National Institute of General Medical Sciences

CONGRESSIONAL JUSTIFICATION
FY 2022

Department of Health and Human Services
National Institutes of Health



DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Institute of General Medical Sciences (NIGMS)

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Director's Overview



Jon R. Lorsch, Ph.D.
Director, NIGMS

The National Institute of General Medical Sciences (NIGMS) supports fundamental biomedical research that increases our understanding of biological processes and lays the foundation for advances in disease prevention, detection, diagnosis, and treatment. NIGMS-funded scientists investigate how living systems work at a range of levels, from individual molecules to cells, tissues, organs, organisms, and whole populations. Additionally, to ensure the continued vitality and productivity of the biomedical research enterprise, NIGMS provides leadership in training the next generation of scientists, enhancing the diversity of the scientific workforce, developing enhanced research capacity throughout the country, and providing new technologies and resources to the biomedical community.

Responding to a Pressing Health Need: COVID-19

The emergence of unanticipated, life-threatening conditions like coronavirus disease 2019 (COVID-19) is a reminder that robust preparation for health threats must constitute an essential component of the nation's investments in biomedical research. To this end, NIGMS is actively participating in the National Institutes of Health (NIH)'s response efforts to COVID-19.

MIDAS – NIGMS is among the largest sponsors of infectious disease research at NIH. As part of these research efforts, the Institute supports the Models of Infectious Disease Agents Study (MIDAS), a collaboration among scientists who conduct research in mathematical and computational modeling to improve the detection, mitigation, and prevention of emerging infectious disease threats. The MIDAS Coordination Center plays a key role in organizing and facilitating infectious disease modeling research by coordinating communications among researchers, students, public health agencies, practitioners, and officials. The Center also provides specific data services such as access to curated data sets, models, algorithms, code, parameters, and cloud computing capabilities. In addition, the Center has established an online portal for COVID-19 modeling research,[1] which provides an extraordinary collection of data and information regarding the current coronavirus pandemic (see Program Portrait for more details).

CryoEM Centers – NIGMS manages the NIH Common Fund Transformative CryoElectron Microscopy (CryoEM) program,[2] which supports three national centers for CryoEM whose purpose is to broaden researchers' access to this cutting-edge technology and to cultivate a workforce that is skilled in its use through individualized training. With the emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing the COVID-19 pandemic, the Centers have remained open and prioritized essential work on projects related to SARS-CoV-2, allowing researchers to study the structure of key coronavirus molecules and how

[1] https://midasnetwork.us/covid-19/

[2] https://commonfund.nih.gov/cryoem

they may interact with potential treatments and vaccines. For example, one project[3] has shown that the spike protein's structure, an important component in SARS-CoV-2 pathogenesis, undergoes twisting and bending. This motion could impact the binding of drug or vaccine candidates and may provide essential insights for designing additional targets for antiviral intervention. In FY 2021, the program will expand to include centers for CryoElectron Tomography, a technique that allows the structures of molecules to be visualized inside of intact cells.

Research Supplements – To highlight the urgent need for expanding research on SARS-CoV-2 and its related pathology, NIGMS issued two Notices of Special Interest (NOSIs) to invite applications for Urgent Award Competitive Revision Supplements:

- *Competitive Revisions to Institutional Development Award Clinical and Translational Research (IDeA-CTR) grants*:[4] The IDeA-CTRs are focused on addressing the healthcare needs and challenges of medically underserved populations in states that have had historically low levels of NIH support and access to research resources. NIGMS has provided supplementary funds to a current IDeA-CTR award to create a registry of COVID-19-related outcomes of patients from 12 IDeA states, including many from medically underserved and minority populations. Data in the registry will be crucial for understanding the pandemic's impact on these populations and effectively addressing it.

- *Supplements to Support COVID-19-Related Research*:[5] NIGMS has issued numerous research supplements that seek to expand research in three areas related to COVID-19: a) development of predictive models for the spread of SARS-CoV-2 and the effects of possible intervention strategies; b) repurposing diagnostic tools currently under development by small businesses to enable the rapid detection of SARS-CoV-2 infection (Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) grants only); and c) enabling rapid development of potential therapeutic agents for COVID-19 by small businesses (SBIR/STTR grants only).

Working to Address Disparities

NIGMS firmly believes that the scientific enterprise is best served by a research workforce richly diverse in perspectives, skills, and experiences. In pursuit of this aim, the Institute supports a wide range of training and capacity-building programs designed to develop talented students from historically underrepresented or underserved groups and populations. These programs provide differing types of support, training, and mentoring experiences for students at multiple stages of their educational and career pathways. The programs operate at a variety of academic institutions across the country, including research-intensive universities, undergraduate institutions, community colleges, minority-serving institutions, medical schools, and medical centers. The NIGMS Institutional Development Award (IDeA) program supports students in 23

[3] Zhang K, Li S, Pintilie G, Chmielewski D, Schmid M., Simmons, G, Jin J, and Chiu W. (August 2020) "A 3,4-Å cryo-EM structure of the human coronavirus spike trimer computationally derived from vitrified NL63 virus particles." bioRxiv 2020.08.11.2456909; doi.org/10.1101/2020.08.11.245696 (preprint)

[4] https://grants.nih.gov/grants/guide/notice-files/NOT-GM-20-033.html

[5] https://grants.nih.gov/grants/guide/notice-files/NOT-GM-20-025.html

U.S. states and territories that have historically received comparatively low levels of NIH funding.[6] Continuing to expand the biomedical research workforce by investing in highly skilled individuals from diverse institutions and backgrounds plays an important role in addressing and reducing the Nation's health disparities and leads to stronger scientific research overall.

MOSAIC – The Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program[7] aims to facilitate the transition of promising postdoctoral researchers from diverse backgrounds into independent faculty careers at research-intensive institutions. This exciting new program, launched in 2019, includes two components: an institutionally focused research education cooperative agreement (UE5) and an individual postdoctoral career transition award (K99/R00). The MOSAIC UE5 constitutes awards to independent organizations (such as professional societies) that will support the educational and career development activities of the MOSAIC K99/R00 scholars. In FY 2020, NIGMS made UE5 awards to the American Society for Biochemistry and Molecular Biology, the American Society for Cell Biology, and the Association of American Medical Colleges. Most recently, applications for the MOSAIC K99/R00s have been awarded. Twenty other NIH Institutes and Centers are participating in the MOSAIC K99/R00 program (see Program Portrait for more details).

Research on Women's Health in IDeA States – In addition to focusing on supporting a diverse biomedical research workforce, NIGMS also supports research related to the specific health needs of unique populations through its IDeA and Native American Research Centers for Health (NARCH)[8] programs. Residents in IDeA states, especially those living in rural areas, often have less access to health care and therefore tend to suffer from poorer health outcomes. Several IDeA states, for instance, are among states with the highest maternal and infant mortality rates.[9] To address this critical issue, NIGMS and the NIH Office of Research on Women's Health, in conjunction with several other NIH Institutes and Centers, are providing administrative supplements to IDeA grants to increase research directed toward women's health and health disparities with a special interest in maternal and infant morbidity and mortality.[10] In so doing, NIGMS seeks to expand the capacity of IDeA states to conduct research that addresses women's health.

