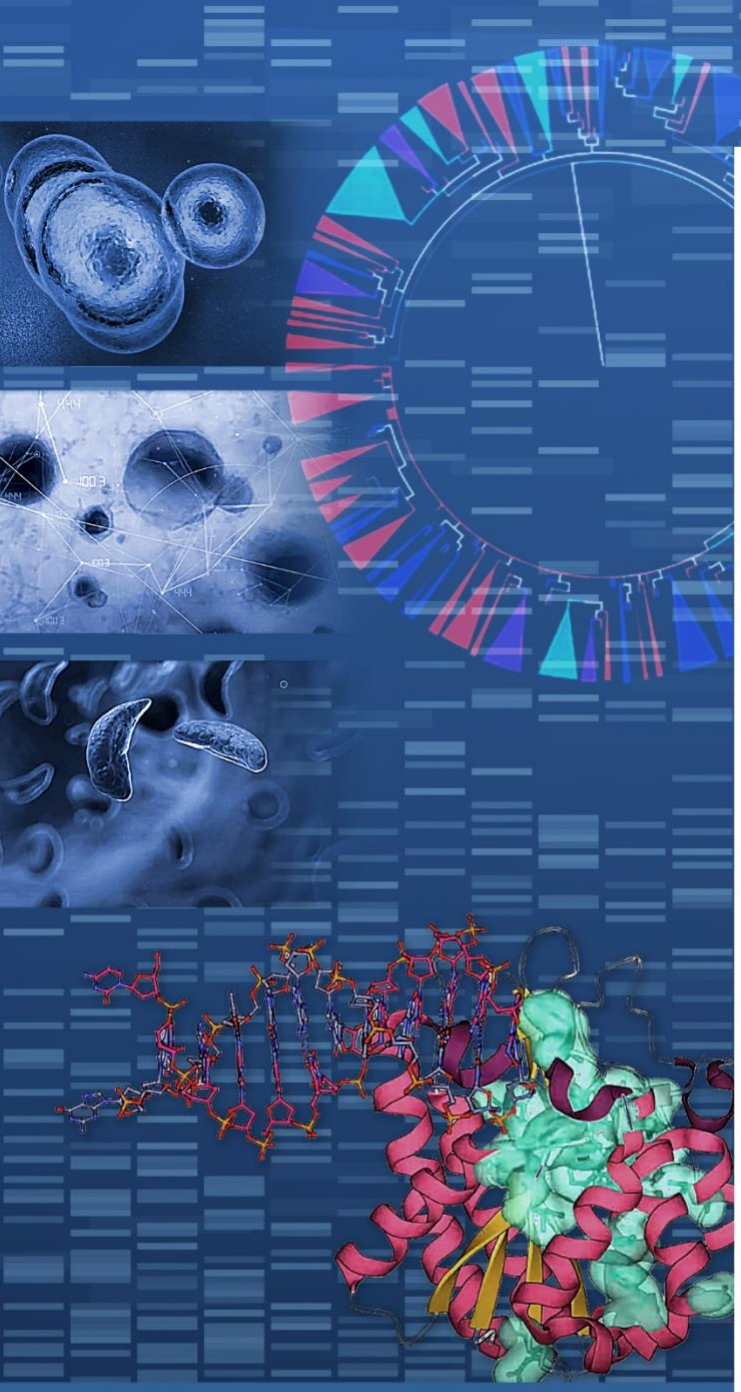

National Library of Medicine

CONGRESSIONAL JUSTIFICATION
FY 2024

Department of Health and Human Services
National Institutes of Health

NIH NLM

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DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Library of Medicine (NLM)

FY 2024 Budget Table of Contents

General Notes

1. FY 2023 Enacted levels cited in this document include the effects of the FY 2023 HIV/AIDS transfer, as shown in the Amounts Available for Obligation table.
2. Detail in this document may not sum to the subtotals and totals due to rounding.

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Director's Overview

Mission

Patricia Flatley Brennan, R.N., Ph.D.

The National Library of Medicine (NLM) is a leader in biomedical informatics and computational health data science research and the world's largest biomedical library. With a mission to acquire, collect, preserve, and disseminate materials relevant to research, medicine, and public health, NLM makes the world's biomedical data and information discoverable and accessible to all: scientists, clinicians, students, educators, librarians, and the public. Our biomedical information services enable data-driven scientific discovery, health care, and public health. Our innovative research programs develop and apply novel computational approaches to accelerate biomedical discovery and advance health care across disease areas. We serve science and society by preserving knowledge about biomedicine and health for future generations.

Our research and information services benefit from the unique expertise and skills represented by an NLM workforce trained in disciplines as wide-ranging as librarianship, information science, informatics, computer science, engineering, clinical care, genomics, and public health. We leverage the competencies of our workforce in all aspects of data-driven biomedical discovery by conducting and supporting research that expands how data are used in health care and discovery; training the next generation of biomedical informaticists, computational health data scientists, and biomedical librarians; developing and applying methods to organize and align data; and managing data repositories accessed every day by millions of users. NLM's role as a research enterprise, and a library, is vital to serving scientists and society. Our work invites collaboration to advance discoveries across the lifespan, fosters an interdisciplinary approach to science, improves access to health information, and promotes health equity.

Science for Everyone, By Everyone: Turning Discovery into Health

NLM plays a central role in turning discovery into health by collecting, organizing, and disseminating research results to anyone who can use them. This role is vital to accelerate science and innovation, inform clinical care and public health, and guide personal health decisions. We work with scientists, universities, scholarly publishers, drug and device manufacturers, and biotechnology and bioinformatics firms, among others to collect data and information relevant to all dimensions of biomedical research and to all health fields and disciplines. We curate and deliver to the public trusted information about health conditions, drugs and supplements, medical tests, and genetics in consumer-oriented, easy-to-read language. We further extend the reach of our information dissemination efforts through our Network of the National Library of Medicine (NNLM®), a network of more than 8,800 libraries across the country in community-, hospital-, and campus-based settings that ensure vital health information is accessible to all, including underserved populations. We also engage a variety of stakeholders in science and innovation through activities such as codeathons that advance and extend the utility of our biomedical information services.

Supporting Innovative Research to Advance New Discoveries for All Stages of Life

NLM's investment in research has grown in recent years, even as we have expanded our biomedical information services. Our intramural and extramural research programs develop and apply data science techniques to accelerate discovery and improve health through all stages of life. NLM-supported research and researchers develop methods and knowledge that are both generally applicable across a variety of conditions and life stages, and specific to the needs of distinct populations across the lifespan (e.g., improving disease screening in pediatric and adult populations). NLM researchers leverage data resources to study the structure, evolution, and inheritance properties of bacteria and viruses; develop computational models to analyze gene pathways associated with diseases such as cancer; and apply machine learning and artificial intelligence (AI) techniques to medical images to improve disease screening and diagnosis for conditions such as infant sepsis, age-related macular degeneration, sickle cell disease, and cervical cancer. NLM's extramural research advances computational sciences and engineering in biomedical research, education, and clinical care and leverages biomedical informatics and data science methods to enable access, analysis, dissemination, and use of biomedical data and information for research and health care. NLM-funded researchers employ computational approaches to enable discovery from and interpretation of health records to further our understanding of which disease characteristics are related to genomic variants. They also connect different data types and sources, such as images and clinical records, to improve health care through predictive modeling, and develop tools to facilitate clinical research.

Inspiring the Next Generation of Biomedical Informaticists, Computational Health Data Scientists, and Biomedical Librarians

Inherent in our mission as a library is making available information resources that inspire students, educators, and the public to engage with science and biomedicine, and that spark interest in future scientific and medical careers. To meet this mission, NLM offers through our extramural and intramural programs a rich set of training opportunities at different academic and professional career stages. We recently renewed our university-based programs—adding 3 new institutions for a total of 18 universities across the country—that provide doctoral and post-doctoral training in biomedical informatics and data science. We launched a new summer research program at 12 institutions to provide introductory experiences in biomedical informatics and data science to undergraduate, post-baccalaureate, and master's students, with a specific focus on attracting students from underrepresented groups. Our recently launched intramural diversity in data science research training program, which hosted its first cohort of five trainees, also aims to further improve the diversity of researchers in the field. In addition, every year, NLM offers short- and long-term intramural training opportunities at high school, undergraduate, post-baccalaureate, graduate, professional school, and postdoctoral levels. We also provide training for the next generation of biomedical librarians and library leaders through on-site fellowships and an NNLM-led data science internship program for up-and-coming library professionals from backgrounds typically underrepresented in library sciences.

Leveraging Our Information Services and Engagement Programs to Promote Public Good

NLM strives to instill scientific integrity and public trust in science by using our biomedical information services to improve transparency in the performance and outcomes of NIH-funded research. We continue to uphold NIH's longstanding commitment to make available to the

public the results of research it supports and conducts, including publications and scientific data. We are deeply engaged in planning NIH's implementation of updated policy guidance from the White House Office of Science and Technology Policy, which will accelerate access to NIH research publications and data through our PubMed Central® (PMC) archive of full-text biomedical and life sciences journal literature, and other relevant NLM data repositories. We continue to advance new modes of scientific communication by applying advanced AI techniques to our indexing and annotation of published biomedical literature, and by implementing the NIH Preprint Pilot. The pilot has successfully increased the discoverability of preprints reporting on NIH-funded COVID-19 research, which has encouraged us to consider expanding it to preprints associated with other NIH-funded research. We also preserve the nation's biomedical knowledge in physical and digital media, and work to ensure diversity and inclusivity in the information and data we collect to reflect health experiences across populations and reveal issues of health disparities.

