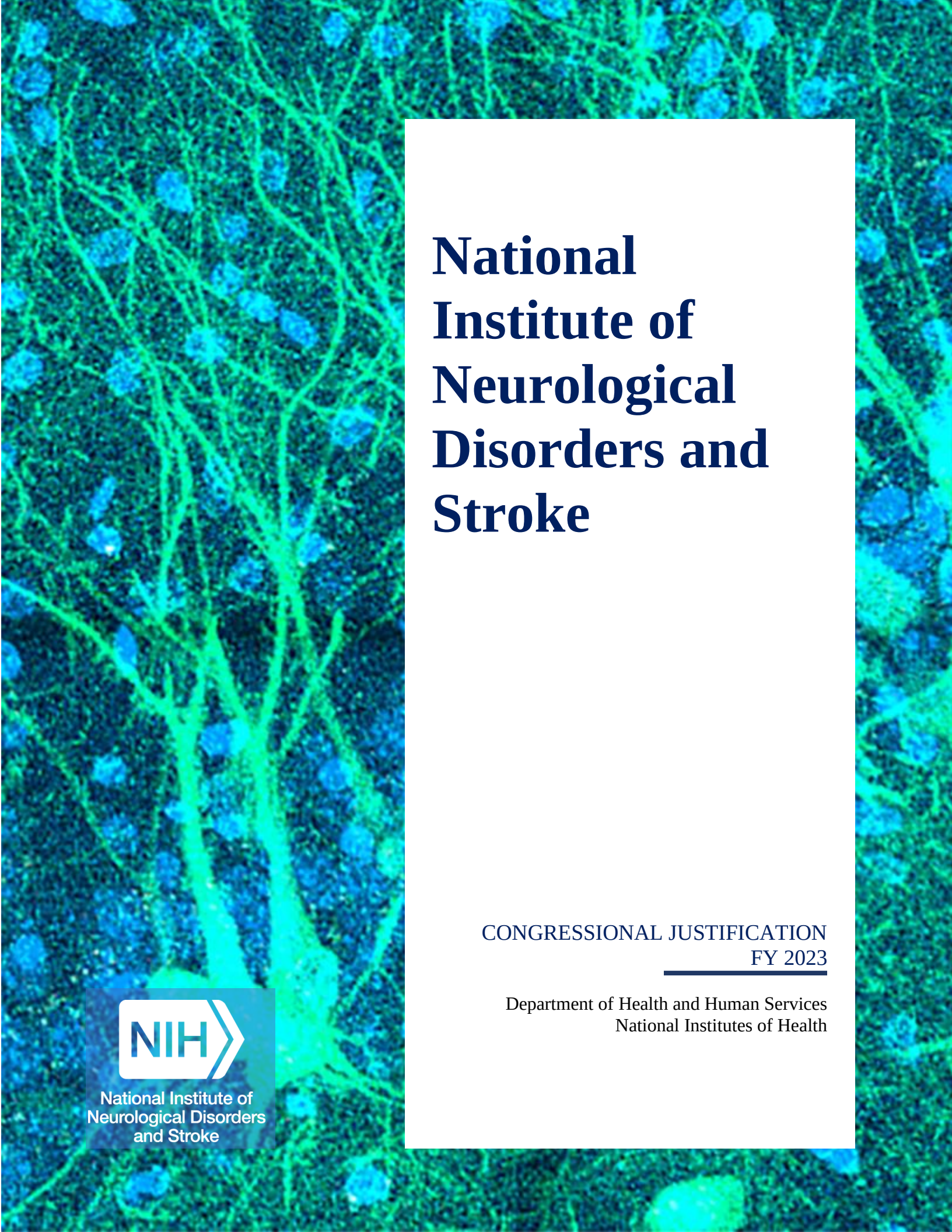

National Institute of Neurological Disorders and Stroke

CONGRESSIONAL JUSTIFICATION
FY 2023

Department of Health and Human Services
National Institutes of Health

NIH
National Institute of Neurological Disorders and Stroke

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DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Institute of Neurological Disorders and Stroke (NINDS)

FY 2023 Budget Table of Contents

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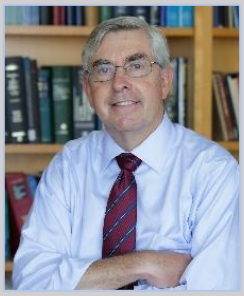
Director's Overview



Walter J. Koroshetz, M.D., *Director*

The mission of the National Institute of Neurological Disorders and Stroke (NINDS) is to seek fundamental knowledge about the brain and nervous system and to use that knowledge to reduce the burden of neurological disease for all people. Common and rare neurological disorders affect people across all ages and population groups, with enormous public health impact. Despite the complexity of the human nervous system and its limited capacity for repair, research funded and conducted by NINDS is improving diagnosis, treatment, and prevention for many neurological disorders. And, armed with the power of big data and increasingly sophisticated tools and methods, basic research on the nervous system and mechanisms of disease is yielding exciting opportunities for future progress. A new NINDS Strategic Plan will guide the institute for the next five years in advancing neuroscience research; strengthening research training and workforce diversity; enhancing communication and engagement with researchers, patients, and the public; and fostering positive workforce culture. This plan reflects priorities for NINDS in the face of major changes affecting medical research and society at large.

COVID-19 and the nervous system: past investments set the stage

As the coronavirus disease-19 (COVID-19) pandemic unfolded, accounts began to describe neurological symptoms associated with SARS-CoV-2 infection. While most people infected with the virus have mild, moderate, or no neurological symptoms, some people experience symptoms including muscle aches, headaches, dizziness, and altered taste and smell. COVID-19 also causes blood cells to clump and form clots in arteries and veins throughout the body, which can cause stroke. Other less common but severe effects can include delirium, seizures, muscle weakness, nerve injury, pain syndromes, and rare inflammatory conditions.

Extensive experience investigating the effects of other viral infections on the nervous system allowed researchers to pivot quickly to studying COVID-19. NINDS intramural investigators have been leaders in this research and reported early evidence of leaky blood vessels in the brain associated with inflammation and damage. NINDS also supported supplements to research grants to allow extramural investigators to shift their focus to COVID-19. By leveraging infrastructure in place for the NIH Helping to End Addiction Long-term (HEAL^{SM}) Initiative, NINDS established the COVID-19 Neuro Databank/Biobank database to collect information on COVID-19-related neurological symptoms and outcomes, as well as biospecimens for further research. Additional projects focus on brain pathology, disorders of consciousness, seizures, stroke delirium, biomarkers of brain damage, and other neurological complications. Also, NINDS clinical networks have provided study sites and infrastructure for clinical trials within the NIH Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV) program.

Beyond acute effects of COVID-19, some people have persistent, disabling symptoms that last for weeks or months (referred to as long COVID), including neurological symptoms such as pain, headaches, fatigue, postural orthostatic tachycardia, sleep disorders, post exertional malaise, and cognitive difficulties. Along with the National Heart, Lung, and Blood Institute (NHLBI), NINDS is a leading partner in the NIH REsearching COVID to Enhance Recovery (RECOVER) Initiative, established to learn why some people have prolonged symptoms or

develop new or returning symptoms after SARS-CoV-2 infection, which will inform ways to prevent long COVID and help people recover. Findings may also shed light on myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), a poorly understood disorder with no effective treatments. Many people with ME/CFS report its onset after an infectious-like illness, and some symptoms associated with long COVID overlap with those of ME/CFS.

NINDS and NIH investments in COVID research are yielding results. Studies suggest that neurological symptoms of COVID-19 result primarily from the virus's effects on brain blood vessels and the body's immune response to infection rather than direct viral infection of the brain or nervous system. Still, many questions remain about how SARS-CoV-2 affects the brain and other organs, and more attention is needed to understand the impact of the virus and the pandemic for chronic neurological diseases, including Alzheimer's and Alzheimer's Disease Related Dementias (AD/ADRD). Given the large and still rising number of Americans who have had COVID-19, research to understand and limit acute and long-term nervous system effects remains a critical priority.

Unrelenting needs and promising opportunities

The COVID-19 pandemic exacerbated the crisis of opioid misuse, addiction, and overdose. Drug overdose deaths rose nearly 30 percent in 2020, with 75 percent of those deaths linked to opioids,[1] and poorly treated or unmanaged pain increased alongside changes to health care and support systems necessitated by the pandemic. NINDS leadership in research to develop non-addictive therapies for pain is a key pillar to addressing this crisis and a major part of the NIH HEAL Initiative[SM]. Building on basic research to understand acute and chronic pain, HEAL programs are advancing promising pain therapies, including a new non-opioid medication for neuropathic pain and implanted devices and noninvasive brain or nerve stimulation for managing pain. HEAL investigators have also patented novel targets for inflammatory pain, migraine, and visceral pain; and the Early Phase Pain Investigation Clinical Network (EPPIC-Net), led by NINDS for the HEAL Initiative[SM], is testing a treatment for knee osteoarthrosis pain.