Promoting Safe and Inclusive Environments – Inclusive, safe, and supportive environments are the cornerstones to productive, successful research and training and are therefore an NIGMS priority.[11] Training programs supported by the Institute are expected to implement robust strategies to ensure that individuals from all backgrounds feel welcomed into (and supported by) the biomedical research community. NIGMS has pioneered the incorporation of language into its training grant Funding Opportunity Announcements to ensure that institutional policies are in place to prevent discrimination, harassment, and other counterproductive practices. Training

[6] https://www.nigms.nih.gov/Research/DRCB/IDeA/Pages/default.aspx

[7] https://www.nigms.nih.gov/training/careerdev/Pages/MOSAIC.aspx

[8] https://www.nigms.nih.gov/Research/DRCB/NARCH

[9] https://www.sciencedirect.com/science/article/pii/S0749379719304192?via%3Dihub#tbl0001; https://www.cdc.gov/nchs/pressroom/sosmap/infant_mortality_rates/infant_mortality.htm

[10] https://grants.nih.gov/grants/guide/notice-files/NOT-GM-20-017.html

[11] Bond MR, Gammie AE, Lorsch JR (2020). Developing a culture of safety in biomedical research training. MBoC 31, 2409-2414.

programs funded by NIGMS are also expected to implement plans to enhance the inclusion, retention, and scientific participation of trainees from all backgrounds.

Investing in Basic – or Foundational – Research

Basic research forms the foundation upon which practical advances in clinical medicine are made. For example, structural biology focuses on developing an understanding of both the structure and dynamics of biological macromolecules, such as proteins and nucleic acids, and how alterations in structure can lead to corresponding changes in function. Deciphering the overall effects of these changes can help explain the differences in function that lead to diseases and guide the development of treatments and cures.

Protein Data Bank – The NIGMS-sponsored Protein Data Bank (PDB) is a free online repository of protein and nucleic acid structures that facilitates atomic-level insight into protein structure and function. Scientists around the world currently deposit about 200 structures per week into the repository, which, to date, contains over 165,000 structures. With approximately 260,000 visitors accessing the repository each month, the PDB is widely used by the scientific community to study basic biological processes, as well as for more medically oriented investigations such as disease mechanisms and drug and vaccine design. Recently, the PDB has been essential in providing researchers access to structural information related to the spike protein, a structure found on the surface of coronaviruses, including SARS-CoV-2, and the target of SARS-CoV-2 vaccine development. The year 2021 will mark the 50th anniversary of the PDB (see Program Portrait for more details).

Examples of NIGMS Achievements, FY 2015 - FY 2020

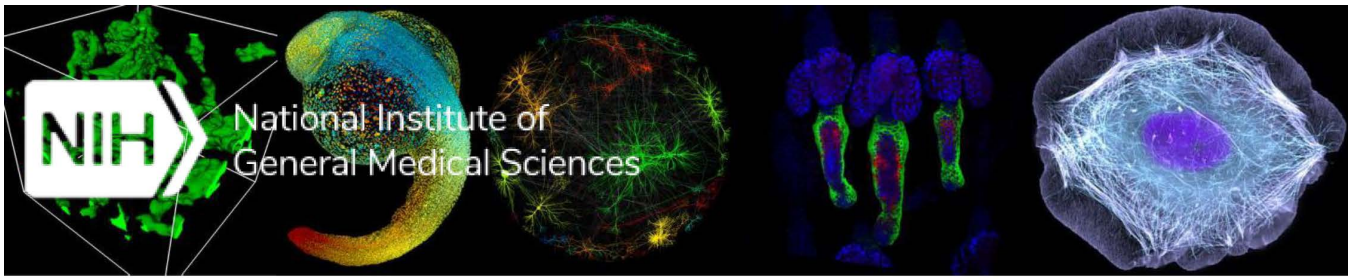
a) The number of early stage investigators (ESIs) receiving their first major competing NIH research project grant (RPG) from NIGMS increased from 128 in FY 2015 to 264 in FY 2020, in part due to the introduction of the R35 Maximizing Investigators Research Award (MIRA) program in FY 2016.

b) Over the last four years (2016-2020), the average age (37.3) of ESIs who receive a MIRA award has been consistently lower than the average age (38.4) of ESIs who receive an NIGMS R01.

c) NIGMS was able to support a record number of RPGs in FY 2020 (4,477 overall, 1,161 competing, and 3,316 noncompeting); these numbers represent an increase of approximately 19 percent above the number of RPGs supported in FY 2015 (3,754 overall, 1,074 competing, and 2,680 noncompeting).

d) The 2020 Nobel Prize in Chemistry was awarded to a long-time NIGMS grantee and one other scientist for the development of CRISPR/Cas9 genome editing technology, which enables researchers to add, delete, or modulate certain genes, as well as create animal models for studying genetic diseases. The ability to precisely target genes in human cells is expected to accelerate progress in developing gene-based therapies and is a critical research tool for understanding how cells and biological systems function.

Overall Budget Policy: The FY 2022 President's Budget for NIGMS is $3,096.1 million, an increase of $104.7 million or 3.5 percent compared to the FY 2021 Enacted level.



"The overarching goal for all of NIH is to advance medical science and improve human health. Through our support of investigator-initiated fundamental research, effective training programs, and the development of new technologies, NIGMS plays a central role in reaching that goal."

Dr. Jon R. Lorsch, NIGMS Director

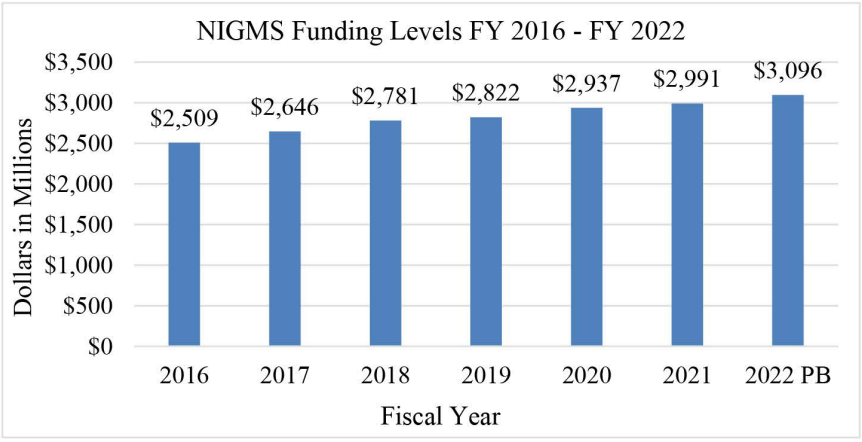
Established in 1962, the National Institute of General Medical Sciences (NIGMS) supports research in basic science, sometimes called "fundamental" science, that helps researchers understand living systems and life processes. This knowledge leads to better ways to predict, prevent, diagnose, treat, and ultimately cure disease.

NIGMS Strategic Priorities

- Support a broad and diverse portfolio of highly meritorious research that drives scientific discoveries and advances our understanding of human health and disease.
- Invest in the development of a highly skilled, creative, adaptable, and diverse biomedical research workforce.
- Ensure access to essential tools, technologies, capabilities, and other resources needed to conduct meaningful biomedical research.
- Demonstrate optimal stewardship of public funds by continually evaluating, improving, and communicating returns on investment.



Jon R. Lorsch, Ph.D.
Director, NIGMS



NIGMS Research Highlights (FY 2020):

- Responding to a pressing health need by supporting and expanding research on **infectious disease modeling**, including for COVID-19, and using technologies like CryoElectron Microscopy to improve the **imaging of biomolecules** such as the SARS-CoV-2 spike protein.
- Strengthening **rural and women's health research** through the Institutional Development Awards Clinical and Translational Research infrastructure programs.
- Accelerating **sepsis** research by focusing on mechanistic studies using samples and data from patients.