NLM engages with other NIH Institutes and Centers, federal agencies, and external stakeholders to achieve our mission and support national priorities. For example, NLM collaborates with the NIH *All of Us* Research Program (*All of Us*) through our intramural and extramural programs. NLM staff are developing training on using *All of Us* data, and, through the NNLM, we support awareness of and engagement in *All of Us*. To support pandemic response efforts, we continued to improve processes and infrastructure to monitor, gather, standardize, evaluate, and share emerging SARS-CoV-2 variant sequencing data for research and public health surveillance. We also continued to improve SARS-CoV-2 data submissions and validation processes in our data repositories. We provided support for NIH programs to develop rapid COVID-19 detection devices and home-based testing technologies, and to understand how people recover from COVID-19. We responded to the mpox public health emergency by establishing new collaborations with publishers and other data providers to provide immediate public access to mpox-related published research results. We also made genome sequences from the recent mpox and polio viral outbreaks rapidly available in GenBank®, NLM's database of all publicly available assembled sequences. In addition, we guided development of government-wide guidance promulgated by the National Science and Technology Council to define desirable characteristics of repositories for data resulting from federally funded research.

Modernizing Our Information Systems

NLM continues to enhance its information services to foster innovative programs, strengthen internal operations, and appropriately manage the growth of information and data generated by biomedical research. We invest in modernizing our data infrastructure to better serve our diverse set of stakeholders by creating a safe, secure, and sustainable computing platform; fostering appropriate and authorized global data sharing; and leveraging advanced computational technology. We are making greater use of commercial cloud platforms to provide access to biomedical data for discovery and public health,

and to strengthen our internal data infrastructure, which ensure data availability and continuity of services. These efforts streamline our biomedical information services and provide users with information more efficiently and effectively. Supplemental NIH funding for time-limited initiatives have allowed us to enhance or modernize data infrastructure needed for NIH priorities related to genomics research and clinical trial registration and results reporting.

Future Initiatives

NLM will continue to lead the development of advanced biomedical data and information systems to support research, clinical care, and public health, as well as novel analytical approaches to uncover new patterns and biomedical phenomena from biomedical and health data. We will strive to provide scientists and society with trustworthy health information and advance NIH- and government-wide priorities.

Priorities for Fiscal Year (FY) 2024 include efforts to:

- **Support sustainability and open science.** We will leverage our expertise to create high-quality, sustainable, and secure databases that make biomedical research information and data publicly accessible through innovative information services that engender trust. We will collaborate across NIH and the Federal Government to accelerate public access to federally funded research results through PMC and other relevant NLM data repositories.
- **Advance biomedical informatics and computational health data science.** We will sustain our investment in intramural and extramural research to develop ways to better leverage clinical data for research purposes. Ongoing research directions will include the use of machine learning methods to analyze different data types and improve disease detection and diagnosis through analysis of medical images and use of computational approaches to understand the structure and function of genes. We will continue to train the next generation of biomedical informatics and data science researchers through our university-based research and summer training programs.
- **Modernize NLM's infrastructure and organization.** We will continue to build a 21st-century digital library that offers literature, data, analytical models, and new approaches to scientific communications that are accessible, sustainable, and available 24 hours a day, 7 days a week. We will prioritize support for mission critical information systems for literature, clinical trial registration and results reporting, and genomics. We will continue to maintain our physical infrastructure, computational platforms, and information services through engagement with our stakeholders. We will also continue to improve our operational and organizational efficiency so that it is well suited to the future of work.
- **Contribute to NIH- and government-wide priorities.** We will continue to provide critical data management and guidance to support NIH and government-wide efforts such as improving health across the lifespan, pandemic preparedness and response, and public access. We will also contribute to NIH efforts to increase diversity, equity, and inclusion across its programs and operations. We will continue to share and apply our scientific knowledge and program expertise in data science, data management, infrastructure, security, and workforce development to support these and other priorities.

National Library of Medicine

Improving health through data-driven discovery

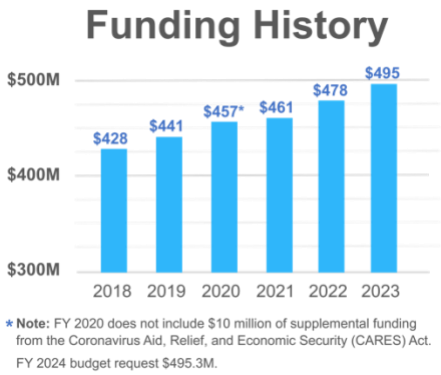
The National Library of Medicine (NLM) is a global leader in biomedical informatics and computational health data science and the world's largest biomedical library. As 1 of the 27 Institutes and Centers at NIH, NLM's research and information services support scientific discovery, health care, and public health.

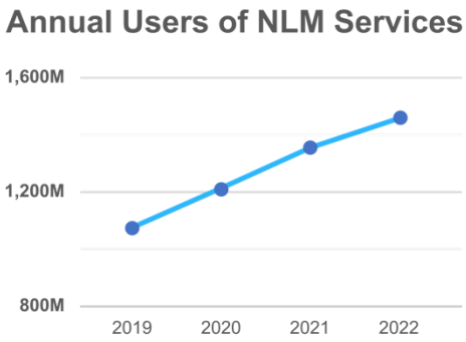
A PLATFORM FOR BIOMEDICAL DISCOVERY

The 2017-2027 NLM strategic plan includes three goals:

1. Accelerate discovery and advance health through data-driven research;
2. Reach more people in more ways through enhanced dissemination and engagement; and
3. Build a workforce for data-driven research and health.

Implementation of the strategic plan enables NLM to support and respond to NIH-wide priorities and support discovery and public health globally.





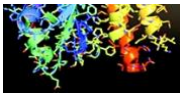
Patricia Flatley Brennan, R.N., Ph.D.
As Director of the NLM since 2016, Dr. Brennan spearheaded the development of a 10-year strategic plan that envisions NLM as a platform for biomedical discovery and data-powered health. Combining her background in engineering, information technology, and clinical nursing practice, Dr. Brennan positions NLM and its world-class genomic databases, innovative research and information services, and vast literature resources to serve science and society, and to guide advances in data science and data-driven discovery.

NLM CONDUCTS AND FUNDS RESEARCH

NLM's vibrant intramural research program conducts innovative research and training in computational biology and computational health sciences. NLM's extramural grants support original research projects and advanced training in biomedical informatics and data science.

Intramural Researchers at NLM

Explore novel applications of artificial intelligence that advance interpretation of medical images to detect health issues.



Apply network analysis approaches to protein-protein interactions to predict interactions between individual molecules in human diseases.

Study and assess features that can predict and mitigate bias in clinical data sets, and design algorithms to reduce bias in research data sets.

Extramural Researchers Across the Nation

Incorporate machine and artificial intelligence into tools and resources that benefit health care providers, scientists, and the public.

Develop approaches to curate biomedical knowledge and data, including integration of structured and unstructured data, to make data findable and usable for scientific discovery.

Conduct research that supports integration and linking of all available data relating to a person's health to support health risk assessments.

National Library of Medicine

21st-CENTURY LIBRARY

Every day, millions of scientists, health professionals, and members of the public use NLM's online information resources to translate research results into new treatments, access NLM's collections, develop new products, inform clinical decision making, and improve public health.

ClinicalTrials.gov — The world's largest clinical trial registry and results database, with nearly 430,000 clinical studies and nearly 56,000 results summaries.

MedlinePlus — NLM's trusted and authoritative source of consumer health information, accessed by more than 430 million users annually.

PubMed — The most heavily used biomedical literature citation database in the world, containing nearly 35 million citations.

PMC PubMed Central — Digital archive of more than 8 million freely accessible, full-text biomedical and life sciences journal articles, including more than 290,000 coronavirus-related articles and more than 3,500 preprint articles featuring NIH-funded research.

Sequence Read Archive — The world's largest publicly available repository for high-throughput sequencing data, comprising more than 60 petabytes of data which are also freely available through commercial cloud services.

Terminology Standards — NLM is the central coordinating body within HHS for clinical terminology standards for health data interoperability.

BIOMEDICAL INFORMATICS TRAINING

NLM funds research training programs in biomedical informatics and data science at 18 universities across the country that enroll approximately 200 predoctoral and postdoctoral trainees.

NLM launched a new research experience training program to attract undergraduate, post-baccalaureate, and master's-level students from underrepresented groups to biomedical informatics and data science doctoral programs, and to promote scientific workforce diversity.

NLM provides research training experiences for short-term, summer, and fellowship trainees at the high school, pre- and post-baccalaureate, and pre- and post-doctoral levels to work with its intramural investigators in computational biology or computational health research.

OUTREACH AND ENGAGEMENT

NLM leverages its Network of the National Library of Medicine (NNLM®) of more than 8,800 academic health science libraries, hospital and public libraries, and community organizations to improve access to health information for all. NNLM offers training to support effective use of NLM information resources by librarians, health professionals, researchers, and the public. NNLM currently operates through seven regions across the United States.