Treatments for other common and rare neurological disorders continue to be pressing needs, and again, research is providing avenues for progress. Despite decades of declining stroke death rates, almost 800,000 people in the United States suffer strokes each year, with about 150,000 deaths and many others left with major disabilities.[2] Recent improvements in emergency stroke treatment expand the time window for effective intervention and present opportunities for developing adjunct therapies that protect the brain. As the population ages, dementia is a large and growing public health burden. Yet, again, research points to opportunity. Evidence suggests that managing stroke risk factors may also prevent dementia, and increased investment in AD/ADRD research is growing understanding of disease mechanisms, with hope for treatments to prevent or slow neurodegeneration. For about a third of people with epilepsy, existing therapies are ineffective, and the prevention of epilepsy remains elusive. NINDS has contributed to new anti-seizure medicines with improved side-effect profiles, and current programs focus on drug resistant epilepsy and epilepsy prevention. Finally, causal gene mutations are known for hundreds of rare genetic neurological disorders, many of which affect infants and children, but

[1] Baker RG, Koroshetz WJ, Volkow ND. The Helping to End Addiction Long-term (HEAL) Initiative of the National Institutes of Health. JAMA. 2021;326(11):1005–1006.
[2] www.cdc.gov/stroke/facts.htm

the small number of people with each condition makes research difficult and limits incentives for industry investment. Here, new initiatives are taking advantage of progress in gene targeting technologies to support the development of tailored disease-modifying therapies for rare disorders, including the NINDS Ultra-Rare Gene Therapy (URGenT) Network. In these programs and others, NINDS aims to increase patient engagement in research to better address the priorities of patients and families and improve research efficiency and effectiveness.

Dysfunction in brain circuits contributes to a wide range of neurological, psychiatric, sensory, and substance use disorders. Historically, limited knowledge about complex brain circuits and inadequate research tools for measuring circuit activity have impeded progress. NINDS is a leader in the NIH BRAIN Initiative®, which is applying innovative technologies to learn how brain circuits work, capturing opportunities made possible by decades of investment in basic research and engineering. The BRAIN Cell Census Network achieved a major milestone in releasing an atlas of cell types and a neuronal circuit diagram for the mammalian primary motor cortex, the brain's main center for directing movement. The BRAIN Initiative® is now launching a program to similarly map all of the human brain. Moreover, advances that will benefit people with brain disorders are emerging from BRAIN Initiative® research, including a brain-controlled neuroprosthesis that allowed a paralyzed person to communicate in sentences, brain stimulation that halts seizures before they occur in people with epilepsy, and long-term wireless neural recordings for circuit discovery and adaptive brain stimulation in Parkinson's disease.

Committing to health equity, diversity, and inclusion across all of NINDS

The COVID-19 pandemic accentuated health disparities that exist across diseases and conditions, including neurological disorders. Such inequities are associated with individuals' racial or ethnic group, religion, socioeconomic status, gender, age, or mental health; sexual orientation or gender identity; cognitive, sensory, or physical disability; geographic location; or other characteristics historically linked to discrimination, stigmatization, or exclusion. Although NINDS and NIH research has contributed to decades of declining stroke death rates overall, the risk of stroke is nearly twice as high for Black Americans as for White Americans, Black Americans have the highest rate of death due to stroke, and Hispanic Americans have seen a troubling increase in strokes since 2013. These disparities may extend to neuro-degenerative disorders, given research linking cerebrovascular disease risks to the risk for cognitive impairment and dementia.[3]

NINDS has supported long-running epidemiological studies to define health inequalities in stroke as well as programs to test interventions that address contributors. To help counter disproportionately high risk factors for stroke and dementia in Black Americans, NINDS updated its public health campaign on stroke awareness and prevention with messaging tailored to engage young Black men. Yet, the persistence of health disparities demands we do more. In 2020, NINDS began a planning process to build on prior efforts and promote research toward effective, scalable interventions targeting biologic and social determinants of health disparities across neurological disorders, with the ultimate goal of creating health equity. As a culmination, NINDS hosted the Health Disparities and Inequities in Neurological Disorders Workshop (HEADWAY) in September 2021. Findings and recommendations from the workshop and planning process will serve as resources for setting priorities and developing new initiatives. NINDS recognizes that diversity in the biomedical research workforce is vital to the NIH

[3] www.cdc.gov/stroke/facts.htm; www.mindyourrisks.nih.gov/research.html

mission, and the NINDS Strategic Plan calls for enhancing diversity and inclusion at all research career stages, including through extramural and intramural programs to support training, mentoring, and career development and to address barriers to diversity among neuroscience research faculty. In addition, the NIH BRAIN Initiative® now requires most grant proposals to include a Plan for Enhancing Diverse Perspectives (PEDP).[4] NINDS is also a committed partner in the NIH UNITE Initiative,[5] an agency-wide effort to identify and address structural racism within the NIH and across the extramural scientific community. These and other efforts to foster diversity will benefit neuroscience research by attracting the most talented researchers and staff from all groups; broadening perspectives in setting research priorities; increasing participation of people from diverse backgrounds in clinical research studies; strengthening capacity to address health disparities; and growing public trust in the work of NINDS and NIH.

Meeting change with resilience: approaches to sustain and strengthen research

Measures necessary for responding to the COVID-19 pandemic had immediate and lasting impacts on biomedical research, as laboratory personnel stayed home and in-person visits for clinical research were put on hold. Prior NINDS support for telemedicine in the treatment of neurological disorders such as stroke and Parkinson's disease helped prepare clinical research teams to meet the challenges of the pandemic through increased use of telemedicine and other approaches to connect remotely with study participants and investigator teams. Such approaches stand to enhance inclusion and health equity beyond the pandemic by increasing access to clinical research and care for underrepresented groups and underserved communities. The COVID-19 pandemic has been especially disruptive for research trainees and investigators just embarking on their careers, broadly highlighting the need to support researchers to achieve their full potential even when challenging life events get in the way. To limit the impact of these disruptions, NINDS extended eligibility for several training and career development programs and established requirements for academic institutions receiving NINDS research training grants to commit to family-friendly environments, leave policies, and accommodations for trainees. Lessons learned and supports put in place will continue to foster a diverse workforce and positive work culture that will attract and retain skilled scientists into the future.

The urgent need for science-driven answers to COVID-19 underscored the value of collaboration in research. NINDS has championed the use of Common Data Elements for clinical research on neurological conditions. These standards aid data sharing and improve data quality, and they helped to build clinical cohorts to study COVID-19. The Accelerating Medicines Partnership: Parkinson's Disease (AMP-PD) program, the BRAIN Initiative®, and the Federal Interagency Traumatic Brain Injury Research (FITBIR) Informatics System are among NINDS and NIH neuroscience programs that are capitalizing on the power of big data, data sharing, and team science to tackle complex scientific problems. NINDS and the National Institute of Allergy and Infectious Diseases (NIAID) also supported the recent development of data and biospecimen sharing platforms for ME/CFS research. As data from new research technologies grow in scale and as machine learning, artificial intelligence, and analysis tools become more sophisticated, neuroscience research will face unprecedented opportunities and new challenges related to data curation, maintenance, and privacy. A new NINDS Data Science Plan, aligned with the NIH Strategic Plan for Data Science, will inform NINDS efforts in this area.

[4] www.braininitiative.nih.gov/about/plan-enhancing-diverse-perspectives-pedp
[5] www.nih.gov/ending-structural-racism/unite

Fact Sheet

National Institute of Neurological Disorders and Stroke

Walter J. Koroshetz, M.D.
Director

Mission

To seek fundamental knowledge about the brain and nervous system and to use that knowledge to reduce the burden of neurological disease.

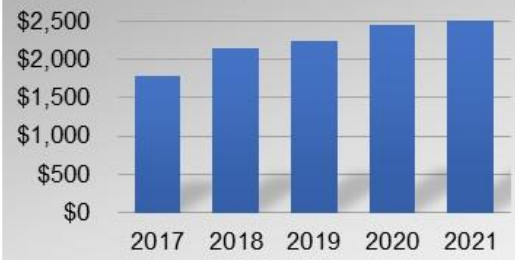
Neurological disorders include common and rare conditions that affect people of all ages. By some measures, they account for a greater burden than any other group of diseases.

NINDS

- Supports and performs basic, translational, and clinical neuroscience research, including studies to understand the nervous system in health and disease and to develop and test new and improved therapies.
- Funds and conducts research training and career development programs to ensure a vibrant, talented, and diverse neuroscience workforce.
- Disseminates neuroscience discoveries and their implications for health to the public, health professionals, researchers, and policy-makers.

NINDS Funding History

(Dollars in Millions)*



FY 2022 CR: $2,513 million
FY 2023 President's Budget: $2,768 million
*Includes funds from the 21st Century Cures Act.

Facts and Figures FY 2021

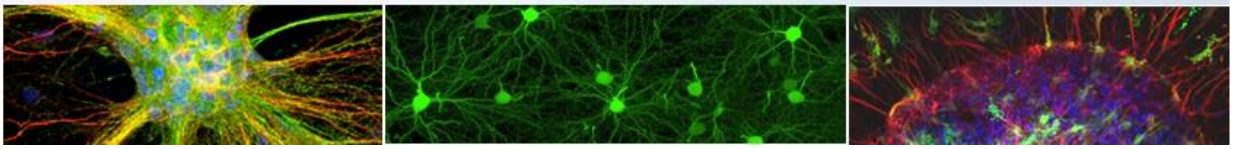
- 554 Full Time Employees
- 878 Research Project Grants[1]
- 1,107 Extramural Principal Investigators[2]
- 131 Extramural Early Stage Investigators[1,3]
- 52 Intramural Principal Investigators

[1]Competing awards only. [2]Includes Principal Investigators and Multiple Principal Investigators. [3]Early Stage Investigators are within 10 years of their final research degree or end of post-graduate clinical training and have not received a substantial independent research grant from NIH.