NIGMS by the Numbers (FY 2020)

171
Full Time NIGMS Employees

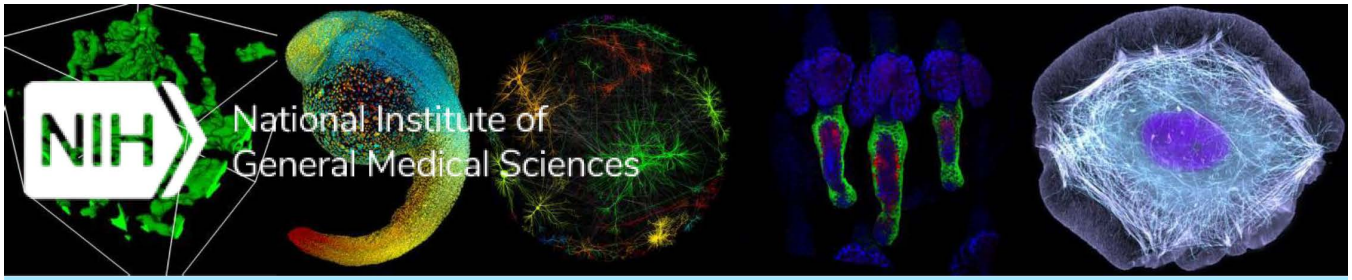
>4,500
Funded Research Grants

>5,000
Funded Scientists
(*competing & non-competing research grants*)

264
Early Stage Investigators (ESIs)
(R01- equivalent)

>4,000
Research Trainees

165
Institutions supported by Training and Workforce grants



Recent Accomplishments

- The receipt of the **2020 Nobel Prize in Chemistry** was awarded to a long-time NIGMS grantee and one other scientist for the development of **CRISPR/Cas9 genome editing technology**, which enables researchers to add, delete, or modulate certain genes as well as create animal models for the study of genetic diseases. The ability to precisely target genes in human cells is expected to accelerate progress in developing gene-based therapies and is a critical research tool for understanding how cells function.

- The number of **Early Stage Investigators (ESIs)** receiving their first major competing NIH research project grant (RPG) from NIGMS **increased** from 128 in FY 2015 to 264 in FY 2020, in part due to the successful introduction of the R35 Maximizing Investigators Research Award grant mechanism in FY 2016.

- NIGMS supported a **record number of RPGs** in FY 2020 (4,477 overall, 1,161 competing, and 3,316 noncompeting); these numbers represent an increase of approximately 19 percent above the number of RPGs supported in FY 2015 (3,754 overall, 1,074 competing, and 2,680 noncompeting).

Current Activities

- NIGMS supports infectious disease modeling through the **Models of Infectious Disease Agents Study (MIDAS)** Coordination Center. The MIDAS Coordination Center has established a portal for COVID-19 modeling, which provides an extraordinary collection of data and information regarding the current COVID-19 pandemic.

- In FY 2019, NIGMS launched the **M**aximizing **O**pportunities for **S**cientific and **A**cademic **I**ndependent **C**areers (**MOSAIC**) program. The aim of MOSAIC is to both facilitate and ensure the successful transition of promising postdoctoral researchers from diverse backgrounds into independent faculty careers at research-intensive institutions.

- The NIGMS-sponsored **Protein Data Bank (PDB)** is a free online repository of protein and nucleic acid structures. With approximately 260,000 visitors each month, the PDB is widely used by the scientific community to study basic biological processes as well as for medically oriented investigations into disease mechanisms and drug design.

Future Initiatives

- Focus on **Laboratory Safety** – NIGMS has launched a website highlighting laboratory safety training and guidelines. The Institute also recently announced the availability of supplements for research education, training, and career development grants to enhance laboratory safety curricula and to build a culture of safety in biomedical research training environments.

- Support strategic **National and Regional Technology Resources** – NIGMS is aiming to increase access to cutting-edge scientific technologies for researchers across the country. By strategically supporting high-value shared technology resources, NIGMS will improve access to important technologies for researchers from a wide variety of institutions and regions, create efficiencies and economies of scale, and reduce costs and administrative burden for institutions.

- Optimize **diversity and inclusion** in the biomedical research workforce – NIGMS is continuing to make a series of strategic changes aimed at optimizing diversity and inclusion in the biomedical research workforce while catalyzing the modernization of biomedical undergraduate and graduate education. These programs span community college, undergraduate, graduate, postdoctoral, and faculty levels, and apply to research-intensive and lesser-resourced institutions.

Major Changes in the Fiscal Year 2022 Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. Within the FY 2022 request level, NIGMS will pursue its highest research priorities through strategic investments and careful stewardship of appropriated funds.

Research Project Grants (+$55.6 million; total $2,041.4 million):

For FY 2022, NIGMS will continue to prioritize the support of investigator-initiated Research Project Grants (RPGs). By prioritizing the funding of early stage investigators via programs like the Maximizing Investigators' Research Award, NIGMS will continue to invest in the pipeline of a diverse group of researchers.

The Support for Research Excellence (SuRE) Award begins in FY 2022. This program will augment the opportunities of scientists and students from diverse backgrounds to better participate in investigator-initiated RPG research. The SuRE program aims to develop and sustain research excellence at under-resourced institutions that support significant numbers of students from backgrounds underrepresented in biomedical research, including Historically Black Colleges and Universities (HBCUs), by supporting investigator-initiated research with strong student participation and providing resources to establish and enhance Offices of Sponsored Programs. SuRE evolved from its predecessor, the Support of Competitive Research (SCORE) program, that was funded via the Minority Biomedical Research Support sub-mechanism. In FY 2022, SuRE will be funded at an estimated $6.6 million.

Due to many consecutive years of growing competing RPG counts, NIGMS estimates a considerable increase in its non-competing RPG numbers and commitment base in FY 2022. Due to the increase in the number of non-competing RPG commitments projected in FY 2022, competing demands and NIH policies in other mechanisms, the competing RPG grant count is estimated to decrease by 215 RPGs compared to FY 2021. Overall, funding for RPGs increases by 2.8 percent.

Research Center Grants (+$15.7 million; total $473.0 million):

In FY 2022, NIGMS will continue to maintain its research center grant portfolio. The Centers Mechanism sees an overall 3.4 percent increase. Similar to the overall increase for the Institute, the Institutional Development Award (IDeA) program will also receive a 3.5 percent increase. The IDeA total program level in FY 2022 is $410.5 million.

Other Research (-$8.8 million; total $203.6 million):

Funding for the Other Research mechanism decreases by 4.2 percent from FY 2021. FY 2022 is the third year of transitioning programs from Other Research and Minority Biomedical Research Support Program (MBRS) into Institutional Training awards. The transition includes moving the Initiative for Maximizing Student Development (IMSD) and the Research Initiative for Scientific Enhancement (RISE), from the MBRS sub-mechanism, as well as Bridges to the Baccalaureate and Bridges to the Doctorate, from the Other sub-mechanism, to new programs under the Training mechanism. The new programs established in FY 2020, the Graduate Research

Training Initiative for Student Enhancement (G-RISE), the Undergraduate Research Training Initiative for Student Enhancement (U-RISE) and the Bridges Programs are similar to their predecessors and maintain their focus on building diversity in the biomedical research workforce. The new programs will better equip the Institute to assist and track the trainees receiving support along the various stages of their careers. This transition will result in nearly $15.5 million moving from MBRS and Other Research into Training, along with $11.2 million moving from MBRS to RPGs for the SuRE program, as mentioned in the RPG section above. While this budget represents a 26.7 percent reduction in MBRS, the intent of this evolution and shift allows for greater opportunities to build diversity in the research workforce.

The Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program is part of NIH's efforts to enhance diversity within the academic biomedical research workforce and is designed to facilitate the transition of talented postdoctoral researchers from diverse backgrounds into independent academic research careers. The Career and Other Other Research sub-mechanisms will include a $1.5 million increase for MOSAIC.

Ruth L. Kirchstein Training Awards (+$33.3 million; total $265.3 million):

Within this budget, Individual Fellowships receives a 4.8 percent increase due to 2.0 percent stipend increases and childcare costs per NIH training policy. Institutional Training sees a 15.2 percent increase due to $15.5 million transitioning from Other Research to training, as described above, plus stipend level increases along with costs for implementing the NIH-wide childcare allowance.