FUTURE INITIATIVES

NLM will continue to lead the development of advanced biomedical data and information systems to support research, clinical care, and public health, as well as novel analytical approaches to uncover new patterns and biomedical phenomena from biomedical and health data. NLM will:

Support sustainability and open science. NLM will leverage its expertise in creating high-quality, sustainable, and secure databases to make biomedical research information accessible through innovative information services that engender trust.

Advance biomedical informatics and computational health data science. NLM will sustain its research investment in methods to analyze different data types, improve disease detection and diagnosis, and understand the structure and function of genes, and continue to train the next generation of biomedical informatics and data science researchers.

Modernize NLM infrastructure and organization. NLM will continue to build a 21st-century digital library that offers literature, data, analytical models, and new approaches to scientific communications that are accessible, sustainable, and available 24 hours a day, 7 days a week.

Contribute to NIH and government-wide priorities. NLM will continue to provide critical data management and guidance to support NIH and government-wide efforts, and to share its scientific knowledge and program expertise in data science, data management, infrastructure, security, and workforce development to support these efforts.

Major Changes in the Budget Request

Major changes in the FY 2024 President's Budget request for the National Library of Medicine (NLM) are briefly described below, by budget mechanism and activity detail. Note that there may be overlap between budget mechanism and activity detail; thus, these highlights will not sum to the total for NLM's FY 2024 President's Budget request, which is $495.3 million, the same as the FY 2023 Enacted level. Within the FY 2024 request level and informed by the NLM Strategic Plan 2017-2027 and other NIH strategic objectives, NLM will pursue its highest priorities through strategic investments and careful stewardship of appropriated funds.

Extramural Programs (same level; total $70.7 million):
NLM will maintain level funding for its in-demand research, training, and engagement programs in biomedical informatics and data science. NLM will continue to support 18 university-based graduate and post-doctoral biomedical informatics and data science training programs and 12 summer research experience programs designed to attract talented undergraduate and post-baccalaureate students to bioinformatics and data science careers. NLM expects to award an estimated 31 new research project grants and will prioritize advances in biomedical informatics and data science, as well as support for early stage investigators. NLM will maintain support for its Network of the National Library of Medicine.

Intramural Programs (-$1.1 million; total $400.3 million):
At this level of funding, NLM will seek efficiencies across the full scope of its intramural programs. NLM will continue to consolidate research and training efforts to develop and apply computational approaches to a broad range of information problems in biology, biomedicine, and human health. NLM will prioritize support for mission critical information systems that are most heavily used by scientists, clinicians, students, educators, librarians, and the public, and identify opportunities to consolidate other related systems onto common, robust platforms. NLM will support work to update clinical vocabularies and data interoperability standards that are most important to NIH's data science efforts and the nation's health care delivery systems. Additionally, NLM will conduct outreach and engagement to promote NLM and NIH resources.

NATIONAL INSTITUTES OF HEALTH
National Library of Medicine

Budget Mechanism *
(Dollars in Thousands)

Mechanism	FY 2022 Final		FY 2023 Enacted		FY 2024 President's Budget		FY 2024 +/- FY 2023	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Research Projects:								
Noncompeting	93	$31,977	98	$33,001	87	$31,561	-11	-$1,440
Administrative Supplements	*(8)*	$308	*(4)*	$309	*(4)*	$310	*(0)*	$1
Competing:								
Renewal	2	$1,072	2	$1,080	2	$1,080	0	$0
New	33	$10,204	28	$9,553	29	$9,940	1	$387
Supplements	0	$0	0	$0	0	$0	0	$0
Subtotal, Competing	**35**	**$11,276**	**30**	**$10,633**	**31**	**$11,020**	**1**	**$387**
Subtotal, RPGs	128	$43,562	128	$43,943	118	$42,891	-10	-$1,052
SBIR/STTR	3	$1,683	5	$1,765	5	$1,692	0	-$73
Research Project Grants	131	$45,245	133	$45,707	123	$44,582	-10	-$1,125
Research Centers								
Specialized/Comprehensive	0	$29	0	$26	0	$26	0	$0
Clinical Research	0	$0	0	$63	0	$83	0	$20
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	**0**	**$29**	**0**	**$89**	**0**	**$109**	**0**	**$20**
Other Research:								
Research Careers	4	$250	4	$270	3	$270	-1	$1
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	$0	0	$0	0	$0	0	$0
Other	54	$23,076	58	$23,896	55	$24,989	-3	$1,093
Other Research	**58**	**$23,325**	**62**	**$24,165**	**58**	**$25,259**	**-4**	**$1,094**
Total Research Grants	189	$68,600	195	$69,962	181	$69,951	-14	-$11
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	7	$265	6	$277	6	$288	0	$11
Institutional Awards	0	$0	0	$0	0	$0	0	$0
Total Research Training	**7**	**$265**	**6**	**$277**	**6**	**$288**	**0**	**$11**
Research & Develop. Contracts	0	$475	0	$476	0	$476	0	$0
SBIR/STTR (non-add)	*(0)*	*($18)*	*(0)*	*($18)*	*(0)*	*($18)*	*(0)*	*($0)*
Intramural Programs	569	$388,333	638	$401,459	638	$400,348	0	-$1,111
Res. Management & Support	85	$19,833	103	$23,141	103	$24,251	0	$1,111
SBIR Admin. (non-add)		*($0)*		*($0)*		*($0)*		*($0)*
Construction		$0		$0		$0		$0
Buildings and Facilities		$0		$0		$0		$0
Total, NLM	**654**	**$477,506**	**741**	**$495,314**	**741**	**$495,314**	**0**	**$0**

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

NATIONAL INSTITUTES OF HEALTH

NATIONAL LIBRARY OF MEDICINE

For carrying out section 301 and title IV of the PHS Act with respect to health information communications, **[**$497,548,000**]***$495,314,000*: *Provided,* That of the amounts available for improvement of information systems, $4,000,000 shall be available until September 30, **[**2024**]** *2025*: *Provided further,* That in fiscal year **[**2023**]** *2024,* the National Library of Medicine may enter into personal services contracts for the provision of services in facilities owned, operated, or constructed under the jurisdiction of the National Institutes of Health (referred to in this title as "NIH").

NATIONAL INSTITUTES OF HEALTH
National Library of Medicine

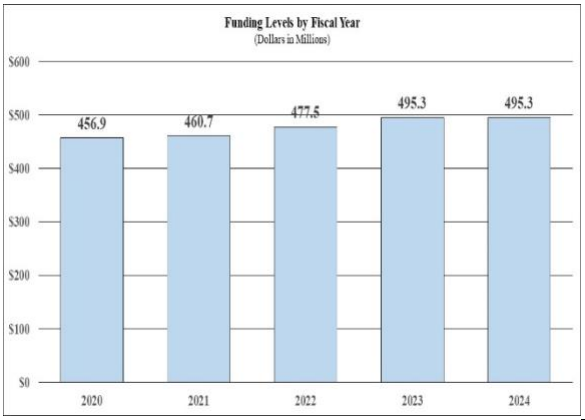
Summary of Changes
(Dollars in Thousands)

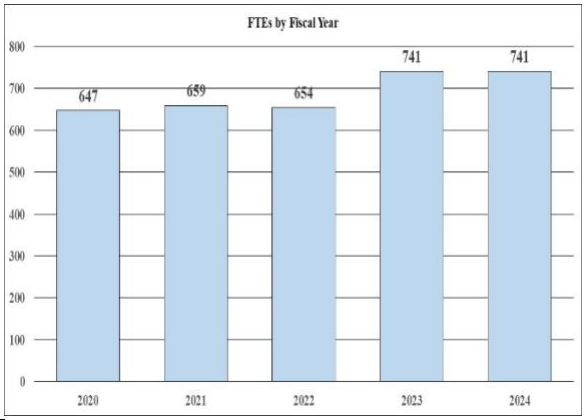
FY 2023 Enacted	$495,314
FY 2024 President's Budget	$495,314
Net change	$0

CHANGES	FY 2023 Enacted FTEs	FY 2023 Enacted Budget Authority	FY 2024 President's Budget FTEs	FY 2024 President's Budget Budget Authority	Built-In Change from FY 2023 Enacted FTEs	Built-In Change from FY 2023 Enacted Budget Authority
A. Built-in:						
1. Intramural Programs:						
a. Annualization of FY 2023 pay and benefits increase		$113,867		$119,946		$1,260
b. FY 2024 pay and benefits increase		$113,867		$119,946		$4,358
c. Paid days adjustment		$113,867		$119,946		$438
d. Differences attributable to change in FTE		$113,867		$119,946		$0
e. Payment for centrally furnished services		$328		$333		$5
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$287,264		$280,070		$5,909
Subtotal						$11,970
2. Research Management and Support:						
a. Annualization of FY 2023 pay and benefits increase		$15,616		$16,450		$173
b. FY 2024 pay and benefits increase		$15,616		$16,450		$598
c. Paid days adjustment		$15,616		$16,450		$60
d. Differences attributable to change in FTE		$15,616		$16,450		$0
e. Payment for centrally furnished services		$0		$0		$0
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		$7,524		$7,801		$172
Subtotal						$1,003
Subtotal, Built-in						$12,973