Research Highlights

Through research supported and conducted by NINDS, researchers understand more about the nervous system and the diseases and conditions that affect it. NINDS has contributed to:

- Decades of decline in stroke deaths, due to advances in prevention and treatment including the clot-busting drug t-PA, clot retrieval devices, and innovative acute stroke imaging methods.
- New therapies for common and rare neurological disorders such as epilepsy, multiple sclerosis, migraine, spinal muscular atrophy, and muscular dystrophy.
- Devices that connect to the nervous system to restore functions lost or impaired due to disease or injury, including implanted brain stimulation therapies for Parkinson's disease, epilepsy, and spinal cord injury.
- Growing evidence for vascular contributions to dementia, which may inform new approaches to prevent cognitive decline and promote healthy brain aging.
- Cutting-edge tools for neuroscience research allowing studies to classify the many cell types in the human brain, map complex neural circuits, and observe brain activity in unprecedented detail.

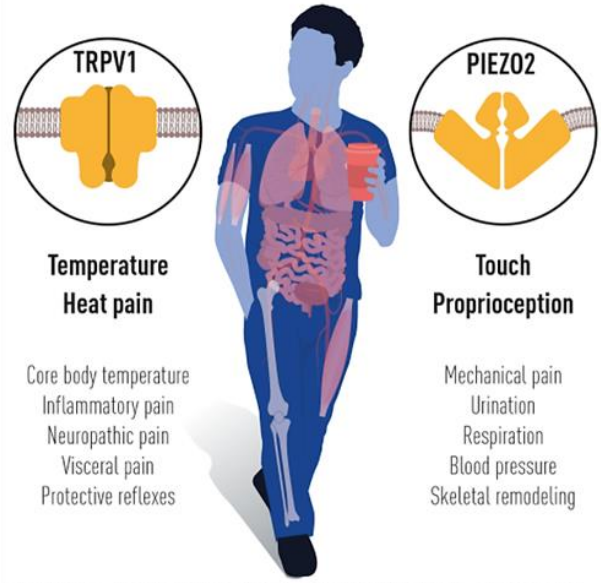


National Institute of Neurological Disorders and Stroke

Recent accomplishment

Basic science as the foundation for breakthroughs

Two recipients of NINDS and other NIH support for basic neuroscience research were awarded the 2021 Nobel Prize in Physiology or Medicine. Over decades of research David Julius and Ardem Patapoutian identified ion channel receptors in nerve endings that trigger electrical impulses in response to temperature changes and mechanical force. Beyond unraveling mysteries about how we sense heat, touch, and body position, these fundamental discoveries are leading to new approaches for treating chronic pain and other conditions.



Credit: Mattias Karlén © The Royal Swedish Academy of Sciences, http://www.nobelprize.org/.

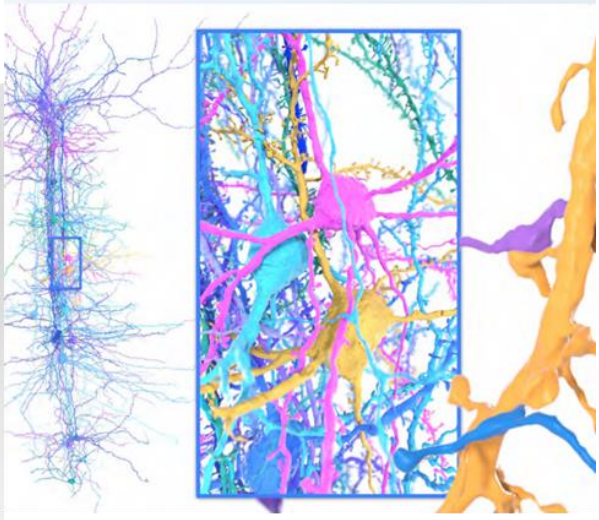
Future Initiatives

- ***Health Disparities and Health Equity*** NINDS is committed to reducing the disproportionate burden of neurological disease borne by disadvantaged groups. Guided by public input and strategic planning, NINDS will intensify research on health disparities and equity, and minority, community, and global health.
- ***NINDS Ultra-rare Gene Therapy (URGenT) Network*** URGenT will support precision gene targeted therapy development for severe ultra-rare neurological diseases affecting fewer than 20 in one million people. Together, these diseases represent a large medical need with little incentive for therapy development. NINDS will also support natural history studies to identify clinical outcome measures, a prerequisite for future clinical trials.

Trans-NIH neuroscience research

NINDS is a leading partner in trans-NIH neuroscience initiatives, reflecting the nervous system's role in many aspects of human health, development, and disease.

- The **Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative®** is an ambitious effort to develop and use new technologies to study brain circuits and their functions, and ultimately to understand and treat brain diseases.
- NINDS leads programs within the **NIH Helping to End Addiction Long-term℠ (HEAL) Initiative** to develop non-addictive treatments for pain and also leads the **NIH Pain Consortium,** joining 23 Institutes and Centers on pain research.
- NINDS and the National Institute on Aging (NIA) work together to advance research on **Alzheimer's Disease and Alzheimer's Disease-Related Dementias (ADRD)**, including through the new **Center for Alzheimer's and Related Dementias (CARD)** on the NIH campus.
- The **NIH Blueprint for Neuroscience Research** is a collaboration among NIH Institutes, Centers, and Offices to address cross-cutting needs for neuroscience research and research training.
- NINDS and the National Institute of Allergy and Infectious Diseases (NIAID) lead the trans-NIH **Myalgic Encephalomyelitis/ Chronic Fatigue Syndrome (ME/CFS)** working group.



This 3D reconstruction of neurons and their connections in the mouse brain was recreated by an artificial intelligence pipeline that uses electron microscope images from a cubic mm of mouse visual cortex. (Amy Sterling, Princeton University)

Major Changes in the Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. Note that there may be overlap between budget mechanism and activity detail, and these highlights will not sum to the total change for the FY 2023 President's Budget request for NINDS, which is $2,768.0 million, an increase of $254.6 million from the FY 2022 CR level. The request includes $225.0 million provided by the 21st Century Cures Act. Within the President's Budget request level, NINDS will pursue its highest research priorities through strategic investments and careful stewardship of appropriated funds.

Research Project Grants (RPGs) (+$239.5 million; total $2,046.1 million):
The NINDS budget reflects an increase of $239.5 million in the Research Project Grants portfolio, including SBIR/STTR awards. Competing RPGs are expected to increase by 193 grants in FY 2023 compared to the FY 2022 CR level of awards.

Other Research (-$3.0 million; total $175.9 million):
The Other Research mechanism reflects a decrease due to Other Research grants converting to Research Project Grants.

Research and Development Contracts (+$7.9 million; total $134.2 million):
NINDS plans to increase R&D contract funding to accommodate new and expanded contracts within the HEAL and Blueprint Neurotherapeutics Programs.

Research Management and Support (+$5.0 million; total $102.0 million):
The NINDS budget reflects an increase of $5.0 million in Research Management and Support to provide additional staff and other support in recognition of recent increases in the NINDS grant portfolio.

Budget Mechanism Table

NATIONAL INSTITUTES OF HEALTH

National Institute of Neurological Disorders and Stroke

Budget Mechanism [*,1]

(Dollars in Thousands)

Mechanism	FY 2021 Final [2]		FY 2022 CR		FY 2023 President's Budget		FY 2023 +/- FY 2022	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Research Projects:								
Noncompeting	2,138	$1,128,502	2,231	$1,239,184	2,242	$1,260,648	11	$21,464
Administrative Supplements	*(192)*	$21,585	*(182)*	$16,838	*(233)*	$23,700	*(51)*	$6,862
Competing:								
Renewal	91	$58,365	73	$47,085	71	$45,689	-2	-$1,396
New	786	$518,573	645	$422,042	829	$625,550	184	$203,508
Supplements	1	$710	0	$0	0	$0	0	$0
Subtotal, Competing	**878**	**$577,648**	**718**	**$469,128**	**900**	**$671,239**	**182**	**$202,111**
Subtotal, RPGs	3,016	$1,727,736	2,949	$1,725,149	3,142	$1,955,587	193	$230,438
SBIR/STTR	118	$91,022	107	$81,496	125	$90,514	18	$9,018
Research Project Grants	3,134	$1,818,758	3,056	$1,806,646	3,267	$2,046,102	211	$239,456
Research Centers								
Specialized/Comprehensive	26	$42,755	25	$39,270	24	$36,983	-1	-$2,287
Clinical Research	0	$0	0	$0	0	$0	0	$0
Biotechnology	0	$0	0	$0	0	$0	0	$0
Comparative Medicine	0	$237	0	$237	0	$237	0	$0
Research Centers in Minority Institutions	0	$0	0	$0	0	$0	0	$0
Research Centers	**26**	**$42,992**	**25**	**$39,507**	**24**	**$37,220**	**-1**	**-$2,287**
Other Research:								
Research Careers	279	$51,695	275	$51,500	279	$52,441	4	$941
Cancer Education	0	$0	0	$0	0	$0	0	$0
Cooperative Clinical Research	8	$6,355	0	$1,843	9	$2,902	9	$1,059
Biomedical Research Support	0	$0	0	$0	0	$0	0	$0
Minority Biomedical Research Support	0	$0	0	$0	0	$0	0	$0
Other	258	$109,067	299	$125,553	293	$120,575	-6	-$4,978
Other Research	**545**	**$167,118**	**574**	**$178,896**	**581**	**$175,918**	**7**	**-$2,978**
Total Research Grants	3,705	$2,028,868	3,655	$2,025,049	3,872	$2,259,240	217	$234,191
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	340	$16,450	339	$16,491	356	$17,535	17	$1,045
Institutional Awards	71	$18,629	325	$19,205	325	$19,593	0	$387
Total Research Training	**411**	**$35,080**	**664**	**$35,696**	**681**	**$37,128**	**17**	**$1,432**
Research & Develop. Contracts	119	$121,925	123	$126,325	127	$134,179	4	$7,855
SBIR/STTR (non-add)	*(0)*	*($938)*	*(0)*	*($979)*	*(0)*	*($1,109)*	*(0)*	*($130)*
Intramural Research	308	$225,479	323	$229,268	338	$235,450	15	$6,182
Res. Management & Support	246	$92,166	284	$97,056	294	$102,046	10	$4,990
SBIR Admin. (non-add)	*(0)*	*($663)*	*(0)*	*($670)*	*(0)*	*($690)*	*(0)*	*($20)*
Construction		$0		$0		$0		$0
Buildings and Facilities		$0		$0		$0		$0
Total, NINDS	**554**	**$2,503,517**	**607**	**$2,513,393**	**632**	**$2,768,043**	**25**	**$254,650**

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

[1] Of which $50.0 million in FY 2021, $50.0 million in FY 2022, and $225.0 million in FY 2023 is derived by transfer from the NIH Innovation Account under the 21st Century Cures Act.