Research Management and Support (+$8.0 million; total $87.3 million):

RMS increases by $8.0 million due to increasing costs for payroll and NIH-wide taps and assessments. The increase includes $4.3 million for the NIGMS portion of an NIH-wide Cybersecurity initiative.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Budget Mechanism - Total[1]

(Dollars in Thousands)

MECHANISM	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Research Projects:								
Noncompeting	3,316	$1,325,189	3,282	$1,315,956	3,528	$1,447,587	246	$131,631
Administrative Supplements	*(589)*	54,032	*(734)*	67,332	*(760)*	69,689	*(26)*	2,357
Competing:								
Renewal	248	97,933	248	105,142	203	88,857	-45	-16,285
New	902	373,983	944	397,200	774	335,587	-170	-61,613
Supplements	11	2,371	3	350	3	350	0	0
Subtotal, Competing	1,161	$474,288	1,195	$502,692	980	$424,794	-215	-$77,898
Subtotal, RPGs	4,477	$1,853,509	4,477	$1,885,980	4,508	$1,942,070	31	$56,090
SBIR/STTR	181	98,034	184	99,838	183	99,327	-1	-511
Research Project Grants	4,658	$1,951,543	4,661	$1,985,818	4,691	$2,041,397	30	$55,579
Research Centers:								
Specialized/Comprehensive	155	$400,999	160	$413,146	156	$427,606	-4	$14,460
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	24	40,875	24	41,631	25	43,088	1	1,457
Comparative Medicine	1	2,518	1	2,518	1	2,343	0	-175
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	180	$444,392	185	$457,295	182	$473,037	-3	$15,742
Other Research:								
Research Careers	107	$31,111	123	$35,633	132	$38,380	9	$2,747
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	9,541	0	9,717	0	9,994	0	277
Minority Biomedical Research Support	286	94,966	257	85,479	188	62,688	-69	-22,791
Other	219	88,101	205	81,641	230	92,562	25	10,921
Other Research	612	$223,718	585	$212,470	550	$203,624	-35	-$8,846
Total Research Grants	5,450	$2,619,653	5,431	$2,655,583	5,423	$2,718,058	-8	$62,475
Ruth L Kirschstein Training Awards:	FTTPs		FTTPs		FTTPs		FTTPs	
Individual Awards	314	$17,201	314	$18,198	314	$19,070	0	$872
Institutional Awards	4,026	198,287	4,262	213,784	4,648	246,239	386	32,455
Total Research Training	4,340	$215,488	4,576	$231,982	4,962	$265,309	386	$33,327
Research & Develop. Contracts	20	$20,272	20	$20,647	21	$21,370	1	$723
(SBIR/STTR) (non-add)	*(0)*	*(997)*	*(0)*	*(1,015)*	*(0)*	*(1,051)*	*(0)*	*(36)*
Intramural Research	0	3,800	0	3,865	0	4,053	0	188
Res. Management & Support	171	78,005	184	79,340	184	87,313	0	7,973
SBIR Admin. (non-add)	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*	*(0)*
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIGMS	171	$2,937,218	184	$2,991,417	184	$3,096,103	0	$104,686

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

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

For carrying out section 301 and title IV of the PHS Act with respect to general medical sciences, [$2,991,417,000]*$3,096,103,000* of which [$1,271,505,000]*$1,271,505,000* shall be from funds available under section 241 of the PHS Act: *Provided*, That not less than [$396,573,000]*$410,453,000* is provided for the Institutional Development Awards program.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Summary of Changes

(Dollars in Thousands)

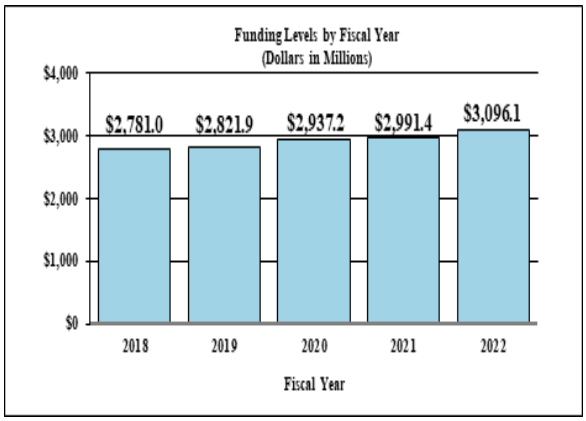
FY 2021 Enacted	$2,991,417
FY 2022 President's Budget	$3,096,103
Net change	$104,686

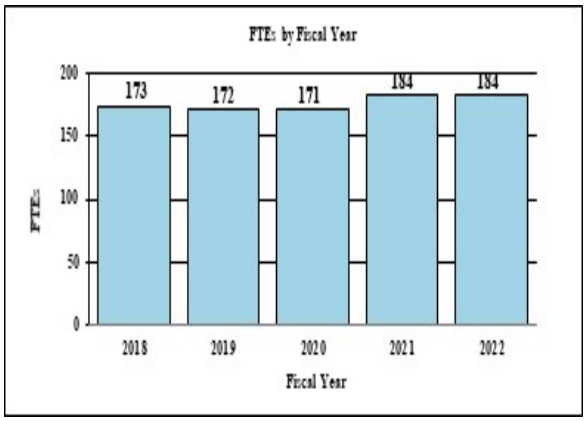
CHANGES	FY2021 Enacted FTEs	FY2021 Enacted Budget Authority	FY 2022 President's Budget FTEs	FY 2022 President's Budget Budget Authority	Built-In Change from FY 2021 Enacted FTEs	Built-In Change from FY 2021 Enacted Budget Authority
A. Built-in:						
1. Intramural Research:						
a. Annualization of January 2021 pay increase & benefits		$2,053		$2,107		$5
b. January FY 2022 pay increase & benefits		2,053		2,107		49
c. Paid days adjustment		2,053		2,107		0
d. Differences attributable to change in FTE		2,053		2,107		0
e. Payment for centrally furnished services		163		172		8
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		1,649		1,775		42
Subtotal						$105
2. Research Management and Support:						
a. Annualization of January 2021 pay increase & benefits		$32,642		$33,647		$87
b. January FY 2022 pay increase & benefits		32,642		33,647		919
c. Paid days adjustment		32,642		33,647		0
d. Differences attributable to change in FTE		32,642		33,647		0
e. Payment for centrally furnished services		13,013		13,664		651
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		33,685		40,002		809
Subtotal						$2,465
Subtotal, Built-in						$2,570

CHANGES	FY2021 Enacted No.	FY2021 Enacted Amount	FY 2022 President's Budget No.	FY 2022 President's Budget Amount	Program Change from FY 2021 Enacted No.	Program Change from FY 2021 Enacted Amount
B. Program:						
1. Research Project Grants:						
a. Noncompeting	3,282	$1,383,288	3,528	$1,517,276	246	$133,988
b. Competing	1,195	502,692	980	424,794	-215	-77,898
c. SBIR/STTR	184	99,838	183	99,327	-1	-511
Subtotal, RPGs	4,661	$1,985,818	4,691	$2,041,397	30	$55,579
2. Research Centers	185	$457,295	182	$473,037	-3	$15,742
3. Other Research	585	212,470	550	203,624	-35	-8,846
4. Research Training	4,576	231,982	4,962	265,309	386	33,327
5. Research and development contracts	20	20,647	21	21,370	1	723
Subtotal, Extramural		$2,908,212		$3,004,737		$96,525
	FTEs		FTEs		FTEs	
6. Intramural Research	0	$3,865	0	$4,053	0	$83
7. Research Management and Support	184	79,340	184	87,313	0	5,508
8. Construction		0		0		0
9. Buildings and Facilities		0		0		0
Subtotal, Program	184	$2,991,417	184	$3,096,103	0	$102,116
Total built-in and program changes						$104,686