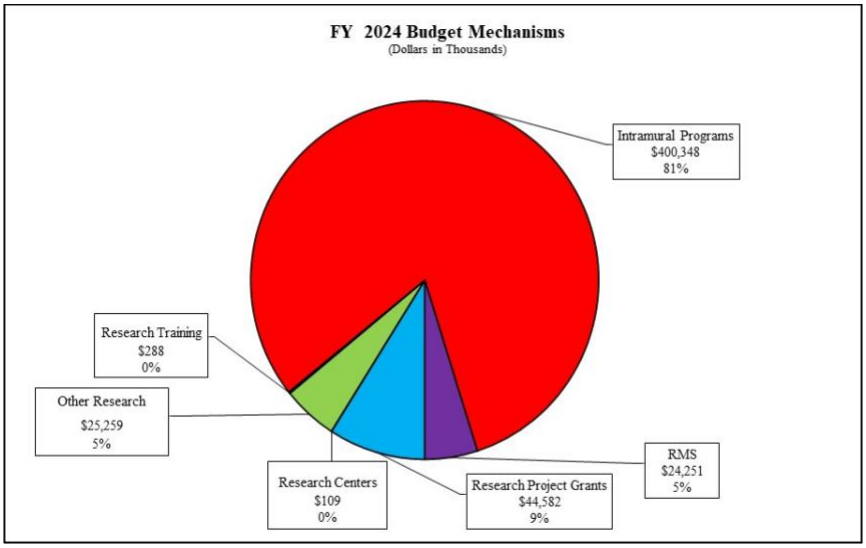
CHANGES	FY 2023 Enacted No.	FY 2023 Enacted Amount	FY 2024 President's Budget No.	FY 2024 President's Budget Amount	Program Change from FY 2023 Enacted No.	Program Change from FY 2023 Enacted Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	98	$33,310	87	$31,871	-11	-$1,439
b. Competing	30	$10,633	31	$11,020	1	$387
c. SBIR/STTR	5	$1,765	5	$1,692	0	-$73
Subtotal, RPGs	133	$45,707	123	$44,582	-10	-$1,125
2. Research Centers	0	$89	0	$109	0	$20
3. Other Research	62	$24,165	58	$25,259	-4	$1,094
4. Research Training	6	$277	6	$288	0	$11
5. Research and development contracts	0	$476	0	$476	0	$0
Subtotal, Extramural		$70,714		$70,714		$0
6. Intramural Programs	638	$401,459	638	$400,348	0	-$13,081
7. Research Management and Support	103	$23,141	103	$24,251	0	$108
8. Construction		$0		$0		$0
9. Buildings and Facilities		$0		$0		$0
Subtotal, Program	741	$495,314	741	$495,314	0	-$12,973
Total built-in and program changes						$0

History of Budget Authority and FTEs:

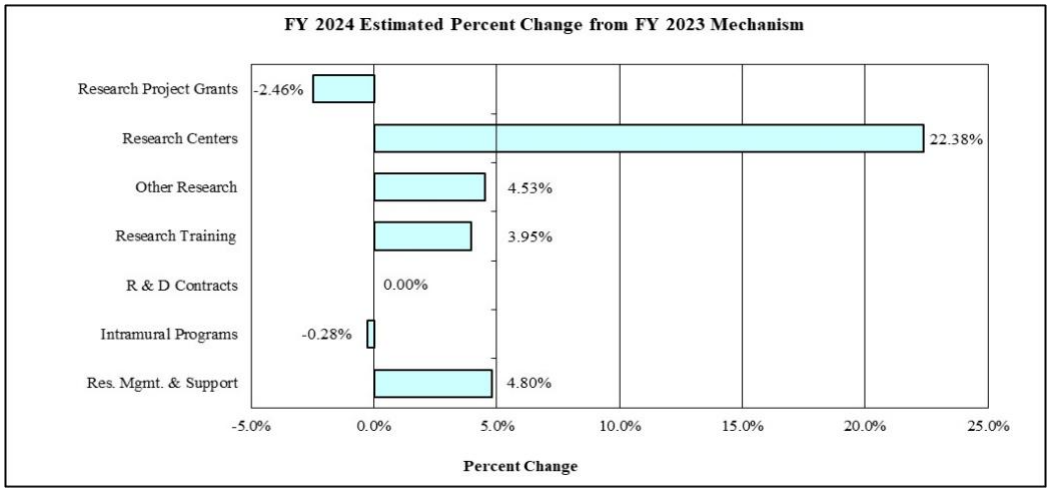




Distribution by Mechanism:



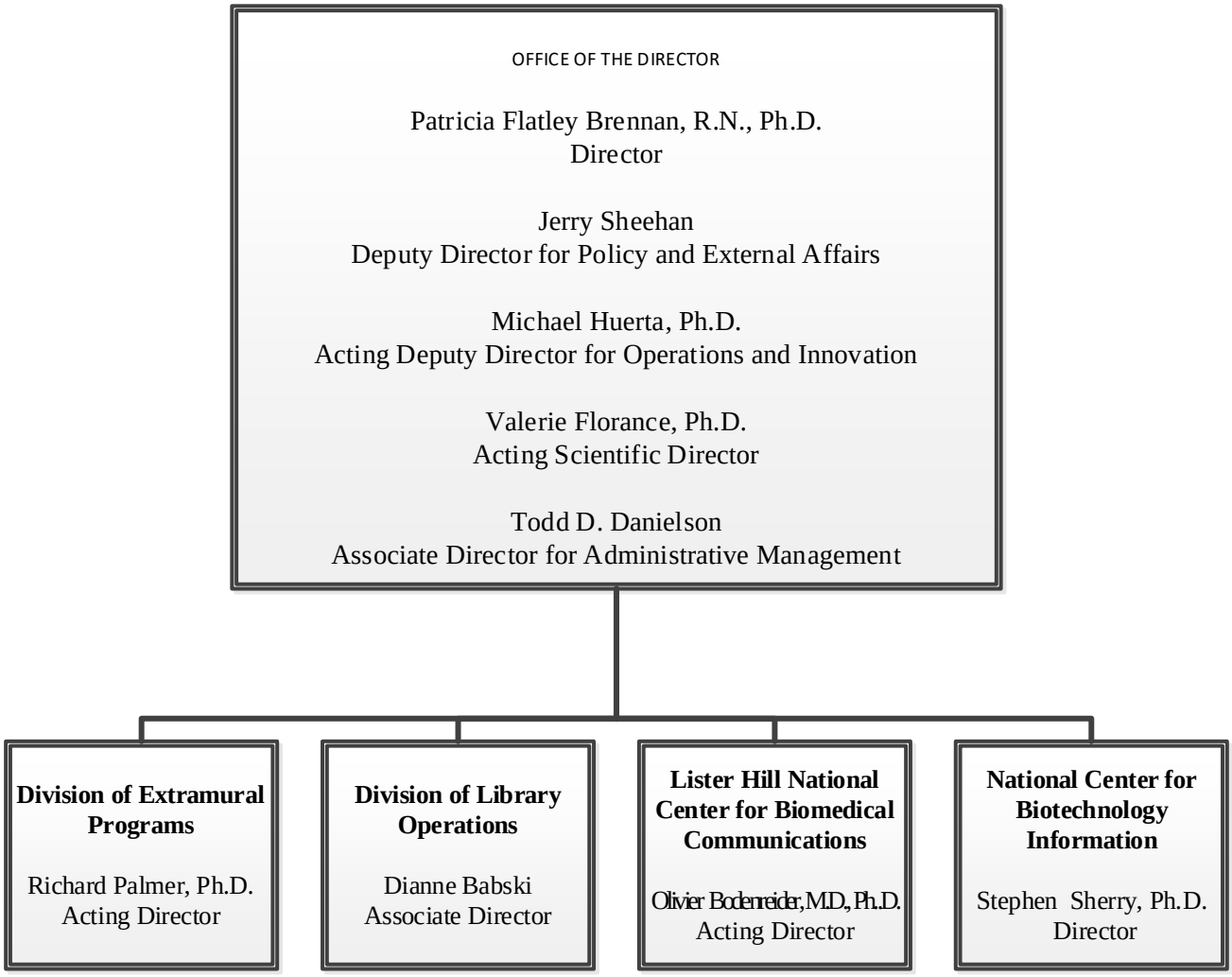
Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH

National Library of Medicine

ORGANIZATIONAL CHART



NATIONAL INSTITUTES OF HEALTH
National Library of Medicine

Budget Authority by Activity*
(Dollars in Thousands)

	FY 2022 Final		FY 2023 Enacted		FY 2024 President's Budget		FY 2024 +/- FY 2023 Enacted	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Health Information for Health Professionals and the Public (NN/LM)		$10,683		$11,769		$11,658		-$111
Informatics Resources for Biomedicine and Health		$13,412		$13,175		$14,390		$1,216
Biomedical Informatics Research		$45,245		$45,771		$44,666		-$1,105
Subtotal, Extramural		**$69,340**		**$70,714**		**$70,714**		**$0**
Intramural Programs	**569**	**$388,333**	**638**	**$401,459**	**638**	**$400,348**	**0**	**-$1,111**
Research Management & Support	**85**	**$19,833**	**103**	**$23,141**	**103**	**$24,251**	**0**	**$1,111**
TOTAL	**654**	**$477,506**	**741**	**$495,314**	**741**	**$495,314**	**0**	**$0**

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

National Library of Medicine

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

Budget Authority (BA):

	FY 2022 Final	FY 2023 Enacted	FY 2024 President's Budget	FY 2024 +/- FY 2023
BA	$477,506,000	$495,314,000	$495,314,000	0
FTE	654	741	741	0

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

Overall Budget Policy: The FY 2024 President's Budget request for NLM is $495.3 million, the same level as the FY 2023 Enacted level. NLM will seek efficiencies across its intramural programs, including intramural research in computational health and computational biology and information services that provide access to published biomedical literature, molecular biology and clinical research data, and consumer health information. NLM will continue to review its information services to consolidate similar services onto a small number of well-maintained, modern information technology (IT) platforms. At flat levels of funding, NLM will award an estimated 31 new research project grants through its extramural programs and maintain constant funding for graduate and post-doctoral training programs and summer research experience programs in the fast-growing fields of biomedical informatics and data science. NLM will support outreach programs to promote access and training in the effective use of NLM resources across multiple stakeholders, including community engagement in the NIH *All of Us* Research Program. NLM will also provide mission critical support for NIH- and government-wide priorities regarding public access to research results, data management, and data science.