[2] Includes $22.1 million of 21st Century Cures Act funding not obligated in FY 2021 and carried over into FY 2022.

Appropriations Language

NATIONAL INSTITUTES OF HEALTH

National Institute of Neurological Disorders and Stroke

For carrying out section 301 and title IV of the PHS Act with respect to neurological disorders and stroke, $2,543,043,000.

NIH INNOVATION ACCOUNT, CURES ACT

(INCLUDING TRANSFER OF FUNDS)

For necessary expenses to carry out the purposes described in section 1001(b)(4) of the 21st Century Cures Act, in addition to amounts available for such purposes in the appropriations provided to the NIH in this Act, $1,085,000,000, to remain available until expended: Provided, That such amounts are appropriated pursuant to section 1001(b)(3) of such Act, are to be derived from amounts transferred under section 1001(b)(2)(A) of such Act, and may be transferred by the Director of the National Institutes of Health to other accounts of the National Institutes of Health solely for the purposes provided in such Act: Provided further, That upon a determination by the Director that funds transferred pursuant to the previous proviso are not necessary for the purposes provided, such amounts may be transferred back to the Account: Provided further, That the transfer authority provided under this heading is in addition to any other transfer authority provided by law.

Summary of Changes

NATIONAL INSTITUTES OF HEALTH
National Institute of Neurological Disorders and Stroke

Summary of Changes
(Dollars in Thousands)

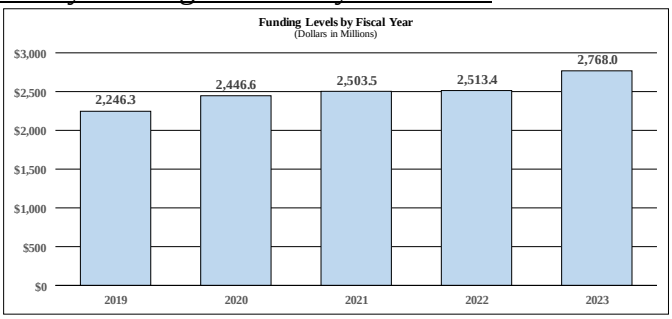
FY 2022 CR	$2,513,393
FY 2023 President's Budget	$2,768,043
Net change	$254,650

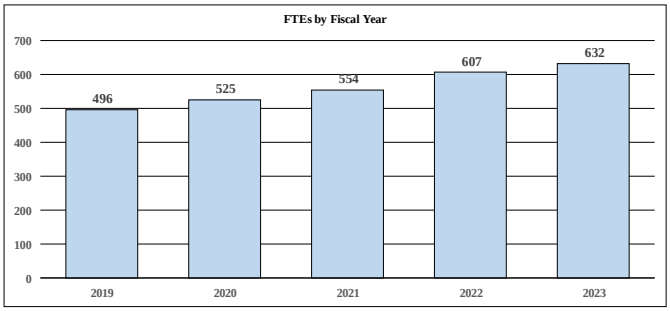
CHANGES	FY 2022 CR FTEs	FY 2022 CR Budget Authority	FY 2023 President's Budget FTEs	FY 2023 President's Budget Budget Authority	Built-In Change from FY 2022 CR FTEs	Built-In Change from FY 2022 CR Budget Authority
A. Built-in:						
1. Intramural Research:						
a. Annualization of January 2022 pay increase & benefits		$72,276		$76,318		$479
b. January FY 2023 pay increase & benefits		$72,276		$76,318		$2,448
c. Paid days adjustment		$72,276		$76,318		-$275
d. Differences attributable to change in FTE		$72,276		$76,318		$3,520
e. Payment for centrally furnished services		$36,627		$37,359		$733
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$120,366		$122,212		$2,548
Subtotal						$9,453
2. Research Management and Support:						
a. Annualization of January 2022 pay increase & benefits		$53,830		$57,413		$357
b. January FY 2023 pay increase & benefits		$53,830		$57,413		$1,820
c. Paid days adjustment		$53,830		$57,413		-$205
d. Differences attributable to change in FTE		$53,830		$57,413		$1,900
e. Payment for centrally furnished services		$7,516		$7,667		$150
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$35,710		$36,967		$780
Subtotal						$4,802
Subtotal, Built-in						$14,255

CHANGES	FY 2022 CR No.	FY 2022 CR Amount	FY 2023 President's Budget No.	FY 2023 President's Budget Amount	Program Change from FY 2022 CR No.	Program Change from FY 2022 CR Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	2,231	$1,256,022	2,242	$1,284,348	11	$28,326
b. Competing	718	$469,128	900	$671,239	182	$202,111
c. SBIR/STTR	107	$81,496	125	$90,514	18	$9,018
Subtotal, RPGs	3,056	$1,806,646	3,267	$2,046,102	211	$239,456
2. Research Centers	25	$39,507	24	$37,220	-1	-$2,287
3. Other Research	574	$178,896	581	$175,918	7	-$2,978
4. Research Training	664	$35,696	681	$37,128	17	$1,432
5. Research and development contracts	123	$126,325	127	$134,179	4	$7,855
Subtotal, Extramural		$2,187,069		$2,430,547		$243,478
6. Intramural Research	323	$229,268	338	$235,450	15	-$3,271
7. Research Management and Support	284	$97,056	294	$102,046	10	$188
8. Construction		$0		$0		$0
9. Buildings and Facilities		$0		$0		$0
Subtotal, Program	607	$2,513,393	632	$2,768,043	25	$240,395
Total built-in and program changes						$254,650

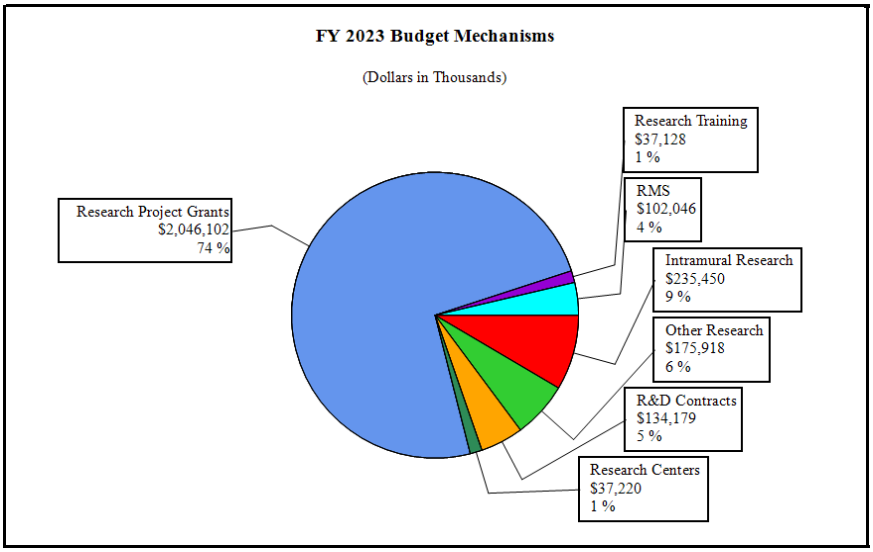
Budget Graphs

History of Budget Authority and FTEs:

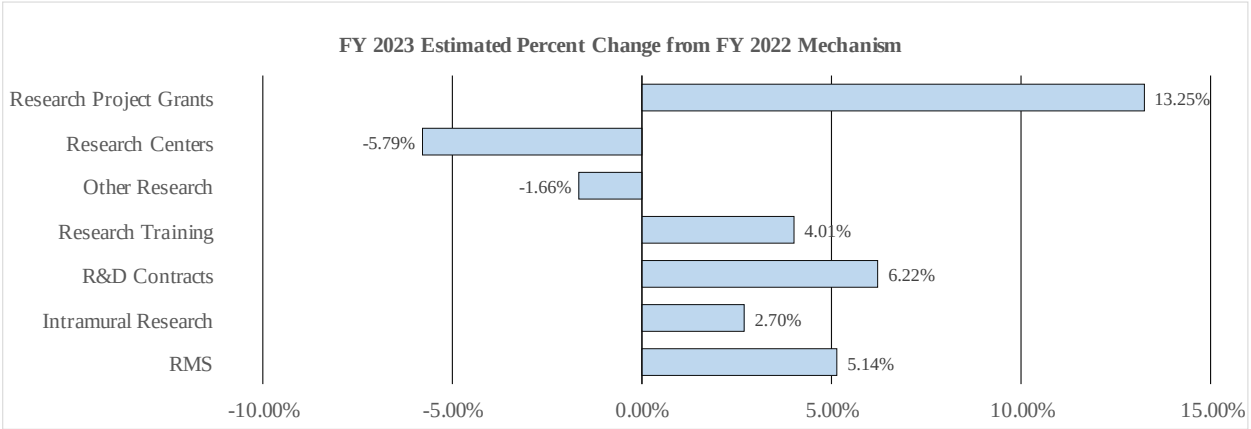




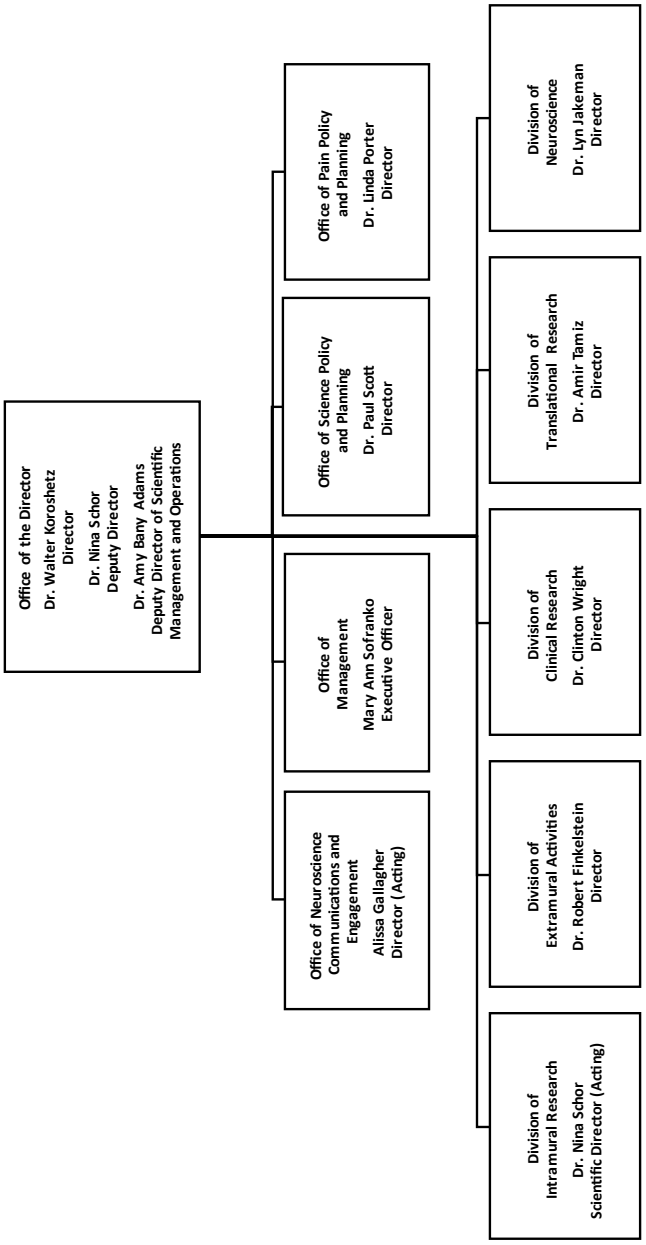
Distribution of Mechanism:



Change by Selected Mechanism:



Organization Chart



Budget Authority by Activity

	FY 2021 Final		FY 2022 CR		FY 2023 President's Budget		FY 2023 +/- FY 2022 CR	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Division of Neuroscience		$1,518,460		$1,521,710		$1,620,789		$99,079
Division of Clinical Research		$132,748		$133,040		$128,435		-$4,605
Division of Translational Research		$180,549		$180,933		$197,032		$16,099
Division of Extramural Activities		$110,978		$111,221		$109,991		-$1,230
Opioid/Pain Research [1]		$243,137		$240,165		$374,300		$134,135
Subtotal, Extramural		**$2,185,872**		**$2,187,069**		**$2,430,547**		**$243,478**
Intramural Research	**308**	**$225,479**	**323**	**$229,268**	**338**	**$235,450**	**15**	**$6,182**
Research Management & Support	**246**	**$92,166**	**284**	**$97,056**	**294**	**$102,046**	**10**	**$4,990**
TOTAL	**554**	**$2,503,517**	**607**	**$2,513,393**	**632**	**$2,768,043**	**25**	**$254,650**

* Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

[1] Total for Opioid/Pain Research including IR and RMS is (in thousands) $269,484 in FY 2021, $270,295 in FY 2022, and $405,443 in FY 2023.

Justification of Budget Request

National Institute of Neurological Disorders and Stroke (NINDS)

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

Budget Authority (BA):

	FY 2021 Final	FY 2022 CR	FY 2023 President's Budget	FY 2023 +/- FY 2022
BA	$2,503,517,000	$2,513,393,000	$2,768,043,000	$254,650,000
FTE	554	607	632	25

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

Overall Budget Policy: The FY 2023 President's Budget request for NINDS is $2,768.0 million, an increase of $254.6 million or 10.1 percent compared to the FY 2022 CR level. The NINDS request includes 21st Century Cures Act funding of $225.0 million for the BRAIN Initiative. The proposed increase in FY 2023 also includes an increase of $135.1 million for the HEAL Initiative accompanied by a $43.0 million increase in other NINDS opioid and pain research.

Program Descriptions

Division of Neuroscience (DON)

As the largest part of the NINDS extramural program, DON supports research on the normal brain, spinal cord, and nerves of the body; mechanisms of neurological injury and disease; and early development of treatments and diagnostics. DON also supports research resources, core facilities, and scientific conferences. Investigator-initiated research driven by scientific opportunity is the foundation for the DON portfolio, and specific initiatives focus on topics and public health priorities that warrant a more targeted approach. DON program areas include:

Basic neuroscience: Gaps in understanding nervous system development and function and disease mechanisms hinder progress in treating and preventing neurological disorders. Basic research to fill those gaps is critical to the NINDS mission and is unlikely to receive sustained support from the private sector. Investing in basic research provides a broad foundation for future breakthroughs. For example, two basic neuroscientists supported by NINDS received the 2021 Nobel Prize in Physiology or Medicine. Over decades of research David Julius and Ardem

Patapoutian identified receptors in nerve endings that trigger electrical impulses in response to temperature changes and mechanical force. Beyond unraveling mysteries about how we sense heat, touch, and body position, these fundamental discoveries are leading to new approaches for treating chronic pain and other conditions.

NIH BRAIN Initiative®: NINDS is a leading partner in the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, an ambitious effort to develop and apply new technologies to understand brain circuits and their functions, and ultimately to understand and treat brain diseases. Transformative projects underway will develop a comprehensive list of human brain cell types, complete a wiring diagram of mammalian brain circuits, and build an armamentarium of tools to access and modulate specific brain cell types and circuits to enable precision medicine applications in humans. (For more information, see the NIH Cross-Cutting Initiative section on the NIH BRAIN Initiative® in the NIH Congressional Justification Overview volume.)

Neurodegeneration: NINDS leads NIH research support for many neurodegenerative diseases. Programs for Parkinson's disease include the Morris K. Udall Centers of Excellence; the Parkinson's Disease Biomarkers Program (PDBP); and the Accelerating Medicines Partnership for Parkinson's Disease (AMP-PD), which leverages patient cohorts and resources from PDBP and other programs to identify biomarkers and new targets for therapies. As part of the National Plan to Address Alzheimer's Disease, NINDS leads NIH research on Alzheimer's Disease Related Dementias (ADRD), which include Lewy Body dementia (LBD), frontotemporal dementia, vascular contributions to cognitive impairment and dementia (VCID), and mixed etiology dementias. Co-funding from the National Institute on Aging (NIA) enables support for specific initiatives and an extended payline for meritorious ADRD research proposals. NINDS is also partnering with the NIH Common Fund on the Accelerating Leading-edge Science in ALS (ALS^2) initiative, which supported four new projects in 2021 on new mechanistic insights, finding target genes for therapeutic intervention, assessing a way to slow progression, and how environmental exposures contribute to ALS risk.

Stroke and cerebrovascular disease: NINDS supports a broad portfolio of research to

NINDS RESEARCH PROGRAM AWARD

Scientific discovery relies on creativity, hard work, persistence, and support for tackling difficult questions. Reaching a breakthrough can require long-term approaches, taking risks, or changing direction based on new findings, all of which can be difficult to support through traditional NIH funding mechanisms. For these reasons, NINDS launched a special program in 2016, the Research Program Award (R35).

This program allows investigators with a record of achievement the freedom to embark on ambitious, long-term research without the constraints of specific aims tied to a typical research project grant. It supports all of an investigator's NINDS mission-relevant research with stable funding (up to $750,000 per year in direct costs) for up to eight years. Ultimately, the goal of the R35 program is to enable investigators to devote more time and creativity to the pursuit of cutting-edge neuroscience. With longer term research funding, the R35 mechanism helps to reduce the administrative burden of grant writing, allowing more opportunity for investigators to participate in the lab, mentor trainees, and explore new ideas and technologies.

Since the program's inception, NINDS has funded 89 investigators from a variety of institutions, disciplines, and career stages who are pursuing broad and complex neuroscience questions. To encourage more diversity among program applicants and awardees, NINDS revised language in the funding opportunity announcement and increased social media outreach. These efforts resulted in more R35 applications from women, and in FY 2021, women received 39 percent of awards, up from 25 percent of prior awards.

understand stroke causes and the mechanisms involved in stroke-related damage and repair, which might be harnessed to aid neuroprotection and recovery. NINDS established the Stroke Preclinical Assessment Network (SPAN) to rigorously test potential neuroprotective therapies in rodent models of acute ischemic stroke, with built-in replication studies across multiple laboratories to ensure unbiased results. Therapies that are successful in SPAN may later move into clinical trials through the NIH StrokeNet, a NINDS-funded network for stroke clinical trials. NINDS stroke research includes studies to understand small vessel disease (SVD) in the brain, which affects the brain's small arteries and veins. In addition to stroke, SVD is a major cause of VCID. Together with NIA, NINDS also supports a national consortium called MarkVCID to develop and evaluate biomarkers that will help predict, diagnose, and track VCID.