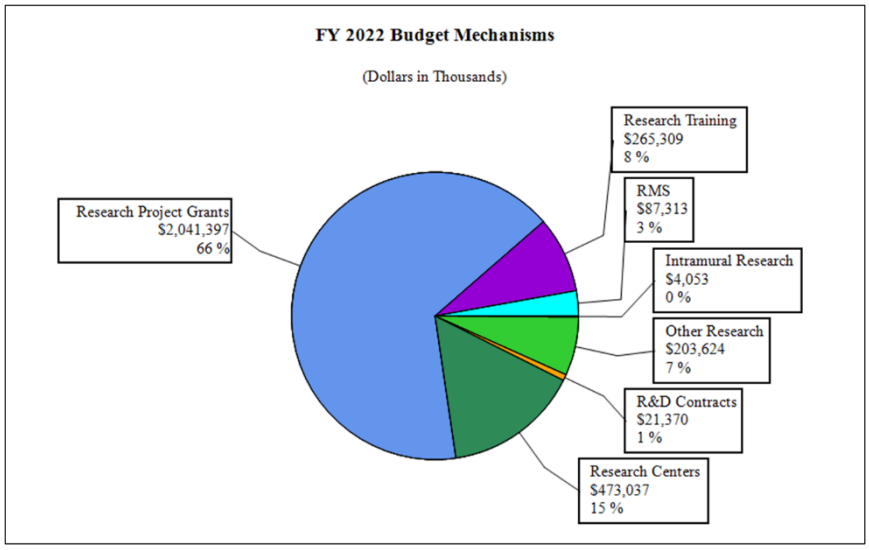
Fiscal Year 2022 Budget Graphs

History of Budget Authority and FTEs:

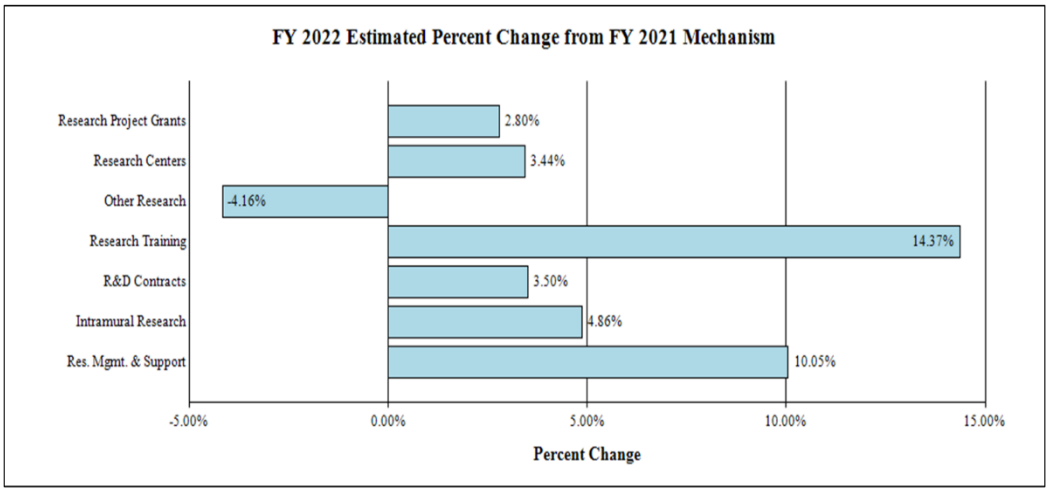




Distribution by Mechanism:



Change by Selected Mechanisms:



National Institutes of Health
National Institute of General Medical Sciences

Organizational Chart



NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Budget Authority by Activity[1]
(Dollars in Thousands)

	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
Extramural Research	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**	**FTE**	**Amount**
Detail								
Biophysics, Biomedical Technology, and Computational Biosciences		$568,447		$578,958		$598,174		$19,216
Genetics and Molecular, Cellular, and Developmental Biology		880,351		896,629		926,389		29,760
Pharmacology, Physiology and Biological Chemistry		593,806		604,786		624,859		20,073
Training, Workforce Development and Diversity		332,280		338,425		349,657		11,232
Division for Research Capacity Building		480,529		489,414		505,658		16,244
Institutional Development Award (IDeA)		*(386,573)*		*(396,573)*		*(410,453)*		*(13,880)*
Subtotal, Extramural		**$2,855,413**		**$2,908,212**		**$3,004,737**		**$96,525**
Intramural Research	**0**	**$3,800**	**0**	**$3,865**	**0**	**$4,053**	**0**	**$188**
Research Management & Support	**171**	**$78,005**	**184**	**$79,340**	**184**	**$87,313**	**0**	**$7,973**
TOTAL	**171**	**$2,937,218**	**184**	**$2,991,417**	**184**	**$3,096,103**	**0**	**$104,686**

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

Justification of Budget Request

National Institute of General Medical Sciences

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

Budget Authority (BA):

	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
BA	$2,937,218,000	$2,991,417,000	$3,096,103,000	+104,686,000
FTE	171	184	184	0

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

Program Descriptions

Genetics and Molecular, Cellular, and Developmental Biology (GMCDB): The GMCDB division supports research to understand the structure and function of cells and cellular components, as well as the cellular and molecular mechanisms that underlie inheritance, gene expression, and development. The results of this research form the foundation for advances in diagnosing, preventing, treating, and curing a wide variety of diseases. Most of the projects supported by the division make use of research organisms, which advance the general understanding of biological processes.[12] To complement GMCDB's substantial investment in research that is performed in a wide variety of research organisms, GMCDB will employ FY 2021 funds to bolster human research studies aimed at revealing the generalizable principles of the genetics of human biology and human disease.[13]

Budget Policy: The FY 2022 President's Budget request for the GMCDB program is $926.4 million, an increase of $29.8 million or 3.3 percent compared to the FY 2021 Enacted level. GMCDB expenditures will support individual investigators seeking fundamental knowledge about biological processes. GMCDB will continue its support for collaborative research on cellular, molecular, and genomic studies in animal models, as well as research into specific genetic variants within complex disorders.

Pharmacology, Physiology, and Biological Chemistry (PPBC): The PPBC division supports a broad spectrum of research aimed at improving the molecular-level understanding of fundamental biological processes and discovering approaches to their control.[14] Research supported by the division takes a multifaceted approach to problems in pharmacology, physiology, biochemistry, and

MIDAS

Computer modeling of infectious diseases has played a prominent role in the response to the COVID-19 pandemic. It estimates the number of people who will become infected over time, which helps public health professionals predict needs for critical supplies, such as clinical staff, hospital beds, and protective equipment. It also can help inform decisions about possible interventions and policy changes, such as social distancing measures or school closures. Overall, infectious disease models are valuable tools for predicting risks and preserving health.

In addition to funding many individual scientists who work with infectious disease models, NIGMS supports the Models of Infectious Disease Agent Study (MIDAS) Coordinating Center, based at the University of Pittsburgh's Graduate School of Public Health and led by Wilbert Van Panhuis, M.D., Ph.D. The center is tasked with facilitating and coordinating infectious disease modeling research. Its goal is to accelerate the rate of discoveries and innovation for the detection and control of infectious diseases. The MIDAS Network provides researchers with access to datasets, experimental models, algorithms, computer code, and model parameters. It also supports cloud-computing resources for infectious disease modeling research. In addition, the center promotes the training of the next generation of infectious disease modeling researchers and maintains communication between public health agencies and the modeling research community.

The MIDAS Network currently has over 600 members and any infectious disease scientist, practitioner, or student can request to join the network and access the coordinating center's information and resources. Many of the network members are conducting research on COVID-19 and contributing to an extraordinary international collection of data and information regarding the public health emergency. The coordinating center has also created a central online repository for sharing data and data-driven discoveries about COVID-19. The more we are able to openly share insights, data, and resources, the better positioned we'll be to respond to this and future disease outbreaks.