Program Descriptions

Intramural Programs

NLM's intramural programs encompass three major activities: 1) Intramural Research and Training; 2) Biomedical Information Services; and 3) Outreach and Engagement.

Intramural Research and Training

NLM supports 17 intramural researchers who develop and apply new computational approaches to a broad range of information problems in biology, biomedicine, and human health. These investigators conduct research using mathematical, statistical, computer science, and bioinformatics techniques to understand questions about the function, evolution, and structure of genomes, and to analyze large clinical and biological datasets, including those from electronic

health records (EHRs). NLM researchers play a unique and vital role in a wide range of collaborations across NIH that help scientists and clinicians improve human health by devising new, customized analytical methods to better understand basic biology, the natural history of disease, and clinical manifestations of illness.

NLM researchers develop computational approaches that characterize biological phenomena and predict functional consequences. Recent advances include the use of computational approaches to further understand the interactions between evolutionary forces and various molecular constraints that shape the diversity of biochemical function and the structure of organisms. NLM investigators recently identified multiple new families of genetic sequences systems and are adapting them as new tools for genome editing. Researchers at NLM are helping to improve the understanding of immune response by identifying proteins that perform similar processes in both animal and bacteria immune systems, and by using mathematics and statistics to help determine the assumptions underlying preclinical trials of HIV therapies.

Researchers at NLM use computational tools to derive insights from clinical records or literature on clinical care. This computational work was recently applied by mining insurance claims data to gain insight into varying effects of certain medications on health. To advance interpretation of medical images, NLM researchers are leveraging artificial intelligence (AI) techniques—combined with deep knowledge of imaging equipment—to develop computational tools that analyze image features to enable health screenings across multiple conditions. This area of research supports image analysis for biomedical research, clinical assessment of disease, and treatment planning. Methods developed by NLM researchers are helping to address bias in data and improve data curation. Other recent advances include using AI, natural language processing, and data mining techniques to streamline biomedical information retrieval that best answers user questions—leading to the development of an indexing initiative to navigate the many NLM resources.

NLM's intramural research program offers a vibrant training environment to mentor future researchers in computational health and computational biology topics ranging from natural language understanding to clinical data mining to evolutionary genomics and protein structure. In FY 2022, NLM hosted 28 postdoctoral researchers, 10 post-baccalaureate trainees, 3 predoctoral researchers, 18 summer interns, 19 research fellows, 1 clinical fellow, and 2 visiting scientists. In FY 2022, NLM launched a new research summer internship program in data science and informatics that provides biomedical informatics training and research opportunities to students from diverse backgrounds, including those from underrepresented groups. The inaugural cohort of five interns worked on a variety of projects to improve methods to derive meaning from free text clinical data, explore whether different modes of gene expression occur within a tumor, characterize elements of cells that control genetic expression, use AI to predict progression of eye disease, and understand bias in machine learning.

Biomedical Information Services

To support scientific discovery, health care, and public health, NLM uses its web-based biomedical information services to collect, manage, preserve, and disseminate trillions of bytes

of data and information derived from biomedical literature, molecular biology data, clinical trial reports, consumer health information, and health data standards to more than 7 million people and computer information systems every day. NLM's services, which are increasingly sought after to advance science, improve human health, and address current and emerging public health emergencies, must keep pace with an increasing volume and variety of data. NLM applies modern technologies, such as cloud computing and AI, to enhance operational efficiencies. In FY 2022, NLM continued to improve its biomedical information services by soliciting stakeholder input on user needs and using AI and automation to enhance use and discoverability of biomedical information. NLM continued to advance its work in health data standards and conduct outreach and engagement to promote NLM and NIH resources.

Automated Indexing to Improve Access to Biomedical Literature

NLM is using artificial intelligence (AI) to revolutionize its products and services to enhance retrieval and discovery of biomedical information. For example, MEDLINE® records that are accessible through PubMed have long been indexed using NLM Medical Subject Headings (MeSH), a controlled vocabulary designed to improve discoverability and effective retrieval during online searches.

For many years, NLM has used computer-based tools to assist with indexing. NLM recently enhanced its Medical Text Indexer (MTI) for use across the full collection of more than 5,000 MEDLINE journals. Developed internally to curate the literature more effectively and efficiently, the MTI incorporates AI deep learning approaches to improve the application of MeSH indexing.

Automated indexing reduces the overall time required to provide MeSH indexing data and allows NLM to scale MeSH indexing for MEDLINE to the volume of published biomedical literature. Initial results show that indexing time per citation was reduced from a 69-day average at the start of FY 2022 to 24 hours or less. This effort resulted in nearly 1.4 million MEDLINE citations indexed with MeSH in FY 2022. Automated indexing has improved consistency of indexing across the MEDLINE collection.

As NLM continues to modernize access to biomedical literature through automated indexing, NLM is also leveraging AI and natural language processing methods to develop automatic tools for finding gene and chemical names in the biomedical literature to improve literature retrieval and information access.

Biomedical Literature Information Services

NLM makes trusted biomedical literature information available to those who need it when they need it. NLM's core literature services and resources are keeping pace with the expanding and changing field of science communication, while maintaining public trust and preserving the integrity of the scientific record.

One of NLM's literature services is its flagship PubMed® database of citations to biomedical literature, where users can access information across many devices and platforms, as well as through major search engines. In FY 2022, NLM added more than 1.6 million citations to PubMed, bringing the collection to nearly 35 million citations.

NLM leads the world in promoting free public access to published results of biomedical research through PubMed Central® (PMC), NLM's full-text archive of biomedical literature. Ten other federal agencies use PMC as the most efficient and effective means of disseminating full-text journal articles reporting on research they fund. In FY 2022, NLM added more than 1 million full-text articles to PMC, expanding the archive to more than 8 million articles. NLM also updated its PMC website as a part of ongoing efforts to modernize PMC and allow for continuous enhancements based on user feedback.

NLM continues to lead the NIH Preprint Pilot, which provides direct access to drafts of scientific articles that report on NIH-funded COVID-19 research prior to peer review. The pilot has

accelerated discovery and accessibility of NIH research results posted to eligible preprint servers by making them available in PMC and PubMed. Providing access to preprints alongside full-text articles further maintains confidence that NLM services will provide users with timely and relevant information.

Molecular Biology Data

Rapid and reliable access to molecular biology data, including genomic data, is essential to support research and translate discovery into knowledge. To support this effort, NLM maintains an array of more than 40 freely accessible integrated molecular biology databases and bioinformatics tools to enable biomedical research, support public health, and power new discoveries. Ensuring that these repositories are continuously updated and expanded enables researchers around the world to have access to more complete collections of timely and accurate data to accelerate biomedical discovery, translate research into new treatments, inform clinical decision making, and improve public health.

In FY 2022, NLM continued to make data available through its molecular biology data repositories by adding nearly 450 million genetic sequences to GenBank®, including nearly 5 million SARS-CoV-2 sequence records, and releasing new tools to improve the quality of genomic data submitted to GenBank. NLM also added more than 7.6 million records to its Sequence Read Archive (SRA), the world's largest publicly available repository of raw, unassembled genetic sequencing data. To facilitate more efficient access, retrieval, and use of these data, NLM made more than 20 million SRA data records available on two commercial cloud providers in two formats. In addition, NLM introduced a new reduced data file format to SRA to support reliable and faster data transfer, download, and analysis.

Providing Access to Biomedical Data and Information for Public Health Response

NLM leveraged its biomedical information systems to contribute to the nation's response to the COVID-19 pandemic and mpox public health emergency by providing access to authoritative data and information, and increasing health promotion.

NLM's Public Health Emergency COVID-19 Collection, available through PubMed Central (PMC), provides access to a growing set of more than 290,000 freely available articles in machine-readable formats, which have been accessed more than 300 million times. Through the NIH Preprint Pilot, NLM provides access to the full text of more than 3,500 preprints of NIH-funded COVID-19 research available through PMC. NLM applied artificial intelligence and machine learning techniques to expand LitCovid, a searchable, curated literature database, which now includes more than 290,000 SARS-CoV-2 articles indexed in PubMed.