Rare diseases: Many rare diseases affect the nervous system, and research on these disorders often yields insights into more common diseases with shared mechanisms. NINDS supports a large portfolio of research on rare diseases and is a partner in the NIH Rare Diseases Clinical Research Network, funding consortia for lysosomal disorders, mitochondrial diseases, dystonia, and others. NINDS has contributed to new treatments for rare disorders, including the first gene-based, disease-modifying therapies for spinal muscular atrophy and muscular dystrophy. An ongoing NINDS initiative aims to fill gaps in clinical trial readiness for rare neurological and neuro-muscular diseases with new therapies on the horizon, and a new initiative will support natural history and clinical outcome assessment studies for ultra-rare neurological diseases, meeting a critical need for therapy development. In FY 2023, NINDS will lead NIH support for a data management and coordinating center for the Undiagnosed Disease Network, enabling this successful program to continue past its initial NIH Common Fund support.

Other neurological disorders: DON research includes studies on many more nervous system disorders and on mechanisms shared across diseases, with studies informing new and improved treatments and diagnostics for hydrocephalus, spinal cord injury, traumatic brain injury (TBI), and neuropathies, among others. NINDS seeks input from research and patient communities to help set priorities, such as the Benchmarks for Epilepsy Research, updated in 2020. Because neuroscience spans scientific disciplines, NINDS also works closely with other NIH Institutes in areas of complementary interest. For example, in addition to having a leading role in the NIH HEAL Initiative[SM], NINDS is the primary NIH Institute for pain and headache research and leads the NIH Pain Consortium, which includes 23 Institutes and Centers. NINDS also leads NIH efforts focused on myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), including support for multi-disciplinary research centers focused on understanding this complex disease and building research capacity. Additional areas of collaboration include developmental disorders such as cerebral palsy, autism, Fragile X Syndrome, and Down syndrome; muscular dystrophies; brain tumor; autoimmune conditions such as multiple sclerosis (MS); and infections that affect the nervous system, including acute and long-term effects of COVID-19.

Budget Policy: The FY 2023 President's Budget request for the Division of Neuroscience is $1,620.8 million, an increase of $99.1 million, or 6.5 percent, from the FY 2022 CR level.

Division of Translational Research (DTR)

The DTR leads extramural NINDS therapy development through milestone-driven programs and services that support all development stages for drugs, devices, and biologic therapies, from

TRANSLATIONAL NEURAL DEVICES

The NINDS Translational Neural Devices program supports therapeutic and diagnostic device development for nervous system disorders, from preclinical studies through early-stage clinical trials. Building on historical NINDS contributions to effective devices, including the cochlear implant to restore hearing and deep brain stimulation for Parkinson's disease, current initiatives support device development in academia and small businesses with milestone-driven funding to optimize success. Recent accomplishments include:

- An FDA-approved device that engages neuromodulatory circuits to improve motor and sensory function after stroke
- A device that restores respiratory muscle function in spinal cord injury
- A tiny wearable device for accurate, real-time seizure monitoring in epilepsy
- Advances to enable adaptable brain stimulation for Parkinson's disease based on at-home recordings of patients' brain activity and movement

In 2021, NINDS and the NIH Blueprint for Neuroscience Research announced the Blueprint MedTech program as an incubator for cutting-edge neurotechnology. The program will fund device optimization and clinical feasibility studies and provide access to resources such as translational research services and expert advice on issues such as regulatory submissions, commercialization, and strategic partnerships.

NINDS also leads neural device research within the NIH HEAL and BRAIN initiatives, leveraging shared expertise across these programs. The HEAL Initiative℠ is advancing devices for diagnosing and treating acute and chronic pain conditions, and the NIH BRAIN Initiative® supports the development of recording and stimulating devices to treat central nervous system disorders and better understand the human brain.

preclinical studies to first-in-human clinical trials. Translational research is prone to failure and poses risks for private sector investment. DTR programs help to remove these risks by advancing therapies to a point of readiness sufficient for industry interest, or in some cases, for testing in NINDS-funded clinical trials. DTR will support the following programs in FY 2023:

The **Blueprint Neurotherapeutics Network (BPN)** is led by NINDS for the NIH Blueprint for Neuroscience Research, a partnership of NIH Institutes and Centers that support neuroscience research. The BPN focuses on the development of small molecule drugs and biologic therapies. Successes to date include one compound tested in Phase II clinical trials to improve cognitive and memory function in Fragile X Syndrome and Alzheimer's disease and another that has entered a Phase III trial for Stargardt disease, an inherited juvenile form of macular degeneration.

Cooperative Research to Enable and Advance Translational Enterprises (CREATE) supports the development of biologic therapies, including large biological molecules, cell therapies, and gene therapies. Many therapies in CREATE are based on antisense oligonucleotides (ASOs) designed to modify the expression of specific genes, reflecting the promise of such precision medicine approaches for neurological diseases. Building on the success of the BPN for small molecule therapies, the **Blueprint Neurotherapeutics Network for Biologics (BPN-Biologics)** was established in 2021 as a broader platform for advancing biological therapies for nervous system diseases.

The **Innovation Grants to Nurture Initial Translational Efforts (IGNITE)** program funds early-stage therapy development that fuels the pipeline for later stage programs, such as the BPN. IGNITE activities include assay validation, demonstration that therapies have sufficient biological activity to merit further study, and development of model systems for early testing.

The NINDS **Ultra-rare Gene Therapy (URGenT)** Network will support precision medicine therapy development for serious, life-threatening ultra-rare neurological diseases affecting fewer

than 20 in one million people. Together, these diseases represent a large medical need without available treatments and with little incentive for private sector therapy development.

The **NINDS Biomarkers Program** supports development and validation of biomarkers, which can aid therapy development, clinical trials, and patient care decisions. Biomarkers are in later validation stages for MS diagnosis, TBI prognosis, and response to investigational therapy in GM1 gangliosidosis and Friedreich's ataxia. NINDS also leads a HEAL Initiative[SM] biomarker program for pain conditions, with projects on prognostic/diagnostic markers for post-traumatic headache, chemotherapy-induced neuropathic pain, and adolescent musculoskeletal pain.

The **Epilepsy Therapy Screening Program (ETSP)** screens candidate compounds from academia and industry in standardized animal models and has contributed to 11 drugs approved for common and rare epilepsies. Vigabatrin, identified by the ETSP as an antiseizure treatment, is now in an NINDS-funded clinical trial as an intervention to prevent or reduce the risk of infantile spasms and refractory seizures in infants with tuberous sclerosis. The ETSP aims to advance more treatments for drug-resistant epilepsy and disease prevention and modification.

NINDS established the **Preclinical Screening Platform for Pain (PSPP)** within the HEAL Initiative[SM] to identify and profile non-addictive therapeutics for acute and chronic pain.

NINDS Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs support research by small businesses to develop therapies, diagnostics, and research tools relevant to the NINDS mission. Several DTR programs, as well as the NIH BRAIN and HEAL initiatives, include SBIR/STTR funding opportunities.

The **NIH Countermeasures Against Chemical Threats (CounterACT)** program, funded by the NIH Office of the Director, develops medical countermeasures for toxic exposures after a chemical emergency and is part of the Chemical Countermeasures Research Program at NIAID. Several drug candidates have moved to advanced development, including midazolam, which received expanded FDA approval for reducing seizures after nerve agent exposure.

Budget Policy: The FY 2023 President’s Budget request for the Division of Translational Research is $197.0 million, an increase of $16.1 million, or 8.9 percent, from the FY 2022 CR level.

Division of Clinical Research (DCR)

DCR supports clinical trials infrastructure and large-scale clinical research, including early and advanced phase clinical trials, comparative effectiveness research, and epidemiological studies for neurological conditions across the lifespan. To optimize clinical research, DCR enforces milestones for progress and provides resources to improve patient access and recruitment. In FY 2023, major DCR programs will include:

NINDS clinical research networks provide accessible infrastructure for efficient early and late stage clinical trials, bring together expert communities to promote high-quality research, enable partnerships with industry and patient groups, and help train future clinical trial investigators.

- The **Network for Excellence in Neuroscience Clinical Trials (NeuroNEXT)** supports Phase II clinical trials to gather critical information about investigational treatments prior to larger late-stage trials, as well as studies to discover and validate biomarkers. Since 2011, NeuroNEXT has begun 10 studies focused on a range of common and rare neurological disorders. Completed trials have built evidence to justify later stage trials for treatments for MS, Huntington's disease, and neuroprotection after acute stroke.
- **NIH StrokeNet** supports trials on stroke treatment, prevention, and recovery and rehabilitation through 25 regional centers and over 400 hospitals across the United States. Since 2014, 16 trials have been conducted or are ongoing through the network, with results informing clinical care. StrokeNet's first pediatric trial is testing rehabilitation to improve upper extremity motor function in babies who had a perinatal stroke, and a new trial aims to find the first proven treatment for acute intracerebral hemorrhage (hemorrhagic stroke).
- **Strategies to Innovate EmeRgENcy Care Clinical Trials Network (SIREN),** led by NINDS and the National Heart Lung and Blood Institute (NHLBI), conducts clinical trials in emergency care for neurologic, cardiac, respiratory, and hematologic conditions. Ongoing trials are testing treatments for TBI and improving neurological outcomes after cardiac arrest. Another trial tested the safety and efficacy of convalescent plasma for preventing progression of mild COVID-19 to severe illness. NIH halted the trial when interim results showed no benefit, demonstrating SIREN's ability to rapidly launch trials and deliver actionable results.
- NINDS leads the **Early Phase Pain Investigation Clinical Network (EPPIC-Net)** for the HEAL Initiative[SM], for early phase trials of novel pain treatments.