Wilbert Van Panhuis, M.D., Ph.D., during an interview with the PBS Student Reporting Lab, which is supported by an NIGMS Science Education Partnership Award.

[12] https://nigms.nih.gov/education/fact-sheets/Pages/using-research-organisms.aspx

[13] https://nigms.nih.gov/about/overview/Pages/GMCDB.aspx

[14] https://nigms.nih.gov/research-areas/areas-of-research/pharmacology-physiology-and-biological-chemistry

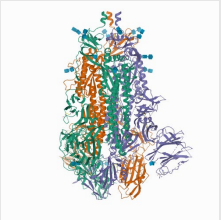
Protein Data Bank

The Protein Data Bank (PDB), established in 1971, is an open-access digital data bank of 3-dimensional protein structures and a key resource for drug development. More than 1 million people—including researchers, pharmaceutical and biotechnology workers, medical professionals, educators, and students—use the PDB each year. It serves as the single global repository for 3D structural data of proteins, DNA, RNA, and complexes that these molecules form with drugs. Knowing the structures of these molecules is essential for understanding their roles in human health and disease. NIGMS has been critical to the success and growth of the PDB since the late 1970s; and in 2019, NIGMS supported approximately 45 percent of the PDB's core operations.

Stephen Burley, D.Phil., M.D., and his colleague John Westbrook, Ph.D., reported in early 2019 that structural data in the PDB facilitated the discovery and development of 183 of the 210 new drugs that were approved by the U.S. Food and Drug Administration from 2010 to 2016. In almost three-quarters of cases, the structural information came from academic research groups rather than from industry. The approved drugs benefited a wide range of therapeutic areas, from anti-infectives and cancer drugs to drugs targeting respiratory, cardiovascular, and central nervous system conditions.

Another analysis of the same 210 drugs showed that NIH funding contributed to the discovery and development of all of them, with the funded research focused mainly on the drugs' targets rather than the drugs themselves.

Recently, PDB resources have played a vital role in providing researchers with information about SARS-CoV-2 proteins, including the spike protein, which is the primary target of antibodies produced by the body's immune system. Knowing the structures of these proteins helps researchers determine the most promising candidates for drug and vaccine development.



A diagram showing the structure of the SARS-CoV-2 spike protein, taken from the PDB.

biological chemistry that are very basic in nature. The goals of this research include an improved understanding of drug action and of anesthesia; mechanisms underlying responses to drugs; new methods and targets for drug discovery; advances in natural products synthesis; an enhanced understanding of biological catalysis; knowledge of metabolic regulation and fundamental physiological processes; and the integration and application of basic physiological, pharmacological, and biochemical research to clinical issues in anesthesia, sepsis, traumatic injury, and critical illness.[15] The division works to ensure that research approaches are state-of-the-art and employ the optimal research organisms for the problems being addressed.

Budget Policy: The FY 2022 President's Budget request for the PPBC program is $624.9 million, an increase of $20.1 million or 3.3 percent compared to the FY 2021 Enacted level. PPBC will continue to emphasize the support of investigator-initiated research grants related to basic pharmacology, biochemistry, and chemistry that inform knowledge of how small molecules influence human health.

Biophysics, Biomedical Technology, and Computational Biosciences (BBCB): The BBCB division facilitates advances in basic biomedical research by supporting technology development at all stages and its dissemination, computational research, and the development and application of biophysical and computational methods and tools, such as analytical methods, mathematical modeling, and simulations.[16] This year, BBCB continued to enhance its support for data resources and artificial intelligence approaches (e.g., computational facilities, software, and machine learning) to address fundamental biomedical research

[15] https://www.nigms.nih.gov/Research/specificareas/Pages/ClinicalResearchAreas.aspx

[16] https://www.nigms.nih.gov/research-areas/areas-of-research/biophysics-biomedical-technology-and-computational-biosciences

questions. In addition, NIGMS' new National and Regional Resources program is making cutting-edge technologies available to substantial numbers of NIH-supported researchers.[17] Awards made this year provide unique tools for studying glycoproteins and glycolipids, valuable collections of research organisms and DNA clones, and a unique mass spectrometry resource; another mass spectrometry resource located at the University of Arkansas and the University of Oklahoma will serve researchers in all 25 of the Institutional Development Award (IDeA) states. BBCB also supports biophysical techniques and studies, derived from the physical and engineering sciences, to develop and improve measurement and analysis of macromolecular, cellular, and organelle processes and functions.

Budget Policy: The FY 2022 President's Budget request for the BBCB program is $598.2 million, an increase of $19.2 million or 3.3 percent compared to the FY 2021 Enacted level. BBCB will continue to fund investigator-initiated approaches to enable better understanding of biophysical processes in cells and the development of new and emerging biophysical and computational biomedical technologies.

Division of Training, Workforce Development, and Diversity (TWD): The TWD division supports programs that foster the development of a strong and diverse biomedical research workforce.[18] The division funds research training, student development, and career development activities through a variety of programs ranging from the undergraduate level to the doctorate and beyond. TWD also administers the Common Fund Diversity Program Consortium, including the Coordination and Evaluation Center, Building Infrastructure Leading to

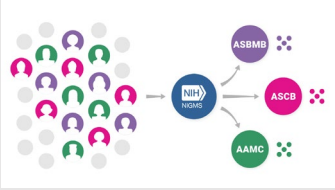
MOSAIC

A core principle of both financial investment and biology is that diversity leads to strength. This holds true for the scientific research enterprise as well. The new Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program, managed by NIGMS, seeks to enhance diversity within the biomedical workforce. This is a crucial need—as of 2014, scientists from traditionally underrepresented groups comprised just 10 percent of Ph.D. recipients and fewer than 5 percent of newly hired assistant professors in NIH-relevant fields each year.

MOSAIC is designed to facilitate the transition of promising postdoctoral researchers from diverse backgrounds into independent faculty careers at research-intensive institutions. The program has two components: a postdoctoral career transition award (K99/R00) for individual researchers; and a research education cooperative agreement (UE5), awarded to organizations of biomedical researchers.

The MOSAIC K99/R00 grant provides support for up to two years of mentored postdoctoral research training and up to three years of independent research funds. The MOSAIC UE5 grant supports educational activities that equip MOSAIC K99/R00 scholars with professional skills, mentoring, and career networks. These resources allow them to transition into and succeed in academic research careers at research-intensive institutions. The first MOSAIC UE5 grants were awarded in August 2020 to the American Society for Biochemistry and Molecular Biology, the American Society for Cell Biology, and the Association of American Medical Colleges.

Fifteen NIH Institutes and Centers are participating in the MOSAIC K99/R00 award. In the first two application cycles, more than 75 percent of applications came from scientists from historically underrepresented racial/ethnic groups; and more than 75 percent were submitted by women from all racial/ethnic backgrounds, demonstrating the diverse pool of promising postdoctoral scientists. NIGMS also supports many other programs that strive to increase diversity in science, from grants that support underrepresented students pursuing Ph.D.s, to centers that focus on research needs prioritized by American Indians and Alaska Natives.



Researchers who receive MOSAIC K99/R00 grants from NIGMS are paired with organizations funded by MOSAIC UE5 grants.