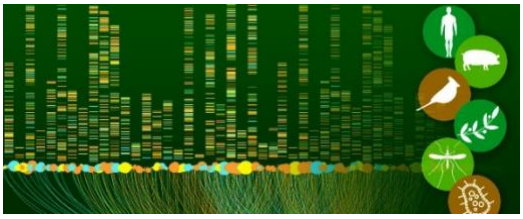
NLM also continued disseminating information on COVID-19-related clinical studies through ClinicalTrials.gov, which currently includes more than 8,000 related studies as well as more than 7,000 listed with the World Health Organization.

In FY 2022, NLM enriched its terminology resources to facilitate the standardized exchange of COVID-19 drug, laboratory, and clinical data in support of research, clinical care, and public health. NLM expanded these resources with relevant terms and also added SARS-CoV-2 and COVID-19 detection and treatment terms to its Medical Subject Headings (MeSH) thesaurus to support indexing, cataloging, and searching of the biomedical literature.

NLM continued to support sharing of genetic sequence data in support of public health response. In FY 2022, NLM launched the SARS-CoV-2 Variants Overview interactive web resource. This free, open-access tool supports the identification of emerging SARS-CoV-2 variants, and provides the public health community with valuable information needed to guide COVID-19 pandemic research and response efforts. NLM continued to support NIH and interagency initiatives to make SARS-CoV-2 and COVID-19 sequence data widely available for public health response.

Leveraging its public health response experience to support the current mpox public health emergency, NLM launched the Public Health Emergency Mpox Initiative to make mpox-related literature freely and immediately accessible. NLM also rapidly released mpox genome sequences through GenBank and enhanced MeSH and health terminologies with relevant terms.

NLM also improved the research and clinical utility of its sequence data repositories. In FY 2022, NLM added nearly 40 million records to RefSeq, a database of annotated reference sequences against which variations can be analyzed. It added more than 400,000 human genome sequence variants to ClinVar, a public archive of reports on relationships among human genome variations and human phenotypes. NLM also collaborated with international partners to create a new, standardized human genetic sequence data annotation strategy to promote consistency in clinical variant reporting, facilitate efficient exchange of clinical variant data, and reduce potential clinical harm caused by errors in variant interpretation.



In FY 2022, NLM continued development of the NIH Comparative Genomics Resource (CGR) to modernize biomolecular data resources and their underlying infrastructure. NLM initiated a robust community engagement and stakeholder outreach strategy; created new web resources to make it easier for users to navigate, browse, and download genome sequence and metadata; and created new tools and databases to facilitate visualizing and identifying sequences. The NIH CGR will support more effective genomic data search and retrieval, gene annotation, evaluation of sequence quality, and comparative analysis.

NLM continued to support the response to the COVID-19 pandemic through the SARS-CoV-2 Sequencing for Public Health Emergency Response, Epidemiology, and Surveillance (SPHERES) consortium. NLM's involvement resulted in improved SARS-CoV-2 data submission and validation processes, enhanced graphic interfaces for data retrieval, coordinated U.S. efforts to provide publicly accessible SARS-CoV-2 data via GenBank and SRA, and support for the mpox public health emergency response with the creation of a reference genome sequence as a template for submissions. NLM continued to participate in the NIH Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV) Tracking Resistance and Coronavirus Evolution (TRACE) initiative to develop processes and infrastructure to monitor and evaluate emerging SARS-CoV-2 variants, and to standardize, gather, and share variant sequencing data. In FY 2022, as part of its engagement in ACTIV TRACE, NLM refined data processing and analysis methods, and provided results in a format that supports findability of data records and large-scale analysis.

Clinical Trial Data

NLM's ClinicalTrials.gov is the world's largest publicly accessible database of privately and publicly funded clinical studies. In FY 2022, NLM received registration information for more than 38,000 new clinical research studies. NLM also added more than 4,000 new results summaries to ClinicalTrials.gov. Making this information visible and accessible improves transparency, accountability, and encourages public trust in science consistent with legislative requirements. With the support of NIH, NLM continued its ClinicalTrials.gov modernization effort and launched the first beta release of the modernized ClinicalTrials.gov website in FY 2022. This first release of the modernized website provides a more responsive design with an updated search experience and new study record display. The website also makes information about race and ethnicity, sex and gender, and age of participants easier to find and access.

Additional FY 2022 modernization efforts included enhancements to the ClinicalTrials.gov technical infrastructure and ongoing stakeholder engagement to solicit feedback.

Consumer Health Information

NLM's MedlinePlus® is an online resource specifically designed to meet consumers' health information needs. Available in English and Spanish, MedlinePlus offers trusted, authoritative information for patients and families on a broad variety of health conditions, medical tests, drugs and supplements, and offers links to other credible sources of information. In FY 2022, NLM enhanced content related to genetics, genetic conditions, and related health topics. In FY 2022, more than 430 million users viewed nearly 900 million MedlinePlus pages for health information. A companion service, MedlinePlus Connect, provides patients and clinicians with direct, tailored access to MedlinePlus resources automatically through EHR systems, patient portals, and other health information technology (IT) systems at the point of care. In FY 2022, MedlinePlus Connect responded to nearly 180 million electronic requests from health IT systems.

Standards and Terminologies for Health Data Interoperability

NLM plays a critical role in promoting the interoperability of health data through the development, maintenance, and dissemination of health data standards. NLM works across NIH and the Federal Government to advance the interoperable exchange of health data for care and quality reporting in support of federal health IT interoperability requirements, and of research.

In FY 2022, NLM continued to support the improvement of three standards used to assure the precise and current representation of terms and codes needed for clinical care and research: 1) the standard nomenclature of medicine (Systematized Nomenclature of Medicine Clinical Terms, or SNOMED CT®), 2) laboratory tests and observations (Logical Observation Identifiers, Names and Codes, or LOINC®), and 3) drug names (RxNorm). In FY 2022, NLM supported expansion of the International Edition of SNOMED CT with more than 6,000 concepts and the addition of nearly 1,000 concepts to enable users to capture information specific to the U.S. health care system such as test data requested by the Centers for Disease Control and Prevention. NLM added more than 1,500 new terms to LOINC to support stakeholders' ability to provide high-quality interoperable laboratory information, and updated drug names in RxNorm to include new COVID-19 investigational drugs. Such terminology additions are critical to health care. For example, the inclusion of COVID-19-related drug terms in RxNorm facilitates the prescription and monitoring of therapeutics and vaccinations in EHR systems that support payment as well as care management.

In addition, NLM added 260 new subject headings and edited 1,000 existing subject headings to its Medical Subject Headings (MeSH®) indexing terms to better support social determinants of health research; aligned relevant terms with Office of Management and Budget standards for race and ethnicity; and added more than 70 supplementary chemical records for mpox, SARS-CoV-2, and COVID-19 detection and treatment—further enhancing the discoverability of biomedical information. NLM enhanced the Common Data Element (CDE) Repository, a freely available source of standard, structured, machine-readable definitions of data elements, variables, and measures used in NIH-funded clinical research. Use of CDEs is a strategy that improves

consistency of data collection across research studies to enable comparison of results and data aggregation.

Outreach and Engagement
NLM's outreach and engagement activities foster innovation and raise awareness and support for the use of NIH and NLM information, data resources, and physical collections. In FY 2022, with support from the NIH *All of Us* Research Program (*All of Us*), NLM launched a library ambassador program to support minority-serving institution libraries with a goal of increasing knowledge and use of the *All of Us* Researcher Workbench. The library ambassador program will provide hands-on learning to use *All of Us* data, develop technical skills, and facilitate campus-wide data and research engagement activities such as codeathons.

NLM also expanded its public outreach efforts in FY 2022 by hosting more than 30 online exhibitions; linking to more 1,400 pages of digitized collection materials; and hosting a variety of virtual lectures on topics such as racism and its influence on medicine, health care, and health, and contributions of computational innovation to biomedical research. NLM continued its collaboration under the Environmental Health Information Partnership (EnHIP) to advance health equity and build capacity on college campuses and in communities. In FY 2022, EnHIP projects included the development of materials to support a database of FDA-regulated products and a COVID-19 food storage security project.

Budget Policy: The FY 2024 President's Budget estimate for NLM's Intramural Programs is $400.3 million, a decrease of $1.1 million from the FY 2023 Enacted level of $401.5 million. To accommodate this reduced level of funding, NLM will seek additional efficiencies across all components of its intramural programs, including research and training in computational health and biology, which aims to support the needs of NLM, NIH, and the broader biomedical research community related to understanding the function and evolution of genomes; using computational approaches to analyze biomedical images; discovering how gene proteins change their structures and functions; developing methods to gain insights from large health databases; creating and evaluating strategies to automate analysis of text; and using statistical methods to characterize the function and evolution of molecules. NLM will prioritize support for its most heavily used biomedical information services including SRA, ClinicalTrials.gov, and PubMed, and will continue to consolidate related services onto a small number of well-maintained, modern IT platforms. NLM will also seek efficiencies in its support for clinical terminology standards that foster integration, interoperability, and analysis of genomic, clinical research, and electronic health data. NLM will sustain outreach programs that promote access and training in the effective use of biomedical and health information through engagement with broad sets of stakeholders.

Extramural Programs
NLM's extramural programs provide financial support for three major activities: 1) Biomedical Informatics Research and Training; 2) Informatics Resources for Biomedicine and Health; and 3) Health Information for Health Professionals and the Public.