The **Office of Global Health and Health Disparities** within DCR directs NINDS support for research on health disparities for neurological disorders and on minority, community, and global health relevant to the NINDS mission. An ongoing strategic planning process will guide and strengthen new NINDS investments in these areas.

The **NINDS Common Data Elements (CDE) Program** works with researchers, industry, nonprofit, other Federal agencies, and professional organizations to develop data standards for neurological disorders to foster collaboration and data sharing across studies and improve data quality and integrity. The program has developed CDEs for more than 20 disease areas, many with pediatric standards, and a common set for use across diseases.

Budget Policy: The FY 2023 President's Budget request for the Division of Clinical Research is $128.4 million, a decrease of $4.6 million, or 3.5 percent, from the FY 2022 CR level.

Division of Extramural Activities (DEA)

DEA leads NINDS efforts in research training and career development, workforce diversity initiatives, and enhancing neuroscience rigor and reproducibility research. DEA also houses the NINDS Scientific Review Branch and is growing capacity to conduct and leverage analyses that inform the development and implementation of NINDS programs and policies.

The **Office of Training and Workforce Development** directs NINDS extramural research training and career development programs, including fellowships and mentored awards and grants for programs at academic institutions. Complementing NIH-wide programs, NINDS initiatives address unique training needs across neuroscience research career stages. Current

LANDIS MENTORSHIP AWARD

NINDS established the Landis Mentorship Award to recognize the critical role of excellent mentors in developing exceptional future scientists. The award is named for former NINDS Director Dr. Story Landis, who generously mentored others as they navigated their neuroscience careers.

Each year, NINDS selects Landis Awardees from grantees who show dedication to superior mentorship and training. NINDS invites nominations from current or former trainees who have first-hand knowledge of an individual's influence as a mentor, with rotating requests for nominations for junior, mid-career, and senior investigator mentors. Awardees receive a $100,000 grant supplement to support their work to mentor additional neuroscience trainees.

Since 2018, NINDS has named 26 Landis Awardees who exemplify outstanding mentorship by cultivating mentees' scientific excellence, investing in mentees' professional development, and strengthening the research workforce through inclusion of people from diverse backgrounds. NINDS hopes the Landis Award shows the scientific community and academic institutional leaders in particular the high value NINDS places on training and mentorship. Further, NINDS hopes the award will encourage institutions to reward individuals not only for research achievements but also for their impact on the future of neuroscience through mentorship and training.

initiatives include national research training programs for neurosurgeons and pediatric neurologists, career development awards for advanced trainees launching independent projects, and workshops focused on strengthening mentorship in neuroscience research.

The **Office of Programs to Enhance Neuroscience Workforce Diversity (OPEN)** promotes diversity in neuroscience research via programs designed to overcome barriers to the participation and inclusion of underrepresented or disadvantaged groups and individuals with disabilities. Programs span career stages from K-12 outreach to mentoring networks and funding opportunities targeting career transitions. NINDS is also a partner in the NIH Common Fund's Faculty Institutional Recruitment for Sustainable Transformation (FIRST) program to foster inclusive excellence at NIH-funded institutions.

The **Office of Research Quality** promotes rigor and transparency in neuroscience research and has been instrumental to NIH and research journal policies to improve rigor in experimental design and transparent reporting in publications. New initiatives fund efforts to build, evaluate, and disseminate free and engaging educational resources on rigorous research principles.

Budget Policy: The FY 2023 President's Budget request for the Division of Extramural Activities is $110.0 million, a decrease of $1.2 million, or 1.1 percent, from the FY 2022 CR level.

NINDS Intramural Research Program (IRP)

The NINDS IRP conducts research and research training on the NIH campus. The IRP spans basic, translational, and clinical research in neuroscience, neurology, and neurosurgery and hosts core facilities providing state-of-the-art research technologies. With over 150 labs from NINDS and 10 other Institutes conducting neuroscience research at NIH, including many co-located in the Porter Neuroscience Research Center, the IRP offers a rich environment for collaboration.

The unique resources of the IRP enable innovative, multidisciplinary studies that bridge basic and clinical neuroscience to answer fundamental questions about the nervous system and its diseases. One recent study mapped brain activity in research volunteers as they learned a new skill and showed that during rest, the volunteers' brains repeatedly replayed faster versions of the practiced activity. The more volunteers replayed the activity while at rest the better they performed during later practice, demonstrating that learning occurs during breaks from practice. Among other advances, IRP researchers built a cellular map of chronic MS lesions that points to treatment targets and found the cause of a form of childhood ALS – and a potential gene-silencing therapy.

NINDS intramural clinical studies benefit from the NIH Clinical Center, a hospital devoted solely to clinical research. NINDS leads a multisystem study on post-infectious ME/CFS to identify clinical and biological markers and disease mechanisms and will launch a study of veterans with Gulf War Illness (with the Veterans Health Administration) as well as a study of people with persistent symptoms long after acute COVID-19 infection. Other clinical studies focus on epilepsy, MS, neurodegenerative diseases, brain tumors, movement disorders, and rare genetic disorders; and they include early trials for drugs, devices, and gene therapy. In addition, NINDS helps find causes of puzzling neurological cases through the NIH Undiagnosed Diseases Program and works with local emergency departments on studies of acute stroke and TBI.

The Center for Alzheimer's and Related Dementias (CARD) established by NIA and NINDS in 2020 aims to stimulate ambitious research that may be challenging to accomplish within traditional extramural funding mechanisms. Understanding the many ways genes linked to dementia affect cellular pathways will be essential for discovering strategies to prevent or halt neurodegeneration. As one of its first projects, CARD is using CRISPR/Cas9-based gene editing to create a repository of induced pluripotent stem cell lines that model over 100 different AD/ADRD gene variants. The cell lines will be freely available to the research community.

Budget Policy: The FY 2023 President's Budget request for the Intramural Research Program is $235.5 million, an increase of $6.2 million, or 2.7 percent, from the FY 2022 CR level.

Research Management and Support (RMS)

RMS comprises administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants, training awards, and research contracts. RMS also includes strategic planning, program evaluation, regulatory compliance, communication about NINDS research and neurological disorders, and liaison with other agencies, Congress, and the public. In 2021, NINDS updated its stroke prevention campaign (Mind Your Risks), based on evidence linking high blood pressure (hypertension) and the risk of dementia later in life. Messages on the importance of controlling hypertension aim to engage young Black men, as a step to addressing disproportionately high risks and risk factors for stroke and dementia in Black Americans.

Budget Policy: The FY 2023 President's Budget request for Research Management and Support is $102.0 million, an increase of $5.0 million, or 5.1 percent, from the FY 2022 CR level.

NIH Helping to End Addiction Long-term℠ (HEAL) Initiative

The NIH HEAL Initiative℠ launched in 2018 as an aggressive, multi-agency effort to speed scientific solutions to stem the national opioid crisis. NINDS leads HEAL activities focused on new non-addictive medications and devices to treat acute and chronic pain conditions. These efforts include programs for pain biomarker discovery, preclinical therapy development, and a clinical trials network for testing potential therapies, all of which build on and integrate with NINDS programs and infrastructure for basic, translational, and clinical research.

Budget Policy: The FY 2023 President's Budget request for NINDS HEAL funding is $405.4 million, an increase of $135.1 million, or 50.0 percent, from the FY 2022 CR level. NINDS HEAL funding for FY 2023 includes $374.3 million for extramural research, $20.0 million for intramural research, and $11.1 million for RMS.

NATIONAL INSTITUTES OF HEALTH
National Institute of Neurological Disorders and Stroke

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2014	$1,642,619,000		$1,631,703,000	$1,587,982,000
Rescission				$0
2015	$1,608,461,000			$1,605,205,000
Rescission				$0
2016	$1,660,375,000	$1,656,334,000	$1,694,758,000	$1,696,139,000
Rescission				$0
2017 [1]	$1,695,180,000	$1,751,049,000	$1,803,306,000	$1,783,654,000
Rescission				$0
2018 [2]	$1,355,998,000	$1,853,011,000	$1,904,666,000	$2,188,149,000
Rescission				$0
2019 [2]	$1,838,556,000	$2,228,780,000	$2,275,580,000	$2,274,413,000
Rescission				$0
2020 [2]	$2,026,031,000	$2,385,571,000	$2,490,494,000	$2,444,687,000
Rescission				$0
2021 [2]	$2,245,110,000	$2,465,110,000	$2,526,245,000	$2,513,393,000
Rescission				$0
2022 [2]	$2,783,300,000	$2,799,515,000	$2,786,096,000	$2,513,393,000
Rescission				$0
2023 [2]	$2,768,043,000			

[1] Budget Estimate to Congress includes mandatory financing.

[2] Includes funds derived by transfer from the NIH Innovation Account under the 21st Century Cures Act.