[17] https://www.nigms.nih.gov/Research/mechanisms/Pages/NIGMS-National-and-Regional-Resources-(R24).aspx

[18] https://www.nigms.nih.gov/research-areas/areas-of-research/training-workforce-development-and-diversity

Diversity, and the National Research Mentoring Network.[19] TWD-funded initiatives include the Diversity Supplement Program, Bridges to the Baccalaureate, Maximizing Access to Research Careers, Research Initiative for Scientific Enhancement, Initiative for Maximizing Student Development, Post-baccalaureate Research Education, Bridges to the Doctorate, National Research Service Award fellowships and training grants, Pathway to Independence Awards, Career Awards, Institutional Research and Academic Career Development Awards, Innovative Programs to Enhance Research Training, Support for Research Training Conferences, the Research on Interventions Program, and the Science of Science Policy Awards. TWD recently launched a new program called "Maximizing Opportunities for Scientific and Academic Independent Careers."[20] Collectively, these programs are designed to ensure that future generations of researchers will be drawn from the entire pool of talented individuals, bringing different aptitudes, perspectives, interests, and experiences to address complex scientific problems. NIGMS seeks to enhance the diversity of the biomedical research workforce by supporting individuals from a variety of backgrounds at multiple training and career stages in a variety of institutions and educational settings across the country.

Budget Policy: The FY 2022 President's Budget request for the TWD program is $349.7 million, an increase of $11.2 million or 3.3 percent compared to the FY 2021 Enacted level. TWD will continue to support these programs and the Individual and Institutional Training awards. FY 2022 funds provide for a 2.0 percent stipend increase and childcare allowance, implemented in FY 2021 for Individual awards and to be extended to Institutional awards in FY 2022.

Division for Research Capacity Building (DRCB): DRCB administers four major programs that support research, research infrastructure improvement, faculty development, and research training.[21] The IDeA program broadens the geographic distribution of NIH funding for biomedical research in 23 states and Puerto Rico (i.e., states that historically have had low levels of NIH funding). There are five major IDeA funding initiatives: (1) the Centers of Biomedical Research Excellence (COBRE) initiative aims to develop thematic, multidisciplinary centers; (2) the IDeA Networks of Biomedical Research Excellence (INBRE) initiative supports the establishment of statewide networks for expanding research access and capabilities; (3) the IDeA Program Infrastructure for Clinical and Translational Research (IDeA-CTR) initiative promotes the advancement of clinical and translational research that addresses health concerns in IDeA-eligible states; (4) the IDeA co-funding initiative aims to increase the pool of NIH funded investigators; and (5) the Regional Technology Transfer Accelerator Hubs for IDeA States (STTR) program supports the commercialization of innovative technologies and methodologies and aims to strengthen entrepreneurial skills needed to move discoveries and technologies out of the lab and into commercial products that address human health. The Hubs will implement educational programs in IDeA states, foster small business and technology transfer activities, and support proof-of-concept studies to spur translation of academic research discoveries into products. The recently launched Support for Research Excellence (SuRE) program seeks to develop and sustain research excellence at higher education institutions that have strong records of serving students from diverse backgrounds underrepresented in biomedical research, award

[19] https://www.nigms.nih.gov/training/dpc/Pages/default.aspx

[20] https://www.nigms.nih.gov/training/careerdev/Pages/MOSAIC.aspx

[21] https://www.nigms.nih.gov/research-areas/areas-of-research/research-capacity-building

baccalaureate and/or graduate degrees in science, and receive limited research grant support from the NIH.[22] The Native American Research Centers for Health (NARCH) program supports partnerships between American Indian/Alaska Native tribes or tribally based organizations and institutions that conduct intensive biomedical research.[23] The Science Education Partnership Awards (SEPA) program invests in educational activities that complement or enhance the training of a workforce to meet the nation's biomedical, biobehavioral, and clinical research needs.[24]

Budget Policy: The FY 2022 President's Budget request for the DRCB program is $505.7 million, an increase of $16.2 million or 3.3 percent compared to the FY 2021 Enacted level. FY 2022 funds for the IDeA program are $410.5 million, an increase of $13.9 million or 3.5 percent compared to the FY 2021 Enacted level. DRCB will continue to support new and continuing awards in these four programs. DRCB also supports the use of SBIR/STTR funds to initiate small business and technology transfer activities in IDeA states.[25]

Intramural Research: NIGMS has a small but unique intramural research training program, the NIGMS Postdoctoral Research Associate Training (PRAT) Program.[26] The NIGMS PRAT Program is a competitive three-year postdoctoral fellowship program that provides high quality research training in the basic biomedical sciences in NIH intramural research laboratories. The program prepares trainees for leadership positions in biomedical careers through mentored laboratory research, networking, and intensive career and leadership development activities. The program places special emphasis on training fellows in all areas that are within the NIGMS mission, including but not limited to biological chemistry, biophysics, bioinformatics, cellular and molecular biology, computational biosciences, developmental biology, genetics, immunology, neuroscience, pharmacology, physiology, and technology development. The PRAT program includes professional development activities tailored to the PRAT fellows, such as a monthly seminar series featuring presentations by current PRAT fellows and outside speakers whom the fellows have invited, and training sessions focused on grant-writing, career planning, communications skills, and leadership skills.

Budget Policy: The FY 2022 President's Budget request for the Intramural Research program is $4.1 million, an increase of $0.2 million or 4.9 percent compared to the FY 2021 Enacted level. FY 2022 funds will provide training for outstanding postdoctoral fellows conducting research in emerging areas of science relevant to the NIGMS mission, while working in the intramural laboratories of other NIH Institutes.

Research Management and Support (RMS): RMS provides administrative, budgetary, logistical, and scientific support toward the review, award, and monitoring of research grants, training awards, and research and development contracts. RMS funds also support strategic planning, coordination, and evaluation of NIGMS programs; regulatory compliance; and

[22] https://www.nigms.nih.gov/about/council/minutes/Pages/sep-17-2020.aspx#support-for-research-excellence
[23] https://www.nigms.nih.gov/capacity-building/division-for-research-capacity-building/native-american-research-centers-for-health-(narch)
[24] https://www.nigms.nih.gov/Research/DRCB/sepa/Pages/default.aspx
[25] https://www.nigms.nih.gov/Research/mechanisms/Pages/STTR-Regional-Technology-Transfer.aspx
[26] https://www.nigms.nih.gov/training/pages/prat.aspx

coordination and engagement with other Federal agencies, Congress, and the general public. RMS continues to fund development and enhancements to enterprise IT tools which facilitate the review, award, funding, and monitoring of grants and contracts. Utilizing technologies such as Natural Language Processing, Artificial Intelligence, and data reporting and visualization toolsets, funds are allocated to enterprise applications that facilitate the overall grants business process lifecycle and improve decision support capability. In addition, RMS is funding the expansion of NIGMS' presence in the enterprise cloud environment. Migration of the NIGMS infrastructure to the NIH enterprise cloud environment allows for systems to be developed and hosted in an environment that results in reduced resource dependencies, operational and maintenance cost savings, enhanced cybersecurity and disaster recovery, while ensuring compliance with the Federal Information Technology Acquisition Reform Act.

Budget Policy: The FY 2022 President's Budget request for RMS is $87.3 million, an increase of $8.0 million or 10.0 percent compared to the FY 2021 Enacted level. RMS funds support the operational needs of the Institute, including its necessary investments in information technology. In FY 2022, requested funds will also be used to support cybersecurity infrastructure requirements.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2013	$2,378,835,000		$2,387,112,000	$2,430,035,536
Rescission				$4,860,071
Sequestration				($121,971,075)
2014	$2,401,011,000		$2,435,570,000	$2,364,147,000
Rescission				$0
2015	$2,368,877,000			$2,371,476,000
Rescission				$0
2016	$2,433,780,000	$2,439,437,000	$2,511,431,000	$2,512,073,000
Rescission				$0
2017[1]	$2,512,437,000	$2,538,851,000	$2,633,755,000	$2,650,838,000
Rescission				$0
2018	$2,185,509,000	$2,713,775,000	$2,887,194,000	$2,785,400,000
Rescission				$0
2019	$2,572,669,000	$2,818,667,000	$2,874,292,000	$2,872,780,000
Rescission				$0
2020	$2,472,838,000	$3,033,183,000	$2,969,113,000	$2,937,218,000
Rescission				$0
2021	$2,672,074,000	$2,972,479,000	$3,046,962,000	$2,991,417,000
Rescission				$0
2022	$3,096,103,000			

[1] Budget Estimate to Congress includes mandatory financing.