Biomedical Informatics Research and Training

NLM's research grants advance fundamental and applied biomedical informatics and data science research, and develop novel computational approaches for biomedical research. In FY 2022, NLM funded 208 awards across the country, including 28 co-funded with other NIH Institutes, Centers, and Offices. NLM-funded researchers develop methods to improve access, storage, retrieval, management, dissemination, and use of biomedical data and information to support discovery and decision-making. Active NLM-supported projects develop and test health IT solutions that support clinical care and patient self-management, employ computational approaches and tools to interpret and analyze health records, and develop new AI and machine learning tools and approaches.

In FY 2022, NLM-funded researchers:

- Leveraged a web-based mapping platform to develop algorithms that analyze relationships between the built and natural environments and health outcomes, which can inform population-based strategies that reduce health disparities and improve health.
- Developed tools that leverage patient EHR data to understand which disease characteristics are attributed to genomic variants to help identify genes that may explain why many patients with autism spectrum disorder also have epilepsy.
- Developed an automated electronic platform for single-patient clinical trials that allows clinicians to observe an individual's response to new precision therapy approaches that maximize benefits and minimize harm.
- Developed and evaluated a model for predicting pulmonary embolism outcomes based on EHR data that optimizes image utilization while improving clinical outcomes.
- Leveraged artificial intelligence to assist in the prescription verification process and help avoid dangerous and costly pharmacy dispensing errors.

NLM is also a leading funder of Ph.D.-level training in biomedical informatics and data science. NLM's flagship university-based research training program supports universities across the country to enroll predoctoral and postdoctoral fellows and trainees. In FY 2022, NLM recompeted its university-based training program and made awards to 18 universities that will enroll approximately 200 trainees annually over the next 5 years. Through this investment, NLM continues to build a well-trained, data-driven research workforce for the future. Recipients will focus training on various dimensions of biomedical informatics and data science such as clinical informatics, translational bioinformatics, clinical research informatics, public health informatics, and consumer health informatics. In FY 2022, NLM launched a new biomedical informatics and data science summer training program for undergraduate, post-baccalaureate, and master's students, with a specific focus on attracting individuals from diverse backgrounds, including those from underrepresented groups. This program will create a pathway to careers in biomedical informatics and data science for 135 students per year across 12 institutions. Each institution will implement a plan to enhance the recruitment and retention of trainees from historically underrepresented groups to advance a well-trained, diverse research workforce for the future.

Informatics Resources for Biomedicine and Health

The NLM Information Resource Grants to Reduce Health Disparities supports projects that bring useful and understandable health information to populations affected by health disparities and to their health care providers. In FY 2022, NLM awarded two grants to develop: 1) an online guide for people in rural Georgia living with and managing autism spectrum disorder, as well as resources for physicians, and 2) a combination digital resource and training program for Afghan and Syrian refugees to improve reproductive health literacy. The NLM Grants for Scholarly Works in Biomedicine and Health supports the development of monographs and books by health professionals, public health officials, biomedical researchers, and health science historians. In FY 2022, NLM awarded three grants for scholarly works about: 1) the history of health care in U.S. prisons, 2) a comparative study of medical examiner and coroner offices in the United States, and 3) the role of statistics and statisticians in modern medicine.

Health Information for Health Professionals and the Public

NLM's extramural program oversees cooperative agreements that fund the Network of the National Library of Medicine (NNLM®) to train U.S. health professionals on how to access biomedical information, enhance access to trusted health information, and build capacity for data management and science at health sciences libraries. In FY 2022, nearly 1,500 NNLM health information access activities engaged more than 50,000 participants across all 50 states, the District of Columbia, Guam, and the U.S. Virgin Islands. The NNLM National Center for Data Services (NCDS) coordinates with NNLM-participating institutions to provide training and resources that increase data science capacity among information professionals. In FY 2022, the NNLM NCDS launched a webinar training series to help librarians prepare for the implementation of the NIH Data Management and Sharing policy that reached more than 1,000 attendees. The NNLM NCDS also welcomed its first cohort of eight graduate students for a

Training the Next Generation of Bioinformaticists and Data Scientists

NLM's longstanding university-based informatics training program meets a growing national need for investigators trained to bring computer science, data science and other information sciences to bear on problems in domains such as health care, public health, basic biomedical research, clinical and translational research, and consumer health.

For 40 years, this program has helped ensure an available data-driven biomedical informatics and data science workforce. A recently recompeted solicitation resulted in 18 awards—the largest number of awards made to date. Through this program, 18 funded universities will train approximately 200 graduate students and postdoctoral fellows annually over the next five years.

This program advances bioinformatics and data science research. Trainees make strides in health information technology (IT) design to:

- improve usability and utility of electronic health record systems
- advance development and testing of standards to support interoperable health data exchange and research
- develop and test health information tools to support clinical care and patient self-management across variety of conditions
- advance techniques for effective design and implementation of health IT systems

This program also supports methodological developments by contributing to the development of tools and approaches to leverage clinical and other health data in biomedical research; advancing computational methods and approaches including natural language processing, deep learning, machine learning, and use of neural networks; and developing advanced techniques to support research activities such as cohort identification, informed consent, and data use. Trainees increase understanding in the field about the scope of public health issues, such as the opioid crisis, through analysis of complex data.

As part of its commitment to bioinformatics and data science training, NLM also recently made 12 awards under its newly launched research training program to attract underrepresented undergraduate, post-baccalaureate, and master's students to bioinformatics and data science doctoral programs, and to promote scientific workforce diversity.

newly launched data internship program which seeks students from communities traditionally underrepresented in library science, and offers participants an opportunity to work on data-related projects and engage in professional development activities. NNLM also leads engagement through programs, partnerships, activities, and trainings offered in support of the NIH *All of Us* Research Program. In FY 2022, this collaboration resulted in more than 16 virtual health programs reaching an audience of nearly 6,000.

Budget Policy: The FY 2024 President's Budget request includes $70.7 million for NLM's Extramural Programs, the same level as the FY 2023 Enacted level. Within this funding level, NLM will seek to keep pace with growing demand for research and training in biomedical informatics and data science, including among early-stage investigators and those from underrepresented communities. NLM will continue to accept investigator-initiated applications through NIH parent-grant announcements, as well targeted funding announcements. NLM will aim to support noncompeting grants at the previously committed level. NLM will award an estimated 31 competing research project grants and aim to support early stage and new investigators at success rates comparable to those of established investigators submitting new applications. NLM will maintain funding for 18 university-based graduate and post-doctoral biomedical informatics and data science training programs, which reach approximately 200 trainees a year who are in high demand across the biomedical enterprise. NLM will continue to support 12 summer research experience programs aimed at attracting talented undergraduate and post-baccalaureate students to bioinformatics and data science careers. NLM will support its unique resource grant programs aimed at ensuring relevant and reliable information for consumers and health professionals. Through a cooperative agreement with the Network of the National Library of Medicine, NLM will continue to support efforts to advance community engagement in the *All of Us* Research Program and retain support for training on and access to biomedical and health information resources, as well as to improve data management and sharing practices among biomedical researchers.

Research Management and Support

NLM's research management and support activities provide administrative, budgetary, communications, and logistical support for NLM programs to ensure strategic planning and evaluation, regulatory compliance, policy development, and partnerships with other federal agencies, Congress, the private sector, and the public. In FY 2022, NLM continued to streamline its organizational and administrative structure to enhance collaborative leadership, innovation, and management of its unified intramural research program. NLM continued to ensure responsible stewardship of federal funds by continuing to implement its objectives, outline progress towards the NLM strategic plan, streamline biomedical information services, and make it easier for users to access information. NLM also actively engaged in NIH and government-wide policy efforts related to open science, clinical trial transparency, and public health preparedness and response.

Budget Policy: The FY 2024 President's Budget request includes $24.3 million for NLM's RMS activities, an increase of $1.1 million from the FY 2023 Enacted level of $23.1 million. RMS will support NLM-wide planning and evaluation, including implementation of NLM's strategic plan. Increased funding will enable critical enhancements of NLM's physical and information

systems security infrastructure, policy development and administration functions, as well as improved coordination of NLM's growing engagement in trans-NIH efforts.

Conclusion: As the leader in biomedical informatics and computational health data science research, NLM is dedicated to making data-driven biomedical resources and science available whenever and wherever it is needed. NLM harnesses its intramural and extramural research programs, biomedical information services, and engagement activities to turn discovery into health. NLM's work and resources are essential to improve the health of the Nation.

NATIONAL INSTITUTES OF HEALTH
National Library of Medicine

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2015	$372,851,000			$336,939,000
Rescission				$0
2016	$394,090,000	$341,119,000	$402,251,000	$394,664,000
Rescission				$0
2017 [1]	$395,684,000	$407,086,000	$412,097,000	$407,510,000
Rescission				$0
2018	$373,258,000	$413,848,000	$420,898,000	$428,553,000
Rescission				$0
2019	$395,493,000	$433,671,000	$442,230,000	$441,997,000
Rescission				$0
2020	$380,463,000	$463,599,000	$465,837,000	$456,911,000
Rescission				$0
Supplemental				$10,000,000
2021	$415,665,000	$460,841,000	$471,789,000	$463,787,000
Rescission				$0
2022	$474,864,000	$486,769,000	$476,074,000	$479,439,000
Rescission				$0
2023	$471,998,000	$494,572,000	$494,302,000	$497,548,000
Rescission				$0
2024	$495,314,000			

[1] Budget Estimate to Congress includes mandatory financing.