Authorizing Legislation

NATIONAL INSTITUTES OF HEALTH
National Institute of Neurological Disorders and Stroke

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2022 Amount Authorized	FY 2022 CR	2023 Amount Authorized	FY 2023 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$2,513,393,000	Indefinite	$2,768,043,000
National Institute of Neurological Disorders and Stroke	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$2,513,393,000		$2,768,043,000

NATIONAL INSTITUTES OF HEALTH

National Institute of Neurological Disorders and Stroke

Amounts Available for Obligation [1]

(Dollars in Thousands)

Source of Funding	FY 2021 Final	FY 2022 CR	FY 2023 President's Budget
Appropriation [2]	$2,513,393	$2,513,393	$2,768,043
Secretary's Transfer	-$7,396	$0	$0
OAR HIV/AIDS Transfers	-$2,480	$0	$0
Subtotal, adjusted budget authority	$2,503,517	$2,513,393	$2,768,043
Unobligated balance, start of year	$6,583	$21,103	$0
Unobligated balance, end of year (carryover) [3]	-$21,103	$0	$0
Subtotal, adjusted budget authority	**$2,488,997**	**$2,534,496**	**$2,768,043**
Unobligated balance lapsing	$0	$0	$0
Total obligations	$2,488,997	$2,534,496	$2,768,043

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2021 - $24,954 FY 2022 - $25,000 FY 2023 - $25,000

[2] Of which $70.0 million in FY 2020, $50.0 million in FY 2021, and $76.0 million in FY 2022 is derived by transfer from the NIH Innovation Account under the 21st Century Cures Act.

[3] Reflects 21st Century Cures Act funding not obligated in FY 20, and carried over into FY 21.

Budget Authority by Object Class

NATIONAL INSTITUTES OF HEALTH

National Institute of Neurological Disorders and Stroke

Budget Authority by Object Class[1]

(Dollars in Thousands)

		FY 2022 CR	FY 2023 President's Budget	FY 2023 +/- FY 2022
Total compensable workyears:				
	Full-time equivalent	607	632	25
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$183	$183	$0
	Average GM/GS grade	13.8	13.8	0.0
	Average GM/GS salary	$127	$130	$2
	Average salary, Commissioned Corps (42 U.S.C. 207)	$128	$130	$2
	Average salary of ungraded positions	$151	$154	$3
	OBJECT CLASSES	**FY 2022 CR**	**FY 2023 President's Budget**	**FY 2023 +/- FY 2022**
	Personnel Compensation			
11.1	Full-Time Permanent	$47,440	$50,575	$3,135
11.3	Other Than Full-Time Permanent	$29,405	$31,234	$1,829
11.5	Other Personnel Compensation	$3,445	$3,665	$219
11.7	Military Personnel	$333	$354	$20
11.8	Special Personnel Services Payments	$14,557	$15,106	$549
11.9	**Subtotal Personnel Compensation**	**$95,181**	**$100,935**	**$5,753**
12.1	Civilian Personnel Benefits	$30,712	$32,571	$1,859
12.2	Military Personnel Benefits	$213	$226	$13
13.0	Benefits to Former Personnel	$0	$0	$0
	Subtotal Pay Costs	**$126,106**	**$133,731**	**$7,625**
21.0	Travel & Transportation of Persons	$594	$607	$13
22.0	Transportation of Things	$287	$293	$6
23.1	Rental Payments to GSA	$0	$0	$0
23.2	Rental Payments to Others	$48	$49	$1
23.3	Communications, Utilities & Misc. Charges	$371	$379	$8
24.0	Printing & Reproduction	$0	$0	$0
25.1	Consulting Services	$56,491	$57,609	$1,119
25.2	Other Services	$42,624	$42,861	$237
25.3	Purchase of Goods and Services from Government Accounts	$169,353	$173,832	$4,480
25.4	Operation & Maintenance of Facilities	$514	$514	$0
25.5	R&D Contracts	$32,301	$36,071	$3,770
25.6	Medical Care	$333	$347	$14
25.7	Operation & Maintenance of Equipment	$4,335	$4,430	$95
25.8	Subsistence & Support of Persons	$0	$0	$0
25.0	**Subtotal Other Contractual Services**	**$305,951**	**$315,665**	**$9,714**
26.0	Supplies & Materials	$11,990	$12,254	$264
31.0	Equipment	$5,226	$5,341	$115
32.0	Land and Structures	$2,084	$2,130	$46
33.0	Investments & Loans	$0	$0	$0
41.0	Grants, Subsidies & Contributions	$2,060,734	$2,297,592	$236,858
42.0	Insurance Claims & Indemnities	$0	$0	$0
43.0	Interest & Dividends	$0	$0	$0
44.0	Refunds	$0	$0	$0
	Subtotal Non-Pay Costs	**$2,387,287**	**$2,634,312**	**$247,025**
	Total Budget Authority by Object Class	**$2,513,393**	**$2,768,043**	**$254,650**

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

NATIONAL INSTITUTES OF HEALTH

National Institute of Neurological Disorders and Stroke

Salaries and Expenses

(Dollars in Thousands)

Object Classes	FY 2022 CR	FY 2023 President's Budget	FY 2023 +/- FY 2022
Personnel Compensation			
Full-Time Permanent (11.1)	$47,440	$50,575	$3,135
Other Than Full-Time Permanent (11.3)	$29,405	$31,234	$1,829
Other Personnel Compensation (11.5)	$3,445	$3,665	$219
Military Personnel (11.7)	$333	$354	$20
Special Personnel Services Payments (11.8)	$14,557	$15,106	$549
Subtotal, Personnel Compensation (11.9)	**$95,181**	**$100,935**	**$5,753**
Civilian Personnel Benefits (12.1)	$30,712	$32,571	$1,859
Military Personnel Benefits (12.2)	$213	$226	$13
Benefits to Former Personnel (13.0)	$0	$0	$0
Subtotal Pay Costs	**$126,106**	**$133,731**	**$7,625**
Travel & Transportation of Persons (21.0)	$594	$607	$13
Transportation of Things (22.0)	$287	$293	$6
Rental Payments to Others (23.2)	$48	$49	$1
Communications, Utilities & Misc. Charges (23.3)	$371	$379	$8
Printing & Reproduction (24.0)	$0	$0	$0
Other Contractual Services			
Consultant Services (25.1)	$55,247	$56,362	$1,115
Other Services (25.2)	$42,624	$42,861	$237
Purchase of Goods and Services from Government Accounts (25.3)	$103,791	$106,315	$2,525
Operation & Maintenance of Facilities (25.4)	$514	$514	$0
Operation & Maintenance of Equipment (25.7)	$4,335	$4,430	$95
Subsistence & Support of Persons (25.8)	$0	$0	$0
Subtotal Other Contractual Services	**$206,511**	**$210,483**	**$3,972**
Supplies & Materials (26.0)	$11,990	$12,254	$264
Subtotal Non-Pay Costs	**$219,803**	**$224,067**	**$4,264**
Total Administrative Costs	**$345,908**	**$357,798**	**$11,890**

Detail of Full-Time Equivalent Employment

NATIONAL INSTITUTES OF HEALTH
National Institute of Neurological Disorders and Stroke

Detail of Full-Time Equivalent Employment (FTE)

Office	FY 2021 Final			FY 2022 CR			FY 2023 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Clinical Research									
Direct:	16	-	16	24	-	24	27	-	27
Reimbursable:	6	-	6	7	-	7	7	-	7
Total:	22	-	22	31	-	31	34	-	34
Division of Extramural Activities									
Direct:	64	-	64	70	-	70	72	-	72
Reimbursable:	3	-	3	3	-	3	3	-	3
Total:	67	-	67	73	-	73	75	-	75
Division of Intramural Research									
Direct:	292	2	294	305	3	308	320	3	323
Reimbursable:	14	-	14	15	-	15	15	-	15
Total:	306	2	308	320	3	323	335	3	338
Division of Neuroscience									
Direct:	44	-	44	54	-	54	57	-	57
Reimbursable:	9	-	9	9	-	9	9	-	9
Total:	53	-	53	63	-	63	66	-	66
Division of Translational Research									
Direct:	29	-	29	40	-	40	40	-	40
Reimbursable:	8	-	8	11	-	11	11	-	11
Total:	37	-	37	51	-	51	51	-	51
Office of the Director									
Direct:	77	-	77	81	-	81	83	-	83
Reimbursable:	2	-	2	2	-	2	2	-	2
Total:	79	-	79	83	-	83	85	-	85
Total	552	2	554	604	3	607	629	3	632
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**								
2019	12.6								
2020	12.6								
2021	13.8								
2022	13.8								
2023	13.8								

Detail of Positions

NATIONAL INSTITUTES OF HEALTH
National Institute of Neurological Disorders and Stroke

Detail of Positions[1]

GRADE	FY 2021 Final	FY 2022 CR	FY 2023 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	$182,850	$182,850	$182,850
General Schedule			
GM/GS-15	68	72	79
GM/GS-14	90	100	104
GM/GS-13	107	116	123
GS-12	61	66	71
GS-11	21	21	22
GS-10	1	1	1
GS-9	18	20	24
GS-8	4	4	4
GS-7	3	4	5
GS-6	2	2	2
GS-5	1	1	1
GS-4	3	3	3
GS-3	2	2	2
GS-2	0	0	0
GS-1	1	1	1
Subtotal	382	413	442
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	1	1	1
Senior Grade	0	0	0
Full Grade	1	1	1
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	2	2	2
Ungraded	211	222	224
Total permanent positions	382	413	442
Total positions, end of year	596	638	669
Total full-time equivalent (FTE) employment, end of year	554	607	632
Average ES salary	$182,850	$182,850	$182,850
Average GM/GS grade	13.8	13.8	13.8
Average GM/GS salary	$124,096	$127,447	$129,805

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