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2021 Amount Authorized	FY 2021 Enacted	2022 Amount Authorized	FY 2022 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	$2,991,417,000	Indefinite	$3,096,103,000
National Institute of General Medical Sciences	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				$2,991,417,000		$3,096,103,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Amounts Available for Obligation[1]

(Dollars in Thousands)

Source of Funding	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Appropriation	$2,937,218	$2,991,417	$3,096,103
Secretary's Transfer	0	0	0
OAR HIV/AIDS Transfers	0	0	0
Subtotal, adjusted budget authority	$2,937,218	$2,991,417	$3,096,103
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	$2,937,218	$2,991,417	$3,096,103
Unobligated balance lapsing	-76	0	0
Total obligations	$2,937,142	$2,991,417	$3,096,103

[1] Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2020 - $1,458 FY 2021 - $5,000 FY 2022 - $5,000

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Budget Authority by Object Class[1]

(Dollars in Thousands)

	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021 Enacted
Total compensable workyears:			
Full-time equivalent	184	184	0
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary	$200	$204	$5
Average GM/GS grade	13.1	13.2	0.1
Average GM/GS salary	$131	$134	$3
Average salary, Commissioned Corps (42 U.S.C. 207)	$0	$0	$0
Average salary of ungraded positions	$208	$212	$5

	OBJECT CLASSES	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
	Personnel Compensation			
11.1	Full-Time Permanent	21,154	21,635	481
11.3	Other Than Full-Time Permanent	2,240	2,291	51
11.5	Other Personnel Compensation	582	595	13
11.7	Military Personnel	0	0	0
11.8	Special Personnel Services Payments	1,807	1,849	41
11.9	**Subtotal Personnel Compensation**	**$25,784**	**$26,370**	**$587**
12.1	Civilian Personnel Benefits	8,911	9,384	473
12.2	Military Personnel Benefits	0	0	0
13.0	Benefits to Former Personnel	0	0	0
	Subtotal Pay Costs	**$34,695**	**$35,754**	**$1,060**
21.0	Travel & Transportation of Persons	7	7	0
22.0	Transportation of Things	1	1	0
23.1	Rental Payments to GSA	0	0	0
23.2	Rental Payments to Others	0	0	0
23.3	Communications, Utilities & Misc. Charges	70	72	2
24.0	Printing & Reproduction	0	0	0
25.1	Consulting Services	14,070	14,752	683
25.2	Other Services	7,294	7,840	547
25.3	Purchase of goods and services from government accounts	75,420	79,092	3,672
25.4	Operation & Maintenance of Facilities	515	531	16
25.5	R&D Contracts	2,848	2,899	51
25.6	Medical Care	0	0	0
25.7	Operation & Maintenance of Equipment	6,110	6,299	189
25.8	Subsistence & Support of Persons	0	0	0
25.0	**Subtotal Other Contractual Services**	**$106,257**	**$111,414**	**$5,157**
26.0	Supplies & Materials	33	34	1
31.0	Equipment	82	85	3
32.0	Land and Structures	42	43	1
33.0	Investments & Loans	0	0	0
41.0	Grants, Subsidies & Contributions	1,578,725	1,677,187	98,462
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	**$1,685,217**	**$1,788,844**	**$103,626**
	Total Budget Authority by Object Class	**$1,719,912**	**$1,824,598**	**$104,686**

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

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Salaries and Expenses

(Dollars in Thousands)

OBJECT CLASSES	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
Personnel Compensation			
Full-Time Permanent (11.1)	$21,154	$21,635	$481
Other Than Full-Time Permanent (11.3)	2,240	2,291	51
Other Personnel Compensation (11.5)	582	595	13
Military Personnel (11.7)	0	0	0
Special Personnel Services Payments (11.8)	1,807	1,849	41
Subtotal Personnel Compensation (11.9)	**$25,784**	**$26,370**	**$587**
Civilian Personnel Benefits (12.1)	$8,911	$9,384	$473
Military Personnel Benefits (12.2)	0	0	0
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	**$34,695**	**$35,754**	**$1,060**
Travel & Transportation of Persons (21.0)	$7	$7	$0
Transportation of Things (22.0)	1	1	0
Rental Payments to Others (23.2)	0	0	0
Communications, Utilities & Misc. Charges (23.3)	70	72	2
Printing & Reproduction (24.0)	0	0	0
Other Contractual Services:			
Consultant Services (25.1)	13,865	14,752	887
Other Services (25.2)	7,294	7,840	547
Purchases from government accounts (25.3)	59,338	62,721	3,383
Operation & Maintenance of Facilities (25.4)	515	531	16
Operation & Maintenance of Equipment (25.7)	6,110	6,299	189
Subsistence & Support of Persons (25.8)	0	0	0
Subtotal Other Contractual Services	**$87,123**	**$92,144**	**$5,021**
Supplies & Materials (26.0)	$33	$34	$1
Subtotal Non-Pay Costs	**$87,234**	**$92,258**	**$5,024**
Total Administrative Costs	**$121,929**	**$128,012**	**$6,084**

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2020 Final			FY 2021 Enacted			FY 2022 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division for Research Capacity Building									
Direct:	11	-	11	11	-	11	11	-	11
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	11	-	11	11	-	11	11	-	11
Division of Biophysics, Biomedical Technology, and Computational Biosciences									
Direct:	10	-	10	12	-	12	12	-	12
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	10	-	10	12	-	12	12	-	12
Division of Data, Integration, Modeling and Analytics									
Direct:	10	-	10	10	-	10	10	-	10
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	10	-	10	10	-	10	10	-	10
Division of Extramural Activities									
Direct:	63	-	63	67	-	67	67	-	67
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	63	-	63	67	-	67	67	-	67
Division of Genetics and Molecular, Cellular, and Developmental Biology									
Direct:	16	-	16	17	-	17	17	-	17
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	16	-	16	17	-	17	17	-	17
Division of Management									
Direct:	36	-	36	37	-	37	37	-	37
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	36	-	36	37	-	37	37	-	37
Division of Pharmacology, Physiology and Biological Chemistry									
Direct:	12	-	12	15	-	15	15	-	15
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	12	-	12	15	-	15	15	-	15
Division of Training, Workforce Development and Diversity									
Direct:	10	-	10	12	-	12	12	-	12
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	10	-	10	12	-	12	12	-	12
Office of the Director									
Direct:	3	-	3	3	-	3	3	-	3
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	3	-	3	3	-	3	3	-	3
Total	171	-	171	184	-	184	184	-	184
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.	0	0	0	0	0	0	0	0	0

FISCAL YEAR	Average GS Grade
2018	12.8
2019	12.9
2020	13.0
2021	13.1
2022	13.2

NATIONAL INSTITUTES OF HEALTH
National Institute of General Medical Sciences

Detail of Positions[1]

GRADE	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	197,300	199,569	204,109
General Schedule			
GM/GS-15	20	25	25
GM/GS-14	61	68	72
GM/GS-13	54	56	55
GS-12	9	8	9
GS-11	6	6	3
GS-10	0	0	0
GS-9	2	4	3
GS-8	4	6	6
GS-7	8	4	4
GS-6	0	0	0
GS-5	0	0	1
GS-4	0	1	0
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	164	178	178
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	0	0	0
Senior Grade	0	0	0
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	0	0	0
Ungraded	22	26	26
Total permanent positions	165	179	179
Total positions, end of year	187	205	205
Total full-time equivalent (FTE) employment, end of year	171	184	184
Average ES salary	197,300	199,569	204,109
Average GM/GS grade	13.0	13.1	13.2
Average GM/GS salary	129,258	130,744	133,719

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