NATIONAL INSTITUTES OF HEALTH
National Library of Medicine

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2023 Amount Authorized	FY 2023 Enacted	2024 Amount Authorized	FY 2024 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$495,314,000	Indefinite	$495,314,000
National Library of Medicine	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$495,314,000		$495,314,000

NATIONAL INSTITUTES OF HEALTH

National Library of Medicine

Amounts Available for Obligation [1]

(Dollars in Thousands)

Source of Funding	FY 2022 Final	FY 2023 Enacted	FY 2024 President's Budget
Appropriation	$479,439	$497,548	$495,314
Mandatory Appropriation: (non-add)			
Type 1 Diabetes	*($0)*	*($0)*	*($0)*
Other Mandatory financing	*($0)*	*($0)*	*($0)*
Subtotal, adjusted appropriation	$479,439	$497,548	$495,314
OAR HIV/AIDS Transfers	-$1,933	-$2,234	$0
Subtotal, adjusted budget authority	$477,506	$495,314	$495,314
Unobligated balance, start of year	$3,000	$3,000	$0
Unobligated balance, end of year (carryover)	-$3,000	$0	$0
Subtotal, adjusted budget authority	**$477,506**	**$498,314**	**$495,314**
Unobligated balance lapsing	-$413	$0	$0
Total obligations	$477,093	$498,314	$495,314

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2022 - $19,757 FY 2023 - $19,965 FY 2024 - $20,280

NATIONAL INSTITUTES OF HEALTH
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Budget Authority by Object Class[1]
(Dollars in Thousands)

		FY 2023 Enacted	FY 2024 President's Budget	FY 2024 +/- FY 2023
Total compensable workyears:				
	Full-time equivalent	741	741	0
	Full-time equivalent of overtime and holiday hours	0	0	0
	Average ES salary	$209	$218	$9
	Average GM/GS grade	12.0	12.0	0.0
	Average GM/GS salary	$122	$127	$5
	Average salary, Commissioned Corps (42 U.S.C. 207)	$127	$134	$7
	Average salary of ungraded positions	$138	$145	$7
	OBJECT CLASSES	**FY 2023 Enacted**	**FY 2024 President's Budget**	**FY 2024 +/- FY 2023**
	Personnel Compensation			
11.1	Full-Time Permanent	$48,157	$50,783	$2,627
11.3	Other Than Full-Time Permanent	$43,076	$45,426	$2,350
11.5	Other Personnel Compensation	$2,358	$2,487	$129
11.7	Military Personnel	$246	$259	$13
11.8	Special Personnel Services Payments	$2,095	$2,209	$114
11.9	**Subtotal Personnel Compensation**	**$95,931**	**$101,164**	**$5,233**
12.1	Civilian Personnel Benefits	$33,538	$35,217	$1,679
12.2	Military Personnel Benefits	$14	$15	$1
13.0	Benefits to Former Personnel	$0	$0	$0
	Subtotal Pay Costs	**$129,484**	**$136,396**	**$6,912**
21.0	Travel & Transportation of Persons	$351	$360	$8
22.0	Transportation of Things	$113	$116	$3
23.1	Rental Payments to GSA	$3	$3	$0
23.2	Rental Payments to Others	$157	$161	$4
23.3	Communications, Utilities & Misc. Charges	$335	$343	$8
24.0	Printing & Reproduction	$89	$92	$2
25.1	Consulting Services	$71,207	$69,858	-$1,349
25.2	Other Services	$71,466	$65,183	-$6,283
25.3	Purchase of Goods and Services from Government Accounts	$86,969	$89,397	$2,428
25.4	Operation & Maintenance of Facilities	$963	$963	$0
25.5	R&D Contracts	$484	$484	$0
25.6	Medical Care	$1	$1	$0
25.7	Operation & Maintenance of Equipment	$13,821	$14,153	$332
25.8	Subsistence & Support of Persons	$0	$0	$0
25.0	**Subtotal Other Contractual Services**	**$244,910**	**$240,039**	**-$4,872**
26.0	Supplies & Materials	$1,657	$1,696	$40
31.0	Equipment	$27,750	$25,361	-$2,389
32.0	Land and Structures	$11,814	$12,098	$284
33.0	Investments & Loans	$0	$0	$0
41.0	Grants, Subsidies & Contributions	$78,630	$78,630	$0
42.0	Insurance Claims & Indemnities	$0	$0	$0
43.0	Interest & Dividends	$19	$19	$0
44.0	Refunds	$0	$0	$0
	Subtotal Non-Pay Costs	**$365,830**	**$358,918**	**-$6,912**
	Total Budget Authority by Object Class	**$495,314**	**$495,314**	**$0**

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

NATIONAL INSTITUTES OF HEALTH

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Salaries and Expenses

(Dollars in Thousands)

Object Classes	FY 2023 Enacted	FY 2024 President's Budget	FY 2024 +/- FY 2023
Personnel Compensation			
Full-Time Permanent (11.1)	$48,157	$50,783	$2,627
Other Than Full-Time Permanent (11.3)	$43,076	$45,426	$2,350
Other Personnel Compensation (11.5)	$2,358	$2,487	$129
Military Personnel (11.7)	$246	$259	$13
Special Personnel Services Payments (11.8)	$2,095	$2,209	$114
Subtotal, Personnel Compensation (11.9)	**$95,931**	**$101,164**	**$5,233**
Civilian Personnel Benefits (12.1)	$33,538	$35,217	$1,679
Military Personnel Benefits (12.2)	$14	$15	$1
Benefits to Former Personnel (13.0)	$0	$0	$0
Subtotal Pay Costs	**$129,484**	**$136,396**	**$6,912**
Travel & Transportation of Persons (21.0)	$351	$360	$8
Transportation of Things (22.0)	$113	$116	$3
Rental Payments to Others (23.2)	$157	$161	$4
Communications, Utilities & Misc. Charges (23.3)	$335	$343	$8
Printing & Reproduction (24.0)	$89	$92	$2
Other Contractual Services			
Consultant Services (25.1)	$71,207	$69,858	-$1,349
Other Services (25.2)	$71,466	$65,183	-$6,283
Purchase of Goods and Services from Government Accounts (25.3)	$74,917	$77,345	$2,428
Operation & Maintenance of Facilities (25.4)	$963	$963	$0
Operation & Maintenance of Equipment (25.7)	$13,821	$14,153	$332
Subsistence & Support of Persons (25.8)	$0	$0	$0
Subtotal Other Contractual Services	**$232,373**	**$227,501**	**-$4,872**
Supplies & Materials (26.0)	$1,657	$1,696	$40
Subtotal Non-Pay Costs	**$235,076**	**$230,269**	**-$4,807**
Total Administrative Costs	**$364,559**	**$366,665**	**$2,106**

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Detail of Full-Time Equivalent Employment (FTE)

Office	FY 2022 Final			FY 2023 Enacted			FY 2024 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Office of the Director/Administration									
Direct:	57	-	57	60	-	60	60	-	60
Reimbursable:	11	-	11	11	-	11	11	-	11
Total:	68	-	68	71	-	71	71	-	71
National Center for Biotechnology Information									
Direct:	270	1	271	314	1	315	314	1	315
Reimbursable:	18	-	18	16	-	16	16	-	16
Total:	288	1	289	330	1	331	330	1	331
Lister Hill National Center for Biomedical Communications									
Direct:	32	-	32	33	-	33	33	-	33
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	32	-	32	33	-	33	33	-	33
Division of Library Operations									
Direct:	248	-	248	284	-	284	284	-	284
Total:	248	-	248	284	-	284	284	-	284
Division of Extramural Programs									
Direct:	16	1	17	21	1	22	21	1	22
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	16	1	17	21	1	22	21	1	22
Division of Library Operations									
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	-	-	-	-	-	-	-	-	-
Total	652	2	654	739	2	741	739	2	741
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
2020	11.8
2021	11.9
2022	12.0
2023	12.0
2024	12.0

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Detail of Positions[1]

GRADE	FY 2022 Final	FY 2023 Enacted	FY 2024 President's Budget
Total, ES Positions	5	5	5
Total, ES Salary	$1,003,995	$1,045,360	$1,088,430
General Schedule			
GM/GS-15	19	19	19
GM/GS-14	51	51	51
GM/GS-13	132	150	150
GS-12	99	120	120
GS-11	26	30	30
GS-10	0	0	0
GS-9	9	9	9
GS-8	26	27	27
GS-7	4	4	4
GS-6	1	1	1
GS-5	1	1	1
GS-4	2	2	2
GS-3	1	1	1
GS-2	1	1	1
GS-1	4	4	4
Subtotal	376	420	420
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	0	0	0
Senior Grade	1	1	1
Full Grade	0	0	0
Senior Assistant Grade	1	1	1
Assistant Grade	0	0	0
Subtotal	2	2	2
Ungraded	267	310	310
Total permanent positions	375	462	462
Total positions, end of year	650	737	737
Total full-time equivalent (FTE) employment, end of year	654	741	741
Average ES salary	$200,799	$209,072	$217,686
Average GM/GS grade	12.0	12.0	12.0
Average GM/GS salary	$117,550	$122,393	$127,435

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